Walkway Network Model Tools

OR

“How Pedestrian Advocates Can Be the Smartest Folks in the Room”

J. Scott Parker, Chad Tucker and Ellen Vanderslice
Mayor Sam Adams of Portland promises millions for sidewalks for Southwest Portland and East Portland at the State of the City address, 2010.
Walkway Network Analysis

Creating and maintaining the walkway network model
Concepts to master:

• Walking access
• The walkway network
• Walkway network models
• Walkway network analysis
Walking access
Walking **access** means providing **walkway facilities** that get people where they want to go.
Walking access

In the utility model we assume 100% demand for walking access from every dwelling
The walkway network
Sidewalk corridors

Shortcuts, paths and trails

Crosswalks

= THE WALKWAY NETWORK
This picture tells you, “WALKING IS NOT IN THE TRANSPORTATION MODEL”
Walkway network analysis methods were first conceived in 2011 as part of East Portland in Motion.
Walkway network models
nodes
nodes + arcs
Typical street intersection in the **street** network

Typical street intersection in the **walkway** network
Walking directions are in beta. Use caution – This route may be missing sidewalks or pedestrian paths.

Suggested routes

Walking directions to Roosevelt High School

1. Head northeast on N Charleston Ave toward N Lombard St
   144 ft
2. Turn right onto N Lombard St
   56 ft
3. Slight left to stay on N Lombard St
   0.2 mi
4. Turn left onto N Mohawk Ave
   223 ft
5. Turn right onto N Central St
6. Turn left onto N Ida Ave
   Destination will be on the left
   335 ft

Roosevelt High School
Portland, Oregon
Walkway network analysis
Walkway Network Analysis

Creating and maintaining the walkway network model

“What if?” loop

Define project
Analyze and visualize
NETWORK CHANGES
LANES
TRAFFIC CONTROL
SPEED
SIDEWALK PAVEMENT
DESTINATIONS
Highlighted Barriers
Walksheds
Node Access Index
Segment traversals
Prepare street/trail centerline and generate walkway centerline
Close up, walkway centerline
Easy crossings have less impedance

Difficult crossings have greater impedance
IMPEDEANCE

- Cost weight
- Friction
- Effective distance
Assign impedance
Uncontrolled crosswalk
Effective length of crosswalk treatments on 5-lane roadway with 40mph speed limit

- Crossing guard (physical distance): 85 feet
- Uncontrolled: 1442 feet
Uncontrolled crosswalk
Would you walk west to this pedestrian bridge?
Would you walk east to this marked crosswalk with a median refuge?
Effective length of crosswalk treatments on 5-lane roadway with 40mph speed limit

- Crossing guard (physical distance): 85 feet
- Uncontrolled: 1442 feet
- Median refuge: 688 feet
- Pedestrian bridge (not for those with disabilities): 325 feet

Effective length in feet
Effective length of crosswalk treatments on 5-lane roadway with 40mph speed limit

- Crossing guard (physical distance)
  - Effective length: 100 feet

- Uncontrolled
  - Effective length: 1500 feet
  - Take your life in your hands

- Median refuge
  - Walk to crossing: 400 feet
  - Cross to bus at refuge: 1100 feet

- Pedestrian bridge (not for those with disabilities)
  - Walk to bridge: 200 feet
  - Climb and cross: 600 feet
  - Walk to bus: 300 feet
Analysis Tool
- Traversal generator
- Access index generator

Visualization Tools
- Walkshed calculator
- Slope-shading to highlight barriers
- Table of summary data
- Access index symbolizer
Project Definition Tool

- Project editor
The vision:
Walkway network analysis tools that anyone can easily use to generate instant results
CASE STUDY:
Powell-Division Corridor
Transit and Development Project
Powell-Division Transit Project: Connecting Communities to Education, Healthcare, and Jobs

Portland State

Portland State is Oregon’s largest and most diverse public university, the 50-acre campus has 30,000 students enrolled and is an anchor to downtown.

Poster courtesy Metro

OHSU

As the state’s only health and research university and Portland’s largest employer, OHSU has 13,500 employees and an annual budget of $1.4 billion.

Innovation Quadrant

Portland’s Innovation Quadrant enhances the connections and collaboration between higher education institutions, workforce development providers, and private sector partners that are currently located in four districts in the Central City.

East Portland

With the recently completed East Portland Broadway Plan, the city has committed $8 million in improvements to walking, biking, and access to transit, including projects on Powell and Division.

Jobs

Major employers include:

- Oregon Health & Science University: 14,350 employees
- TriMet: 2,900 employees
- Fred Meyer HQ: 2,000 employees
- Advanced Business Technologies: 500 employees
- Mt. Hood Community College: 750 employees

Quick Facts

More than 8 high schools in the study area, including David Douglas and Reynolds, the two largest in the state of Oregon.

Three major hospitals in the study area: Legacy Mt. Hood, Adventist, OHSU. Multnomah County Health Department operates primary care clinics in downtown Gresham, Rockwood, and East Portland.

Catholic Charities opened the Clack County Center in 2010, a 65,000 sf facility with rooms to serve more than 25,000 annually.

The Study Area crossed two light rail corridors - the Blue Line Green Line and the MAX Orange Line (under construction) - and parallel MAX Blue Line.
Metro heard A LOT about safer walking
The Powell-Division routes under consideration total 21 miles of roadway.

That’s only 0.4% of the roadway network in the Portland region.

11% of all pedestrian fatalities/severe injuries happened on that 0.4%
VISION ZERO: TRAFFIC INJURIES & FATALITIES, 2004-2013

Pedestrian Fatalities
- 2
- 1

Pedestrian Injuries
- 8 to 12
- 4 to 7
- 2 to 3
- 1

High Crash Corridors

This pedestrian tab includes all crashes over the ten year period where a person was injured or killed while walking.
Pedestrian Access Approach for Powell-Division
May 2015
**Approach to Pedestrian Access:**

1. Acknowledge previous policy and plans that analyze the conditions and make recommendations in the corridor
2. Report the safety issues that are affecting pedestrian travel in the corridor
3. Construct a detailed walkway network model to analyze current conditions in the corridor
4. Identify gaps and areas for improvements in the pedestrian environment in the corridor
5. Inventory pedestrian-related projects from previous plans
6. Use the walkway model analysis to score infrastructure projects
Half-mile walkshed
Half a mile from Powell/59th as the crow flies:
Half a mile from Powell/59th comparing crow-fly access with distance-weighted access.
Half a mile from Powell/59th comparing crow-fly access and distance-weighted access with traffic-weighted access.
Distance-weighted vs. Traffic-weighted
Division (11th & Clinton)

Map 2

Walkshed - Distance

Walkshed | Employment | Housing Units
---|---|---
5 minute | 1659 | 80
10 minute | 4229 | 1252

Walkshed - Traffic

Walkshed | Employment | Housing Units
---|---|---
5 minute | 1009 | 53
10 minute | 3265 | 661

- Station
- Community Center
- Employment
- Hospital
- Library
- School
- Parks and/or Natural Areas
- Cemeteries
- Golf Courses
- School Lands
**Division & 92nd MAX Station**

**Walkshed - Distance**

<table>
<thead>
<tr>
<th>Walkshed</th>
<th>Employment</th>
<th>Housing Units</th>
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<tbody>
<tr>
<td>5 minute</td>
<td>70</td>
<td>204</td>
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<td>10 minute</td>
<td>471</td>
<td>1269</td>
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**Walkshed - Traffic**

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<tr>
<td>5 minute</td>
<td>63</td>
<td>132</td>
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<td>10 minute</td>
<td>154</td>
<td>645</td>
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Division & 130th

Map 24

Walkshed - Distance

Walkshed - Traffic

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<th>Housing Units</th>
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<td>483</td>
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<td>10 minute</td>
<td>974</td>
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<tbody>
<tr>
<td>5 minute</td>
<td>62</td>
<td>325</td>
</tr>
<tr>
<td>10 minute</td>
<td>610</td>
<td>1090</td>
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- Station
- 5 minute walkshed
- 10 minute walkshed
- Community Center
- Employment
- Hospital
- Library
- School
- Parks and/or Natural Areas
- Cemeteries
- Golf Courses
- School Lands
TIGARD, OREGON
City of Tigard

2014–2034

Strategic Plan

The most walkable community in the Pacific Northwest where people of all ages and abilities enjoy healthy and interconnected lives.

Council adopts vision for Tigard to become walkable and interconnected

The Tigard City Council by a unanimous 4-0 vote Tuesday night has approved a 20-year strategic plan, with a vision to become the most walkable community in the Pacific Northwest where people of all ages and abilities enjoy healthy and interconnected lives.

“This is a roadmap for our city and the way we can develop our identity to become a community where our residents can remain healthy and connected to the city and each other,” said Tigard Councilor Marc Woodard. “Starting now, we can now begin to plan for our future decisions and make long-term plans. All of these will ensure we achieve this vision.”
SUPPORT FROM ABOVE

• MAYORS
• COMMISSIONERS
• DEPARTMENT HEADS
SUPPORT FROM WITHIN

• ALLY IN THE GOVERNMENT

• FACE TO FACE COLLABORATION
SUPPORT FROM BELOW

- VOLUNTEERS
- INTERNS
- TEMPS
- GRADUATE STUDENTS
THE FOUNDATION
1. INCOMPATIBLE DATA

2. PEDESTRIANS? PEDESTRIANS WHO?
Building the Foundation = Months

Generating Walkway Network = 10 minutes

Project Definition = 10 minutes

Analysis = seconds

Visualization = seconds
<table>
<thead>
<tr>
<th><strong>NUMBER</strong> OF <strong>PUBS</strong></th>
<th><strong>SURFACE TYPE</strong></th>
<th><strong>NUMBER</strong> OF <strong>PORTALS</strong> TO <strong>ALTERNATE</strong> <strong>WORLDS</strong></th>
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<tr>
<td><strong>NUMBER</strong> OF <strong>FOOD</strong> <strong>CARTS</strong></td>
<td><strong>PEDESTRIAN ONLY</strong></td>
<td><strong>UNI</strong>-<strong>QUE</strong> <strong>ID</strong> <strong>NUMBER</strong></td>
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THE FOUNDATION
Building the Foundation = Months

Generating Walkway Network = 10 minutes

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QUESTIONS?