

Appendices and Supplemental Tools

APPENDICES

The following three appendices provide useful background information, context, and additional resources for the Walkable Neighborhoods Plan for Tigard.

Appendix A: Literature Review - pg 38

A review of current literature around GIS-based analysis for pedestrian travel, walkability, and role of neighborhood-scale commercial activity.

Appendix B: Existing Conditions - pg 41

A summary of existing plans, policies and current zoning that pertain to walkability.

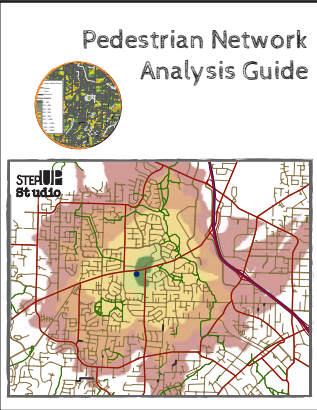
Appendix C: Case Studies - pg 46

Summaries of lessons to learn from a handful of other cities.

SUPPLEMENTAL TOOLS

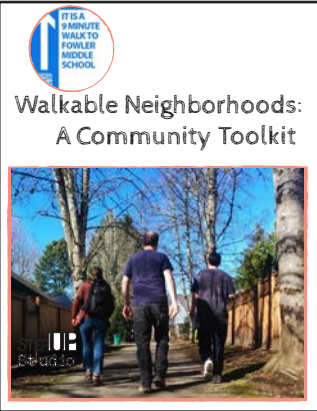
The following set of tools were created to support continued implementation of the five walkability strategies, as well as the City of Tigard’s efforts to promote walkability through their ongoing strategic planning process.

Pedestrian Network Analysis Guidebook



A step-by-step how-to guide for continued use of the Pedestrian Network Analysis ArcGIS tool.

Walkable Neighborhoods: A Community Toolkit



A simple guide book for community members containing steps they can take to make their city and neighborhoods more walkable.

Walkable Tigard: A Communications Plan



A basic communications plan to help the city promote walkability.

GIS

Measuring the pedestrian environment through GIS analysis has been validated by several academic studies using buffers, service area generation and the Network Analyst tool in ArcGIS. While GIS has been employed mostly to measure accessibility of certain destinations using the road network, few studies have evaluated using it to measure walkability in a complex pedestrian network with high and low capacity streets, off-street trails and neighborhood trails.

Properly characterizing the walking environment has been the greatest challenge for GIS analysis of the pedestrian network (Parker and Vanderslice, 3). The use of buffers to determine the ped sheds of particular uses has immediate shortcomings, as it measures distance to destinations as-the-crow-flies instead of distances traveled on the actual network (MTC, G-1). Measuring distances along a pedestrian network can be relatively easy using the Network Analyst tool, however, the tool constrains the network by assuming road centerlines are the only pedestrian corridors (Parker and Vanderslice, 9). The use of service areas shows an area of influence different destinations like parks, schools and stores have based on street patterns, development density and specific impedances (MTC, G-1).

Recently, more robust measures of the walking network have been developed that better reflect the behavior of pedestrians. These new tools rely on measures of connectivity and accessibility to capture the nature of the pedestrian environment and determine how walkable it is (Tal and Handy, 4). Accessibility and connectivity of the pedestrian network was measured in Davis, California by Tal and Handy using measures of Link to Node Ratio (LNR), Pedestrian Route Directness (PDR) and service areas for various walking destinations. LNR is the ratio of road segments to road intersections and measures the connectivity of the walking network, with higher values showing the availability of alternative routes and directness of travel. The service area measure looks at pedsheds, or the area that can be accessed by traveling a network distance accounted as the share of a circle with the same radius. The PDR measure takes the service area established above and tallies the number of households in it (a density factor).

A comprehensive approach to quantifying walkability using GIS involves modeling pedestrian behavior. Experiences in Halton, Ontario demonstrate that the pedestrian network can be modeled with Network Analyst and ArcGIS Model Builder to complete an automated analysis of pedestrian network performance. Rattan and his colleagues measured three components of the walking network to determine walkability, density, diversity and design.

Density was defined by population and employment density; diversity was established as proximity to certain destinations; and, design was defined as trail availability per 1,000 residents (Modeling Walkability, 30). Destinations used to characterize diversity included transit stops, grocery stores, convenience stores and elementary schools. Service areas were calculated for each destination to determine the proportion of residents that are within a walkable distance to it. The combination of density, diversity and design calculations can be used to assess the walkability of communities to see if they need to engage in marketing to promote walking where indicators show that walkability is high, or to concentrate on pedestrian design where walkability is low.

Agent-based simulation models have been used recently to mimic pedestrian behavior in a suburban context. Jin and Grammenos have developed a model structure to explicitly simulate pedestrian activity considering traffic conditions, preferred routes and the likelihood of social encounters. The authors acknowledge that generalizing about suburban walking activity is risky since distinct neighborhoods have their own design characteristics. Their model allows planners to test scenarios for enhancing walkability by simulating pedestrian behavior patterns. Although agent-based models have been used previously to simulate pedestrian activity in buildings and parks, its application at the city and regional scale has not been attempted. The authors tested their model on seven different suburban residential street patterns, finding that pedestrian-only routes combined with the availability of desired destinations can increase the share of walking trips by 24% in certain neighborhoods.

Another GIS model developed by J. Scott Parker focuses solely of pedestrian network analysis. The walking network is characterized in this model by recognizing walking corridors throughout the built environment. The model assigns two walking corridors to each street and links the road network to off-street trails, neighborhood trails and desire paths. Each pedestrian facility can be weighted based on ease of travel, with features that are significant pedestrian impediments, like freeway ramps, fully weighted and local streets and collectors and arterials with uninterrupted sidewalks with little or no weight. The model also acknowledges the presence of signals and crosswalks and weights those pedestrian assets accordingly. The Parker model is not only an accurate depiction of the performance of a walkway network, it can be used to evaluate individual capital projects by placing weights or taking weights off specific pedestrian facilities. Model outputs are rendered spatially as potential throughput at different intersections in the network based on number of households in a service area.

Jin, X., & Grammenos, F. (2013). Taking the Guesswork out of Designing for Walkability. *Planitizen*, 5/21/13.

Metropolitan Transportation Commission, Planning Section (2006). Characteristics of Rail and Ferry Station Area Residents in the San Francisco Bay Area: Evidence from the 2000 Bay Area Travel Survey

Tal, G., & Handy, S. (2012). Measuring nonmotorized accessibility and connectivity in a robust pedestrian network. Transportation Research Record: *Journal of the Transportation Research Board*, 2299(1), 48-56.

Rattan, A., et. al. Modeling Walkability: Automating Analysis so it is Easily Repeated. *ESRI ArcUser*, Winter 2012.

Vanderslice, E. & Parker, J.S. Walkway Network Analysis. *Unpublished Manuscript*, 2011.

Walkability

The term walkability has become a popular way to describe the connection between urban form and ease of pedestrian movement. While current literature regarding walking as a utilitarian form of transportation has blossomed, the term walkability still remains ill defined. General definitions of walkability describe it as a measure of the effectiveness of urban design to promote walking as an alternative to auto travel (Rattan et. al.). Scholars associate walkability as a mode of transportation, an essential part of transit use and an attribute of healthy communities (Tal and Handy).

The relationship between urban form and walking was explored over a decade ago by Cervero and Duncan. The authors drew from responses to a household travel survey sent to 15,066 randomly selected households in nine counties around the San Francisco Bay Area. The study looked at walking and biking behavior, although only the findings related to walking are presented here. The results were modeled to validate factors that form perceived barriers to walking, including distance, steep inclines, darkness, crime and precipitation. Ignoring steep slopes means that the impact of associated model features, like curvilinear and cul-de-sac street layouts, are diluted. It is notable that other scholarly literature on the subject of walkability does not account for incimate weather or steep topography.

The affect of urban design, land use diversity and development density on the walking network was examined by the authors to determine what factors influence decisions to take walking trips. Urban design was quantified by assessing block size and intersection density; diversity of land uses was characterized by an absence of homogeneous residential neighborhoods; and, density was related to a concentration of population and variety of destinations. Study findings demonstrated that number of cars per household and physical disabilities reduced walking trips while a diverse mix of land uses and greater development densities promoted walking. The authors found that urban form exerts a modest influence on travel behavior – more so than demographics or distance and travel time.

Ability to access destinations and a welcoming pedestrian environment were cited as the most important factors influencing pedestrian activity by Tal and Handy. Walkability is an important element of urban design that can replace auto trips. It is a measure of the quality of the pedestrian environment encompassing safety, comfort and enjoyment. The authors characterize accessibility as a function of network connectivity, which limits out-of-direction travel and shortens travel distances. The authors found that when the street network is combined with a robust off-street trail network, walking was preferred for trips under a ½ mile.

Rauterkus and Miller studied 5,603 property transactions to see if walkability, as measured by Walk Score, affected home valuation. They defined walkability as a measure of how amenable a community is for walking to everyday destination like schools, parks and stores. Pedestrian friendly neighborhoods are seen as a “housing intervention” by the authors because they are more apt to take cars off the road and promote public health through active lifestyles. Diverse land uses, such as mixed-use developments, encourage and sustain a walking culture. The authors found a correlation between home prices and walkable neighborhoods.

Cervero, R., & Duncan, M. (2003). Walking, bicycling, and urban landscapes: evidence from the San Francisco Bay Area. *American journal of public health*, 93(9), 1478-1483.

Rattan, A., et. al. Modeling Walkability: Automating Analysis so it is Easily Repeated. *ESRI ArcUser*, Winter 2012.

Rauterkus, S. Y., & Miller, N. G. (2011). Residential land values and walkability. *The Journal of Sustainable Real Estate*, 3(1), 23-43.

Tal, G., & Handy, S. (2012). Measuring nonmotorized accessibility and connectivity in a robust pedestrian network. *Transportation Research Record: Journal of the Transportation Research Board*, 2299(1), 48-56.

Neighborhood Commercial Zones

Access to nearby retail establishments is good for the promotion of walking. Small nodes with markets, cafes, restaurants and boutiques within residential neighborhoods draw people out of their houses and cars by offering casual walking trips to everyday locations. While enticing people to local stores by providing easy pedestrian access seems intuitive, scholarly literature concerning the relationship between pedestrian movement and neighborhood commercial nodes is sparse and inconclusive.

Perhaps the best treatise on the subject is a 1996 journal article by Susan Handy. She sought to understand the link between walking and urban form by advancing the concept of accessibility to explain this relationship. The decision to walk is dependent on the circumstances leading to mode choice and characteristics of individual values. Urban form needs to be evaluated by the diversity and nature of the choices inherent to it. Handy uses accessibility as a measure because it is a useful approach to explain patterns of activity by examining “their quantity, quality, variety, and proximity; and the connectivity between them as provided by the transportation system.”

The author argues that greater accessibility leads to shorter trips and the variety and availability of destinations enhances accessibility by offering more options from which to choose. The interplay between an accessible pedestrian network and places to walk induces walking trips, according to the study. While accessibility and a diversity of destinations within walking distance may generate more foot traffic, that doesn’t mean it reduces auto travel. Therefore, testing the link between urban form and walking behavior separately is critical understanding which components of the pedestrian environment influence travel choices.

The author’s research focuses on walking trips to commercial establishments to reveal travel choice, as these are the most pliable and frequent category of non-work pedestrian travel. She compares two traditional grid network neighborhoods and two post WWII suburban neighborhoods in the extreme north and south of San Francisco Bay Area to understand how urban form and the availability of shopping destinations influence decisions to walk. The two Silicon Valley neighborhoods are Mountain View (traditional) and Sunnyvale (suburban) and the two Santa Rosa neighborhoods are Junior College (traditional) and Rincon Valley (suburban). The study relies on regularly collected household surveys to assess commercial destination walking trips in these four neighborhoods.

Criteria examined by the author includes number of supermarkets, corner stores and department stores within a given area and time of travel. Key findings from her research include:

- Supermarket trips are not suited to walking due to heavy loads;
- A greater number of destinations counters a desire for short distance trips;
- The opportunity to walk to a variety of shopping locations induces new walking trips;
- Walking trips that substitute for driving do not significantly reduce overall auto travel;
- Decisions to walk to a shopping destination are not necessarily to the closest store because pedestrians are willing to travel greater distances to a store of choice when a diversity of choices are available.

Conclusions made by the author as a result of the study indicate that people are willing to take trips they would not otherwise consider in a car when they are able to walk and travel greater distances on foot to seek a store of choice.

An article by Hess et. al. looks at the relationship between urban sites with short blocks versus post-WWII suburban sites with loop and lollipop street patterns and gaps in the sidewalk network. The authors aggregate 12 sites into four groups with large commercial centers, medium size retail centers and small neighborhood commercial nodes. Commercial service areas are assumed to be half a mile by the authors. They found that most people arrive at suburban commercial centers via the sidewalk network (78%), yet less than half of retail locations have sidewalks. Use of sidewalks by shoppers is evidenced by a 60% share of pedestrians using them to access retail locations. Not surprisingly, multi family housing complexes with nearby grocery stores produce high numbers of shopping trips on foot, indicating a correlation between the share of walking trips in areas with high housing density and commercial shopping opportunities. Pedestrian network distance is 27% greater in compact urban environments versus 66% longer in suburban areas and distances to commercial nodes are 29% greater in suburban areas, indicating that pedestrian travel is much more challenging in a suburban context.

Another article by Susan Handy examines walking behavior in six neighborhoods in Austin, Texas. Similar to her study in the San Francisco Bay Area, the author chooses several traditional neighborhoods built during the teens and twenties, and two modern, post-WWII neighborhoods. She looks at neighborhood commercial destinations through the lens of pedestrian amenities and their proximity to residential neighborhoods. The residential neighborhoods examined are characteristic of those throughout the US, with relatively good pedestrian access to commercial nodes in the traditional neighborhoods and poor access and fewer retail choices in the more modern settings.

The study relies on conclusions made from statistical analysis of the results of a thousand random household surveys. The response rate is reported at 25%. Residents of the traditional neighborhood reported higher incidences of walking with recreational walking, exercise and dog walking the most popular responses. Few residents reported qualitative barriers to walking such as hills, traffic and weather.

Responses to questions concerning the frequency of walking trips to stores showed distinct differences between traditional and suburban neighborhood types. Suburban residents made trips to a store on foot less than once a month while residents in the traditional neighborhoods did so more than six times a month. Traditional neighborhoods, the author found, generated more walking trips due to a larger share of houses within walking distance of a commercial center. Her findings indicate that walking to neighborhood commercial centers substitute for auto trips, but reductions in vehicle miles traveled are insignificant.

Handy, S. L. (1996). Understanding the link between urban form and nonwork travel behavior. *Journal of planning education and research*, 15(3), 183-198.

Handy, S. L. (1996). Urban form and pedestrian choices: study of Austin neighborhoods. *Transportation Research Record: Journal of the Transportation Research Board*, 1552(1), 135-144.

Hess, P. M., Moudon, A. V., Snyder, M. C., & Stanilov, K. (1999). Site design and pedestrian travel. *Transportation Research Record: Journal of the Transportation Research Board*, 1674(1), 9-19.

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Table B1: Tigard Statistics

Approximate Population	49,774
Approximate Land Area	11.81 square miles
Approximate Density	4,066 persons per sq. mi.
Rate of Commuting on Foot	2.85%
Rate of Commuting on Transit	4.14%
Mean Travel Time to Work	22.7 Minutes
Home-Ownership Rate	60.46%
Median Household Income	\$62,576

~ U.S. Census Bureau 2012 - Social Explorer

Existing Plans and Policies

Increasing walkability is a common goal shared by a number of plans and policies at the state, regional, and local levels, and a brief summation follows. Selected excerpts of some of the relevant goals and policies in the Tigard 2035 Transportation System Plan, Oregon Bicycle and Pedestrian Plan, and Metro 2035 Regional Transportation Plan are provided below.

At the state level, the Transportation Planning Rule (TPR) requires that effort be applied to the development and enhancement of alternative modes of transportation, including walking, biking and transit. In addition, the TPR requires that local jurisdictions adopt land use and subdivision ordinance amendments to protect transportation facilities and to provide bicycle and pedestrian facilities between residential, commercial, and employment/institutional areas. It is further required that local communities coordinate their respective plans with the applicable county, regional, and state transportation plans.

At the Regional level, Metro is committed to increasing walkability as an important component to meeting the Metro 2040 Growth Concept. This is reflected in the Regional Transportation Plan, Regional Active Transportation Plan, and other regional planning efforts, such as the Southwest Corridor Plan.

At the Local level, the Tigard 2027 Comprehensive Plan and Tigard 2035 Transportation System Plan both support increased walkability by designing public streets within Tigard that encourage pedestrian and bicycle travel, and requiring / facilitating construction of off-street trails to develop pedestrian and bicycle connections that cannot be provided by a street. These plans also require appropriate access to bicycle and pedestrian facilities for all schools, parks, public facilities, and commercial areas. Increased walkability would be achieved through various strategies, such as prioritizing fixing gaps in the current sidewalk and trail system to create a more complete network of pedestrian facilities.

While these plans and policies demonstrate a clear mandate to increase walkability, there are other transportation priorities which may produce outcomes detrimental to walkability. The need to reduce traffic congestion and enhance vehicular capacity through wider roads and higher speeds, or facilitate the movement of large trucks through wide turning radii at intersections, negatively impacts walkability, and balancing these competing priorities requires careful consideration.

Table B2: Select Plans Affecting Walkability

State	Oregon Statewide Planning Goal 12 - Transportation
State	Oregon Bicycle And Pedestrian Plan
Regional	2035 Regional Transportation Plan
Regional	Metro Regional Active Transportation Plan
Regional	Southwest Corridor Plan
Local	Tigard 2027 Comprehensive Plan
Local	Tigard 2035 Transportation System Plan
Local	Tigard Greenways Trail System Master Plan

Excerpt - Tigard 2035 Transportation System Plan

Goal 1 – Land Use and Transportation Coordination -Develop mutually supportive land use and transportation plans to enhance the livability of the community.

- Policy 1 - The City shall prioritize transportation projects according to community benefit, such as safety, performance, and accessibility, as well as the associated costs and impacts.
- Policy 2 -The City shall maintain and enhance transportation functionality by emphasizing multi-modal travel options for all types of land uses.
- Policy 3 -The City shall promote land uses and transportation investments that promote balanced transportation options.

Goal 3 – Multi-Modal Transportation System

- Policy 4 -The City shall develop and maintain neighborhood and local connections to provide efficient circulation in and out of neighborhoods.
- Policy 5 -The City shall require development adjacent to transit routes to provide direct pedestrian accessibility
- Policy 6 -The City shall develop and implement public street standards that recognize the multi-purpose nature of the street right-of-way.
- Policy 7 -The City shall design all public streets within Tigard to encourage pedestrian and bicycle travel.
- Policy 8 -The City shall require sidewalks to be constructed in conjunction with private development and consistent with adopted plans.
- Policy 9-The City shall require and/or facilitate the construction of off-street trails to develop pedestrian and bicycle connections that cannot be provided by a street.
- Policy 10-The City shall require appropriate access to bicycle and pedestrian facilities for all schools, parks, public facilities, and commercial areas.

Goal 4 – Safe Transportation System

- Policy 1 -The City shall consider the intended uses of a street during the design to promote safety, efficiency, and multi-modal needs.
- Policy 2 -The City shall coordinate with the appropriate agencies to provide safe, secure, connected, and desirable pedestrian, bicycle, and public transit facilities.

~ Tigard 2035 Transportation System Plan - pages 11-13

Excerpt - Oregon Bicycle and Pedestrian Plan

Vision: The Oregon Bicycle and Pedestrian Plan envisions a transportation system where:

- People can bicycle or walk safely and conveniently to all destinations within reasonable walking or bicycling distance.
- People can walk or ride to and from their transit stops and have a comfortable and convenient place to wait or transfer.
- Touring bicyclists can enjoy Oregon’s natural beauty on roads and highways that are designed for bicycle travel.
- Appropriate transportation choices are available to all.
- Streets, roads and highways are designed to encourage bicycling and walking.

~ Oregon Bicycle and Pedestrian Plan - page 2

Vision: Oregon envisions a transportation system where walking and bicycling are safe and convenient transportation modes for urban trips.

GOAL: To provide safe, accessible and convenient bicycling and walking facilities and to support and encourage increased levels of bicycling and walking.

- ACTION 1: Provide bikeway and walkway systems that are integrated with other transportation systems.
- ACTION 2: Create a safe, convenient and attractive bicycling and walking environment.
- ACTION 3: Develop education programs that improve bicycle and pedestrian safety.

~ Oregon Bicycle and Pedestrian Plan - page xiii

GOAL: to provide safe, accessible and convenient bicycling and walking facilities and to support and encourage increased levels of bicycling and walking.

ACTION 1: Provide bikeway and walkway systems that are integrated with other transportation systems.

- STRATEGY 1A. Integrate bicycle and pedestrian facility needs into all planning, design, construction and maintenance activities of the Oregon Department of Transportation, local governments and other transportation providers.
- STRATEGY 1B. Retrofit existing roadways with paved shoulders or bike lanes to accommodate bicyclists, and with sidewalks and safe crossings to accommodate pedestrians.
- STRATEGY 1C. Provide financial and technical assistance to local governments for bikeway and walkway projects on local streets.

ACTION 2: Create a safe, convenient and attractive bicycling and walking environment.

- STRATEGY 2A. Adopt design standards that create safe and convenient facilities to encourage bicycling and walking.
- STRATEGY 2B. Provide uniform signing and marking of all bikeways and walkways.
- STRATEGY 2C. Adopt maintenance practices to preserve bikeways and walkways in a smooth, clean and safe condition.

ACTION 3: Develop education programs that improve bicycle and pedestrian safety.

- STRATEGY 3A. Monitor and analyze bicyclist and pedestrian crash data to formulate ways to improve bicyclist and pedestrian safety.
- STRATEGY 3B. Publish bicycling and walking maps and guides that inform the public of bicycle and pedestrian facilities and services.
- STRATEGY 3C. Develop bicycling and walking safety education programs to improve skills and observance of traffic laws, and promote overall safety for bicyclists and pedestrians.
- STRATEGY 3D. Develop safety education programs aimed at motor vehicle drivers to improve awareness of the needs and rights of bicyclists and pedestrians.
- STRATEGY 3E. Develop a promotional program and materials to encourage increased usage of bicycling and walking.

~ Oregon Bicycle and Pedestrian Plan - page 21

Quotes from the Oregon Bicycle and Pedestrian Plan

“Effective walkway and bikeway networks are best achieved by **modifying the existing street system**, rather than trying to create a separate network.” (Page 6 - emphasis added)

“Disconnected streets and cul-de-sacs create long travel distances, even though the actual distance from origin to destination may be fairly short, making walking and bicycling impractical. A grid street system provides continuity for pedestrians and bicyclists along the shortest routes; lacking this, **disconnected streets can be improved with connecting paths**.” (Page 10 - emphasis added)

“Many land use practices result in long distances between origin and destination points, requiring an automobile for most trips. Zoning for high densities of employment, housing and mixed-use development places origin and destination points closer together, creating a more pedestrian and bicycle-friendly environment. This can be done more easily in new developments, but **can be retrofitted into established areas with neighborhood commerce zoning**.” (Page 10 - emphasis added)

Excerpt - Metro 2035 Regional Transportation Plan

In the 21st Century, the Portland metropolitan region remains a vibrant and extraordinary region, with a world-class transportation system that...manages both demand and capacity, employs the best technology, and joins rail, highway, street, bus, air, water, pedestrian and bicycle facilities into a seamless and fully interconnected network.

Goal 3: Expand Transportation Choices

Multi-modal transportation infrastructure and services provide all residents of the region with affordable and equitable options for accessing housing, jobs, services, shopping, educational, cultural and recreational opportunities, and facilitate competitive choices for goods movement for all businesses in the region.

- Objective 3.1 Travel Choices – Achieve modal targets for increased walking, bicycling, use of transit and shared ride and reduced reliance on the automobile and drive alone trips.
- Objective 3.2 Vehicle Miles of Travel – Reduce vehicle miles traveled per capita.
- Objective 3.3 Equitable Access and Barrier Free Transportation – Provide affordable and equitable access to travel choices and serve the needs of all people and businesses, including people with low income, children, elders and people with disabilities, to connect with jobs, education, services, recreation, social and cultural activities.

Goal 7: Enhance Human Health

Multi-modal transportation infrastructure and services provide safe, comfortable and convenient options that support active living and physical activity, and minimize transportation-related pollution that negatively impacts human health.

- Objective 7.1 Active Living – Provide safe, comfortable and convenient transportation options that support active living and physical activity to meet daily needs and access services.
- Objective 7.2 Pollution Impacts – Minimize noise, impervious surface and other transportation-related pollution impacts on residents in the region to reduce negative health effects.

~ Metro 2035 Regional Transportation Plan -pages 2.07-2.11

Metro 2035 Performance Targets

Investments that work together toward achieving a set of performance targets is critical for the region to be successful in realizing a truly integrated, multi-modal transportation system that achieves the goals and objectives of this plan.

- Active transportation – By 2035, triple walking, biking and transit mode share compared to 2005.
- Basic infrastructure – By 2035, increase by 50 percent the number of essential destinations⁴ accessible within 30 minutes by trails, bicycling and public transit or within 15 minutes by sidewalks for all residents compared to 2005.
- Safety –By 2035, reduce the number of pedestrian, bicyclist, and motor vehicle occupant
- Fatalities plus serious injuries each by 50% compared to 2005.
- Travel – By 2035, reduce vehicle miles traveled per person by 10 percent compared to 2005.
- Access to daily needs – By 2035, increase by 50 percent the number of essential destinations accessible within 30 minutes by bicycling and public transit for low-income, minority, senior and disabled populations compared to 2005.

~ Metro 2035 Regional Transportation Plan -pages 2.13-2.15

Metro 2035 Regional Pedestrian Network Vision

Successful communities across America are increasingly defined by their walkability. Everyone is a pedestrian, but too often walking is not a safe and convenient option for getting to work or school or meeting daily travel needs. Walking, however, contributes to a healthy lifestyle for young and old alike and walking supports vibrant local economies. This travel mode is the common denominator for all other modes of travel as each trip begins or ends with at least a short walk. Transit trips in particular are based on walk access to transit stops and stations.

As a primary mode of travel that serves short trips and supports other modes the pedestrian system should be complete, direct, safe and enjoyable to use. It must be accessible to everyone regardless of one’s ability to walk unassisted. Walking for short distances is an attractive option for most people when safe and convenient pedestrian facilities are available. The combination of well maintained and illuminated sidewalks of appropriate width, curb ramps, well marked and protected street crossings, and streetscape amenities that might include benches, landscaping and wide planting strips make walking an attractive, convenient and safe mode of travel. On-street facilities might be supplemented with trails and separate sidewalk connections that provide direct and pleasant connections for the pedestrian.

Four policies form the foundation of this vision:

- 1. Promote walking as primary mode for short trips
- 2. Build a well-connected network of pedestrian facilities that serves all ages & abilities
- 3. Create walkable downtowns, centers, main streets and station communities
- 4. Improve pedestrian access to transit

Metro 2035 Regional Pedestrian Network Summary

Currently the regional pedestrian network is incomplete and unsafe; the sidewalk network accessing transit in particular has gaps in continuity and quality. A complete pedestrian system provides a basic building block for economic vitality in centers and other commercially-oriented areas, but when incomplete fails to maximize the connection between transportation and land use that helps contribute to vibrant communities. The existence of gaps prevents the basic system from functioning uniformly throughout the region by inhibiting access to transit, limiting access to centers and other community-level destinations such as parks and schools. It is important for local jurisdictions to pursue sidewalks on every street (except expressways), even if they are not defined as part of the regional pedestrian network (transit mixed-use corridors, mixed-use centers, station communities and regional trails.)

Planning for pedestrian system improvements requires the same level of planning and analysis as might be applied to roadway planning. Investment programs should set priorities for sidewalk improvements to and along major transit routes and communities where physically or economically disadvantaged populations are resident. Emphasis should be given to filling gaps and providing safe crossings of the busiest streets. Access to schools, parks and community centers that are active parts of the local community is important for influencing a healthy lifestyle that includes walking.

Oregon State statutes and administrative rules establish that pedestrian facilities are required on all collector and higher classification streets when those roads are built or reconstructed. Exceptions are provided where cost is excessively disproportionate to need or where there is an absence of need due to sparse population or other factors.

Existing Zoning and Land Use

As discussed in the strategies section of the main walkability plan, an important factor to the walkability of a neighborhood is the presence of something worth walking to; thus having community institutions (schools, churches, libraries) and neighborhood-oriented commercial areas within walking distance is an important component to increasing walking for transportation, particularly as walking trips can potentially substitute for auto trips.

While areas along Pacific Highway and in the Tigard Triangle are well served in this regard, many other areas have few commercial or institutional uses within comfortable walking distance; in such areas it may be worthwhile to consider establishing new neighborhood-oriented commercial nodes of C-N (Neighborhood Commercial) or C-C (Community Commercial).

Alternately, another option could be to change regulations for single-family zones to permit small-scale commercial uses similar to the C-N zone as a conditional use for properties fronting arterials/collectors, subject to certain limitations; this has the advantage of using market forces determine locations for neighborhood-oriented businesses rather than have planners specify specific locations which may or may not be economically viable.

High-Density residential zones (R-25, R-40) already allow certain commercial activities on the ground floor of multi-family structures. However, such use is limited to 10% of the building, which may be insufficient, particularly for smaller infill sites; developing the entire ground floor as retail, common practice in denser cities such as Portland, would require a 10-story building under Tigard’s regulations, which would be out of scale and likely not economically viable. As Tigard’s high-density residential zones develop it may be worthwhile to revisit the floor area percentage limitation.

Chapter 18.510 - Residential Zoning Districts

Of Tigard’s eight residential zones, only the two highest density zones permit limited commercial uses, and only on the ground floor level of multi-family projects, and not to exceed 10% of total gross square footage of building. In all other residential zones commercial uses are prohibited.

Purpose

18.510.010 (A) Preserve Neighborhood Livability

One of the major purposes of the regulations governing development in residential zoning districts is to protect the livability of existing and future residential neighborhoods, by encouraging primarily residential development with compatible nonresidential development –schools, churches, parks and recreation facilities, day care centers, neighborhood commercial uses and other services- at appropriate locations and at an appropriate scale.

Selected List of Zoning Districts

18.510.020 (G) R-25: Medium High-Density Residential District

The R-25 zoning district is designed to accommodate existing housing of all types and new attached single-family and multi-family housing units at a minimum lot size of 1,480 square feet. A limited amount of neighborhood commercial uses is permitted outright and a wide range of civic and institutional uses are permitted conditionally.

18.510.020 (H) R-40: High-Density Residential District

The R-40 zoning district is designed to accommodate existing housing of all types and new attached single-family and multi-family housing units with no minimum lot size. A limited amount of neighborhood commercial uses is permitted outright and a wide range of civic and institutional uses are permitted conditionally

Uses

Permitted in R-25/R-40 High-Density Zones, limited to ground floor level of multi-family projects, not to exceed 10% of total gross square footage of building (Excerpt from Table 18.510.1)

- Sales-Oriented: e.g. Art Supply, Grocery, Hardware, etc. – 18.130.060 (Q)
- Personal Services: e.g. Bank, Barber, Laundromat, etc. - 18.130.060 (O)
- Repair-Oriented: e.g. Bike Repair, Locksmith, etc. – 18.130.060 (P)

Chapter 18.520 - Commercial Zoning Districts

Two commercial zones are specifically neighborhood-oriented, the C-N and C-C zones

Purpose

18.520.010 (A) Provide a range of commercial services for city residents

One of the major purposes of the regulations governing development in commercial zoning districts is to ensure that a full range of retail and office uses are available throughout the city so that residents can fulfill all or most of their needs within easy driving and, ideally within easy walking and/or biking distance of their homes. The location of land within each commercial district must be carefully selected and design and development standards created to minimize the potential adverse impacts of commercial activity on established residential areas. At the same time, it is important to create more opportunities for mixed use, including residential, commercial and institutional activities, in new and redeveloping areas.

Selected List of Zoning Districts

18.520.020 (A) C-N: Neighborhood Commercial District

The C-N zoning district is designed to provide convenience goods and services within a small cluster of stores adjacent to residential neighborhoods. Convenience goods and services are those which are purchased frequently, i.e. at least weekly; for which comparison buying is not required; and which can be sustained in a limited trade area. Such uses include convenience markets, personal services and repair shops. A limited number of other uses, including but not limited to restaurants, gas stations, medical centers, religious institutions, transit-related park-and-ride lots, and facilities with drive-up windows, are permitted conditionally.

18.520.050 (A) Special Limitations on Uses

1. The use shall be conducted wholly within an enclosed structure, except as allowed in Subsection A.3 below;
2. No use shall have a gross floor area greater than 4,000 square feet;
3. Accessory open-air sales, display and/or storage shall be permitted for horticultural and food merchandise only and shall constitute no more than five percent of the gross building floor area of any individual establishment; and
4. Uses operating before 7 a.m. and after 10 p.m. shall be subject to the conditional use provisions, as governed in Chapter 18.330.

18.520.020 (B) C-C: Community Commercial District

The C-C zoning district is designed to provide convenience shopping facilities which meet the regular needs of nearby residential neighborhoods. With a service area of about 1.5 miles, such commercial centers typically range in size from 30,000 – 100,000 gross square feet on sites ranging from 2-8 acres. Separated from other commercially-zoned areas by at least one-half mile, community commercial centers are intended to serve several residential neighborhoods, ideally at the intersection of two or more collector streets or at the intersection of an arterial and collector street. Housing is permitted on or above the second floor of commercial structures at a density not to exceed 12 units/net acre, e.g. the maximum density permitted in the R-12 zone. A limited number of other uses, including but not limited to car washes, gas stations, religious institutions, and transit-related park-and-ride lots, are permitted conditionally. In addition to mandatory site development review, design and development standards in the C-C zone have been adopted to ensure that developments will be well-integrated, attractively landscaped, and pedestrian-friendly.

18.520.050 (B) Special Limitations on Uses

1. Such centers shall be developed preferably as a single unit and occupy only one quadrant of the intersection at which it is located;
2. The use shall be conducted wholly within an enclosed structure, except for outside play areas for children’s day care facilities, and as allowed in paragraphs 3 and 4 of this subsection B;
3. No use shall have a gross floor area greater than 5,000 square feet except for the retail sales of food and beverages, when the maximum floor area shall not exceed 40,000 gross square feet, and all other sales-oriented retail, where the maximum floor area shall not exceed 10,000 gross square feet;
4. Accessory open-air sales, display and/or storage shall be permitted for horticultural and food merchandising uses only shall constitute no more than five percent of the gross building floor area of any individual establishment;
5. Accessory open-air dining or drinking areas shall be permitted for approved eating and drinking establishments or retail food stores only. Outside dining areas are not permitted within 200 feet of any developed residential area. Public or private sidewalk areas around dining areas may not be reduced to less than five feet of clear walkway; and
6. Uses operating before 6 a.m. and/or after 11 p.m. and drive-up windows are subject to conditional use provisions, as governed by Chapter 18.330.

Additional requirements apply in C-C zones, see:

18.520.060 (A) Additional Development and Design Guidelines

Summary

We explored walkability efforts and pedestrian improvements in cities around the world to better understand best practices and possible pitfalls most relevant to Tigard. The most successful efforts by other cities demonstrate how they established pedestrian connections, created walkable facilities and destinations, and fashioned community attachment and investment. Case study research entertained a variety of community sizes and types to glean the widest representative sample of examples and best practices available. A summary of best practices was crafted from the case study literature to offer guidance to Tigard on the best way to reach their goal of becoming the most walkable city in the Northwest.

Summary of Case Studies

City	Population	Area (sq. mile)	Density (sq. mile)	Trail Network	Sidewalks
Tigard	49,774	11.8	4,566	Fanno Creek (4.5 miles), Westside Trail, Washington Square Loop, Tualatin River Trail and neighborhood trails	126 miles of sidewalks
Ann Arbor, MI	116,121	28.7	4,116	Huron River Greenway/Border-to-border, and Allen Creek Greenway Trail is 35 miles	98% of arterial and 82% of non-arterial roads 25 miles of new sidewalks, and 128 major pedestrian crossing improvements;
Alexandria, VA	151,218	15.2	9,948	Alexandria Heritage Trail, 15 miles of multi-use trails (2008)	All arterial and collector roads are required to provide sidewalks on both sides of the street, with 147.3 miles of existing sidewalks
Mill Valley, CA	13,903	4.8	2,867	Part of Bay Trail	18 miles of sidewalks
Flagstaff, AZ	63,505	64.0	992	50 miles of trails (and more than 80 more miles planned) – the Flagstaff Urban Trail System (FUTS). Trail maps etc., Adopt-A-FUTS.	
Charlottesville, VA	41,225	10.3	4,002	10 miles city trails plus other networks. Map and info	
Cary, NC	135,234	52.8	2,561	Greenway system of over trail 70 miles (plus 10 miles inside parks), with 150 miles proposed	242.8 miles of existing sidewalks = .45 miles of sidewalks for each mile of road (ideal is 1.75 miles of sidewalk for each mile of road)
Houten, S Holland	48,427	22.78	2,260	Extensive (see pg. 53)	Extensive (see pg. 53)

~ U.S. City data from 2012 U.S. Census, Social Explorer.

ANN ARBOR, MI

Population: 114,024 people

Area: 27.7 square miles

Density: 4,116 persons per square mile

Main Achievements

- Safe Streets and Sidewalks Taskforce
- Entire sidewalk system repair program
- Achievements in active transportation and active living
- Successful Crossing Guard Program at schools

Ann Arbor is a college town (home to the University of Michigan). Its economy is focused on high technology and university research, has several commercial and historic areas. Arbor has numerous attractions and activities such as museums, theaters, farmers markets, restaurants and stadiums.

The city has a strong focus on creating a walking environment. The walking mode share is substantially higher than the US average. The city also has dense forestation of its parks and residential areas. It has more than 100,000 trees along its streets and parks. The city has 157 municipal parks - from small neighborhood green spots to large recreation areas.

- Ann Arbor Transportation Program operates the Ann Arbor Safe Streets and Sidewalks Taskforce (A2S3) which brings diverse stakeholders together around pedestrian safety issues. They specifically address safety issues on streets and sidewalks. A2S3 also encourages educational outreach of non-motorized travel, and campaign to enforce the right-of-way for pedestrians at two crosswalks.
- A successful Crossing Guard Program has been in place at schools in Ann Arbor where Hired crossing guards provide a safe walking environment for children and foster a culture of walking in a community
- Pedestrian counts are conducted to aid better planning initiatives and targeted engineering treatments.
- Ann Arbor Transportation Authority operates public bus services throughout the city, and also connects to Detroit. There’s a separate zero-fare bus service operates within and between the University of Michigan campuses. Traffic calming initiatives.

Infrastructure

- 98% of arterial roads have sidewalks on both sides
- 82% of non-arterial roads have sidewalks on both sides
- Sidewalk system repair program (2012-2016) has the purpose of repairing sidewalks in all areas of the City, in the public right-of-way, starting with the most deficient sidewalks. The program will also address curb ramps to meet the requirements of ADA.
- Providing crossing amenities are placed as priorities: regularly maintained crosswalks, in-road stop/yield signs, and stop/yield lines and raised crosswalks.

Advocacy Programs and Organizations

- Ann Arbor Area Campaign for Active Transportation
- Since 2008 the city participates national initiative to promote Active Transportation, coordinated by the Rails-to-Trails Conservancy
- Ann Arbor was designated a Silver-level Bicycle Friendly City by the League of American Bicyclists since 2005. Ann Arbor has over 400 bike hoops, 26 secured bike lockers and on-street bike parking in the city’s downtown area, Ann Arbor continues to provide cyclists with opportunities to make trips by bike.
- Friends of the Border to Border Trail: promotion for the completion, maintenance, enhancement, and use of this non-motorized transportation and recreation resource.
- Since 2008, Ann Arbor has been recognized as a Gold-Status community in the Promoting Active Communities Assessment, a state initiative to promote active living. (Communities can use the online self-assessment to evaluate their built environments, policies, and programs that support active living. The system also evaluates Complete Streets (CS) policies and implementation and provides a Complete Streets score).
- Re-imagine Washtenaw Avenue public-arts plan for the Washtenaw Corridor.
- Washtenaw Biking and Walking Coalition: sustainable transportation advocacy
- ‘Get Downtown’: sustainable commuting in Ann Arbor
- ‘Bike Ypsi’: organized rides, events, and bike safety advocacy in Ypsilanti
- League of Michigan Bicyclists: statewide bicycle advocacy
- Ann Arbor Bicycle Touring Society: organized mountain and road bike rides in Michigan and beyond
- Ann Arbor Velo Club: road, mountain, cyclocross, and track racing and support



ALEXANDRIA, VA

Population: 139,966

Area: 15.2 square miles

Density: 9,208 persons per square mile

Main Initiatives and Achievements

- Intensive sidewalk policies
- Complete streets program and form-based codes
- Promotion of mixed use and dense development
- Comprehensive Safe Routes to School Program
- City-wide wayfinding program
- Multiple staff members dedicated to work towards pedestrian and bicycle efforts

Alexandria is located close to Washington DC, and it is its high income suburb. The city has a historic center (Old Town) that is full of restaurants, antique shops, boutiques, theaters and a marketplace. This area is favored by tourists. This and many other neighborhoods in Alexandria are compact and walkable.

- The City dedicates multiple staff members work towards pedestrian and bicycle efforts.
- Intensive sidewalk policies require all arterial streets and collector streets to provide sidewalks on both sides of the street, and new private developments are required to construct or upgrade sidewalks. It also has a sidewalk retrofit policy that aims to repair sidewalks as needed

Promotion of Mixed-Use and Dense Development

- The City embraced the complete streets program and utilizes form-based codes.
- 100 percent of development in the City has been infill in the last few years.
- Walkable environments have been created by providing retail on ground floors of residential buildings and by density bonuses to developers.
- Encouraging ground floor mixed-Use: the City has a measure that states, “No room or space used for residential purposes or commercial purposes, other than restaurant or retail room or space, shall be permitted on the ground floor of residential buildings in mixed use zones.”

Comprehensive Safe Routes to School Program

- 80% of schools have an ongoing Safe Routes to School program.
- Nearly every school has a walking related event or program.
- In 2010: 11 Walk to School Day events in multiple schools and regular Walking Wednesday programs at 6 schools
- Surveys of the number of children walking to school are conducted yearly
- Walking audits are conducted resulting in walking maps for schools

Citywide Wayfinding Program

- Led by the Department of Transportation and Environmental Services with support from the Department of Planning & Zoning
- A consistent image for the entire city, reduce visual clutter, promote walking, bicycling, and use of mass transit
- Wayfinding Design Guidelines Manual
- Implemented in phases



MILL VALLEY, CA

Population: 14,159

Area: 4.848 square miles

Density: 2,920 persons per square mile

History

Due to its terrain, Mill Valley can be difficult to navigate as a pedestrian through its twisty and curvy roads. In the late 1800’s, the city began with hundreds of short-cuts that provided connections between the streets on the hillside and the flatland. In 1890, ‘Steps, Lanes and Paths’ were constructed to be used by residents as an easy way to get to town and to public transportation.

Local volunteers have undertaken actions to address the need for pedestrian connections in areas that are not easily served by conventional sidewalk networks. They began to address pedestrian challenges by documenting unused existing and potential historic pedestrian rights-of-way in the town. In 2000, after years of neglect, the citizens and the city began an effort to identify and rebuild the historic ‘Steps, Lanes and Paths’. The project is funded through the City of Mill Valley’s ‘Vegetation Management Program’. The program allows crews to clear vegetation, replace steps and add marker posts or signage.

Today, there are over 175 heritage ‘steps, lanes and paths’ in the city that provide direct connections for pedestrians. Some of these facilities are simple pathways, others require stairways due to steepness. The right of way still exists to include these passageways which continue to provide connections between streets, commercial areas and other hillside neighborhoods. Many are published on a map published by the city in 2006. The map shows conditions (developed/undeveloped, passable/blocked) and connections to other facilities.



Purpose

- Circulation: Improved linkage to destinations (public transit stops, schools, stores, churches the City Hall and the Library) resulted in an increase in the use of paths and the reduction in traffic.
- Emergency: ‘Steps, Lanes and Paths’ serve as only viable exit from Mill Valley’s narrow streets in the event of a disaster.
- Health: People who use walking to reach their destinations as a way of life are more likely to be and remain healthy.
- Community building: walking around town is a pleasurable and an effective way of meeting people in the community



FLAGSTAFF, AZ

Population: 63,505
Area: 64 square miles
Density: 992 persons per square mile

Main Initiatives and Achievements

- Flagstaff Urban Trail System (FUTS)
- Pedestrian & bike counts
- A yearly weeklong Flagstaff Walks! event
- Placed based approach to zoning
- Level of Service standards for pedestrian, bicycle, and transit facilities

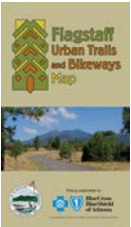
Flagstaff is a college town, the home of Northern Arizona University. It has a strong tourism sector, and an active cultural scene. The city is also a magnet for outdoor enthusiasts: there are 679.2 acres of city parks in Flagstaff. The city has an extensive trail system (called “FUTS”). The network extends throughout the city and is widely used for both recreation and transportation.

The city has a bicycle and pedestrian coordinator, an active pedestrian advocacy group, and a Pedestrian Advisory Committee. Flagstaff provides its staff with excellent training opportunities to expose the staff to current ideas and developments in pedestrian safety and walkability.

Flagstaff conducts pedestrian & bike counts every 3 years, and Trip Diary Survey (FTDS) every 5 years. The FTDS is a City administered survey designed to inform future planning efforts by evaluating resident travel habits. Participants keep a log of all of their trips for one day, including the origin and destination, mode, number of people, and distance.

Place-Based Approach to Zoning that reinforces the unique character of the city. They use the idea that based on their form and character different types of places should be regulated in different ways. Flagstaff was classified into three types of places: Natural Places, Walkable Urban Places, and Drivable Suburban Places.

The Flagstaff Metropolitan Planning Organization developed detailed indices of Level of Service standards for pedestrian, bicycle, and transit facilities in rural, suburban, and urban settings. These standards evaluated factors like sidewalk width, provision of amenities, crossing frequency, crosswalk markings, curb extensions and median islands, and average daily traffic (ADT), among others. The City built these standards into the plan and uses them to prioritize investment, guide development review, and monitor ongoing performance



Flagstaff Urban Trail Sustem (FUTS)

The city has a popular and extensive trail system called the Flagstaff Urban Trail System (FUTS).

- 50 miles of trails, with more than 80 more miles planned.
- Offer an incredibly diverse range of experiences; some trails are located along busy streets, while others traverse beautiful natural places - canyons, riparian areas, grasslands, meadows, and forests - all within the urban area of Flagstaff.
- The system connects neighborhoods, shopping, places of employment, schools, parks, open space, and the surrounding National Forest, and allow users to combine transportation, recreation and contact with nature.
- The city has good trails maps

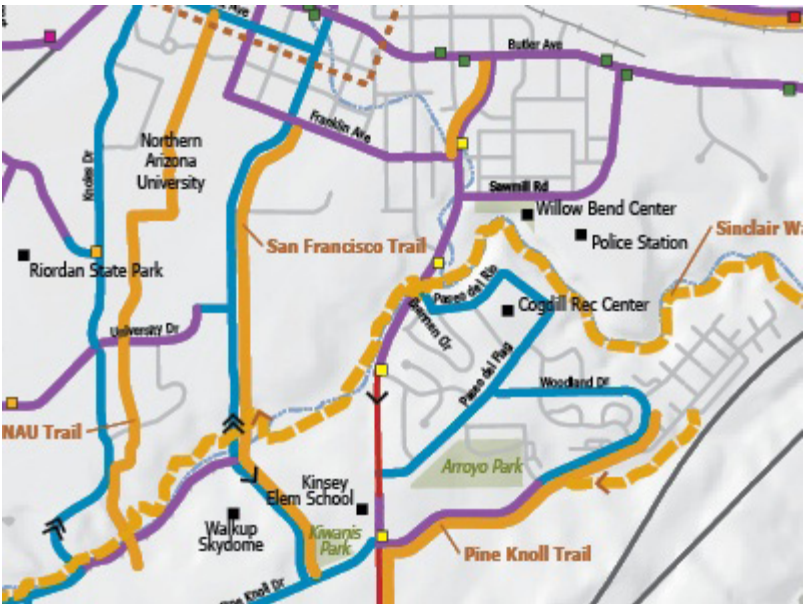
A trail users survey was conducted July 2011

- In 2011 they found that The FUTS system is used for multiple purposes, including recreation (79.6 percent of respondents), health and exercise (78.2 percent) and to experience nature and open space (56.0 percent). In addition, more than half of respondents (50.9 percent) use the FUTS for travel and commuting.
- FUTS trails were all very highly rated by survey respondents, with more than 90 percent of respondents rating these items as “excellent” or “good.”
- Respondents felt that the FUTS provides good connections around town (29.2 percent) and is convenient and is easy to access from many places (23.8 percent) even though they also felt that there are missing segments (connections) and system is incomplete (32.2 percent of respondents)

Adopt-A-FUTS: opportunity for local non-profits, clubs and organizations, businesses, neighborhood associations, schools, families, and individuals to help improve our FUTS trails and make a visible difference in the community.

Flagstaff Walks!

- Annual series of events organized by the City’s Pedestrian Advisory Committee to celebrate Flagstaff’s walkable character and to raise awareness of pedestrian issues
- Activities include education programs (such as the Safe Routes to School Workshops and Science in the parks programs), Geocaching, walkability audits, guided walks (e.g. mural walk), sidewalk and park clean up, International Walk to School Day



CHARLOTTESVILLE, VA

Population: 41,225

Area: 10.3 square miles

Density: 4,002 per square mile

Main Achievements

- Adopted Complete Streets policy in 2010
- Zoning policies promote walkability
- Excellent transit service
- Large outdoor pedestrian mall
- Good pedestrian infrastructure
- Safe Routes to School programs

Charlottesville is a college town (home of University of Virginia), but it also attracts approximately half a million tourists every year. It has a large series of attractions and venues for its relatively small size. These attractions are wine and beer tours, recreational opportunities, and other entertainment.

Zoning Policies

- Require all new development to be infill development tough The Infill Special Use Permit (SUP) (2006) which allows for deviations from the current lot size requirements
- Have maximum parking standards, parking location requirements, and priced public parking to ensure that valuable public space is not unnecessarily used as parking

Infrastructure

- 100% of signalized intersections have been converted to push-button signals with countdown timers
- City has installed in-ground LED crosswalks and uses rapid flash beacons at crosswalks
- Schools received SRTS funding for sidewalk improvements

Excellent transit services (Charlottesville Area Transit and University Transit Services). Transit is available within a 1/4 mile of 95% of the population seven days a week and operates at 95% on time performance. The city is well connected by bus lines and rail to other major cities such as Chicago, Boston, New York City, New Orleans. Charlottesville also has an electric streetcar line.

Charlottesville Downtown has one of the longest outdoor pedestrian malls in the US (created in 1975). Eight blocks of the downtown was closed permanently. The mixed use mall on the historic Main Street is home to over 150 businesses situated in rehabilitated historic buildings.



CARY, NC

Population: 135,234

Area: 55.48 square miles

Density: 2,438 persons per square mile

Main Achievements

- Created a walkable downtown
- Built an extensive greenway network
- Citizen based sidewalk request program
- Ordinances to support walkability standards
- Dedicated staff resources for walkability issues

Cary is not only the largest town in North Carolina, but it is also one of the fastest growing municipalities in the United States. Cary has a long history of its Planned Unit Development (PUD), which allows a developer to plan an entire community before beginning development. The City is committed to improving walkability in its downtown and creating an extensive trail network. Similarly to Tigard, the City has a Downtown Streetscape Project that was created to provide a walkable environment by improving roadway design and streetscape environments. It has dedicated staff resources for non-motorized travel goals such as a pedestrian coordinator, and several other planning, engineering, and parks department staff.

Walkability Program

- \$1 million annual sidewalk request program: a citizen-based program where residents can evaluate and request missing sidewalk links and/or pedestrian related infrastructure. It requires a petition at the neighborhood level and encourages collaboration between neighbors.
- Land Development Ordinance includes Street Connectivity Standards that require residential developments to achieve a connectivity index of 1.2 or greater. If the requirement is waived by the Planning Director the development must provide a pedestrian trail to link any cul-de-sacs (more information in Cary’s Transportation Plan – Pedestrian Plan 3.6. Destinations: Parks, Schools, and Shopping Centers, Streets Plan).
- Approximately 60 miles of trails and greenways, and a couple hundred additional miles planned. It has completed approximately 50 miles of greenway and 8 grade-separated crossings in 2012

Trails and Signs

All greenways in Cary have benches, directional signs, and public art to aid a better walking environment. The Comprehensive Sign Plan (2007) includes design specification for greenway signage and wayfinding

Conducted trail user counts and surveys that showed high values of greenways parks and trails for residents.



HOUTEN, SOUTH HOLLAND, THE NETHERLANDS

Population: 48,427

Area: 22.78 square mile

Density: 2,260 persons per square mile

Houten, situated about 32 miles southeast of Amsterdam, shows what is possible when a city’s commitment to walkability (and bikeability) are carried out to the fullest. Like Tigard, Houten is a mid-century, low-density suburb, though it was developed from scratch following a strictly-planned model with a handful of guiding principles.

Confining Through Traffic to a ‘Ring Road’

- A limited access ring road circumvents the town and isolates the residential communities inside by segregating fast and slow traffic. Fast traffic (45 miles per hour) is limited to the ring road and beyond, while residential areas on the inside are protected by slower speed limits of about 20 miles per hour.

Design of the Interior Streets

- Streets of Houten are rarely straight to discourage traffic from going fast. Town policy states that all roads within the ring road may only have straight sections for 75 meters or less. Even on the ring road, speed is reduced by curved sections. Town policy limits straightaways to 0.25 miles or less along the ring road, forcing drivers to remain in control at a safe speed.
- Due to the many access points to the interior town on the ring road, traffic is distributed over many collectors, so that no collector linking to the ring road accumulates much traffic.

Blocking Through Auto Traffic

- Permeable barriers (housing complexes and green space) are placed throughout the town and are intended to block through auto traffic. To get from one part of town to the other, cars fist must exit a circuitous route to the ring road, travel around the residential areas and reenter at another access point. Greenways create a barrier for cars, but bike paths through the greenway allow cyclists easy, undisturbed access.

High Quality Bicycling and Walking

- Town policy intentionally made traveling through the middle of Houten very difficult by car. Cyclists and pedestrians are able to navigate about town with a network of standalone, one-way and two-way cycle tracks. Exclusive connections were built that make bicycle and pedestrian paths the most direct routes through town, encouraging short, in-town trips to be made by bicycle or on-foot.
- Where standalone bike paths are not available, shared lanes and bicycle streets act as safe connections in residential areas thanks to reduced speed limits for cars. Where bikes need to cross motorways the town has built bike underpasses and underground bicycle roundabouts, completely separating bikes from the dangerously fast auto-traffic.



Centrally Located Shopping, Schools, and Transit Options

- Two main town centers
- A train rail bisects the town and makes two stops within Houten
- Cycling is further promoted by an indoor bicycle parking garage underneath the train station that can hold up to 3,100 bikes
- Shopping centers surround the stations creating an organized and easily accessible town center.
- The bicycle and pedestrian network radiates from the town centers making them easily accessible to residents.
- Residential neighborhoods are segmented and organized by a series of similarly named streets, “themeing” the neighborhoods.
- Schools are strategically placed allowing children to never need to walk more than a ¼ mile to school. Today, the town is expanding this model to the southern train station. When construction is complete, this station will have a layout of shopping areas surrounding the center of town similar to that found in the northern section.

