U.S. Department of Transportation

ITS4US

IT'S TRANSPORTATION FOR ALL OF US

OpenSidewalks:

Advancing Pedestrian Data Collection and Interoperability, through an Open Data Collaborative and Accessibility-first Principles

University of Washington – Transportation Data Equity Project

February 7, 2024

Agenda

- **Purpose of this Webinar**
  - To share insights about mapping and data collection about non-motorized travel environments for navigation, planning and infrastructure prioritization, resulting from UW work on the Transportation Data Equity project.
- **Webinar Content**
  - ITS4US Deployment Program Overview (Kate Hartman)
  - UW team; Anat Caspi, OpenSidewalks and Open Data Collaborative
  - How to Stay Connected
  - Stakeholder Q&A
- **Webinar Protocol**
  - Please mute your phone during the entire webinar
  - You are welcome to ask questions via chatbox at the Q&A Section
  - The webinar recording and the presentation material will be posted on the ITS4US website

Kate Hartman

Chief – Research, Deployment & Evaluation

ITS Joint Program Office (JPO)

ITS4US UW Project AOR

ITS4US Program Overview

- A USDOT Multimodal Deployment effort, led by ITS JPO and supported by OST, FHWA and FTA
- Supports multiple large-scale replicable deployments to address the challenges of planning and executing all segments of a complete trip

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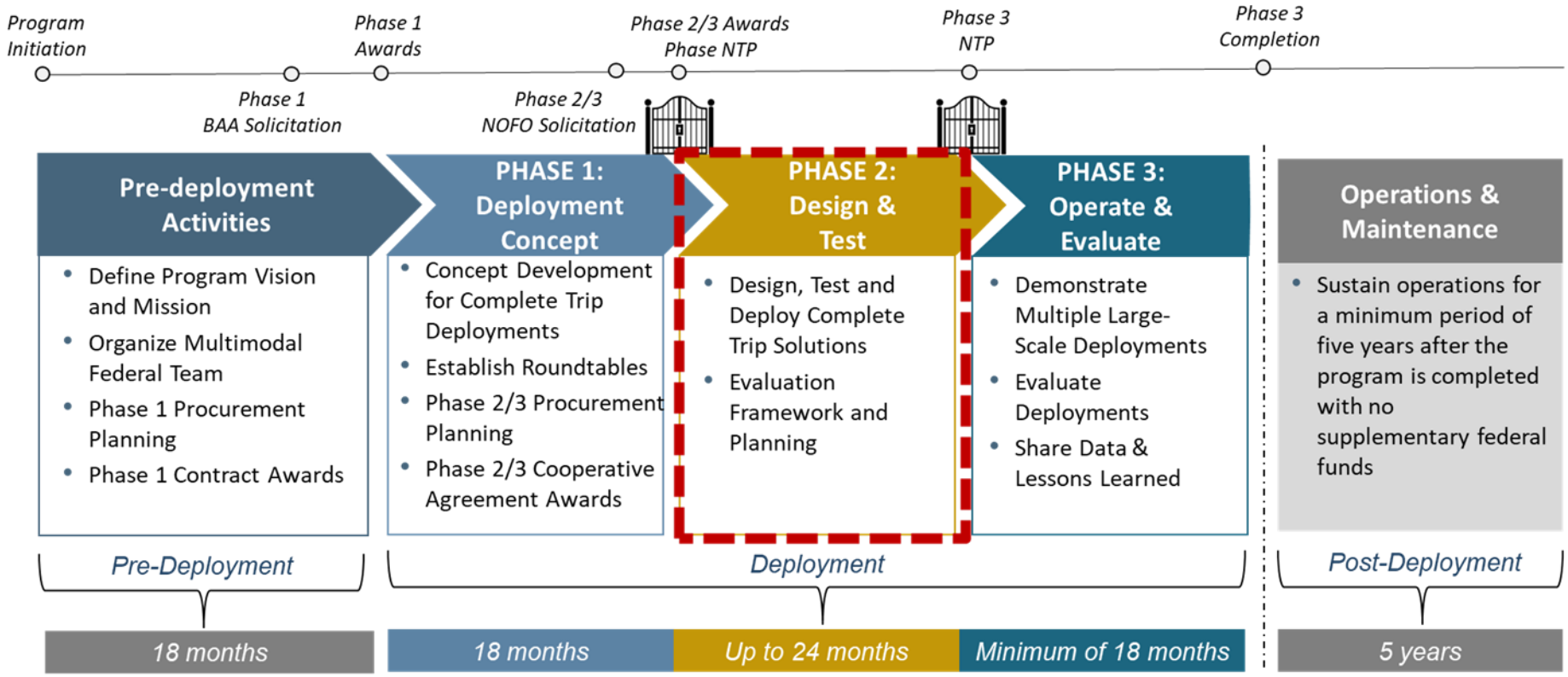
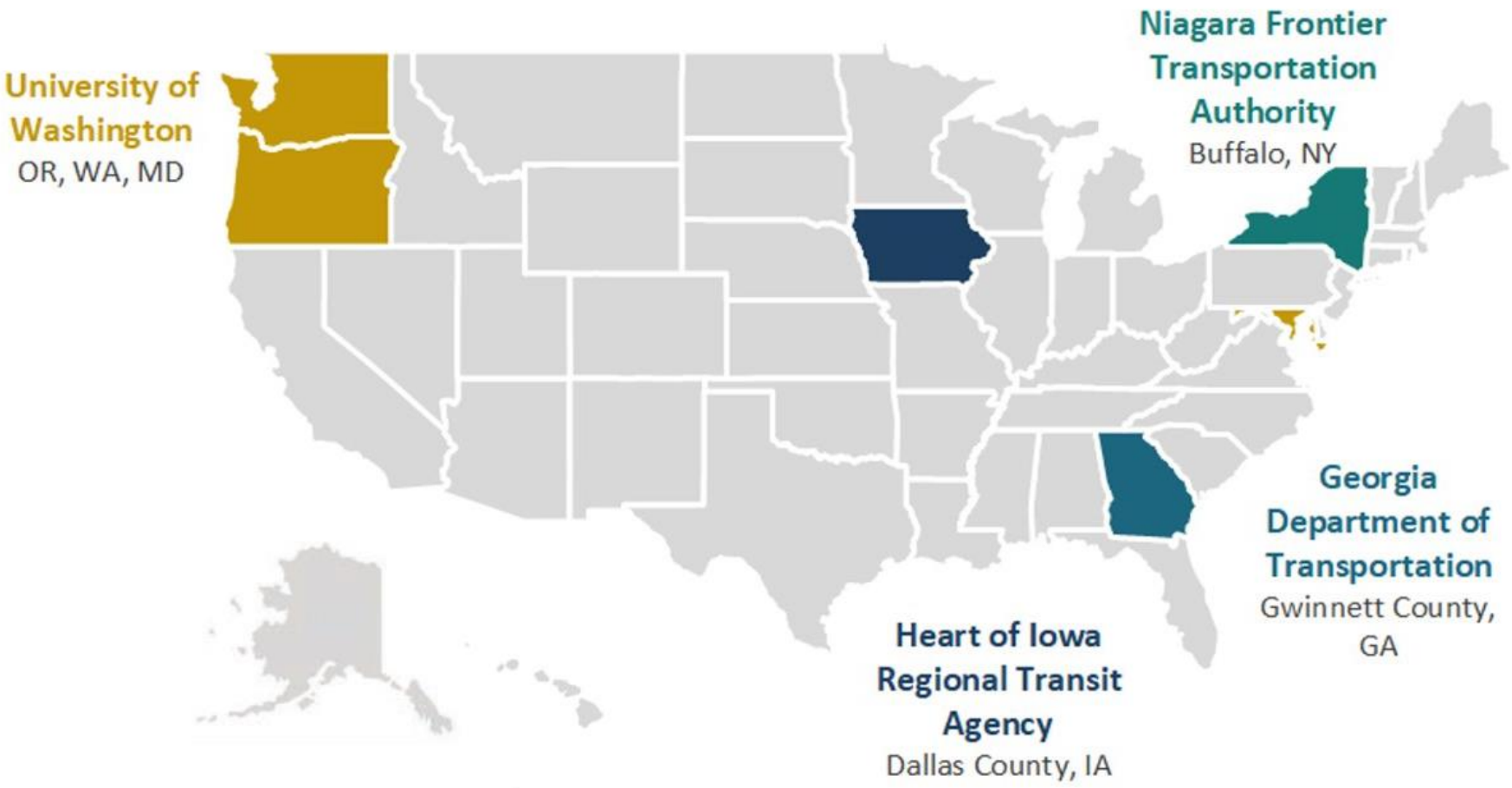
Vision: Innovative and integrated complete trip deployments to support seamless travel for all users across all modes, regardless of location, income, or disability

Deployment Phases



Source: USDOT

ITS4US Deployment Sites



Source: USDOT

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OpenSidewalks:

Advancing Pedestrian Data Collection and Interoperability, through an Open Data Collaborative and Accessibility-first principles

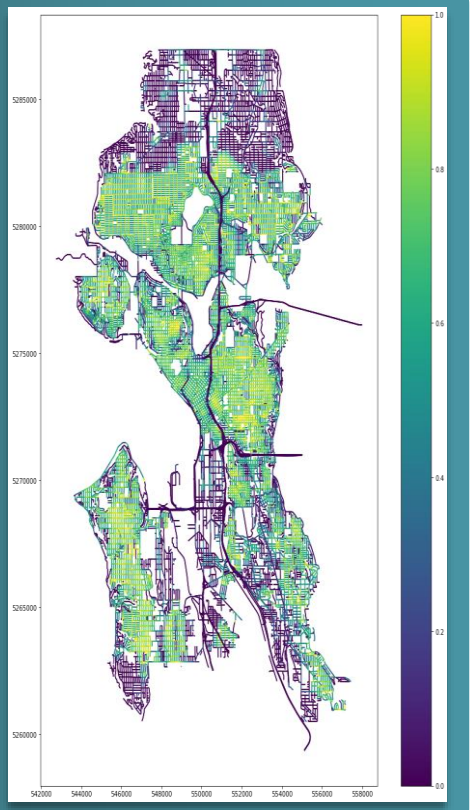
Anat Caspi, PhD
Director, Taskar Center for Accessible Technology

PAUL G. ALLEN SCHOOL OF COMPUTER SCIENCE & ENGINEERING

TCAT The Taskar Center for Accessible Technology

OpenSidewalks

Open, inclusive pedestrian-centric mapping and metrics



Partner with us. Join our study to trial these tools.

www.accessmap.app

tinyurl.com/GoAccessMap

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Access is personal

>Personal Mobility Profiles

Access is not a binary category

>Collect neutral, non-subjective descriptors of environments

Access evaluation requires a network, not separate Assets in the built environment

>Detailed pedestrian transportation network

Accessibility of streets and sidewalks

OpenSidewalks

To realize resilient, sustainable, accessible cities, we must standardize and metricize the full **Pedestrian & bike transportation network**.

Stakeholder information gaps: Planners

PLANNERS:

"Can we improve how we…

- …prioritize infrastructure modifications?
- …address equity considerations?
- …metricize mobility and access to transportation for our diverse population?"

Stakeholder information gaps: Businesses

BUSINESSES, PRIVATE TRANSPORTATION PROVIDERS (TNC'S), PARATRANSIT OPERATORS:

"Can we describe safe, accessible routes for diverse customers to our address/campus/fixed transit route station?"

Stakeholder information gaps: Pedestrians

PEDESTRIANS, BIKERS, NON-MOTORIZED TRAVELERS:

- "How do I find safe, accessible routes tailored to my abilities, needs and wants?"
- "What is my reach in a particular environment?"
- "What neighborhood is best fit for me, my family, my particular non-motorized transportation goals?"

accessmap

Human-centric personal mobility models explore how people actually navigate the built environment around them

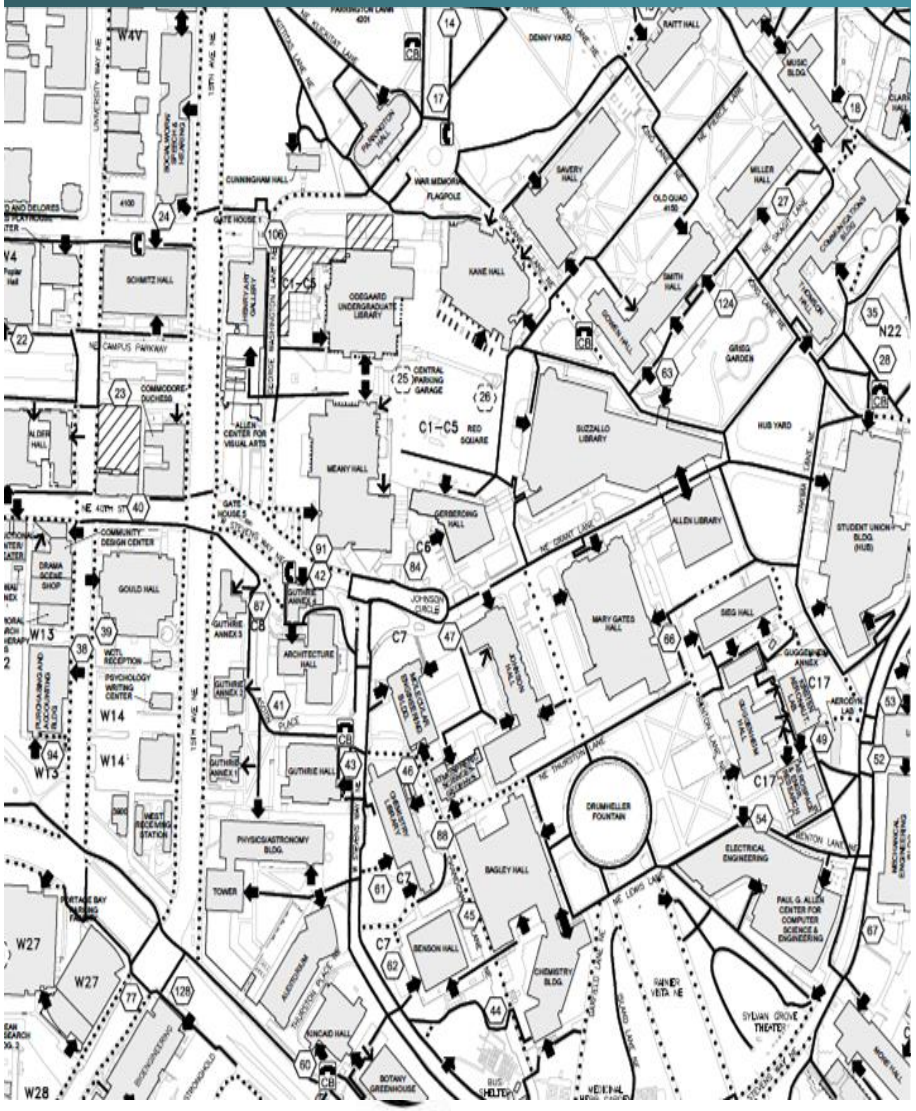
Serving pedestrians has to start with human-centric factors, conditioning mobility on:

- What is an individual's goal?
- What infrastructure exists to support their trip?
- What infrastructure cannot support their trip?
- How do multiple factors in the environment impact this experience?

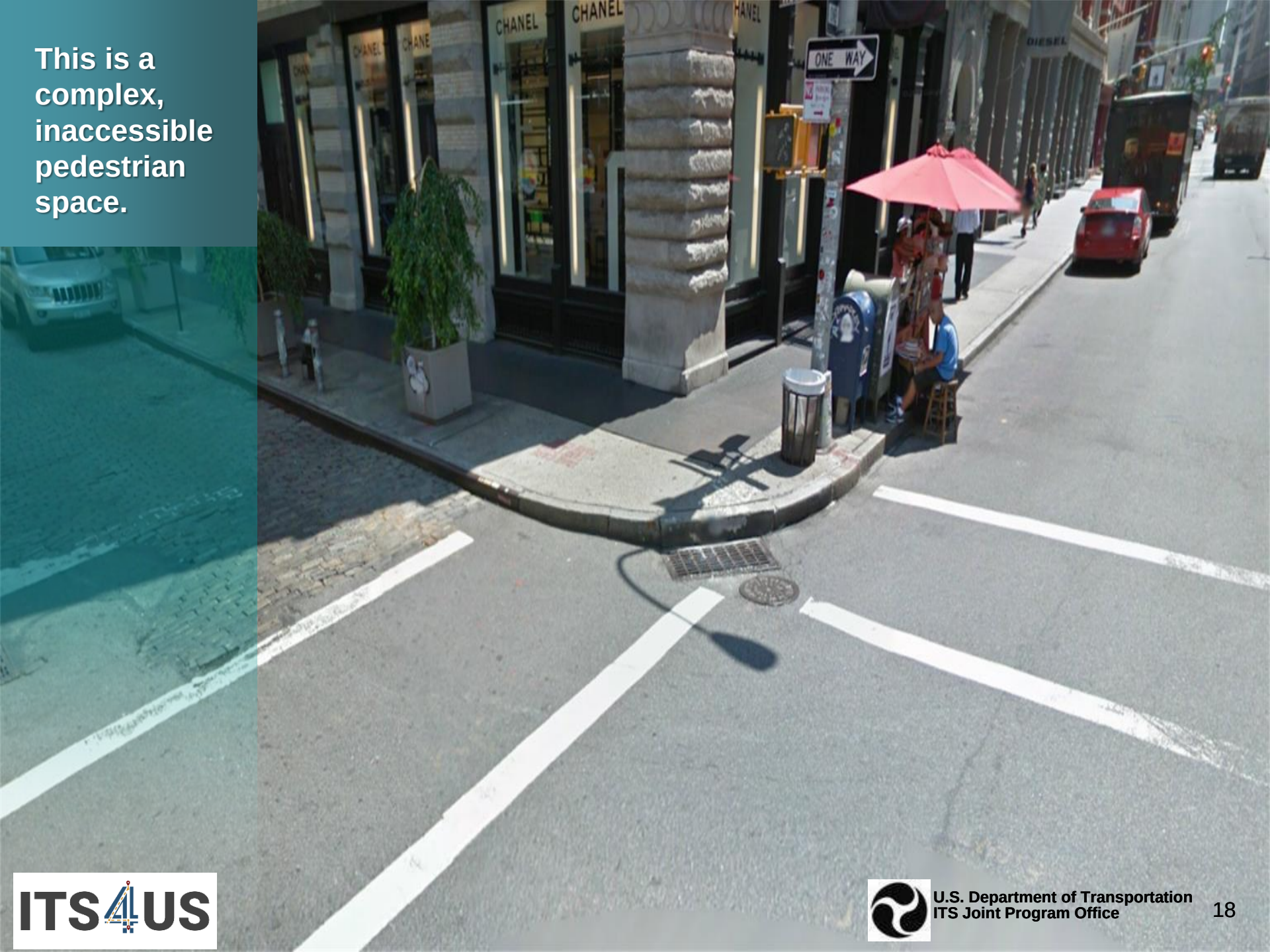
What data is currently collected? Ex: UW

- Sidewalk assets, but…
- …disconnected in space
- … existence, density, unclear abstractions
- …not scalable:
  - No consistency
  - Siloed by organization or purpose
  - Difficult to maintain as the built environment changes
  - Limited information

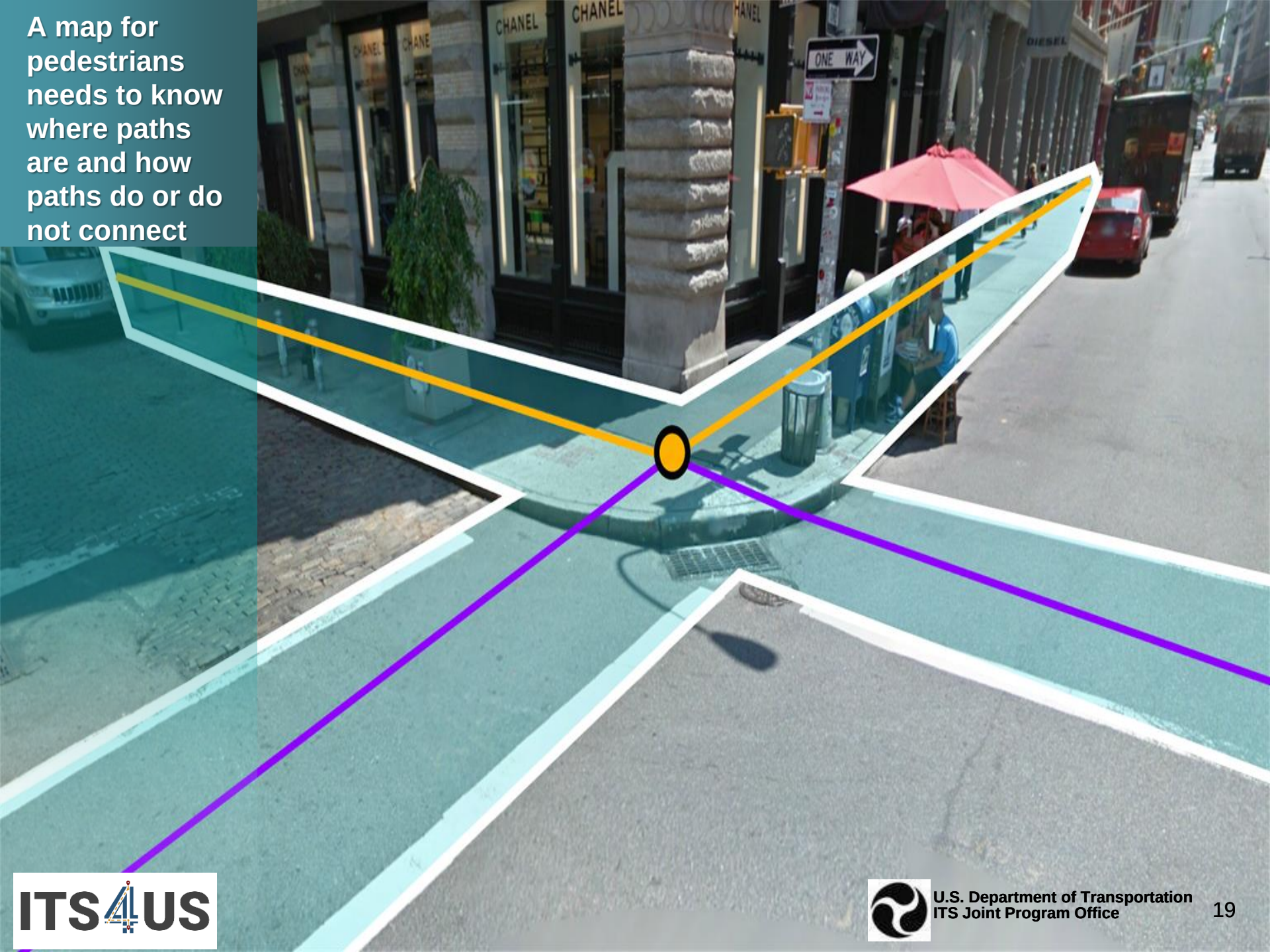
University of Washington Accessibility Map



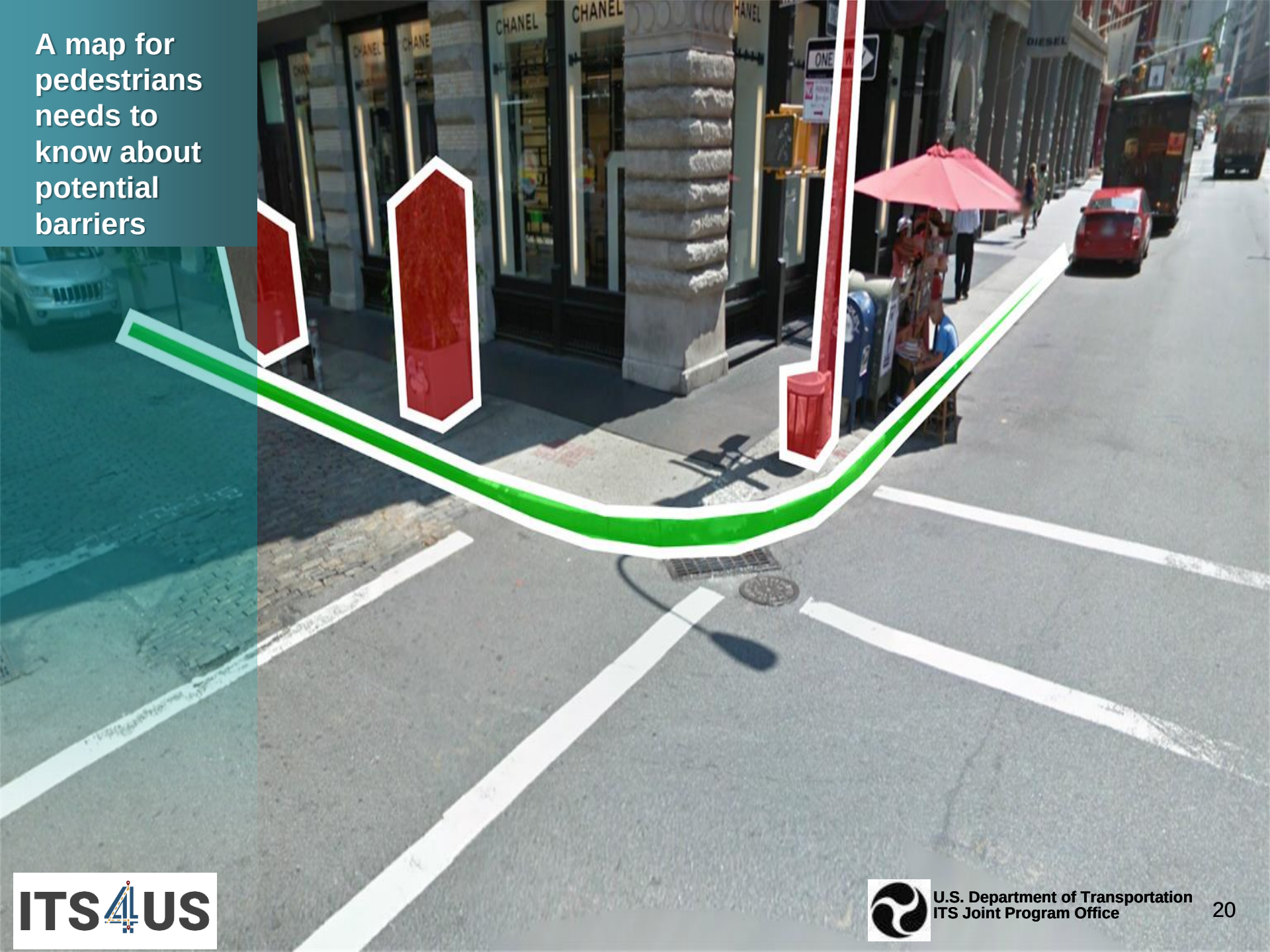
This is a complex, inaccessible pedestrian space.



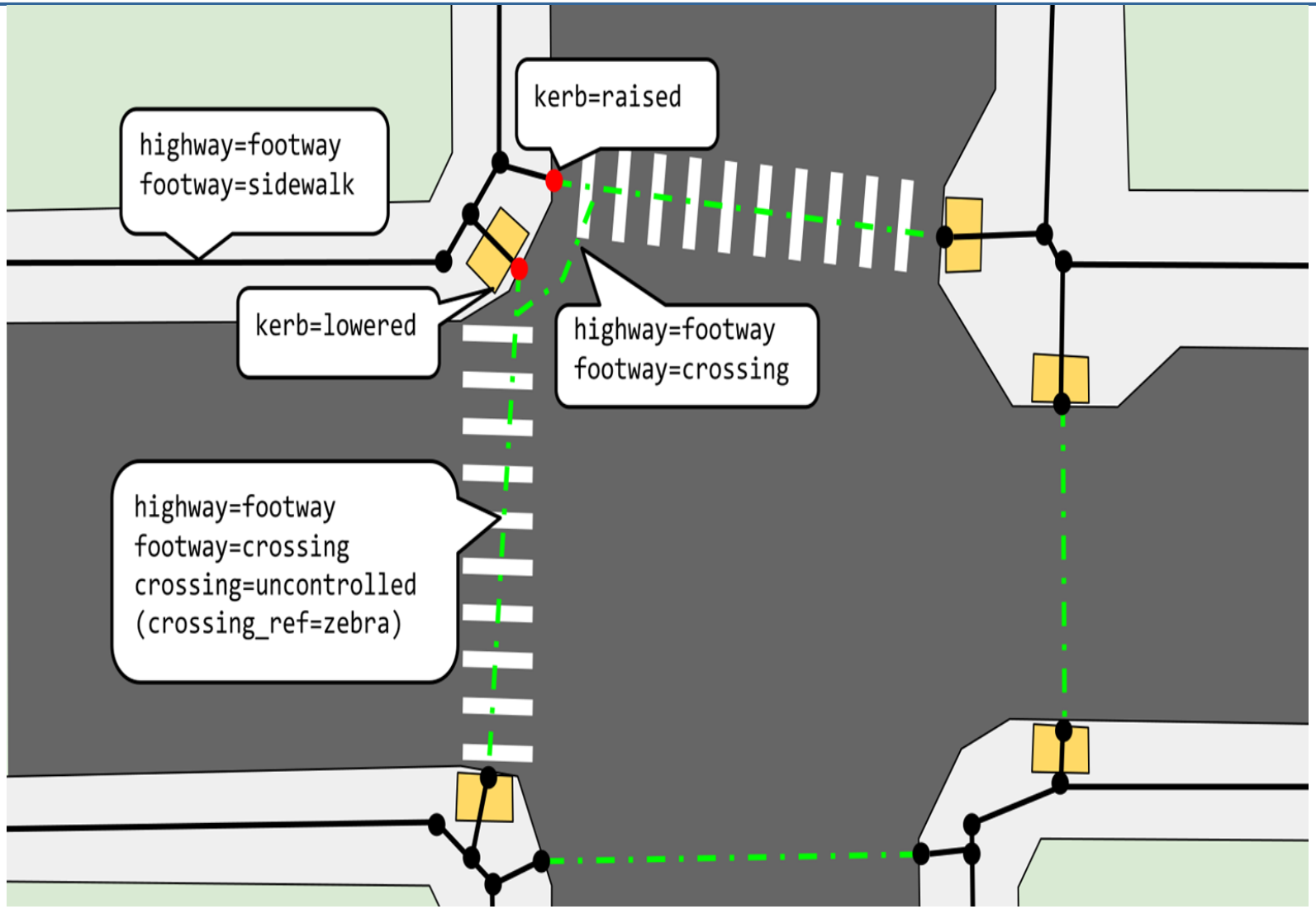
A map for pedestrians needs to know where paths are and how paths do or do not connect



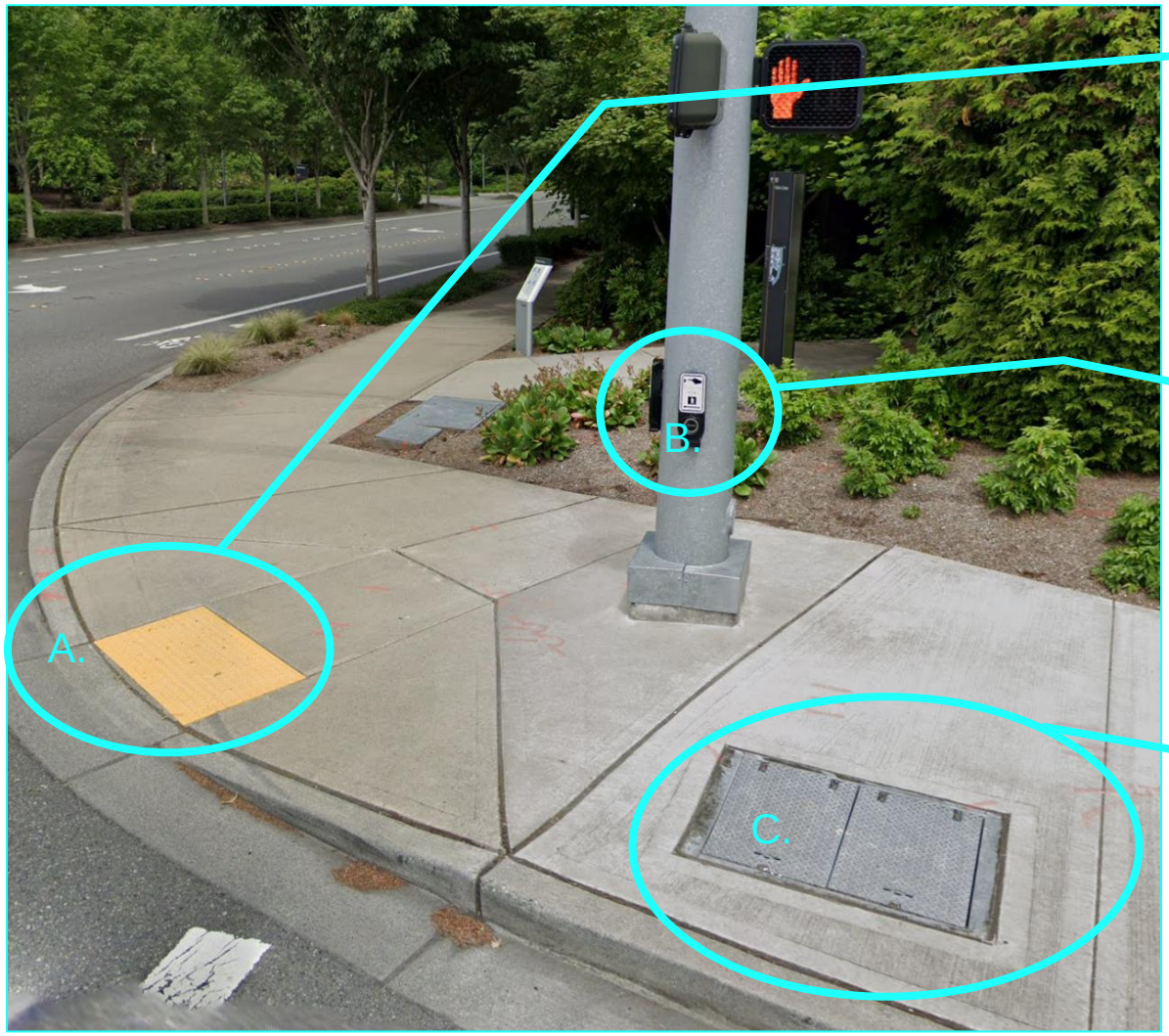
A map for pedestrians needs to know about potential barriers



OpenSidewalks in OpenStreetMap



Every feature can affect travel…



A. Tactile curb ramp

```
barrier=kerb;
kerb=lowered;
tactile_paving=yes
```

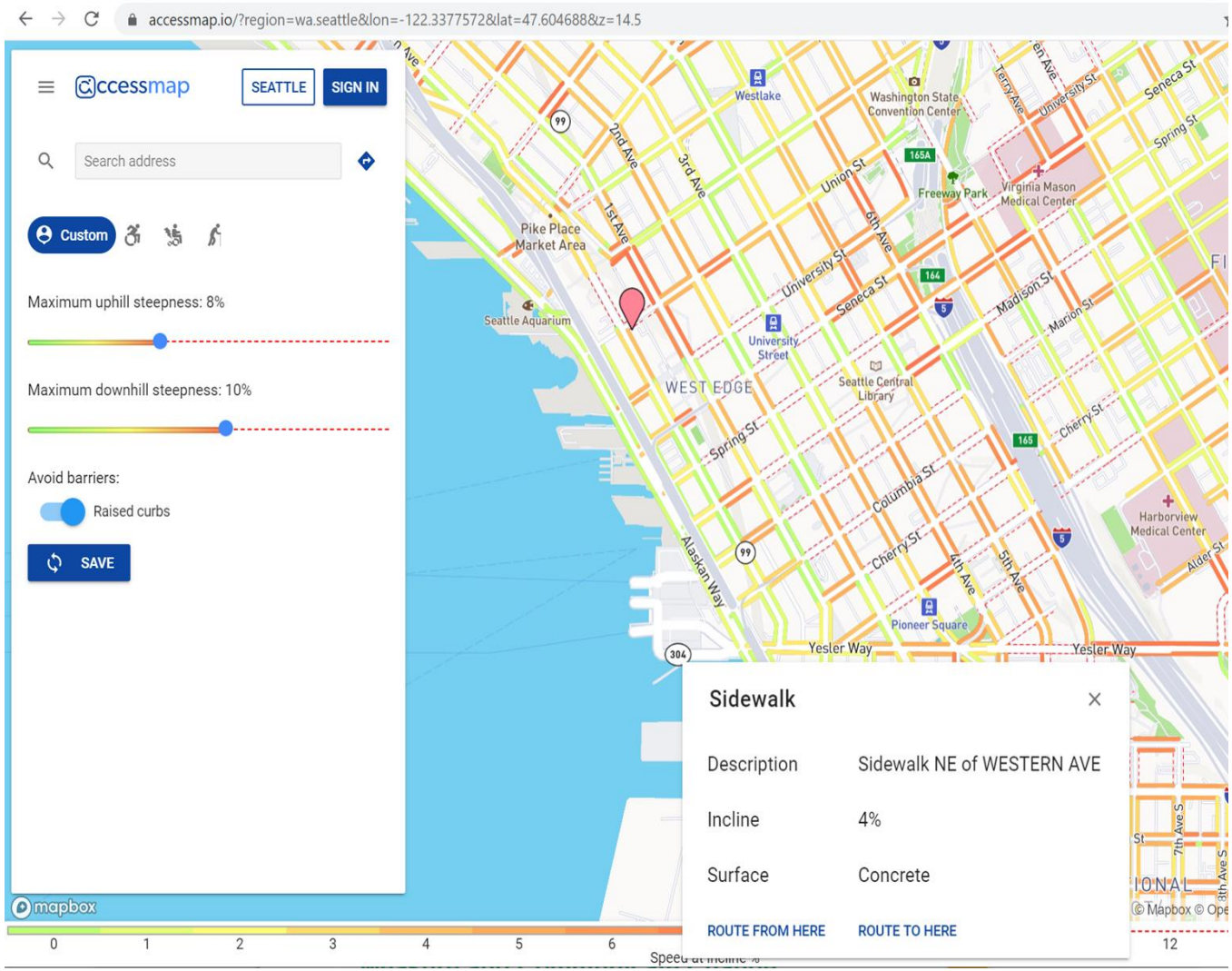
B. Pedestrian signal button

```
button_operated=yes
traffic_signals:sound
traffic_signals:vibrati
on
```

C. Utility hole cover

```
man_made=manhole
manhole:shape=rectang
   le
manhole:lid=metal
```

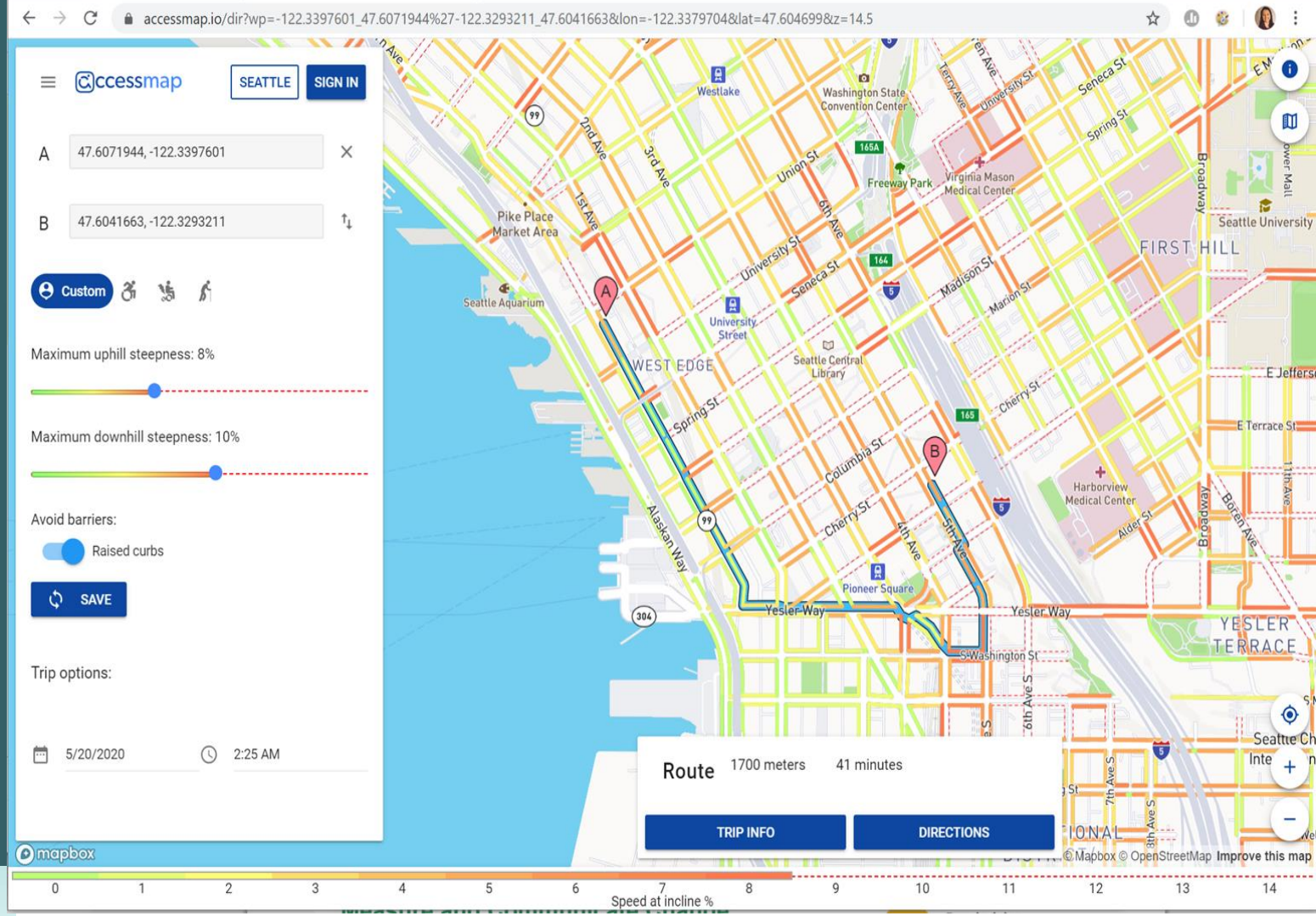
What can we do with this network?



What can we do with this network?

Customized paths within users' limits.

No arbitrary interpretation of what's "passable" or "accessible."



What can planners do with this network?

Avoid "as the crow flies" analysis

American Society of Landscape Architects

Measuring walkability

https://www.asla.org/sustainablelandscapes/Vid_ActiveLiving.html

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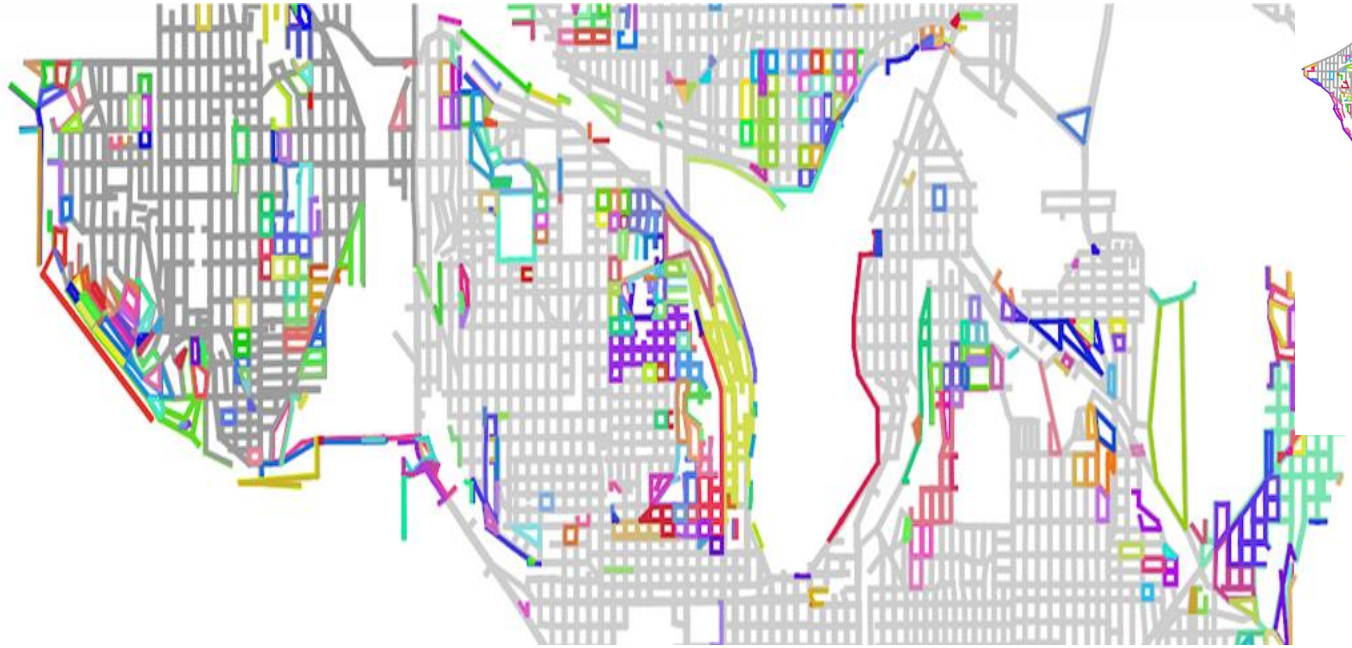
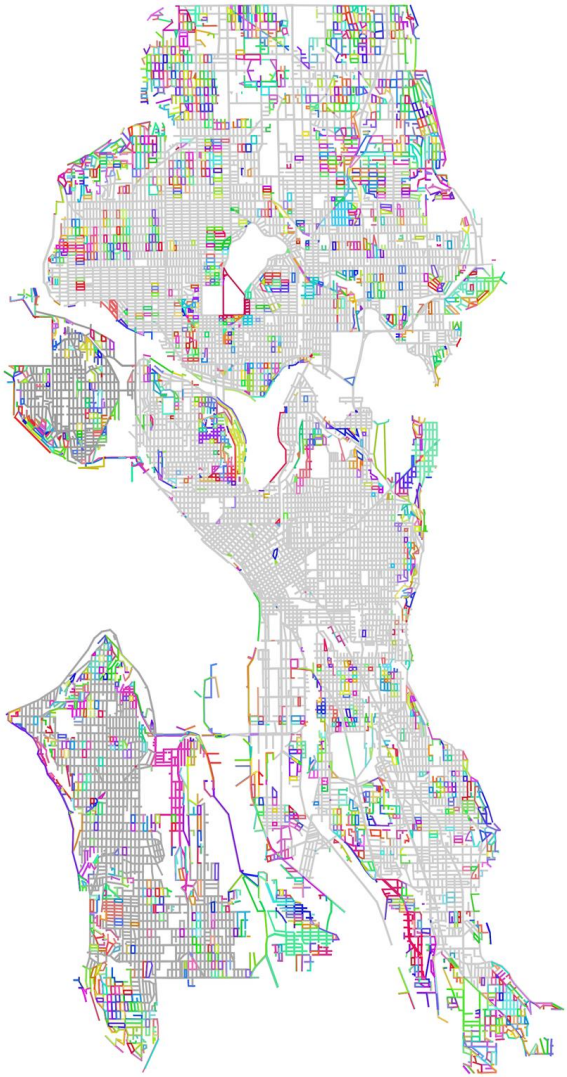
Effective transportation analytics

How disconnected is the city?

“Accessibility islands”

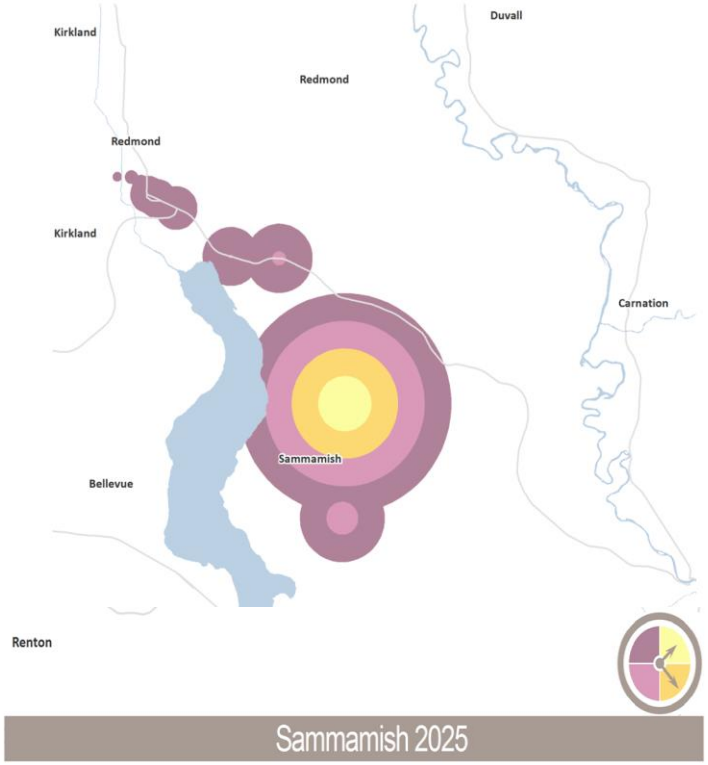




Enhancements made possible by sidewalk network

Without OpenSidewalks

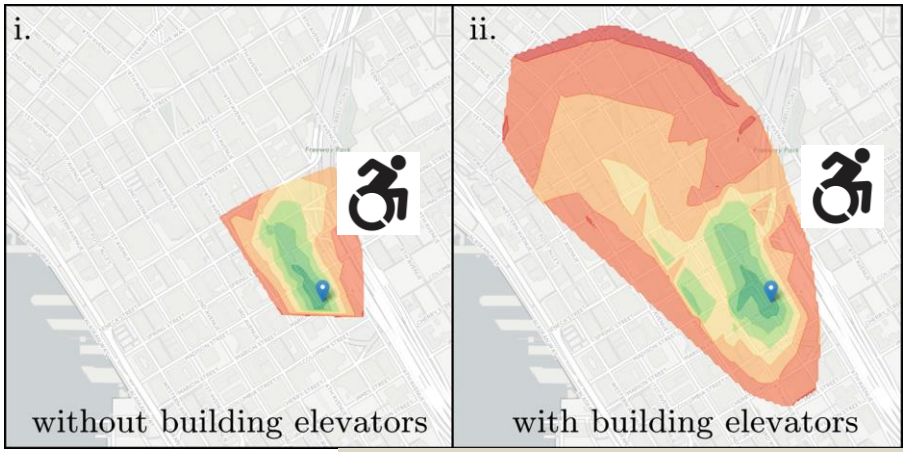
Planners perform "as the crow flies" analysis which has zero consideration for pedestrian access.



Travel times include initial wait times and the average time spent waiting to transfer. Represents trips starting at 8:00 AM on weekdays.

With OpenSidewalks:

Planners can estimate effort for a traveler using a manual wheelchair, without (i) and with (ii) indoor elevators to support trips.



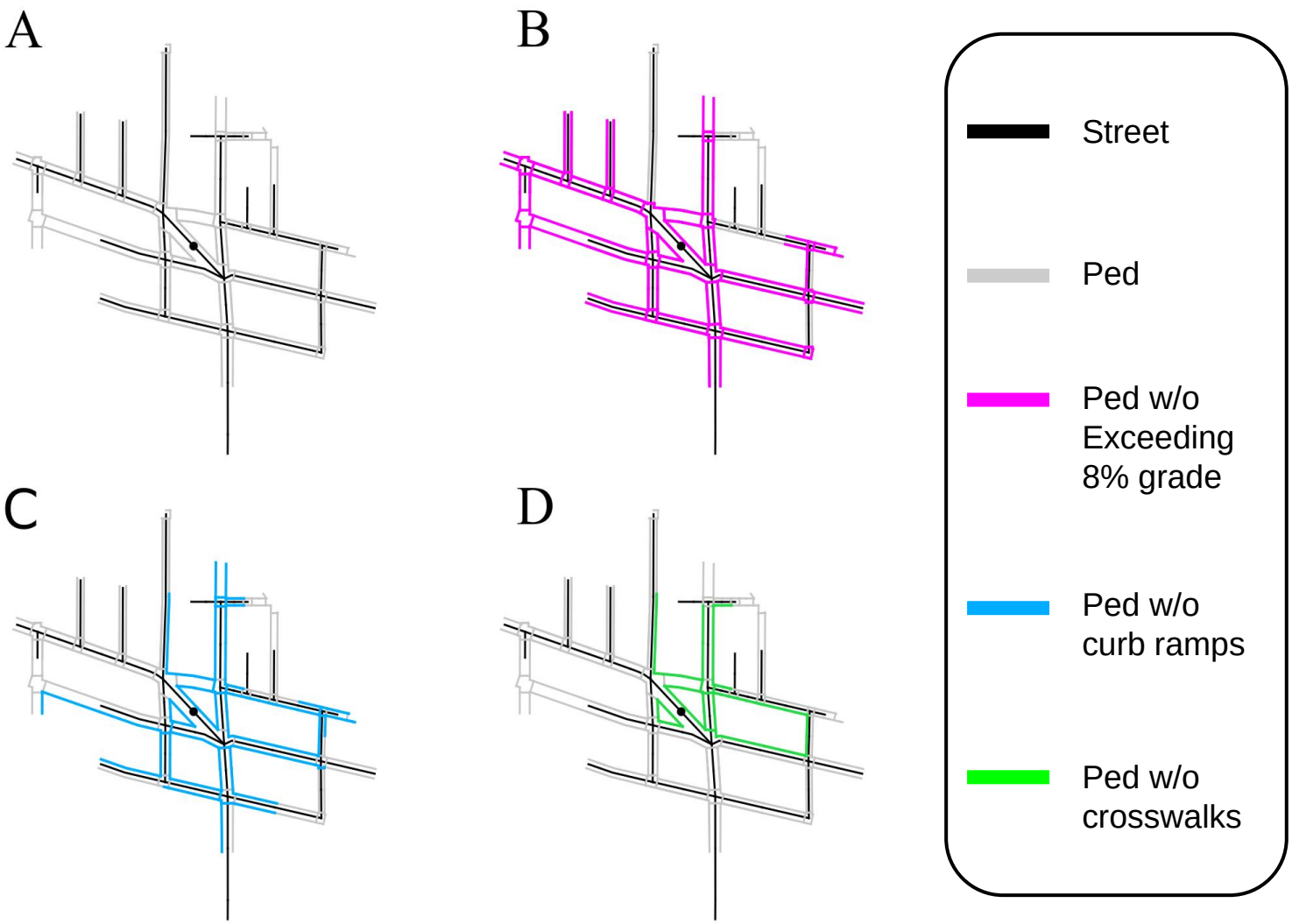
Seattle
Commission for People with DisAbilities

(same color band = same estimated effort to travel)

Effective transportation analytics:

400 meter "walksheds"

Goal: **new, interpretable pedestrian accessibility metrics** that leverage **the detailed pedestrian network** and model step-by-step pedestrian access to and from any given location.



Effective transportation analytics:

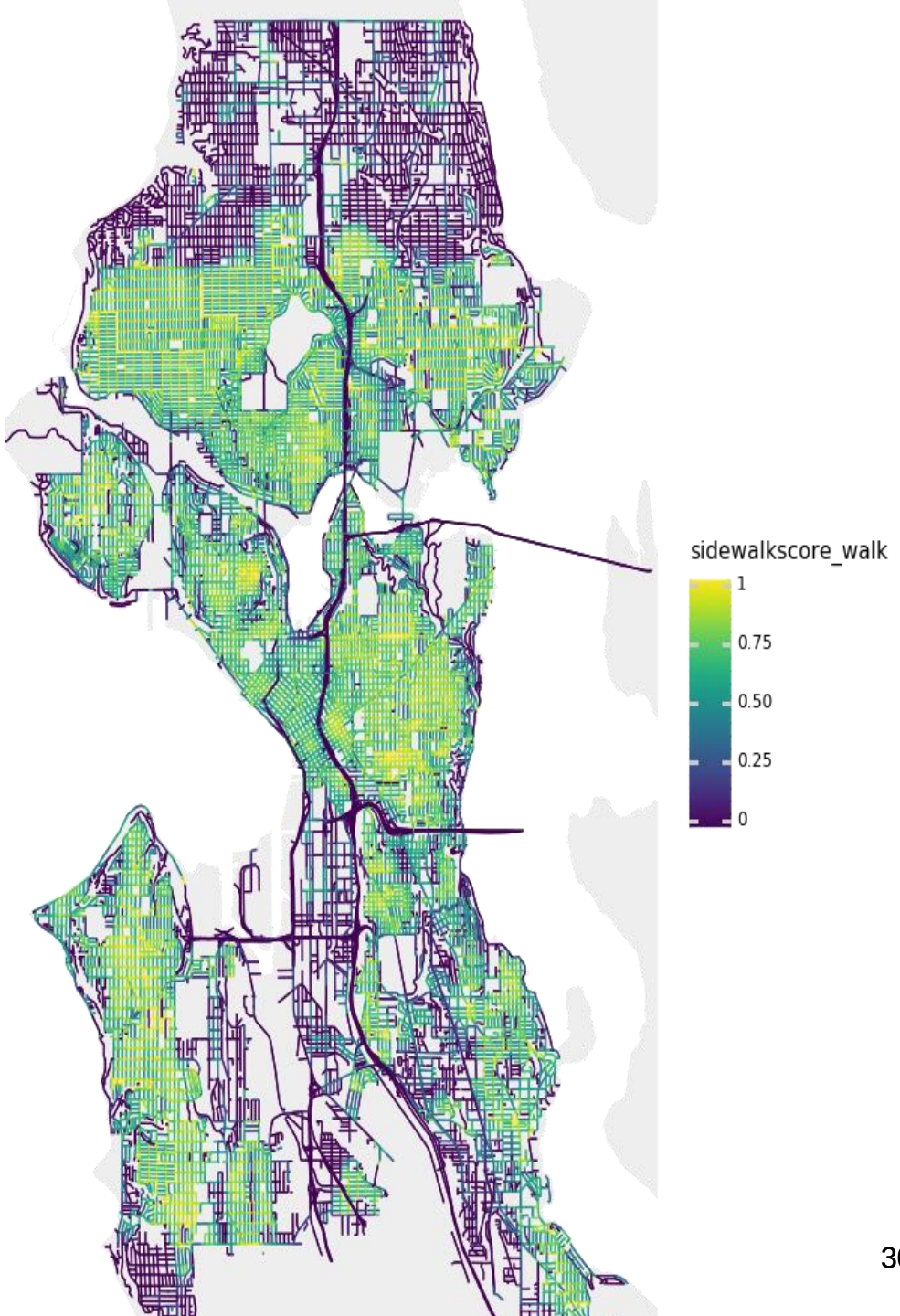
SidewalkScore: Quantifying equitable reach in sidewalk infrastructure

- Leverage the **OpenSidewalks standardized pedestrian network**
- **Create mobility profiles** that describe pedestrian preferences for steepness, crosswalks, & raised curbs.
- **Generate "walksheds"** for a particular mobility profile and compare it against the street network.
- Calculate the **fraction of space reachable** on the **sidewalk network** versus the **street network** for a given pedestrian profile.

Effective transportation analytics:

Pedestrian network "sidewalkscore"

Is sidewalkscore subsumed by walkscore?



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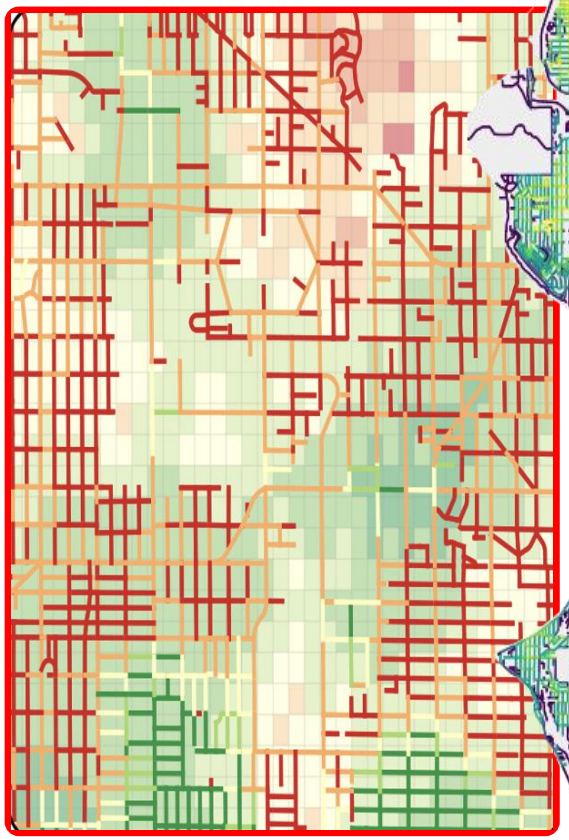
Effective transportation analytics:

Pedestrian network "sidewalkscore"

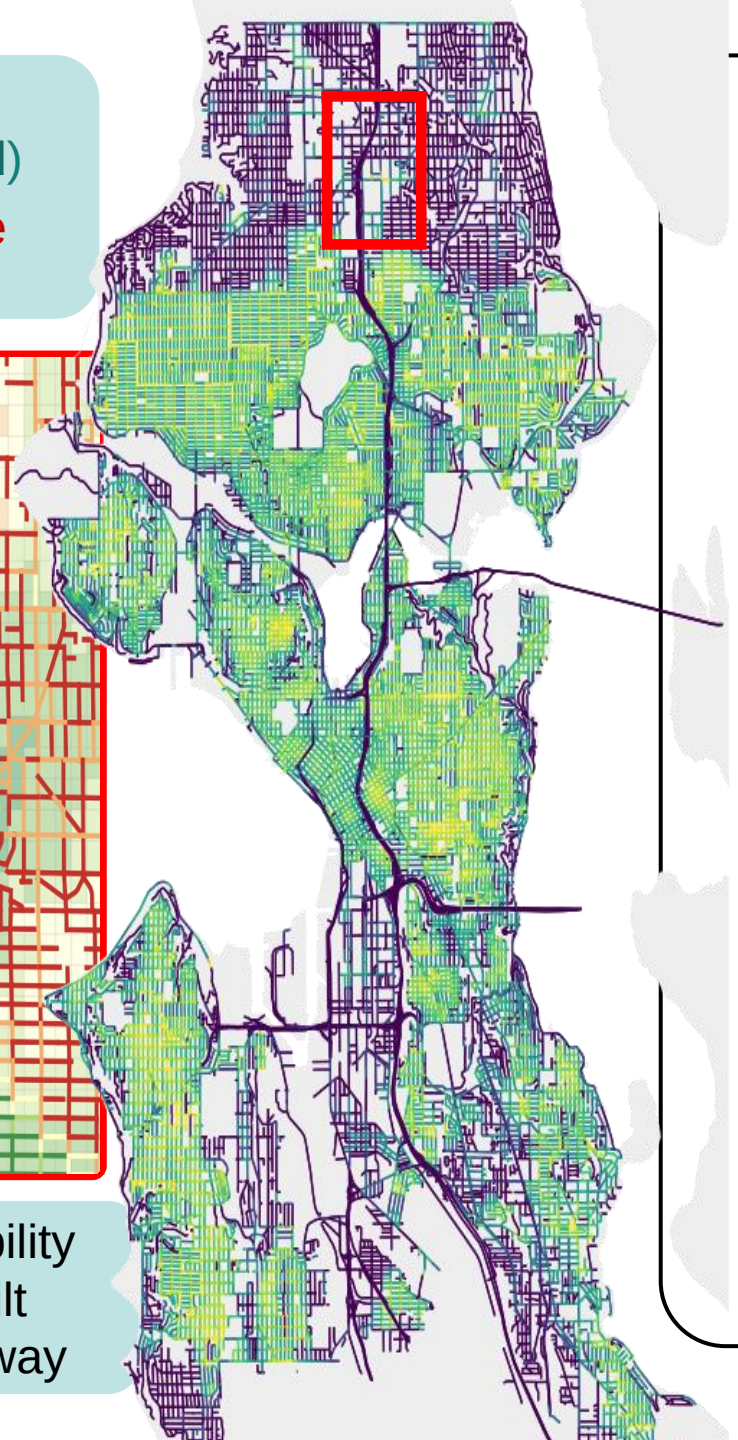
North Seattle example

High walkscore (green background)

Low sidewalkscore (red network)

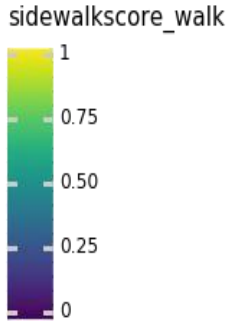


Why? No accessibility features; aging built environment; freeway



SidewalkScore interpretation:
1: On par with street network

0: much worse than street network



Walkshed for unconstrained pedestrian

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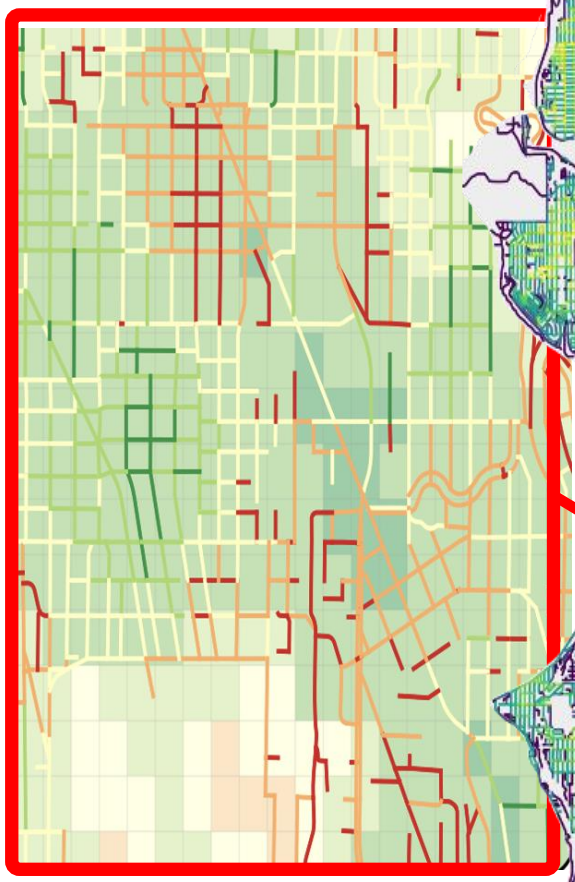
Effective transportation analytics:

Pedestrian network "sidewalkscore"

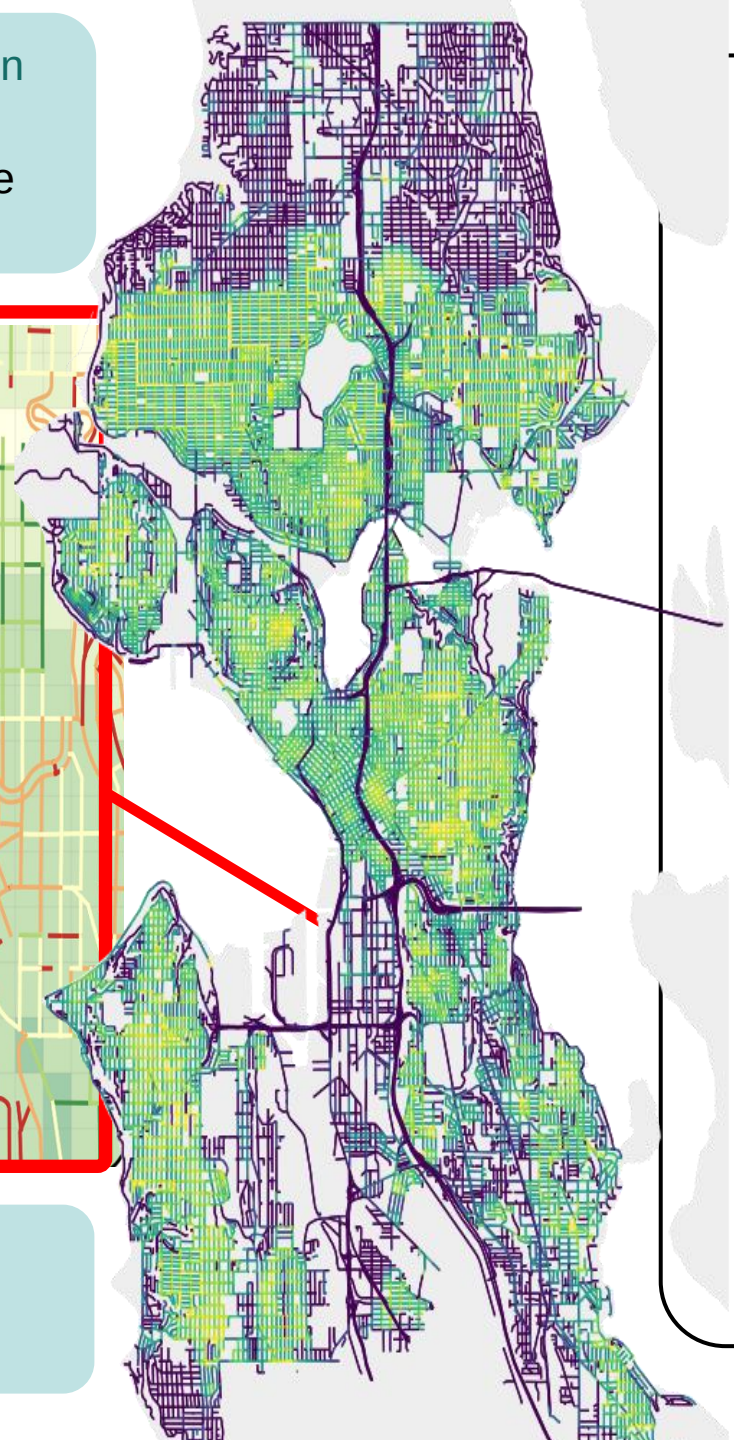
South Seattle example

High walkscore (green background)

Decent sidewalkscore (green/red network)



Why? Recently developed; significant improvements



SidewalkScore interpretation:
1: On par with street network

0: much worse than street network

Walkshed for unconstrained pedestrian

Data Integration is valued

Where does necessary information come from?

Trained mappers

(High quality, but difficult to scale)

Automated Digital Inference

(e.g., satellite imagery, autonomous vehicles)

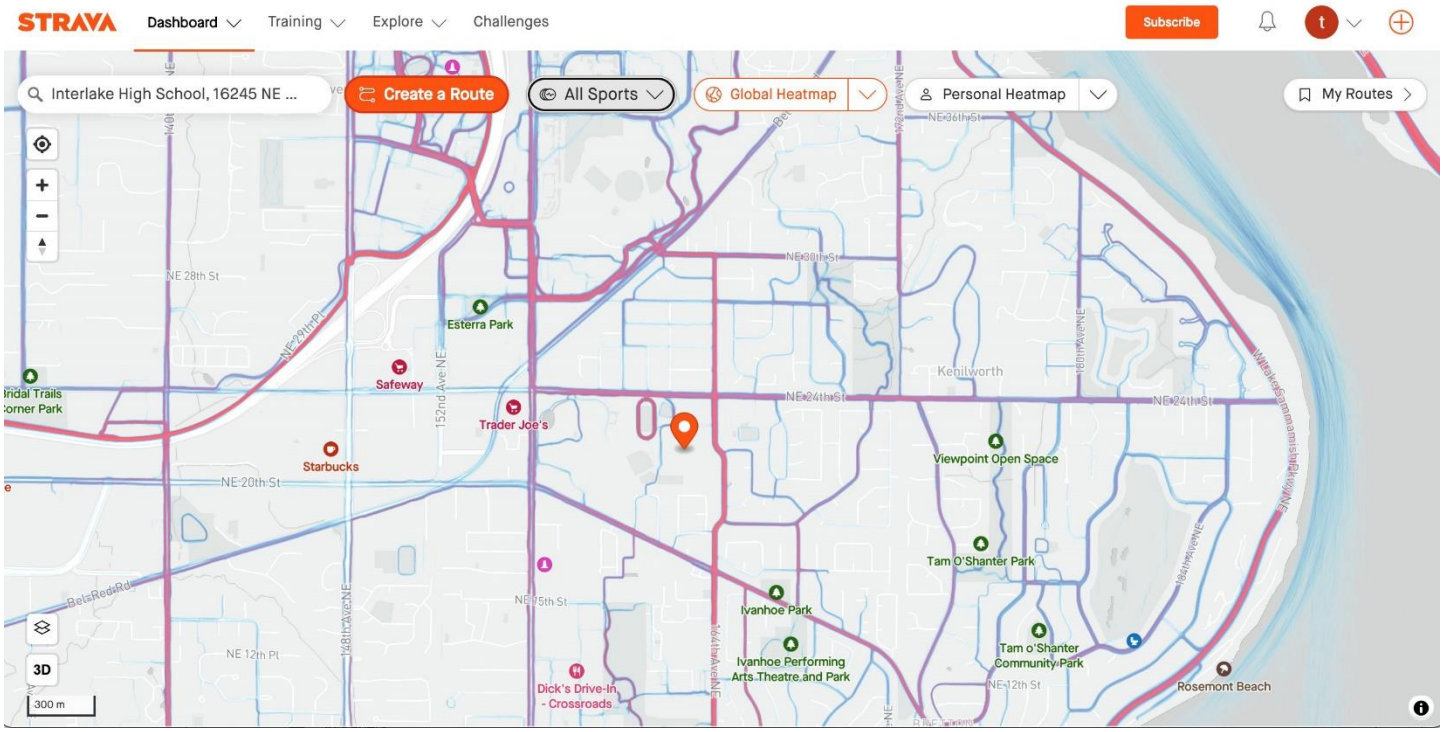
Legacy data from previous efforts

(may be out of date, usually special purpose, may be encumbered, sparse)

Opportunistic Passive Observation

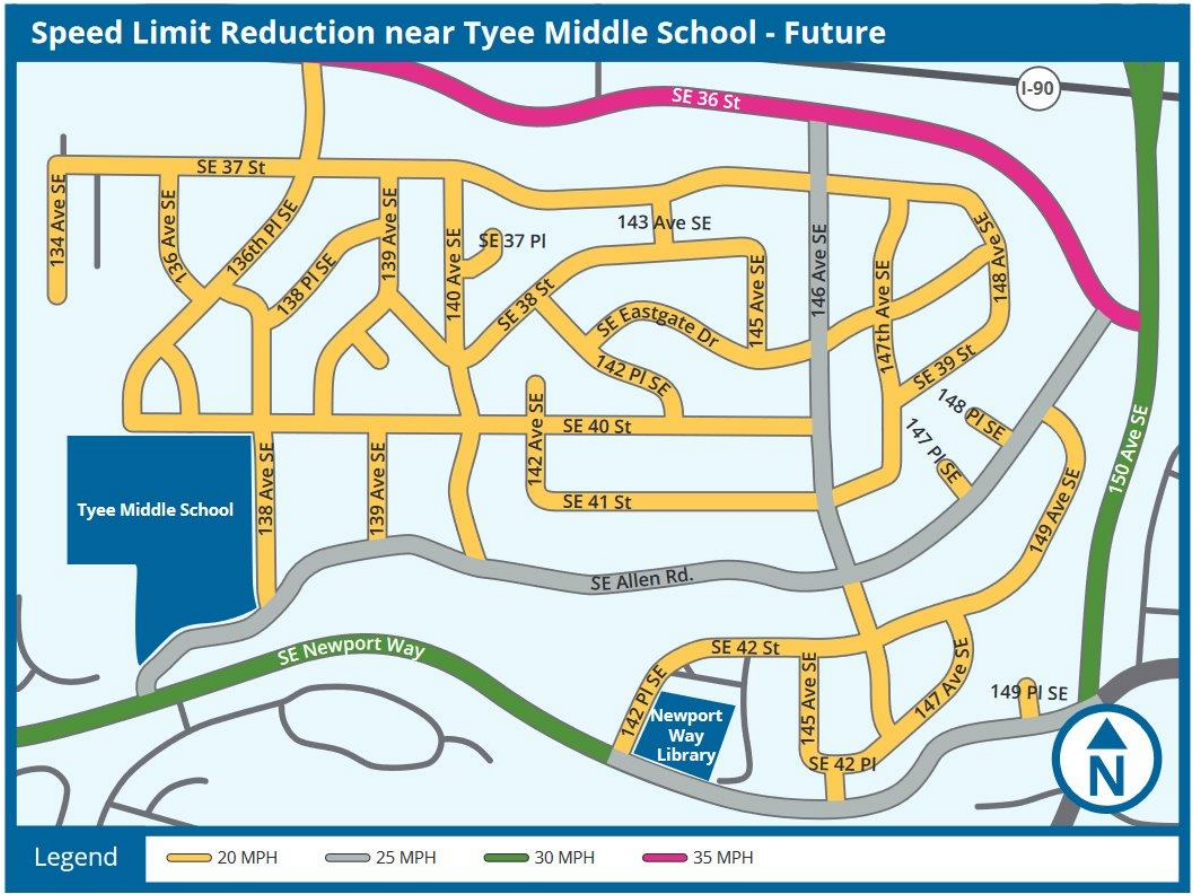
(e.g., crowdsourced video, GPS traces. Expensive; coupled to collection and difficult to integrate)

Where does necessary information come from?



Example: STRAVA Road and Pedestrian Networks
(standardized, biased towards fitness enthusiasts)

Where does necessary information come from?

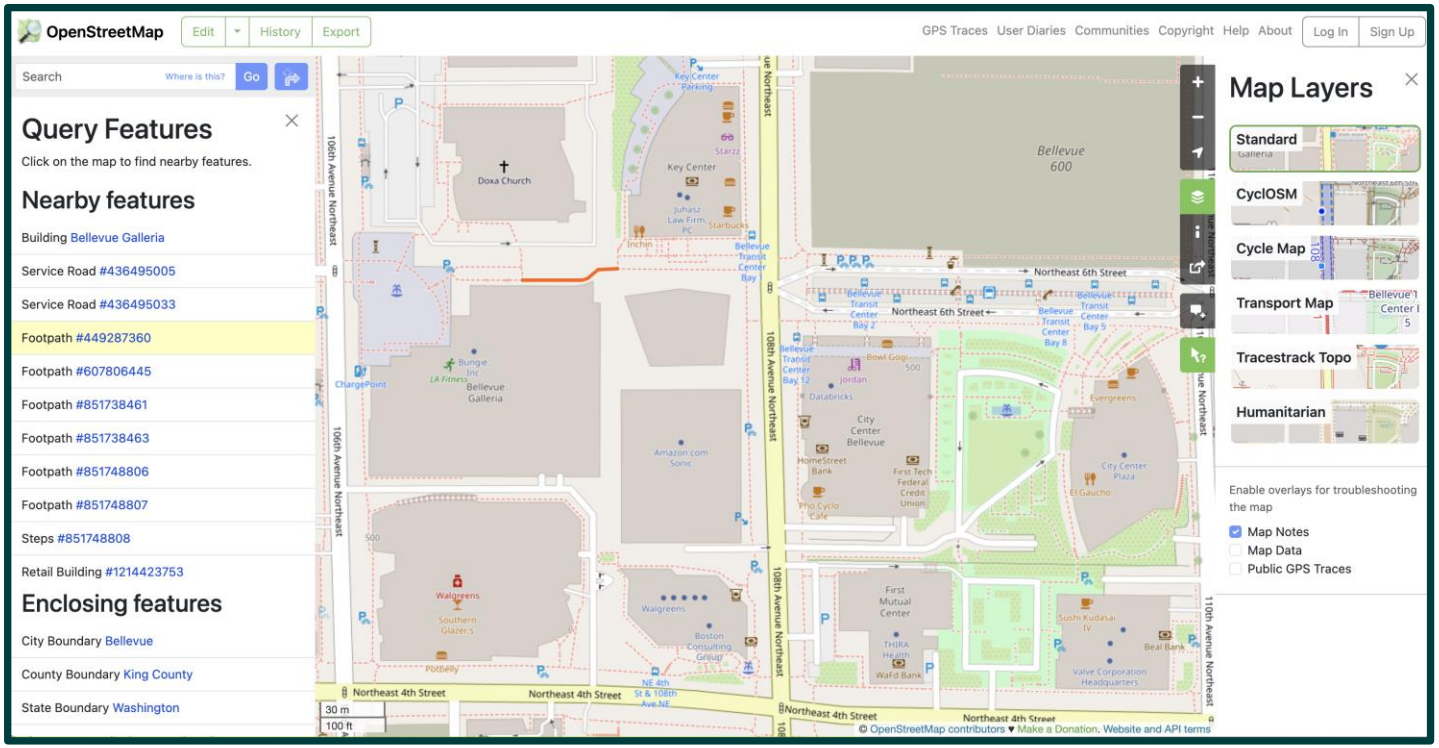


Neighborhood streets highlighted in yellow will have their speed limits reduced from 25 to 20 miles per hour. (Credit: City of Bellevue)

(attached to roadway, not pedestrian routes)

Data Integration (2)

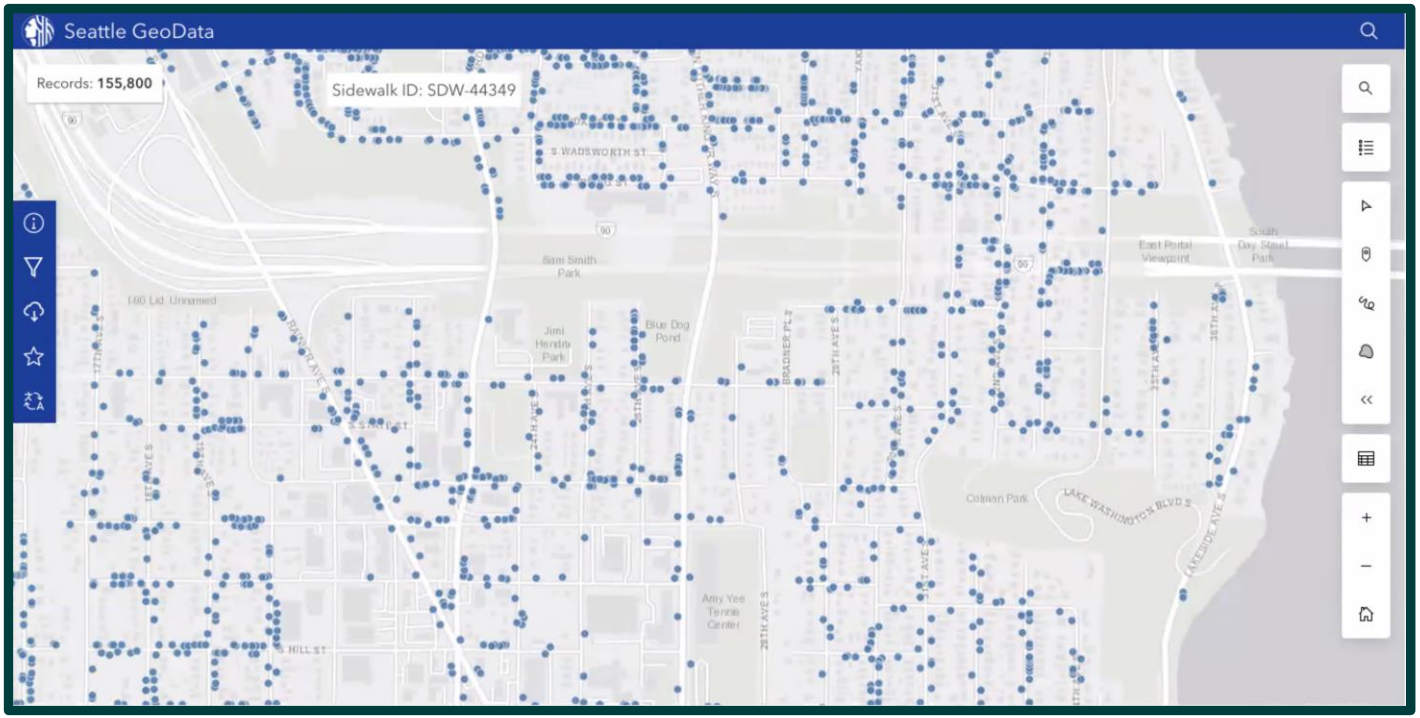
Where does necessary information come from?



Crowdsourced footpaths from Open Street Maps (Credit: OSM)
(pedestrian routes, no accessibility info)

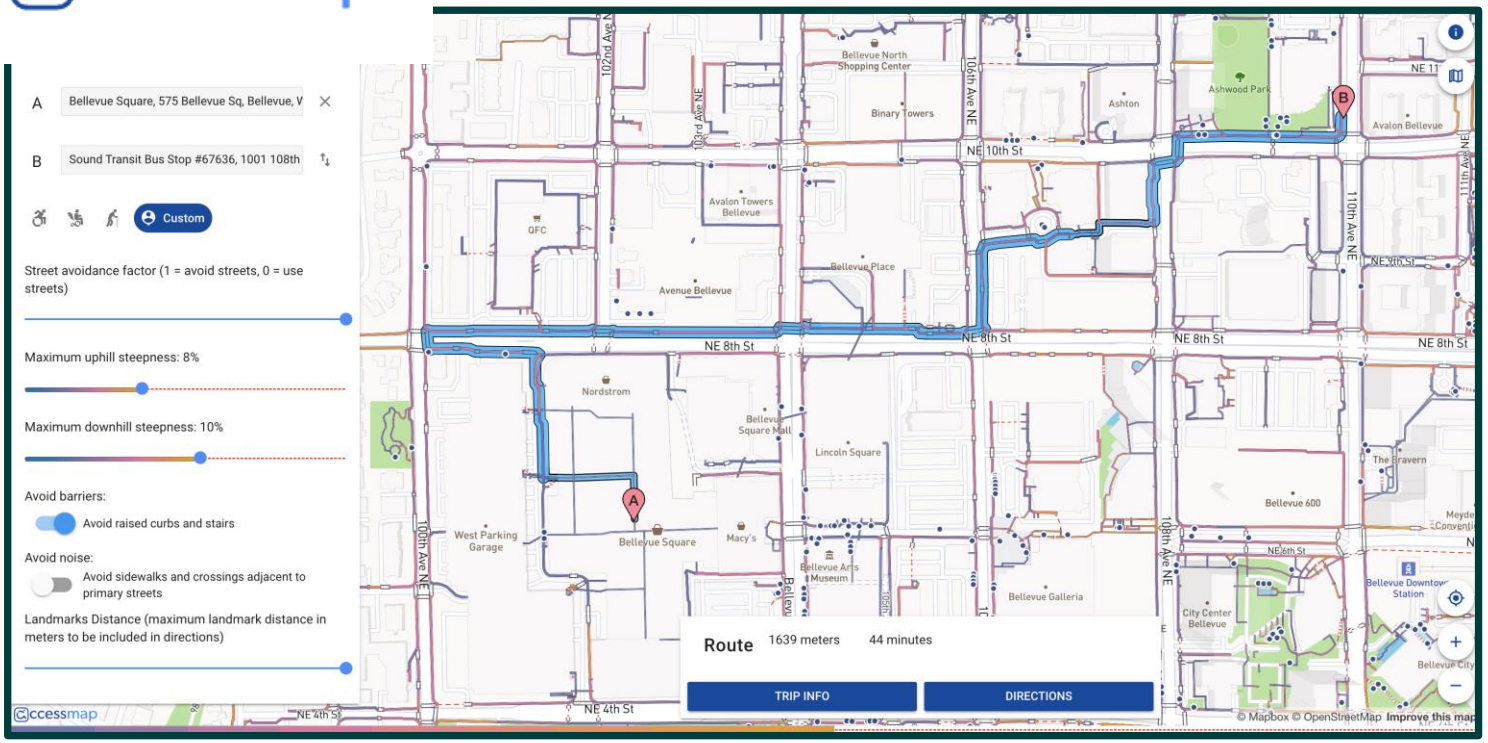
Data Integration (3)

Where does necessary information come from?



Locations of Surface Disruptions (City of Seattle)
(raw locations, not associated with pedestrian routes)

Where does necessary information come from?



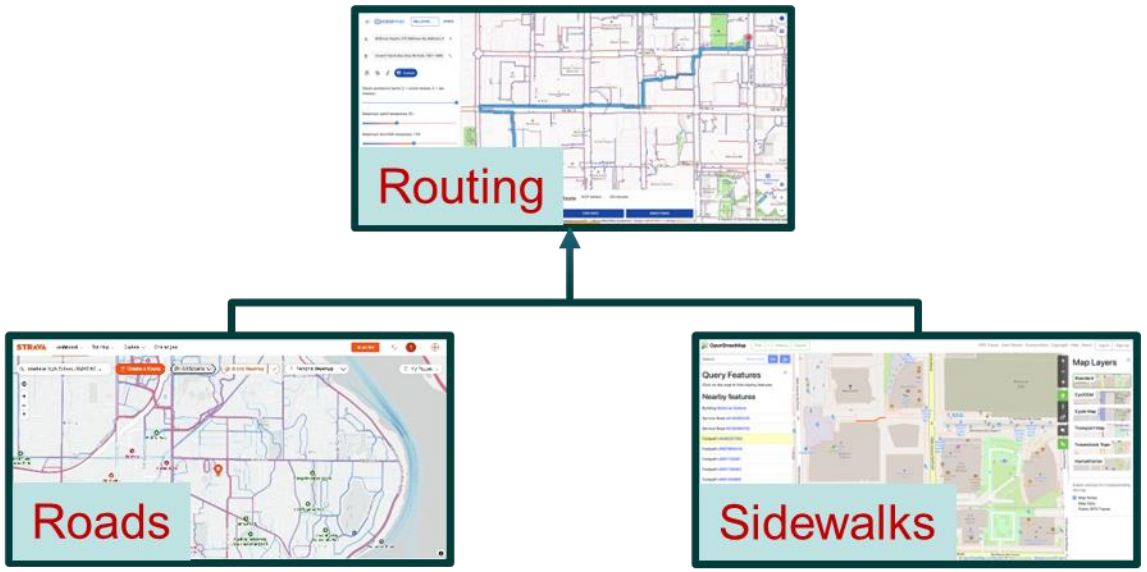
Read Models: Integrations of Multiple Datasets to support Routing and Analytics (Credit: AccessMap)

Data Integration (5)

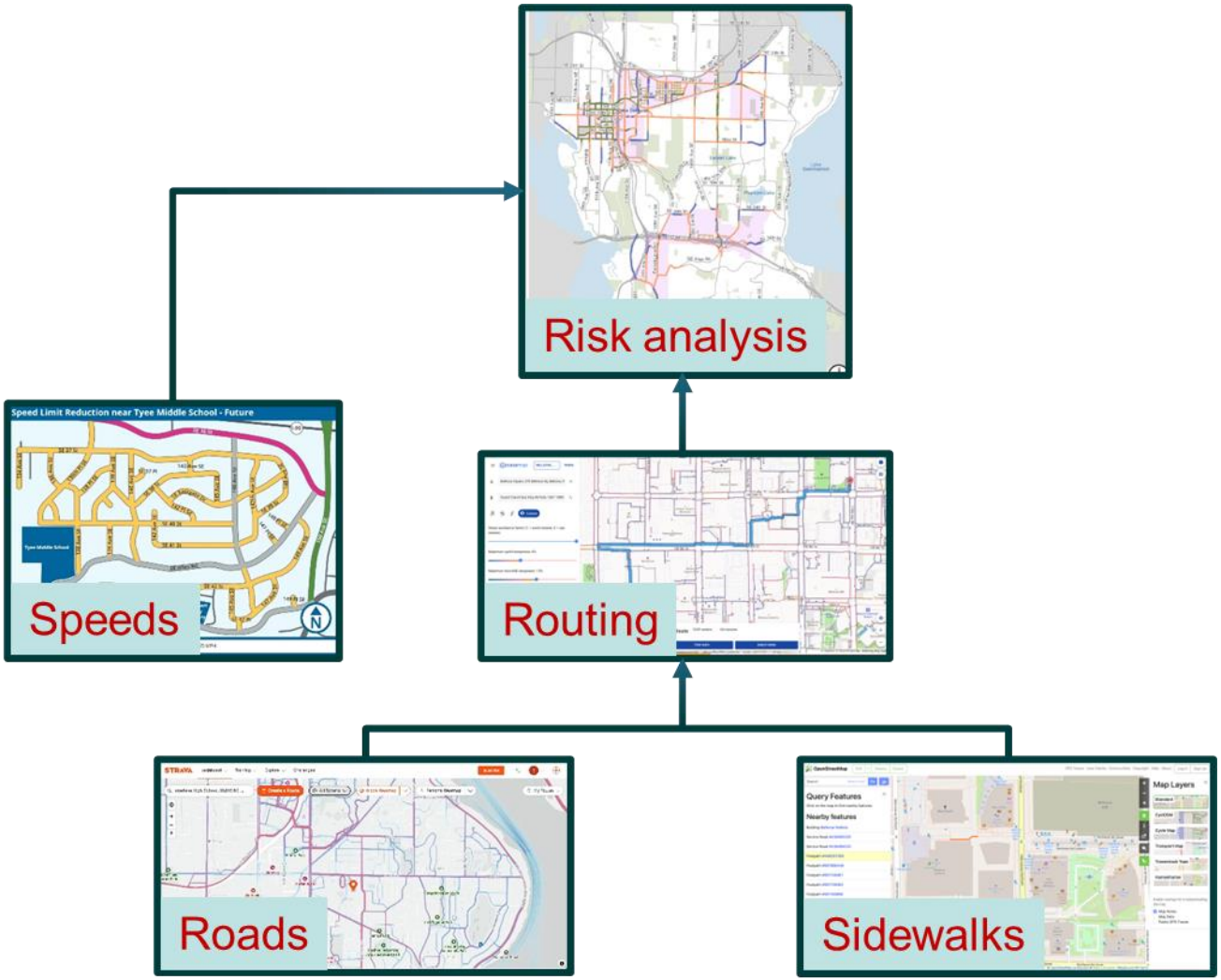
Using the new cost field to visualize sidewalk issues in the walksheds. Only sidewalks with observations included in the cost function are highlighted.

Integrating Heterogeneous Data Enables Analytics

Integrating Heterogeneous Data Enables Analytics



Integrating Heterogeneous Data Enables Analytics



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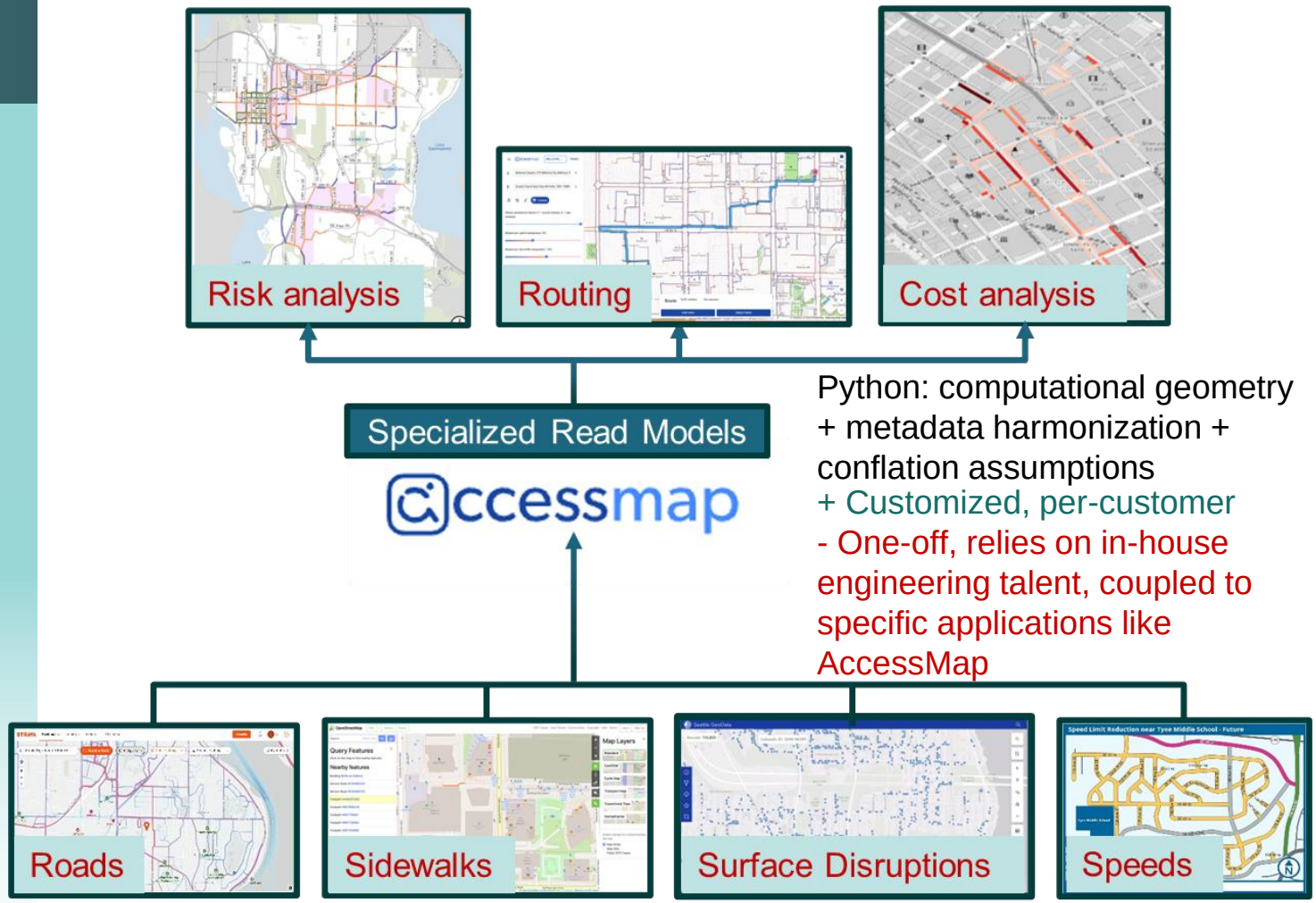


Python: computational geometry + metadata harmonization + conflation assumptions

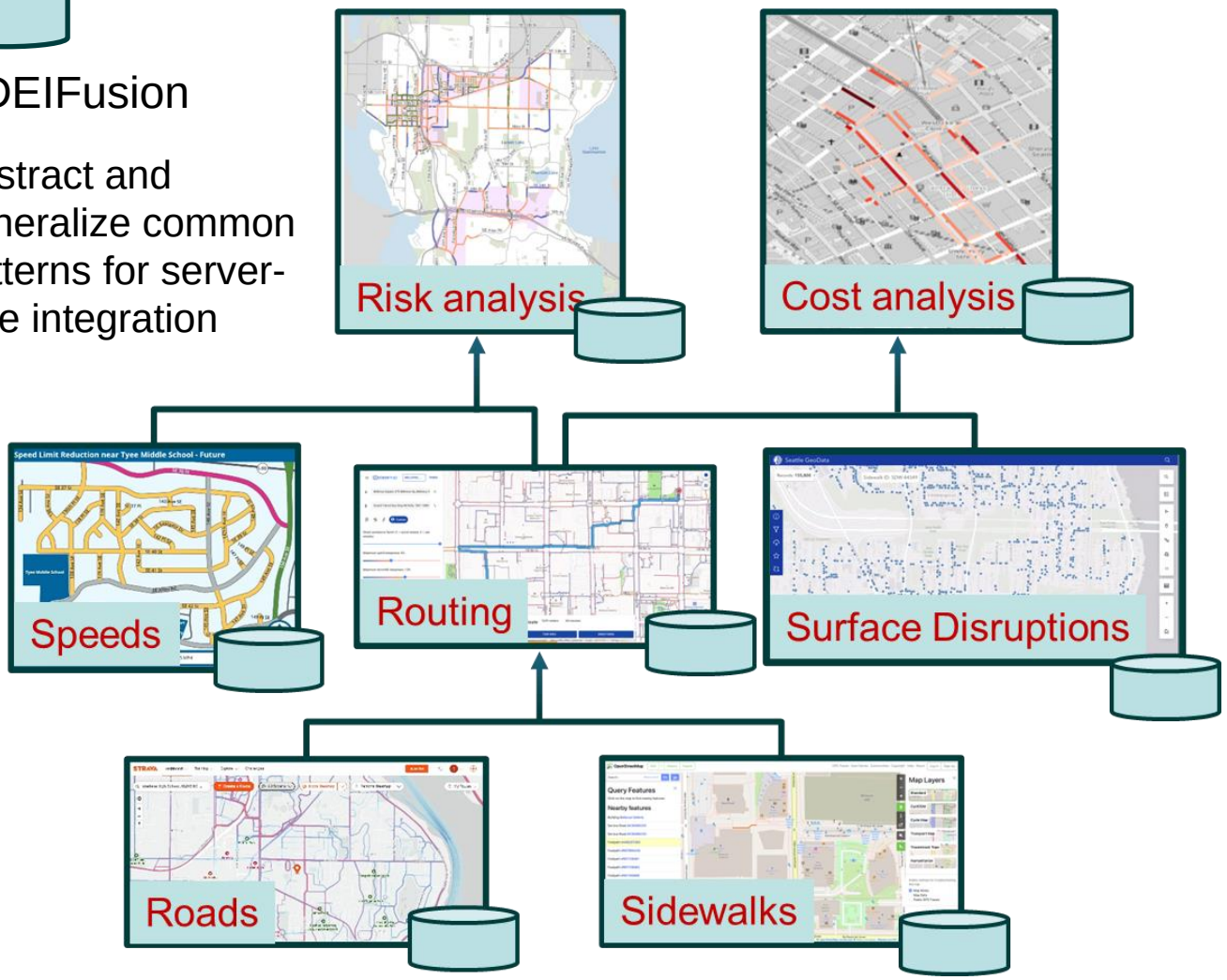
+ Customized, per-customer

- One-off, relies on in-house engineering talent, coupled to specific applications like AccessMap

Integrating Heterogeneous Data Enables Analytics

TDEIFusion

Abstract and generalize common patterns for server-side integration

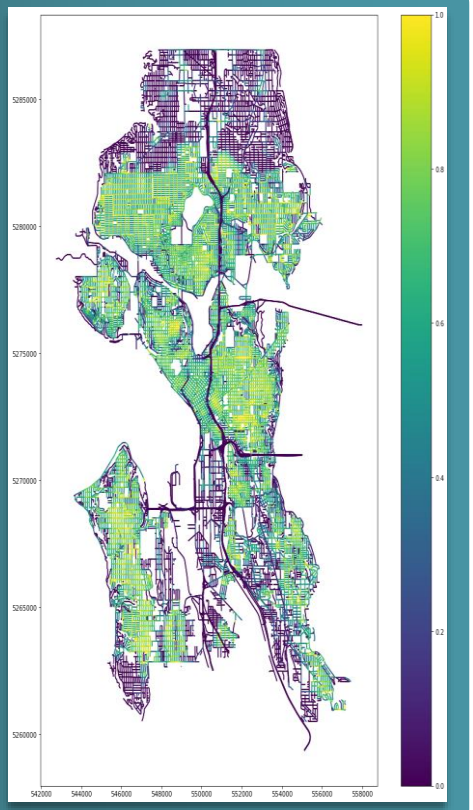


Open, Shared, Standard Bike/Pedestrian Layer Building Blocks of a Resilient City

- Smart:
  - We need the non-motorized path network to fully understand and manage mobility, access to transportation, health & wellbeing.
- Effective:
  - We can use a pedestrian network to address underserved and current needs. Agility is key.
- Efficient:
  - Systematic ways for gathering, interrogating and disseminating information, respond to stakeholder concerns and assess equitable conditions on the ground.

OpenSidewalks

Open, inclusive pedestrian-centric mapping and metrics



Partner with us. Join our study to trial these tools.

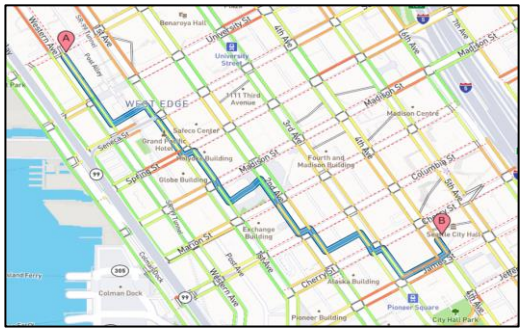
www.accessmap.app

tinyurl.com/GoAccessMap

Any questions? See more?

You can find us at

- @TaskarCenter
- uwtcat@uw.edu



THANKS!

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https://youtu.be/pztl1lRyXAc

Stakeholder Q&A

- Please keep your phone muted
- Please use chat box to ask questions
- Questions will be answered in the order in which they were received