

## 2.1 PROJECT BACKGROUND

### Project Basics

The Green Connections project team conducted a two-year planning process from Winter 2011 to Winter 2013 to develop a citywide network linking people to parks, open spaces, and the waterfront. The main work products developed during this period include:

- » **Green Connections Draft Network:** a map of 24 routes (totaling over 115 miles) that span the entire footprint of the City.
- » **Design Toolkit:** a set of 16 design elements for blocks and intersections that could be applied to meet local needs and goals.
- » **Focus Neighborhood Concept Designs:** The Green Connections team developed preliminary designs for routes in six Focus Neighborhoods: Bayview-Hunters Point, Chinatown, Potrero Hill, Tenderloin, Visitacion Valley, and Western Addition.

- » **Ecology Guide,** which provides a narrative for each route and recommendations for plants that promote target species.
- » **Implementation Guide:** a description of resources, programs, and processes that could help the City, private sector and community members to implement the network.

Green Connections routes will be planned and implemented gradually over the next twenty years to build a cohesive network. Some components could potentially be completed as a citywide project, such as directional signs and other wayfinding strategies. Other, more neighborhood-specific streetscape or traffic calming elements will be phased depending on funding availability, project need, geographic equity, coordination opportunities (such as a scheduled street repaving or other capital projects), and other factors. Green

Connections does not create a new City program; rather, routes will be implemented through a variety of existing City programs and agencies.

Green Connections is also meant to be implemented through community-based planning processes, understanding that stakeholders bring creative ideas and knowledge about local needs and priorities. Green Connections does not offer prescribed, one-size-fits all designs for the routes; rather, the design toolkit is meant to provide a menu of options that will be adapted to fit the local context. The planning process in the six Focus Neighborhoods was meant to provide a model for future planning efforts across the city, whether led by the City or initiated by neighborhood groups.

## 2.2 RELATED POLICIES

Green Connections builds on several City efforts related to street design, open space and sustainability. Collectively, these plans describe a set of strategies for how to improve our streets for walking and bicycling, increase access to parks and open spaces, and enhance the ecological functioning of our streets.

**Recreation and Open Space Element: An Element of the General Plan of the City and County of San Francisco – Revised Draft.** The Recreation and Open Space Element provides a 20-year vision for a comprehensive open space network. A draft was released in December 2013.

**Better Streets Plan.** A set of standards, guidelines, and implementation strategies to govern how the city designs, builds, and maintains its pedestrian environment. The plan outlines specific design guidelines for a variety of street types. Adopted in 2010.

**Walk First: Improving Safety & Walking Conditions in San Francisco.** WalkFirst identified a network of Streetscape Streets, these are streets where people are walking or would likely walk if the conditions were better. These streets are in close proximity to pedestrian generators (schools, parks, tourists activities and shopping districts), and are also located in areas where there might be more dependence on walking as a means of transportation, due to demographics, street slope and/or limited access to transit or private automobiles.

**San Francisco Bicycle Plan.** The bicycle plan establishes a citywide network of bicycle infrastructure, including a number of near-term improvements to specific routes. Adopted in 2009.

**SFMTA 2013-2018 Bicycle Strategy.** The SFMTA 2013-2018 Bicycle Strategy sets new directions and policy targets to make bicycling a part of everyday life in San Francisco. The key actions identified are designed to meet the mode share goal of 50 percent of all trips made using sustainable modes (walking, bicycle, public transit, and vehicle sharing). Draft adopted in 2013.

**San Francisco Pedestrian Strategy.** Released by the Mayor's Pedestrian Safety Task Force in 2013, the San Francisco Pedestrian Strategy provides a path towards making San Francisco the most walkable city in North America.

**San Francisco Stormwater Design Guidelines.** San Francisco's stormwater ordinance requires new development disturbing 5,000 square feet or more of the ground surface to manage stormwater on-site. The Stormwater Design Guidelines outline ways to incorporate on-site stormwater management using low impact design (LID) strategies, also known as green infrastructure. Adopted in 2010.

**Blue Greenway Vision and Roadmap to Implementation.** The Blue Greenway plans to create a 13-mile greenway network along the City's Southeastern Waterfront.

**Urban Forest Plan.** The Urban Forest Plan identifies strategies to proactively manage and grow the City's urban tree population with a primary focus on street trees. The ultimate goal is to create an expanded, healthy and thriving urban forest now and for the future. Draft released in 2013.

## 2.3 PUBLIC PARTICIPATION AND ENGAGEMENT

The Green Connections planning process included a number of opportunities for community input, including more than twenty outreach events across the city. This effort helped the team understand stakeholders' vision for Green Connections and solicited feedback on the draft network, needs and opportunities in different neighborhoods, and potential design options for the routes. Example outreach events include:



**OPEN HOUSE #1**  
February 15, 2012

Kick-off event for the Green Connections project held at the LGBT Center. Members of the public were invited to stop by and provide feedback on their route to the park and their vision for a Green Connection.



**OPEN HOUSE #2**  
October 3, 2012

The second open house for the Green Connections project held at the LGBT Center. Members of the public were invited to stop by and provide feedback on a draft network map and design toolkit.



**UNLIKELY HABITAT:  
A TENDERLOIN  
SWALLOWTAIL TOUR**  
July 1, 2012

A neighborhood walk to explore Civic Center, the Tenderloin, and the habitat these neighborhoods provide for butterflies and people alike. Highlights of the walk include learning about local swallowtails, visiting the Tenderloin National Forest and discussing opportunities for improving walking conditions and greening local streets.



**POTRERO HILL TO  
THE BLUE GREENWAY**  
August 19, 2012

This neighborhood walk explored walking connections from Potrero Hill to parks and the Blue Greenway, a 13-mile walkway along San Francisco's southern waterfront. Highlights of the walk include the Potrero Hill Recreation Center, Esprit Park, Warm Water Cove, the new Pennsylvania Community Gardens.



**SUNDAY STREETS:  
CHINATOWN**  
August 26, 2012

Green Connections attended six Sunday Streets events in 2012, where community members were invited to draw their route to the park and describe what they want to see in a Green Connection.

## Year 1 (Winter 2011 – Fall 2012)

The main goal during the first year of the project was to develop the Draft Network and Design Toolkit. The project team launched Green Connections with a Kick-off Meeting on February 15th, 2012, attended by 150 members of the public. Stakeholders were asked to identify their favorite parks to visit, what streets they use to get to parks, existing barriers to walking and biking, and what other destinations they would like to reach using the routes.

Following the project kick-off, the team participated in a number of events to publicize the project and solicit additional feedback. From March to September 2012, the project team conducted outreach at Sunday Streets events in six neighborhoods (Embarcadero, Great Highway, Mission, Bayview/Dogpatch, Chinatown, and the Western Addition), Bike to School events, and Neighborhood Office Hours in the six Focus Neighborhoods.

In collaboration with Nature in the City, San Francisco Parks Alliance, and Walk San Francisco, the team also led seven walking tours to highlight local ecology and innovative street design strategies already being implemented in the city. Key stakeholders and subject experts were invited to participate in subject-specific charrettes: Walk San Francisco hosted a pedestrian charrette in July 2012 focused on strategies to improve walking conditions, and Nature in the City hosted a series of Ecology Think Tanks in April 2012 to invite experts to deliberate on opportunities for enhancing wildlife habitat corridors in San Francisco.

Throughout these events, community members were asked to provide specific ideas about which parks to prioritize for improved access, the characteristics of streets that influence which routes people take to the park, and what elements people would like to see in a Green Connection.

At these events, the public was asked a series of questions:

- » What is your favorite park to walk to? What do you like about this route?
- » What is your least favorite park to walk to? How can your route could be improved?
- » How do you envision a Green Connection?

To supplement the outreach events, the Green Connections project team also developed an online survey. The survey asked participants to identify barriers to accessing parks and open spaces and what features they would like to see in a Green Connection. It was available from February to June 2012, and over 450 responses were received.

## KEY QUESTIONS FOR YEAR 1 OUTREACH

### Green Connections: WHAT IS YOUR FAVORITE PARK TO WALK OR BIKE TO?

Place a green dot next to a park you like to visit and draw your route.



Tell us what you like about your route.

Blank space for drawing and text input.

### Green Connections: WHAT PARK WOULD YOU LIKE TO WALK OR BIKE TO MORE?

Place a red dot next to a park you would like to visit more and draw your route.



Tell us how your route could be improved.

Blank space for drawing and text input.

### Green Connections: HOW DO YOU ENVISION A GREEN CONNECTION?

Are people walking or biking? Are there birds, butterflies or other animals? Are cars moving fast or slow or not at all? Are kids playing? Is there landscaping, trees or sidewalk gardens? Do you feel safe, calm, playful?

Tell us how you envision a green connection...



## ONLINE SURVEY #1

Online Survey.  
450 Participants.  
February to  
June 2012.

#### Who took the survey?

LIVE IN SAN FRANCISCO



WORK IN SAN FRANCISCO



GENDER



CHILDREN IN HOUSEHOLD



DOGS IN HOUSEHOLDS



#### Park visited most frequently:

PARK MOST VISITED (TOP 10) % chosen

GOLDEN GATE PARK	28%
DOLORES PARK	11%
OTHER	9%
CRISSY FIELD	4%
BERNAL HEIGHTS PARK	4%
GLEN CANYON PARK	3%
YERBA BUENA GARDENS	3%
ALAMO SQUARE	2%
PATRICIA'S GREEN	2%
DUBOCE PARK	2%

HOW DO YOU GET THERE? Mode



WHERE DO YOU START FROM? Place



HOW OFTEN DO YOU VISIT? Frequency



#### Park would like to visit more:

PARK LIKE TO VISIT MORE (TOP 10) % chosen

GOLDEN GATE PARK	22%
CRISSY FIELD	8%
OTHER	7%
JOHN McLAREN PARK	6%
DOLORES PARK	6%
PRESIDIO	6%
GLEN CANYON PARK	4%
HERON'S HEAD PARK	3%
ALAMO SQUARE	2%
BUENA VISTA PARK	2%

HOW DO YOU GET THERE? Mode



WHAT ARE THE REASONS YOU DO NOT GO MORE FREQUENTLY? % chosen

DISTANCE FROM HOME	52%
FAST MOVING CARS	31%
LACK OF BICYCLE FACILITIES	22%
STEEP ROUTE	17%
POOR STREET CONDITIONS	12%
FEELS UNSAFE (CRIMINAL ACTIVITY)	11%
DIRTY	9%
PHYSICAL BARRIERS	9%
LACK OF TREES	6%
NOWHERE TO SIT	6%
NARROW SIDEWALK	5%

#### Qualities that influence route to park:

FOR THOSE THAT WALK: % chosen

SHORTEST ROUTE	60%
FEELS SAFE	33%
FROM CRIMINAL ACTIVITY	32%
TREES	32%
LANDSCAPING & GARDENS	28%
VIEWS	25%
FLATTEST ROUTE	23%
SLOW MOVING TRAFFIC	21%
CLEAN SIDEWALK	21%
INTERESTING SHOPS	18%
WIDE SIDEWALK	15%
SMOOTH/EVEN SIDEWALK	12%
SIDEWALK LIGHTING	7%
PLACES TO SIT	3%

FOR THOSE THAT BIKE: % chosen

BIKE FACILITIES	72%
FLATTEST ROUTE	62%
SHORTEST ROUTE	38%
SLOW MOVING TRAFFIC	31%
OTHER PEOPLE BIKING	30%
NICE VIEWS	24%
GOOD STREET CONDITIONS	23%
TREES	8%
LIGHTING	3%

#### Envisioning a Green Connection

WHAT ATTRIBUTES WOULD YOU LIKE TO SEE IN A GREEN CONNECTION?

TREES	63%
SIDEWALK GARDEN & LANDSCAPING	59%
CLEAN STREETS & SIDEWALK	58%
SLOW CAR TRAFFIC	57%
FACILITIES FOR BIKING	55%
PLACES TO SIT	41%
WIDE SIDEWALK	39%
SMOOTH OR EVEN SIDEWALK	35%
SIDEWALK LIGHTING	33%
SPECIAL PAVING	19%

ONLINE SURVEY #2

Survey on the DRAFT Network. Over 400 participants. October 2012 - March 2013.

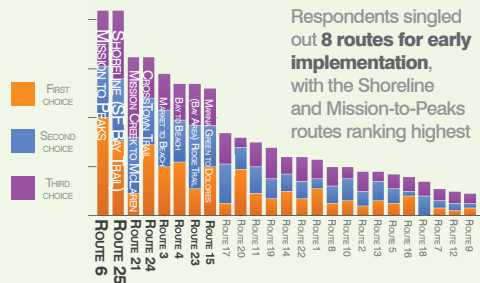
CITYWIDE NETWORK COMMENTS

90% of respondents live within 5 blocks of a route  
 66% of respondents live within 2 blocks of a route

96% of respondents would go as much as 5 blocks out of their way to reach a Green Connection route

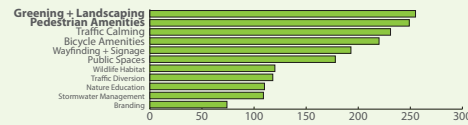


Respondents singled out 8 routes for early implementation, with the Shoreline and Mission-to-Peaks routes ranking highest



IDENTIFYING + IMPROVING THE NETWORK

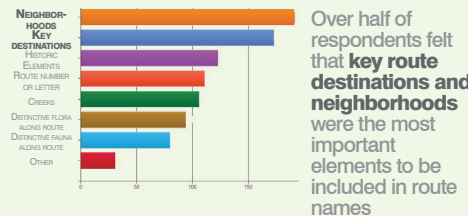
Three-quarters of respondents think greening and pedestrian improvements are most important to transforming a street into a Green Connection



Route signs and wayfinding are key identifying elements for over half of respondents

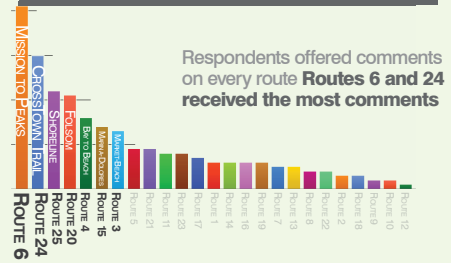


Over half of respondents felt that key route destinations and neighborhoods were the most important elements to be included in route names

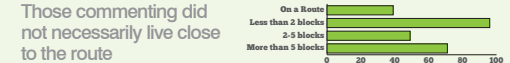


ROUTE SUGGESTIONS

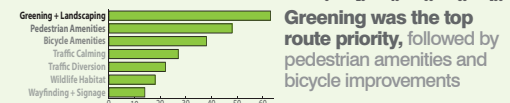
Respondents offered comments on every route. Routes 6 and 24 received the most comments



Those commenting did not necessarily live close to the route



Greening + Landscaping was the top route priority, followed by pedestrian amenities and bicycle improvements



Respondents foresaw some implementation challenges, many related to parking and traffic



Respondents envisioned many roles they could play in helping implement Green Connections projects



The project team hosted an Open House on October 3, 2012 to share and gain feedback on the Draft Green Connections Network and Design Toolkit, which was attended by over 100 community members. Materials included a summary of community feedback during the first year of the project, a draft Green Connections network and design toolkit, and a test of the draft network based on project goals.

Following the open house, a second online survey was available for six months to provide an additional opportunity for the public to provide specific feedback on the network. Over a six-month period, 400 people responded, providing input on changes to the proposed routes as well, as ideas for ways to name the routes and improve them over time.

The summary on the following page highlights the outreach events that took place over the first year of the project and some of the community generated ideas about what a green connection might look like and the qualities of green connections they would like to see.

SUMMARY OF YEAR 1 OUTREACH

**SUNDAY STREETS**

Sunday Streets in neighborhoods across the City. We asked for your feedback on how your route to the park could be improved

EMBARCADERO	MAR 11, 2012
GREAT HIGHWAY	APR 15, 2012
MISSION	JUN 03, 2012
BAYVIEW / DOGPATCH	JUL 22, 2012
CHINATOWN	AUG 26, 2012
WESTERN ADDITION	SEP 09, 2012



**NEIGHBORHOOD OFFICE HOURS**

Informal meetings in the neighborhood to learn more about the project, share ideas and provide input.

WESTERN ADDITION	MAR 14, 2012
TENDERLOIN	MAR 21, 2012
POTRERO HILL	MAR 28, 2012
VISITACION VALLEY	APR 04, 2012
CHINATOWN	APR 11, 2012
BAYVIEW	APR 25, 2012



**BIKE TO SCHOOL DAY**

Bike to School Day was held on April 12, 2012. Postcards were distributed to over 3000 students with information about the project and ways to participate in outreach events.



**WALKS**

A series of walks to envision what a Green Connection could look like. Walks took place throughout San Francisco, looking at completed projects and exploring opportunities to incorporate greening and landscaping, traffic calming features, and promote habitat. Participants were invited to complete a short questionnaire summarizing observations and their for a green connection.

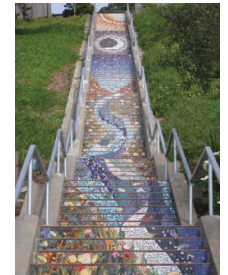
BIRDING AT HERON'S HEAD PARK (WITH JOSIAH CLARK)	MAR 10, 2012
VISITACION VALLEY GREENWAY WALK	APR 21, 2012
GREEN HAIRSTREAK BUTTERFLY: A WALK THROUGH AN ECOSYSTEM CORRIDOR	MAY 20, 2012
HOLLY PARK TO ALEMANY FARM BUTTERFLY WALK	MAY 26, 2012
GREEN STREETS, MEAN STREETS:	JUN 16, 2012
SOMA ALLEYS AND GARDENS	
UNLIKELY HABITAT: A TENDERLOIN SWALLOWTAIL TOUR	JUL 01, 2012
POTRERO HILL TO THE BLUE GREENWAY, GREY TO GREEN TO BLUE --WITH CHOCOLATE SPRINKLES!	AUG 19, 2012



**ENVISIONING A GREEN CONNECTION**

**EXAMPLES OF STREETS THAT ARE LIKE GREEN CONNECTIONS NOW**

Visitacion Valley Greenway	Paths at the top of San Jose Avenue
The Wiggle	Stairways
Poppyland and Penny Lane, Glen Park	Presidio
Alleys in Sunnyside	Market Street (separated bike lanes)
Mid-block open paths in Balboa Terrace	Valencia Street



**SUGGESTED COMPONENTS OF A GREEN CONNECTION**

Daylighted creeks (Mission, Islais)	Good paths for jogging
Urban agriculture, farmer's markets, community gardens, permaculture	Connections to transit
Separated bike lanes	Bathrooms
Alleys, if sunny and clean	Mosaics, public art, murals
Plazas	Connections to footbridges, walking bridges
Chicanes, bulb-outs	Pocket parks
Benches	Par course exercises
Storm/rainwater gardens	Shade
Native plants	Interesting architecture
Seasonal plantings	Trellises on (retaining) walls w/native plants, green roofs





Green Connection in Bayview:  
Board from Open House June 11, 2013



Green Connection in Visitacion Valley:  
Photo from Meeting #1 October 13, 2012



Green Connection in Potrero Hill/Dogpatch:  
Board from Meeting #1 November 17, 2012

## Year 2 (Winter 2012 – Fall 2013)

The focus of the second year of the project was to refine the Green Connections network and the design toolkit based on feedback from community members and City agencies, and to develop a concept design for a Green Connection in six focus neighborhoods: Bayview-Hunters Point, Chinatown, Potrero Hill, Tenderloin, Visitacion Valley, and the Western Addition. This was an opportunity to apply the design toolkit and test the idea of a green connection at a specific location. These neighborhoods were selected for a number of reasons. All of them demonstrate a great need for pedestrian and bicycle improvements – they have high population densities, large populations of children and seniors, and limited open green

spaces within their bounds and little access to parks and open spaces elsewhere in the city. They also have large proportions of minority and low-income households, and in some cases residents are less likely to own cars and more likely to walk, bike, and use transit.

Some of these neighborhoods are also home to other planning projects that have the potential to introduce significant new investment and growth, and thus present opportunities to coordinate with and build-off of other development projects. For instance, three of the neighborhoods (Bayview, Potrero Hill and Visitacion Valley), contain sites that are part of HOPE SF (<http://hope-sf.org>), an

initiative led by the Mayor's Office of Housing to transform San Francisco's most distressed public housing sites into thriving communities with mixed-income housing, community facilities, and new and upgraded infrastructure, including streets.

Events in the focus neighborhoods included workshops and meetings to define project goals and develop initial design concepts. The outreach approach for each focus neighborhood varied, in response to local needs and opportunities. A summary of community engagement and conceptual designs developed in each Focus Neighborhood is described in chapter 6.



## 2.4 BEST PRACTICES FROM SELECTED CITIES

San Francisco’s Green Connections program is an effort to connect people to open spaces via a new kind of street that is itself green and sustainable. In this effort, the project drew inspiration and expertise from established and successful neighborhood greenway and green streets programs around North America and the world. The descriptions and photos here present just a few of the notable examples that the Green Connections team looked to for inspiration. It is worth noting that many cities aiming to respond to a renewed swell of residents and various sustainability and transportation goals have programs similar to Green Connections.



Hudson River Greenway, New York



Map of Riverdale-Maple Glendale Greenway



Bike Boulevard Signage, Berkeley California



Crown Street, Vancouver



Vancouver City Greenways Plan

## Vancouver

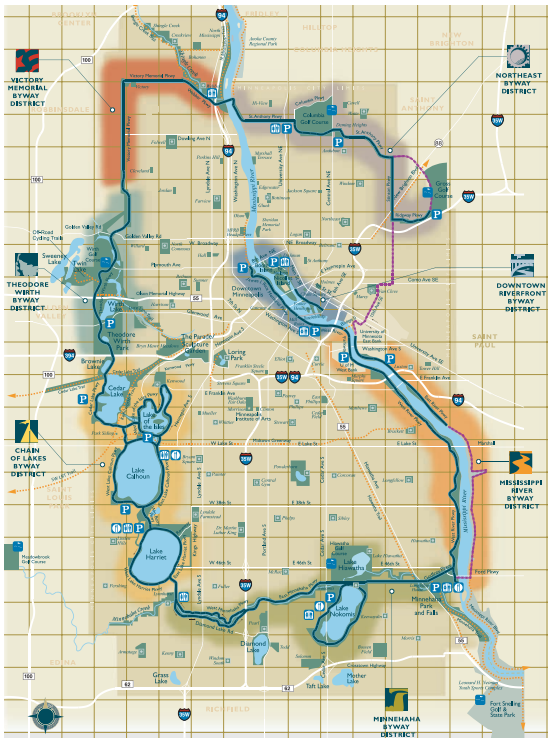
Of all the cities the project team studied, Vancouver with its mix of programs aimed at improving active transportation, accessibility, and sustainability along city streets bears the most resemblance to Green Connections. The Vancouver Greenways Plan, adopted in 1995, has helped the city build what is perhaps the most developed greenway network in North America. It envisioned two types of Greenways, which it defined as “linear public corridors for pedestrians and bicyclists that connect parks, nature reserves, cultural features, historic sites, neighborhoods and retail areas”: city greenways, a network of 16 waterfront promenades, urban walking and

biking paths, and environmental and historical education trails that connect people to cross-town destinations, totaling almost 140 km (similar in scale to Green Connections); and neighborhood greenways, which are smaller-scale, neighborhood connectors that are often initiated as public-private partnerships with local residents, and may include elements such as public art and landscaping. A newer Green Streets program complements the greenways, supporting community members seeking to add greening, beautification projects, and stormwater management elements in their neighborhoods.

For more information:

Vancouver Greenways: <http://vancouver.ca/streets-transportation/greenways-for-walking-and-cycling.aspx>

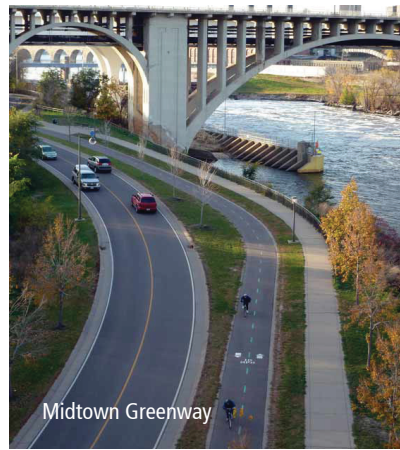
Green Streets: <http://vancouver.ca/streets-transportation/outdoor-community-spaces.aspx>



Grand Rounds National Scenic Byway

## Minneapolis

Minneapolis's remarkable trails, paths, and byways comprise what is arguably the best urban trail network in the US. From trails along both sides of the Mississippi River to the Minnehaha Parkway to the beloved trails around the Lakes, Minneapolis is a national leader in providing its citizens with a safe, beautiful, and accessible active transportation network, much of which is separated from car traffic. One of the keys to the city's success is the integration of high-quality trails with the city's extensive park network – in fact,



Midtown Greenway



the Minneapolis Parks & Recreation Board has primary responsibility over acquiring and maintaining trails. The city's efforts to develop bike boulevards and greenways within city neighborhoods are newer, but it envisions this as a next step to increase the reach and accessibility of an already effective system.

For more information:

Grand Rounds National Scenic Byway: <http://www.minneapolisparcs.org/grandrounds/>

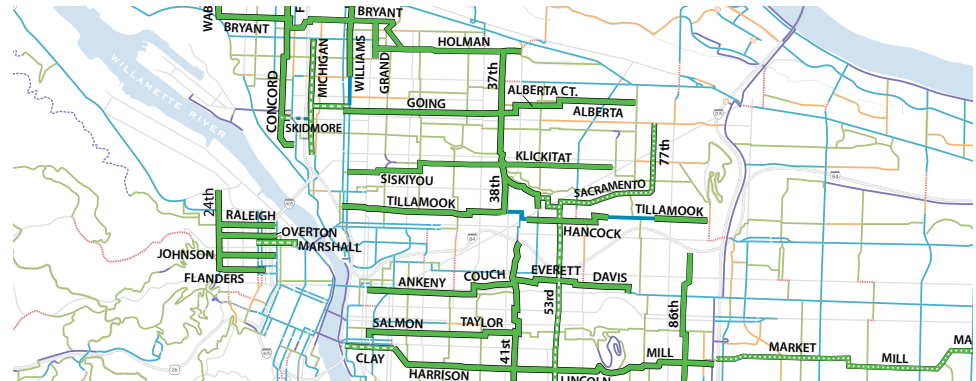
Minneapolis Bicycle Master Plan: <http://www.minneapolismn.gov/bicycles/projects/plan>



Portland Holman Greenway



Portland Green Street



Portland Neighborhood Greenways Plan

## Portland

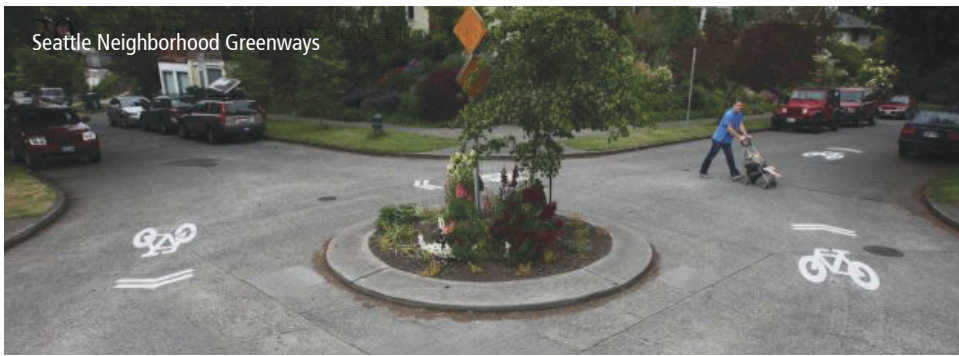
Portland's Neighborhood Greenways, formerly known as Bike Boulevards, are residential streets with low traffic volumes and speeds that prioritize bicycles and pedestrians. They are an integrated subset of the city's ambitious bicycle network envisioned in its Portland Bike Plan 2030. While greenways currently represent only one percent of Portland's roadway network, they have been extremely popular due to the high degree of safety, comfort, and connectivity they provide. They include features such as diverters, signage, and separated cycle

tracks on higher traffic sections. A separate Green Streets Program aims to "convert stormwater from a waste directed into a pipe to a resource that replenishes groundwater supplies," and has yielded some of the most beautiful and effective stormwater management designs in the nation.

For more information:

Portland Neighborhood Greenways: <http://www.neighborhoodgreenways.org>

Portland Green Streets Program: <http://www.portlandoregon.gov/bes/44407>



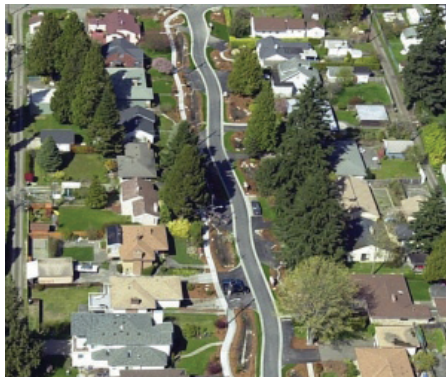
Seattle Neighborhood Greenways



New York City's Hudson River Greenway



Seattle Street Edge Alternatives (SEA) Street



## Seattle

Seattle has achieved among the most significant stormwater management and street redesign projects to be found in North America. The Street Edge Alternatives (SEA) Streets pilot program completed in 2001, a subset of its larger Seattle Green Streets program, showcased a range of unique drainage and street design innovations aimed at mimicking the natural landscape drainage systems that existed prior to traditional piped systems. Monitoring data indicate that the pilot generated a

11% reduction in impervious street surfaces compared to traditional roads, resulting in a 99% reduction of total volume of stormwater runoff.

For more information:

Seattle Green Streets: [http://www.seattle.gov/transportation/rowmanual/manual/6\\_2.asp](http://www.seattle.gov/transportation/rowmanual/manual/6_2.asp)

Seattle Street Edge Alternatives (SEA) Streets: <http://www.seattle.gov/util/environmentconservation/projects/drainagesystem/greenstormwaterinfrastructure/completedgsiprojects/streetedgealternatives/>

## New York

New York City holds claim to one of the nation's first and most ambitious greenway master plans, a 350-mile planned network first published in the Greenway Plan for NYC in 1993. Greenways have been a celebrated component of the park system throughout the city's history, and the plan builds on this legacy to develop paths and trails which link parks and neighborhoods around the city, providing public access to green spaces and the waterfront as well as recreational opportunities for walking, jogging, biking, and in-line

skating. Stretching some 32 miles in length, the Hudson River Greenway (part of the larger Manhattan Waterfront Greenway) is the longest continuous greenway on Manhattan and the single most heavily-used bikeway in America.

For more information:

New York City Greenways: <http://www.nycgovparks.org/facilities/bikeways>

New York City Hudson River Greenway: <http://www.nyc.gov/html/dcp/html/mwvg/mwghome.shtml>



Denver Cherry Creek Trail



## Heels & Wheels Trail

### Definition

Heel & Wheel trails are designed to minimize conflicts between different speed users to reduce conflicts in highly used segments of trail corridors. There are several construction, signage, and striping techniques available to reduce conflicts between different users.

### Ease of Use

High. The comfort level for Heels & Wheels users will generally be high as the different users will be traveling within a shared lane with users of the same speed. The relative comfort will also vary substantially according to the width of the facility, signed regulations, and volumes.

### Use

Heel & Wheel trails should provide additional capacity to trail segments that have poor Levels of Service (LOS) based on the Federal Highway Administration LOS calculations. Heels & Wheel trails are typically best accomplished by adding a parallel trail, adding to the current trail, or reconstructing the trail. Parallel trails can be constructed in hard or soft surfaces depending on the user types and demands.

### Design Considerations

Heels & Wheels should be designed to provide increased convenience for all trail users by minimizing conflicts between users with a speed differential of more than 10 MPH. Signage and ground markings should clearly identify where users should travel. Maximum and minimum speed limits should be posted, and where safety issues are identified, speed enforcement should be conducted.

The dimensions and posted speed limits of the Heels & Wheels sections will vary greatly based on user levels and physical constraints. A single-direction wheeled travel path should have a minimum width of 5 feet. A single direction heeled section should have a minimum width of 5 feet. A two-way wheeled path should have a minimum width of 12 feet. A two-way heeled section should have a minimum width of 8 feet.

Heel & Wheel trails are necessary where documented safety issues and user levels warrant such treatments. The design of the Heel & Wheel should be carefully considered to maximize the safety and user adherence to the intended trail user separation. A key design and construction consideration should be the speed of users.

### Denver Examples

- Cherry Creek Trail (Downtown)

A common Heels & Wheels section provides separation for bicycles and walkers/runners. In some instances, families riding bicycles at slower speeds, inline skaters, long boarders, parents pushing strollers, or mobility impaired persons using a mobility device are uncertain where to travel. It will be critical to understand the unique travel requirements of each user of the corridor (vehicle width, clearance, top speed, braking, etc.) and apply the most appropriate designations between users. To minimize conflicts and provide an uninterrupted experience for users, it will be critical to designate speeds that are appropriate for the trail users in the corridors under consideration for Heels & Wheels treatment.



Denver Heels &amp; Wheels Trail

## Denver

No other US city has gone as far as Denver in integrating its off-street trail and on-street greenway networks. In 2011, the city adopted its ambitious Denver Moves plan, a collaborative effort of the Denver Parks & Recreation and Public Works departments to establish a single, unified plan for bicyclists, pedestrians, and other active transportation users across the city. The plan includes a number of innovative typologies for walking and biking paths, and focuses on creating safe, comfortable

corridors that link neighborhoods, parks, employment centers, business districts, transit hubs, and other destinations in all parts of Denver.

For more information:

Denver Moves: <http://www.denvergov.org/bikeprogram/bicyclingindenver/streetsandtrails/planning/tabid/438250/default.aspx>

CHAPTER

# 3

# The Green Connections Network

