Physical Activity: Built Environment Approaches Combining Transportation System Interventions with Land Use and Environmental Design

Task Force Finding and Rationale Statement
Ratified December 2016

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Task Force Finding and Rationale Statement

Intervention Definition

Built environment interventions to increase physical activity create or modify environmental characteristics in a community to make physical activity easier or more accessible. Coordinated approaches must combine new or enhanced elements of pedestrian or cycling transportation systems with the creation or enhancement of land use and environmental design features. Intervention approaches must be designed to enhance opportunities for active transportation, leisure-time physical activity, or both.

Transportation system interventions include one or more policies or projects designed to increase or improve the following:

- Street connectivity
- Sidewalk and trail infrastructure
- Bicycle infrastructure
- Public transit infrastructure and access

Land use and environmental design interventions include one or more policies, designs, or projects to create or enhance the following:

- Mixed land use environments that increase the diversity and proximity of local destinations where people live, work, and spend their recreation and leisure time
- Access to parks and other public or private recreational facilities

Additional activities may be implemented to promote physical activity and use of new resources in the community (e.g., Safe Routes to School).

Task Force Finding (December 2016)

The Community Preventive Services Task Force recommends built environment approaches that combine one or more interventions to improve pedestrian or bicycle transportation systems with one or more land use and environmental design interventions based on sufficient evidence of effectiveness in increasing physical activity.

The finding is based on evidence from longitudinal studies of people exposed to coordinated built environment approaches (16 studies). Evidence from additional cross-sectional comparisons shows that combinations of activity-supportive built environment characteristics are associated with higher levels of transportation-related physical activity, recreational physical activity, and total walking among exposed people (74 studies).

Rationale

Basis of Finding

The Task Force recommendation is based on evidence from a systematic review of 90 studies (search period through June 2014). Included studies evaluated the effectiveness of built environment approaches used in combination to create or enhance opportunities for physical activity. Studies used diverse designs, assessed and compared different combinations of interventions or existing built environment characteristics, and evaluated longitudinal changes (16

studies) or cross-sectional differences (74 studies) for a wide range of physical activity outcomes. Effect estimates for changes in the level of physical activity could not be calculated because of differences in outcome measures, analyses, and reporting. The Task Force based their finding of sufficient evidence of effectiveness on a qualitative synthesis and assessment of results for studies grouped by design and categorized by type of comparison and physical activity outcome (described below).

For the purposes of this review, interventions were identified and organized into higher-level intervention approaches as follows (Tables 1 and 2).

Table 1. Pedestrian and Bicycle Transportation System Interventions

Intervention	Selected Examples
Street pattern design and connectivity	Designs that increase street connections and create multiple route options, shorter block lengths
Pedestrian infrastructure	Sidewalks, trails, traffic calming, intersection design, street lighting and landscaping
Bicycle infrastructure	Bicycle systems, protected bicycle lanes, trails, traffic calming, intersection design, street lighting and landscaping
Public transit infrastructure and access	Expanded transit services, times, locations, and connections

Table 2. Land Use and Environmental Design Interventions

Intervention	Selected Examples
Mixed land use	Residential, commercial, cultural, institutional, or industrial land uses that are physically and functionally integrated to provide a complementary or balanced mix of restaurants, office buildings, housing, and shops.
Increased residential density	Smart growth communities and new urbanist designs, relaxed planning restrictions in appropriate locations to reduce sprawl, sustainable compact cities and communities with affordable housing
Proximity to community or neighborhood destinations	Community destinations such as stores, health facilities, banks, and social clubs that are accessible and close to each other
Parks and recreational facility access	Public parks, public recreational facilities, private fitness facilities

For the qualitative assessment of effectiveness, included studies were grouped into categories based on the type of built environment comparison evaluated:

- Construction projects – These studies described and evaluated changes made to two or more physical characteristics of the built environment (based on increases in infrastructure and development in the community). Assessments captured the impact of these projects on existing residents or people who moved into the new environment (11 studies).
- Evaluations of the impact of sprawl or policies restricting sprawl – These studies compared communities based on built environment characteristics associated with sprawl development or their proximity to sprawl-affected

areas. Sprawl indices with higher scores typically indicated lower sprawl (i.e., increased compactness) and more activity-friendly environments (6 studies).

- Comparisons of pre-defined neighborhood types – These studies compared residents of selected neighborhoods that had distinct differences in two or more built environment characteristics (most often based on neighborhood layout or design; 7 studies).
- Summary score comparisons of existing built environments or comparisons within or across communities – These studies compared different built environment characteristics, as determined by standardized assessments used to generated a summary score. Higher scores typically indicated a more activity-friendly environment. Researchers commonly used a walkability index as a scoring tool to assess a combination of built environment characteristics (e.g., mixed land use, street connectivity, and residential density; 66 studies).

Within each category, results were grouped into one of six physical activity outcomes: 1) transportation-related walking or biking; 2) recreation-related walking or biking; 3) total walking; 4) total physical activity; 5) moderate to vigorous physical activity (MVPA); and 6) proportion of people meeting recommended levels of MVPA.

Longitudinal Evidence

Construction Projects (11 studies)

A long-term, large-scale study—the community-level natural experiment, Residential Environments Project (RESIDE)—compared changes in physical activity among new residents (movers) based on the built environment characteristics of their different neighborhoods. When the study started, implementation of built environment improvements was delayed and incomplete, and changes in physical activity were modest and inconsistent. Later in the study, follow-up assessments showed meaningful increases in active transportation, and found a dose-response relationship between physical activity and the degree to which activity-friendly improvements had been implemented.

Ten studies used before-after designs to evaluate neighborhood or community-level projects that were smaller in scale than the RESIDE project.

- Seven studies reported effects on transportation-related walking and biking; 5 studies showed results in the favorable direction (2 significant, 3 non-significant), 1 study had results in the unfavorable direction, and 1 study reported mixed results.
- Two studies reported effects on recreation-related walking and biking and showed results in the favorable direction (1 significant, 1 non-significant).
- Two studies evaluated MVPA and showed favorable results; 1 study reported a significant increase in the number of participants who achieved the recommended levels of MVPA (moderate: ≥30 minutes, ≥5 days; vigorous: ≥20 minutes, ≥3 days, or ≥ 150 minutes per week), and 1 study reported non-significant but favorable effects on other MVPA (≥ 4 metabolic equivalents [METs]; MET value of 2, such as walking at a slow pace would require twice the energy that an average person consumes at rest).
- One study evaluated total walking and showed significant, favorable results
- One study reported effects on total physical activity and showed significant, favorable results.
- One study assessed mode of transportation (i.e., walking and biking compared to car use) and showed mixed results.

Summary score comparisons of existing built environments (4 studies)

These studies evaluated more vs less physical activity-supportive built environment features with composite index scores.

- Three studies reported effects on transportation-related walking and biking and showed results in the favorable direction (2 significant, 1 non-significant).
- Three studies reported effects on recreation-related walking and biking with 1 study showing non-significant but favorable results, 1 study showing no change, and 1 study showed mixed effects.
- Two studies evaluated other MVPA. One study reported non-significant but favorable effects, (moderate: ≥30 minutes, ≥3 days; vigorous: ≥20 minutes, ≥3 days), and 1 study showed mixed results.

Evaluations of the Impact of Sprawl (1 study)

One study assessed state- and metropolitan-level polices restricting or regulating sprawl and showed significant, favorable results (i.e., less sprawl, increased physical activity) for both transportation- and recreation-related walking and biking.

Cross-Sectional Evidence

Summary Score Comparisons in Existing Built Environments (62 studies)

Overall, summary score comparisons were favorable across five of the six physical activity outcomes. Most of these studies used summary scores that incorporated walkability measurement indices. Twenty-seven studies that reported on transportation-related walking and biking found higher levels of physical activity (18 studies), no difference in physical activity (5 studies), lower levels of physical activity (1 study), or mixed results (3 studies) in areas with more activity-friendly environments. Sixteen studies evaluated recreation-related walking and biking and found higher levels of physical activity (10 studies), no differences in physical activity (4 studies), or mixed results (2 studies) associated with more activity-friendly environments.

Eighteen studies that reported on total walking found higher levels of physical activity (12 studies), no differences in physical activity (4 studies), or lower levels of physical activity (2 studies) associated with more activity-friendly environments. Fourteen studies assessed total physical activity and found higher levels of physical activity (4 studies), no differences in physical activity (6 studies), or lower levels of physical activity (4 studies) associated with more activity-friendly environments.

Five studies that reported whether participants achieved recommended levels of MVPA found higher levels of physical activity (3 studies) or no differences in physical activity (2 studies) associated with more activity-friendly environments. Nineteen studies using other measures of MVPA found higher levels of physical activity (12 studies), no differences in physical activity (4 studies), lower levels of physical activity (2 studies) or mixed results (1 study) associated with more activity- friendly environments.

Evaluations of the Impact of Sprawl (5 studies)

Five studies used 3 different sprawl indices to assess the relationship between sprawl and physical activity. Four studies associated lower levels of sprawl (i.e., more compact areas) with higher levels of transportation-related walking and biking (2 studies), recreation-related walking and biking (1 study), total physical activity (1 study), and total walking (1 study). One large-scale study with a more recently developed sprawl index measure showed no relationship between sprawl and total physical activity or other MVPA.

Comparisons of pre-defined neighborhood types (7 studies)

Studies compared residents from two types of existing neighborhoods:

- More activity-supportive built environment neighborhoods (e.g., new urbanist, neo-traditional, traditional neighborhood development)
- Less activity-supportive built environment neighborhoods (e.g., neighborhoods with dead-end cul-de-sacs, looping streets, contemporary suburbanism)

Seven studies reported on transportation-related walking and biking and found higher levels of physical activity among residents living in new urbanist neighborhoods (4 studies), or mixed results (1 study). Four studies that reported on recreation-related walking and biking found higher levels of physical activity in new urbanist neighborhoods. These neighborhoods were also associated with greater amounts of total walking time (1 study) and higher levels of total physical activity (1 study); Two studies measured the proportion of residents who achieved recommended levels of MVPA and found no difference (1 study) or mixed results (1 study).

Subset analysis

Recommended Levels of MVPA (6 studies)

Six studies evaluated the effectiveness of built environment approaches on differences or changes in the proportion of people who achieved recommended levels of MVPA. Four studies reported intervention-attributable differences in the form of an odds ratio with a median OR=1.18 (range 0.62 to 2.56). Of the two remaining studies, one found a significant increase in recommended levels of MVPA, and the other showed no effect. Although studies compared different built environment characteristics and examined different groups of participants, results indicated that supportive built environments result in meaningful differences of levels of physical activity in exposed populations.

Changes in the Amount of Time Engaged in Physical Activity (8 studies)

Additional analyses were performed on a subset of studies from the included longitudinal evidence to capture real changes or differences over time by measuring minutes per week of physical activity. Overall, results among all age groups were generally favorable across multiple outcomes (5 self-reported studies, 3 accelerometer-based studies). Transportation-related walking increased by a median of 8.8 minutes per week (interquartile interval [IQI]: -5.1 to 69.9; 5 studies) while transportation-related biking showed no change in minutes per week (2 studies). Recreation-related walking increased by a median of 9.4 minutes per week (IQI: 7.1 to 40.9; 5 studies), recreation-related biking increased 2.5 minutes per week (1 study), and recreation-related walking and biking combined increased 72.1 minutes per week (1 study). Overall increases in minutes per week of physical activity were reported for MVPA (3 studies) and total walking (2 studies), while results were mixed for total physical activity (2 studies).

Differences in the Amount of Time Engaged in Physical Activity (11 studies)

Additional analyses were performed on a subset of studies from the included cross sectional evidence to assess differences in minutes per week of physical activity within groups (i.e., supportive activity-friendly built environments compared to less supportive activity-friendly built environments). Overall, results among all age groups were generally favorable across multiple outcomes (6 self-reported studies, 5 accelerometer-based studies). Compared with residents in less activity-supportive environments, residents in more activity-supportive environments reported a median of 37.8 more minutes per week of transportation-related walking (IQI: 29.5 to 68.0; 6 studies) and a median of 13.7 more minutes per week of recreational walking (IQI: 6.8 to 20.7; 7 studies); results were mixed for transportation-related biking (2 studies), and residents reported less recreational biking (3 studies). Higher levels of physical activity (minutes

per week) were reported for total walking (1 study), however, active transportation to school showed no differences in physical activity (1 study). Residents in more activity-supportive environments reported a median of 50.4 more minutes per week of MVPA (IQI: 26.4 to 80.5; 7 studies) when compared with residents in less activity-supportive environments. Of note, there was some variability in the criteria used to calculate MVPA across studies.

Applicability and Generalizability Issues

Studies were conducted in the United States (52 studies), Canada (7 studies), Belgium (7 studies) Australia (5 studies), New Zealand (4 studies), United Kingdom (4 studies) Sweden (3 studies), Netherlands (2 studies), Czech Republic (1 study), Denmark (1 study), France (1 study), and Germany (1 study). Two studies were conducted in multiple countries. Studies were conducted in urban (25 studies), suburban (5 studies), and mixed (60 studies) areas. No studies were conducted in rural communities alone.

Included studies evaluated changes in physical activity among adults (18-64 years old; 31 studies), youth (17 years or younger; 18 studies), and older adults (65 years and older; 6 studies). Eleven studies assessed the general population or more than one age group, and the remaining studies did not report age (24 studies). Across all studies, 53.8% of participants were female, with 8 studies (100% female) focusing only on changes in physical activity among women. Few studies provided information on demographic characteristics such as race/ethnicity (2 studies), level of educational attainment (19 studies), or income status (14 studies).

Studies differed in the level of scale for construction projects, policy evaluation, or assessment of built environment characteristics in the neighborhood or community. Most studies were categorized as macro-level evaluations (50 studies) and evaluated combinations based on land use and environmental design interventions in the neighborhood or community. Only 12 studies evaluated micro-level interventions such as street-specific changes involving crosswalks, traffic signals, or bike racks. Twenty-seven studies evaluated a mixture of macro- and micro-scale interventions. Most studies measuring walkability or walkable neighborhoods assessed walking (41 studies) while other studies reported bicycle use alone (5 studies) or both walking and biking (30 studies).

Data Quality Issues

Studies providing longitudinal evidence of effectiveness included 2 studies with concurrent comparison neighborhoods or communities and 14 studies with before-after assessments. Five studies recruited people moving into "new" environments and evaluated changes in physical activity levels. Common limitations in this subset included the potential for bias in recruitment, retention, and self-reported physical activity levels, and relatively short-term follow-up. Some studies found incomplete or delayed implementation, resulting in comparisons based on incremental improvements in the built environment.

Seventy-four studies used cross-sectional comparisons to examine associations between exposure to activity-friendly characteristics of the built environment and levels of physical activity. While individual studies attempted to control for a wide range of community and demographic characteristics, most did not attempt to control for potential self-selection of residents or participants in study communities. Common limitations included inadequate descriptions of study populations or intervention details, low participation or response rates, and potential bias in self-reported physical activity levels. Some studies provided modest comparisons of existing differences in characteristics of study communities, which allowed only incremental assessments of potential associations with physical activity levels. Most studies reported results of regression analyses and obscured the raw data on physical activity measures which

complicated interpretation of study results. As a result, most studies provided limited information on the magnitude of change in physical activity, and how it may have been modulated by other factors.

Other Benefits and Harms

The included studies provided little information on other benefits and no information about potential harms of these interventions. Postulated benefits of built environment approaches include: 1) reduced vehicle use and air pollution associated with non-motorized transit; 2) reduced rates of pedestrian and cyclist injuries associated with traffic calming measures, sidewalks, separate bicycle paths, and trails; and 3) improved aesthetics and more positive user perceptions of the space. In addition, activity-friendly environments contribute to a broad range of economic benefits such as increased home values, greater retail activity, reduced health care costs, and improved productivity (Sallis et al., 2015).

The broader literature provided little information on potential harms of activity-friendly environments. Expanded use of infrastructure improvements might increase the absolute number of pedestrian or cyclist injuries (while still reducing the rate for injuries or accidents). Mixed land use policies or street-level modifications might contribute to increased traffic congestion and changes in access to parking. As urban, activity-friendly environments increase in popularity, demand may exacerbate displacement of some residents in the community.

Considerations for Implementation

A broad range of guidelines, policy and program initiatives, and position statements are available from public health agencies and professional organizations in community planning and development. These guidelines are written to allow local creativity and flexibility for urban planners, designers, policy makers, and engineers.

Guidance from Government Agencies

Step It Up! The Surgeon General's Call to Action to Promote Walking and Walkable Communities [www.surgeongeneral.gov/library/calls/walking-and-walkable-communities/call-to-action-walking-and-walkable-communites.pdf] identifies goals and strategies to improve physical activity levels across urban, suburban, or rural settings. Policy makers and community planners should consider diverse approaches including well-maintained sidewalks, pedestrian friendly streets, and access to public transit, adequate lighting, and desirable destinations that are close to home.

- CDC Partner Guide for Step It Up! [www.cdc.gov/physicalactivity/walking/call-to-action/pdf/partnerguide.pdf] is a booklet that describes the benefits of walking, explains some of the barriers, and offers ideas on how you and the organizations you are involved with can help make walking more accessible to all Americans.

Guidance from Professional Associations, Organizations, and Partnerships

The Sustaining Places [www.planning.org/sustainingplaces/] Initiative, developed by the American Planning Association (APA), is a program for human settlement sustainability. It provides a comprehensive plan with six components that can be tailored to different communities and jurisdictions using a best practices toolkit. The plan includes the "livable built environment" which emphasizes design standards appropriate to the community. An example of this would be elements that are implemented to increase mixed land use design and make an area more walkable and bikable. The plan also includes a scoring assessment tool that has been tested in pilot communities.

- Sustaining Places: Best Practices for Comprehensive Plans [app.dhpe.org/Resources/files/264/PAS_578.pdf] outlines principles, processes, and pointers for creating livable, healthy communities that build sustainability into long-range planning.

- Sustaining Places: The Role of the Comprehensive Plan [www.planning.org/publications/report/9026891/]* is a how-to guide for planners, local officials, and involved citizens that provides a practical framework for understanding sustainability.

Complete Streets [smartgrowthamerica.org/program/national-complete-streets-coalition/what-are-complete-streets/] and the National Complete Streets Coalition promote the development and implementation of Complete Streets policies and practices supported by the American Society of Civil Engineers and many other groups. It provides a framework for urban street design that engages community members to create a safe, health-promoting environment for pedestrians and cyclists. Action plans have been implemented in cities to improve land use and environmental design (e.g., street connectivity). A range of tools and performance measures are available to assess plan designs and implementation.

- Complete Streets: We Can Get There from Here [www.smartgrowthamerica.org/app/legacy/documents/cs/resources/cs-ite-may08.pdf]
- Evaluating Complete Streets Projects: A Guide for Practitioners [www.aarp.org/content/dam/aarp/livable-communities/documents-2015/evaluating-complete-streets-projects.pdf] is a how-to guide that outlines ways to develop and deploy performance measures to understand individual projects and connect investments with community goals.
- National Complete Streets Coalition ranks the Best Complete Streets Policies of 2015 [www.smartgrowthamerica.org/app/legacy/documents/best-cs-policies-of-2015.pdf] to provide leaders at all levels of government and planning with examples of strong Complete Streets policies
- Complete Streets: Best Policy and Implementation Practices [www.planning.org/publications/report/9026883/]* highlights communities that have implemented complete streets, and provides model policy language to help communities write and adopt a complete streets policy.

The American Public Health Association's (APHA) Healthy Community Design [www.apha.org/topics-and-issues/environmental-health/healthy-community-design] initiative connects the built environment with public health and has partnered with groups such as America Walks and the National Center for Safe Routes to School to promote active transportation.

- APHA supported development of the simple-to-use Transportation and Health Tool [www.transportation.gov/transportation-health-tool] prepared in partnership with the U.S. Department of Transportation and the CDC.

The Sustainability Tools for Assessing and Rating Communities (also known as the STAR Community Rating System [www.starcommunities.org/]) is a framework of sustainability goals, objectives, and evaluation measures built by and for local governments. This resource can be used to promote community-wide sustainability and serve as benchmark to track local performance on key sustainability indicators.

The National Association of City Transportation Officials (NACTO) [nacto.org] provides guidance on the design and redesign of city and community spaces where people can safely walk, bicycle, drive, take transit, and socialize.*

- Urban Street Design Guide [nacto.org/publication/urban-street-design-guide/]*
- Urban Bikeway Design Guide [nacto.org/publication/urban-bikeway-design-guide/]*
- Transit street design Guide [nacto.org/publication/transit-street-design-guide/]*

* Resource includes paid products or a combination of paid and free, publicly available resources.

See Additional Resources below for a longer list of available guidelines.

Most of the evidence in this review captured participants' exposure to land use and environmental design policies implemented at the macro-level (i.e., elements of overall community design related to walkability). These strategies can have a long term, sustainable influence on the built environment. Although fewer studies evaluated micro-level interventions (e.g., bike racks, street-crossing amenities), results indicated these interventions were effective. They can also be implemented more rapidly and typically require less money.

In rural communities, built environment barriers to physical activity include isolation, longer travel distances, and lack of transportation infrastructure and recreation facilities. Implementing small-scale or micro-level changes (e.g., improving crosswalks, adding pedestrian signs) to move toward larger-scale changes (e.g., building sidewalks, adding physical activity facilities to a school or park) may encourage infrastructure and policy improvements in these communities.

Evidence Gaps

Additional longitudinal assessments are needed to strengthen the evidence base and help identify specific combinations of interventions that have a greater, or more robust impact on physical activity. Studies describing both the implementation and evaluation of coordinated built environment approaches, such as Complete Streets and Sustaining Places, would strengthen the evidence base and provide direct guidance and support to help community, urban, and regional planners.

Many of the included studies analyzed and reported results in ways that did not allow for interpretation of the magnitude of changes in physical activity by time, amount, intensity, or proportion of the population influenced. Additional studies evaluating these characteristics would help quantify the magnitude of individual change and the overall impact on the exposed population. Longer term studies could examine the influence of built environment characteristics on development of regular physical activity habits in childhood and their retention into adulthood.

More studies are needed to evaluate combinations of micro-scale interventions in different settings and populations. Few studies identified or reported demographic characteristics of evaluated communities. More research is needed to learn how program effectiveness varies between urban, suburban, and rural settings. Additional research is needed to assess intervention effectiveness among different populations including racial and ethnic minorities and people with lower socioeconomic status, and in different settings that may lack activity-supportive environments and services.

It would be beneficial for researchers to continue updating and refining summary assessment tools (e.g., walkability indices) and measures for both objective and perceived environmental characteristics and changes (including evaluation of residential self-selection). Studies should be designed to evaluate dose-response relationships between multiple environmental changes and physical activity.

References

Sallis JF, Spoon C et al. Active Living Research Promoting activity-friendly communities: Making the Case for Designing Active Cities. 2015. http://activelivingresearch.org/sites/default/files/MakingTheCaseReport.pdf

Additional Resources

Guidance from Government Agencies

CDC's Healthy Places [www.cdc.gov/healthyplaces/]

- Healthy Community Design Checklist Toolkit [www.cdc.gov/healthyplaces/toolkit/]
  This website from CDC's Division of Emergency and Environmental Health Services helps planners, public health professionals, and the general public include health in the community planning process.

CDC's Making Healthy Living Easier [www.cdc.gov/nccdphp/dch/index.htm]

- The Built Environment Assessment Tool Manual [www.cdc.gov/nccdphp/dch/built-environment-assessment/pdfs/builtenvironment-v3.pdf]
  This how-to guide from CDC's Division of Community Health measures the core features and qualities of the built environment that affect health—especially walking, biking, and other types of physical activity.

U.S. Environmental Protection Agency (EPA) Smart Growth [www.epa.gov/smartgrowth/tools-and-resources-sustainable-communities]
The website provides information to help communities develop and support sustainable neighborhoods and localities while increasing economic competitiveness and directing resources toward places with existing infrastructure.

- Smart Growth Implementation Assistance Project Summaries [www.epa.gov/smartgrowth/smart-growth-implementation-assistance-project-summaries]
- Smart Growth Scorecards [www.epa.gov/smartgrowth/smart-growth-scorecards]
- Codes That Support Smart Growth Development [www.epa.gov/smartgrowth/codes-support-smart-growth-development]

State Departments of Health

- Active Community Environment Toolkit [here.doh.wa.gov/materials/active-community-environments/13_ACEtoolkit_E15L.pdf]
  This guide from Washington is designed to provide local physical activity coordinators, transportation coordinators, and planners with the steps needed to create successful, active, community environments.
- Healthy Communities Toolkit [www.mihealthtools.org/documents/HealthyCommunitiesToolkit_web.pdf]
  The Michigan Department of Community Health offers resources to help communities develop built environments.

Guidance from Professional Associations, Organizations, and Partnerships

American Association of State Highway and Transportation Officials (AASHTO) [www.transportation.org/home/organization/]
The website provides information on the development, operation, and maintenance of an integrated national transportation system.

- Policy on Geometric Design of Highways and Streets, 4th edition; 6th edition [nacto.org/docs/usdg/geometric_design_highways_and_streets_aashto.pdf]*

This guide is for highway engineers and designers who strive for unique design solutions that meet the needs of highway users while maintaining the integrity of the environment.

American Planning Association (APA)

- Planning and Community Health Center [www.planning.org/nationalcenters/health/]
  This website provides tools and technical support to members so they can integrate health into planning practice at all levels (e.g., development patterns, zoning, and land use impact walkability and transportation options).

America Walks [americawalks.org/a-walkable-america/]
This organization leads a coalition of national, state, and local advocacy groups who mobilize individuals, organizations, and businesses to increase walking and walkability. The website includes resources specific to key audiences (e.g., health professionals, community groups, decision makers).

- Technical Resources [americawalks.org/learning-center/technical-resources/]
  This webpage provides information to help planners, architects, and engineers apply use best practices to the design and retrofit of existing neighborhoods, business districts, and cities to make a more walkable built environment.

The Institute of Transportation Engineers (ITE) [www.ite.org]
The website emphasizes thoroughfares in walkable communities (e.g., compact, pedestrian-scaled villages, neighborhoods, town centers, urban centers, urban cores) where walking, bicycling and transit are encouraged.

- Designing Walkable Urban Thoroughfares: A Context Sensitive Approach [library.ite.org/pub/e1cff43c-2354-d714-51d9-d82b39d4dbad]
  This report describes the principles and benefits of context sensitive solutions and how to apply them.

The National Association of Development Organizations (NADO) [www.nado.org/about/]
The website provides education, research, and training for the nation's regional development organizations.

- Planning for Transportation Together: Collaborating to Address Transportation and Economic Resilience [www.nado.org/wp-content/uploads/2016/09/Planning_Transportation_Together_Final.pdf]
  This report summarizes key outcomes from a review of statewide and regional transportation and economic development plans and programs, research projects, websites, and other documents.

Rails to Trails Conservancy [www.railstotrails.org/]
The website offers guides for diverse constituencies to help them design and mobilize public policy for trail development.

- Resource Library [www.railstotrails.org/resource-library/]
- Trail Building [www.railstotrails.org/build-trails/]
  The website provides guidance to transform unused rail corridors into vibrant public spaces.
- Policy [www.railstotrails.org/policy/]

The website provides guidance for investments at the federal and state level to support safe trail, walking, and bicycling networks.

Smart Growth America (SAG) [smartgrowthamerica.org/what-we-do/programs/]
This organization engages elected officials, real estate developers, chambers of commerce, and transportation and urban planning professionals in the urban planning and development process to build better communities.

- Amazing Place [www.smartgrowthamerica.org/app/legacy/documents/amazing-place.pdf]
  The website provides strategies and approaches for economic development that can help communities create walkable neighborhoods and places.
- Foot Traffic Ahead 2016 [www.smartgrowthamerica.org/app/legacy/documents/foot-traffic-ahead-2016.pdf]
  This project evaluates trends toward increased walkable urban places (WalkUPs).
- SGA Smart Growth Implementation Toolkit [smartgrowthamerica.org/resources/smart-growth-implementation-toolkit/]
  This guide is designed to help local leaders untangle the policies and procedures that get in the way of smarter growth and sustainable development.

Urban Land Institute's Building Healthy Places Initiative [uli.org/research/centers-initiatives/building-healthy-places-initiative/]
This initiative leverages the power of a global network to shape projects and places in ways that improve the health of people and communities.

- ULI's Building Healthy Places Toolkit: Strategies for Enhancing Health in the Built Environment [uli.org/wp-content/uploads/ULI-Documents/Building-Healthy-Places-Toolkit.pdf]
  This report outlines evidence based opportunities to enhance health through changes in approaches to buildings and projects. Developers, owners, property managers, designers, investors, and others involved in real estate decision making can use the strategies described in this report to create places that contribute to healthier people and communities.

Walk Score [www.walkscore.com/]*
This is a large-scale, public access walkability index that assigns a numerical walkability score to any address in the United States, Canada, and Australia.

- How Walk Score Works [www.redfin.com/how-walk-score-works]

*Resource includes paid products or a combination of paid and free, publicly available resources.

Disclaimer

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