Dec, 2024

Transportation Data Equity
an initiative by TCAT & UW TRAC

OS-CONNECT
WA State Project for Sidewalks Inventory and Accessibility Mapping

ITS4US
IT'S TRANSPORTATION FOR ALL OF US

While we wait for others to arrive: where in WA state is this mural?

TCAT The Taskar Center for Accessible Technology

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

UNIVERSITY of WASHINGTON

OVERVIEW

- Team & Contributions

- Project Progress Update

- Introduction to Specialized Community-Led Impact Opportunities (SCLIOs)

- Accessing and Using OS-CONNECT

- Preparation for next meeting:

    - Project Driven Uses

    - Community Needs: Regional deep dives, Additional Attributes

    - Data Governance

Team & Contributions

Project Organization

**Anat Caspi,
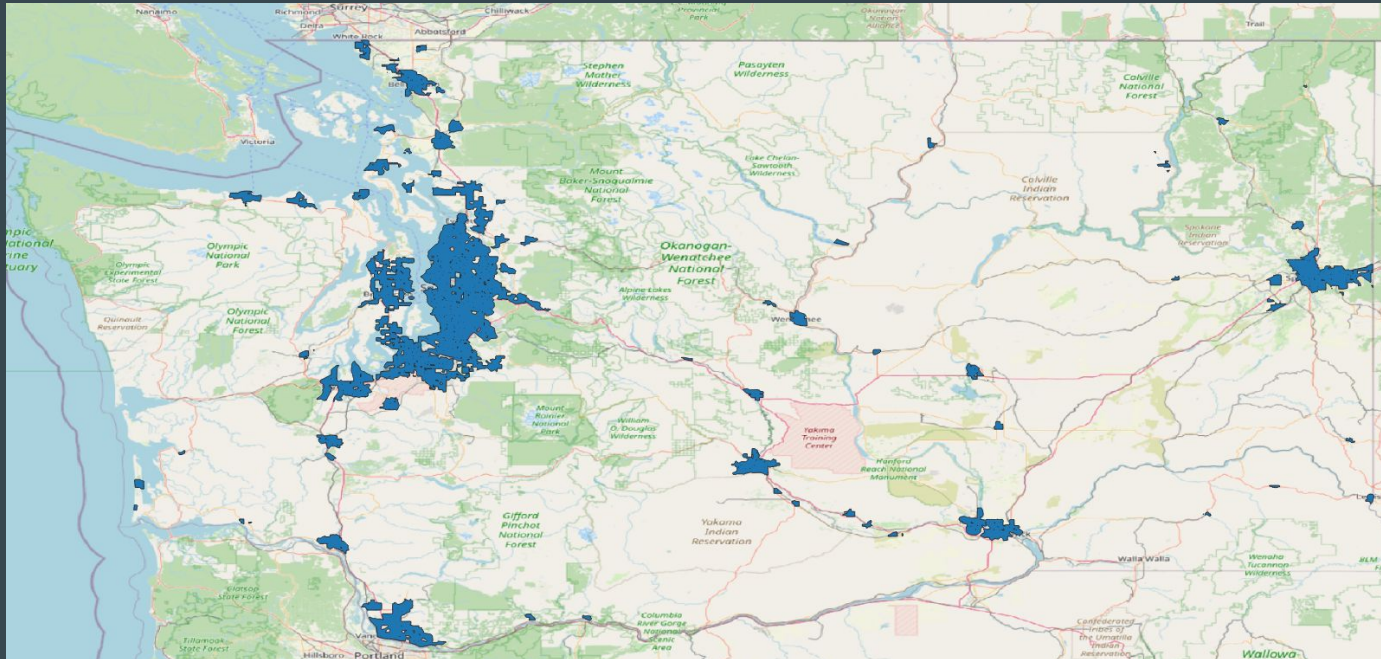Project Lead**

Project
Management

**Ricky Zhang
CV Development Lead**

Development
Team
UWTCAT

**Olivia Quesada
Partnerships and
Communications Lead**

CV Pipeline and Prediction Generation
Image and Prediction post-processing
Quality Assessment
Post-manual vetting
Data Publishing
Visualization tools
Analytic tools
Commenting and Quality Control tools
Regional Deep Dive Programs and
Workshops
Community Engagement

**Bill Howe,
Scientific Advisor**

**Suresh Devalapalli
Execution Lead**

Execution Team
Gaussian Solutions

**Pradeep Pydah,
Interim PM**

Pipeline Hardening
Imagery Ingestion
Manual Vetting
Reporting Tools
Community Vetting Application

PLEASE "Sign In" in the chat

- Name / Pronouns
- Organization / Department
- A hope/goal for this project

Project Overview

- Create a statewide consistent, connected, graph routable open sidewalk data
- Motivation: Furthering the needs and prioritization of WA State Transportation Plan, including supporting activities in Active Transportation, Pedestrian Safety and Vision Zero, Complete Streets, Sustainable resilient ecologically sound communities, correcting the harms in traditionally underserved communities.
- Key Deliverables: OS-CONNECT-statewide Ped Dataset in OSW v0.2 schema
- Set the data up for success as a sustainable, live resource

OpenSidewalks

Project Scope :

- Areas in scope: census tracts that allow for coverage of 95% of the state's population, plus the densest population centers and transit facilities not represented
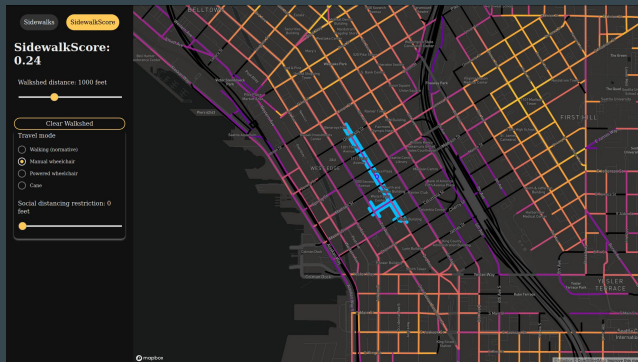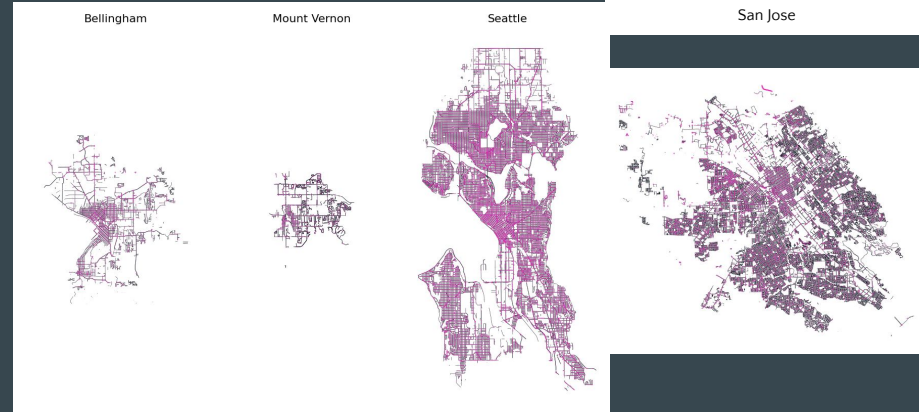

~ 6400 km2 to be mapped

OpenSidewalks

secondary crossing
highway=footway
footway=crossing

marked crossing
highway=footway
footway=crossing
crossing=marked

sidewalk
highway=footway
footway=sidewalk
surface=concrete
width=1.5m
incline=0.003

curb ramp
kerb=lowered

sidewalk
highway=footway
footway=sidewalk
surface=concrete
width=4m
incline=0.001

raised curb
kerb=raised
height=0.02 m

link
highway=footway

Bellingham   Mount Vernon   Seattle   San Jose

Define a **baseline data schema**
Downstream use cases use **schema extensions**

Collect baseline data for the entire state via machine learning and aerial imagery. Even AI requires QAQC.

Collect locally relevant "deep dive" data as a community–led & stewarded effort

Use the data – understand access, plan trips, plan infrastructure, etc.

8

Project Roadmap

PROJECT Roadmap

1. Review Jurisdictional Data

2. State of the Practice

3. Workgroups: Local Communities Focus

4. Sidewalk Collections: Schema and full collection+ QC Pipeline

5. Specialized Community-Led Impact Opportunity (SCLIO) projects

6. Sidewalk Data Summary & Outcomes

Project Workstreams

1. **Data Collection and Compilation:**

   - Identify the counties and order of counties to be included in the analysis based on defined criteria.

   - Collaborate with selected counties and other relevant agencies to access existing sidewalk data.

   - Develop a standardized data collection methodology for areas where data is incomplete or unavailable.

   - Compile and integrate data from multiple sources to create a comprehensive statewide inventory of **"baseline pedestrian graph"**

2. **Accessibility Analysis and Mapping: Exploration in 3-5 select regions**

   - Incorporate accessibility analysis into the dataset, considering suitability for individuals with disabilities.

   - Identify and integrate relevant data on vulnerable populations, tribal lands, and essential service locations.

   - Apply the Safe System Approach principles to assess sidewalk safety and Accessibility for pedestrians and bicyclists.

3. **Data System Development:**

   - Establish a data management system to store, update, and maintain the statewide sidewalk inventory.

   - Develop an open data specification for publishing the dataset and ensure compliance with open data principles.

   - Implement appropriate data security measures and protocols to protect sensitive information.

   - [WSDOT partners intend to: Design user-friendly interfaces and tools to facilitate access and utilization of the sidewalk data by stakeholders.]
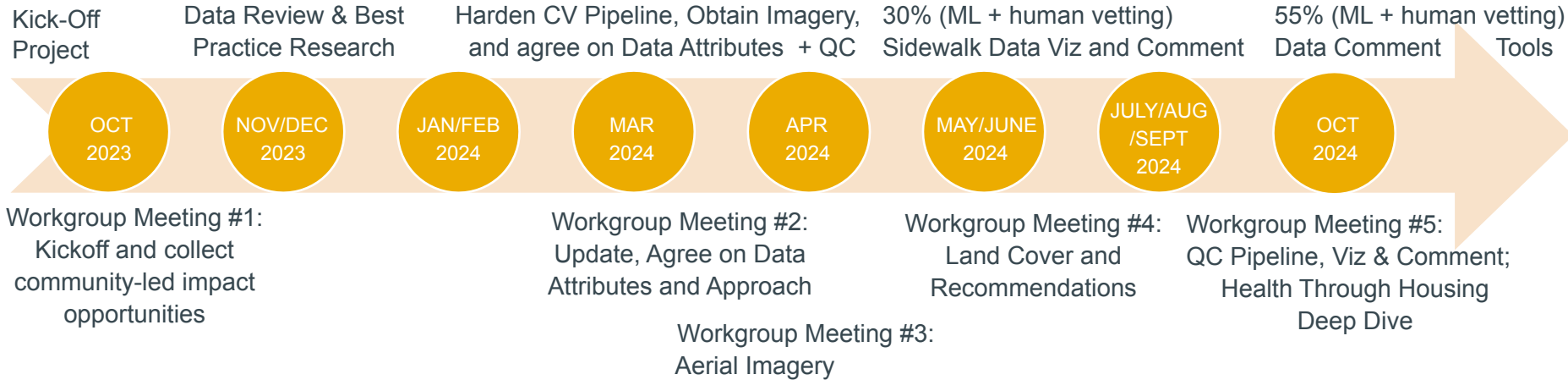
4. **Stakeholder Engagement for Deep Dives in 3-5 Locales:**

   - Engage with local jurisdictions, tribal governments, and transportation agencies throughout the project.

   - Conduct outreach and training sessions to do deeper mapping per community concerns and promote local vetting through use of the statewide sidewalk dataset and tools.

Project Progress Update

Phase 1 TIMELINE to Date

Kick-Off Project

Data Review & Best Practice Research

Harden CV Pipeline, Obtain Imagery, and agree on Data Attributes + QC

30% (ML + human vetting) Sidewalk Data Viz and Comment

55% (ML + human vetting) Data Comment Tools

OCT 2023 — **NOV/DEC 2023** — **JAN/FEB 2024** — **MAR 2024** — **APR 2024** — **MAY/JUNE 2024** — **JULY/AUG /SEPT 2024** — **OCT 2024**

Workgroup Meeting #1: Kickoff and collect community-led impact opportunities

Workgroup Meeting #2: Update, Agree on Data Attributes and Approach

Workgroup Meeting #3: Aerial Imagery

Workgroup Meeting #4: Land Cover and Recommendations

Workgroup Meeting #5: QC Pipeline, Viz & Comment; Health Through Housing Deep Dive

Phase 1 Progress and Milestones

- OS-CONNECT dataset operationalized to cover 55% of Washington State's population.

- AI-powered pipeline put into production with WA State imagery for scalable, maintainable sidewalk data collection.

- Advisory Board collaboration finalized core attributes and priorities.

- Initial fellowships piloted to train community stakeholders.

- Community workshops and webinars conducted for stakeholder engagement.

Current Pipeline Predictions + Initial Human Vetting

Report, Courtesy of Gaussian, at: https://tinyurl.com/WASProvisoCurrent

Proviso Mapping Stats

Generated at: 18 Dec 2024 13:45

Status	Percentage	Area (km2)	Sidewalk Count	Kerb Count	Crossing Count	Kerb Crossing Ratio	Sidewalk Length (km)	Crossings Length (km)
🔵 Released to UW	55.86	4121.13	368145	463580	329293	1.342	26919.77	4232.41
🟠 Ready to Release	8.71	642.28	26289	37394	26226	1.414	1768.17	335.21
🟡 Validation In Progress	0.53	39.3	5726	5001	2975	1.674	232.34	37.7
🟣 AI Inference Done. Scheduled for Mapping	0.27	19.7	1619	957	621	0.594	44.9	7.14
⚪ Pending	34.64	2555.78	0	0	0	0.0	0.0	0.0

REMAINING Phase 1 work

- Expanding dataset coverage to reach 90% of Washington's population.
- Incorporating transit-reachable, low-density areas.
- Training stakeholders through tutorials, workshops and fellowships.
- Refining data governance and QA/QC tools.
- Launching the first phase of Specialized Community-Led Impact Opportunities (SCLIOs).

Data Collection and QC Analysis Pipeline

Pedestrian Prediction Model

– Data Sources: Satellite imagery, OSM road network, crowdsourced data.

– Metadata: Document sources, collection dates, and confidence metrics.

– In-Silico Validation: Script-based checks for data completeness, consistency, and plausibility.

Manual Review and Expert Vetting

– Remote Verification: Validate key paths and nodes using satellite mapping.

– Expert Review: Panels of transportation, GIS, and planning experts review high-priority areas.

– Community Feedback: Engage stakeholders to report issues via platform tools.

Quality Assurance & Checks

– Automated Checks: Ensure connectivity, attribute consistency, and geometric alignment.

– Cross-Referencing: Validate with walksheds, zoning, and GPS data; integrate authoritative sources where available.

Iterative Refinement & Feedback Loop

– Model Retraining: Regularly update models with new data and feedback.

– Error Correction: Log and address issues through the viewer system.

– Continuous Improvement: Incorporate updates and feedback to enhance accuracy.

– Data Publication: Publish vetted data with access controls and stewardship guidelines.

TIMELINE Till Biennium End

Complete 55% data
3-5 region deep dive

Annual
Report

Complete QC
Pipeline on all data

Sidewalk Data
Demonstration

Publish Data and
Analytic Pipelines

Biennium 1
Report & Data

| OCT 2024 | NOV 2024 | DEC 2024 | JAN 2025 | FEB 2025 | MAR 2025 | APR 2025 | MAY 2025 | JUNE 2025 |

Data Review &
Best Practice
Research

Workgroup Meeting #6:
Report, Data Review,
Analytic Workflows

Workgroup Meeting #7:
Data Review,
SCLIOs

Workgroup Meeting #8:
Data Stewardship,
Analytic Workflows

Workgroup Meeting #9:
Data Stewardship

Phase 2 ROADMAP (2025-2027)

- Statewide scaling of community training programs.
- Enhancing the OS-CONNECT dataset with widths and obstructions.
- Co-creating community-driven solutions through SCLIOs.
- Developing long-term tools for sustainable data maintenance and updates.
- Strengthening interoperability with state agency data systems.

Building towards a more accessible future in WA State

- Phase 1 sets the foundation with technology pipeline for OS-CONNECT
  - Ensure phase 1 has complete manual validation prior to publishing
  - QC/QA pipeline identifies problems beyond random sampling techniques. Traversability and comparison to real traversals are key features
- Phase 2 ensures sustainability and community-driven impact.
  - System makes data live, usable, maintainable, and can be joined with new or previously collected data
  - Human-usable tools and training for these tools to create active stewardship

Your insights and participation continue to be vital as we shape the next phase of this work
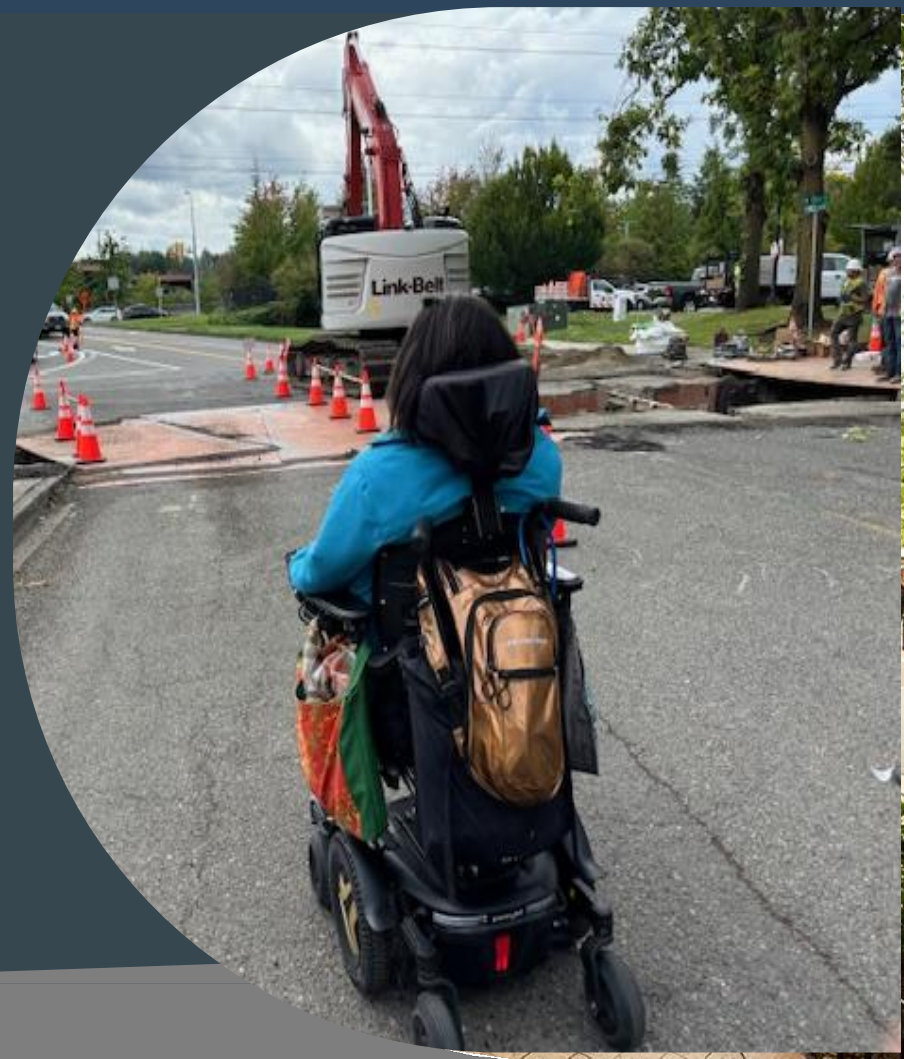
Current state of visualization tools
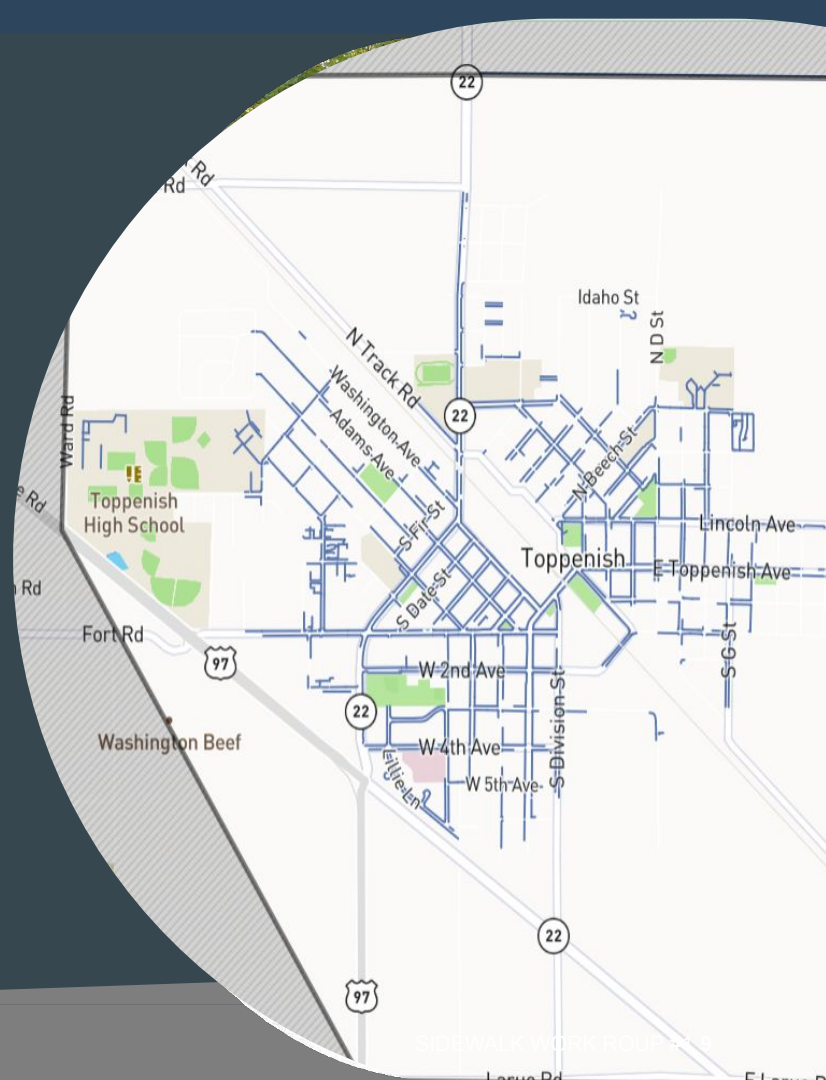
TDEI Visualization and Commenting Tool:

Viewer.sidewalks.washington.edu
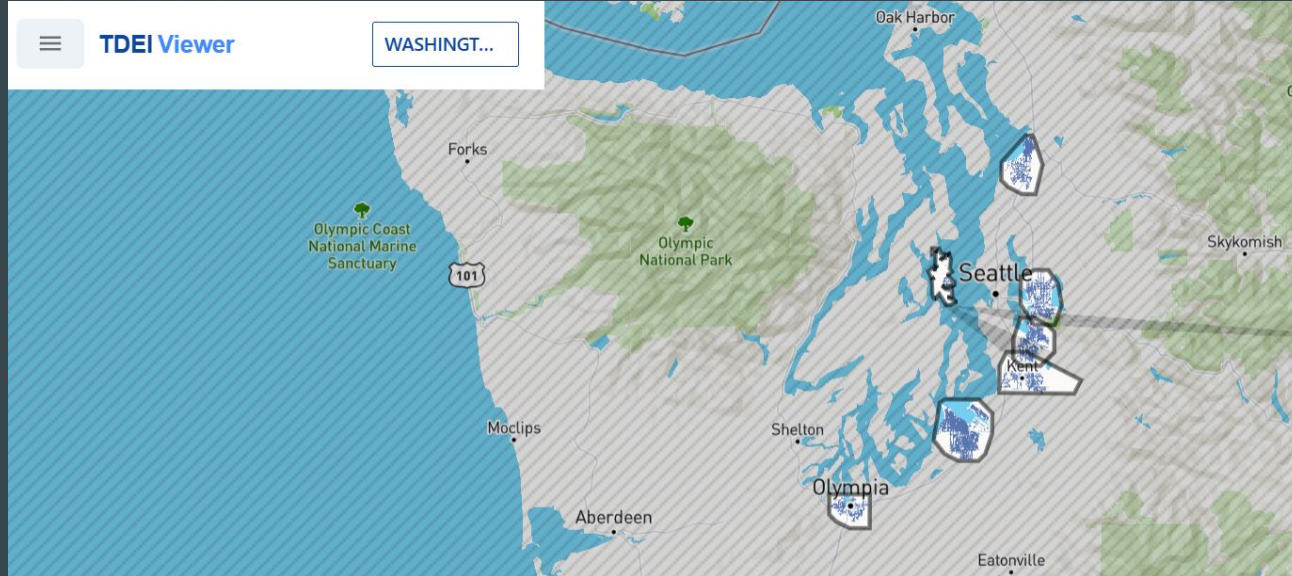
**SCLIOs
What are they?
Current state of
Community Led
projects**

SCLIOs: Specialized Community-Led Impact Opportunities

Definition:

Specialized Community-Led Impact Opportunities are projects that empower local organizations and individuals to leverage OS-CONNECT data to address specific challenges in pedestrian access and mobility.

Purpose:

Solve targeted, community-driven problems.
Foster innovation in data-informed decision-making.
Enhance community engagement and equity.

Alignment:

Supports statewide transportation policy goals, including equity, accessibility, and sustainability.

Resources:
https://tcat.cs.washington.edu/specialized-community-led-impact-opportunity-sclio-grants/

Application: https://forms.gle/CVTtkhP45suZhBzS6

Examples of SCLIOs

Improving Safety Near Schools:

Use OS-CONNECT data to prioritize crosswalk safety enhancements.

Transit Accessibility Evaluation:

Evaluate and improve multimodal transit connections for underserved neighborhoods.

Environmental Justice Assessments:

Identify and address infrastructure gaps in overburdened communities.

Custom Use Cases:

Developed by the grantee in collaboration with community stakeholders.
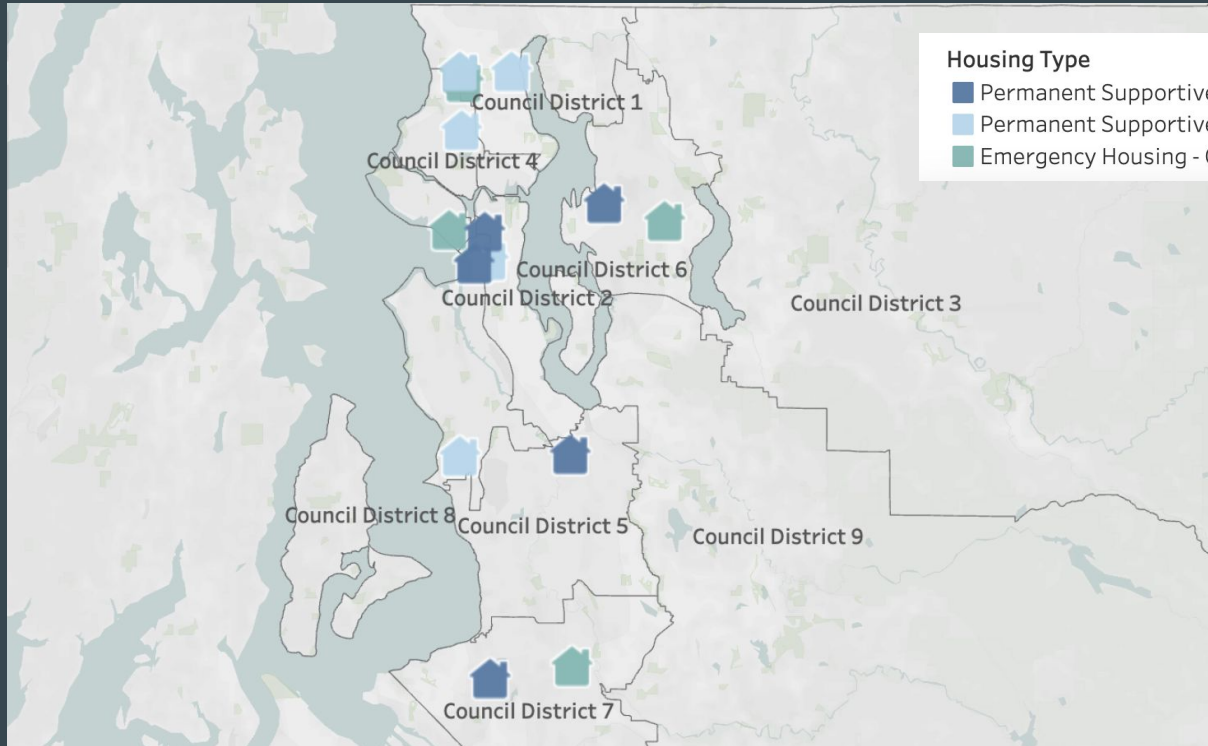
SCLIOs in progress

Overview of currently pursued SCLIOs:

➤ Health Through Housing Initiative: Evaluating walkability for transitional housing in King County.
➤ Expanding and Improving Transit Reach in Wenatchee: Mapping walkability and safety in walksheds of 100 improved transit stops.

Community Benefits:

▪ Addressing urgent, localized issues.

▪ Empowering communities with actionable insights.

Health Through Housing: KCM Connected To Transit, EMPOWER, HopeLink CTNs

Housing Type
- ■ Permanent Supportive Housing - Owned by HTH
- ■ Permanent Supportive Housing - Operations Only
- ■ Emergency Housing - Owned by HTH

Council District 1
Council District 4
Council District 6
Council District 2
Council District 3
Council District 8
Council District 5
Council District 9
Council District 7

Using the OS-CONNECT dataset, in combination with community engagement and TDEI tooling, propose projects that improve access to transit and essential amenities for HTH residents..

Health Through Housing: Methodology Overview
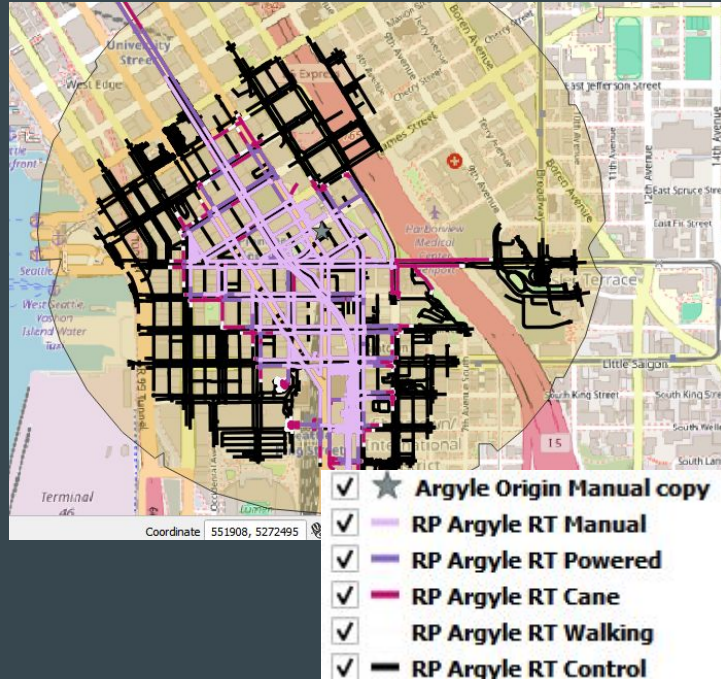
- OS-CONNECT dataset- a starting point
- Walksheds calculated to understand local access and reach inequities
- Additional King County requested data attributes inform new walksheds with greater granularity
- Community-input suggests pedestrian projects incorporating community voices
- Walksheds can simulate the impact of new projects, with scores that allow for apples-to-apples comparisons across projects (for prioritization purposes)

Sidewalk, Crossing and Curb attributes

Sidewalk Attributes

- **Surface Type (already in OS-CONNECT)**
- **Presence of Surface Cracks or Disruptions**
- **Continuity Along the Entire Block**
- **Narrowing of the Sidewalk**
- **Number of Driveways**
- **Number of Light Poles**
- **Number of Manholes**
- **Presence of a Mid-Block Crossing**

Crossing Attributes

- **Presence of Markings (in OS-CONNECT)**
- **Presence of Traffic Signals for Vehicles**
- **Presence of Stop Signals for Vehicles**
- **Presence of Pedestrian Signals**
- **Presence of Pedestrian Call Buttons**
- **Auditory or Speech Notifications for Pedestrian Signals**
- **Vibrating Plates for Pedestrian Signals**
- **Raised Surface Crossings**

Curb Attributes

- **Presence of Traffic Circles**
- **Presence of Roundabouts**
- **Curb Extensions**
- **Number of Curb Cuts**
- **Orientation of Single Curb Ramps**
- **Presence of Tactile Paving on Curb Cuts**
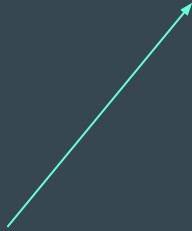- **Raised or Flush Curb Design**
- **Proximity to Bike Lanes**

Health Through Housing: Sidney Wilson House

Residents say:
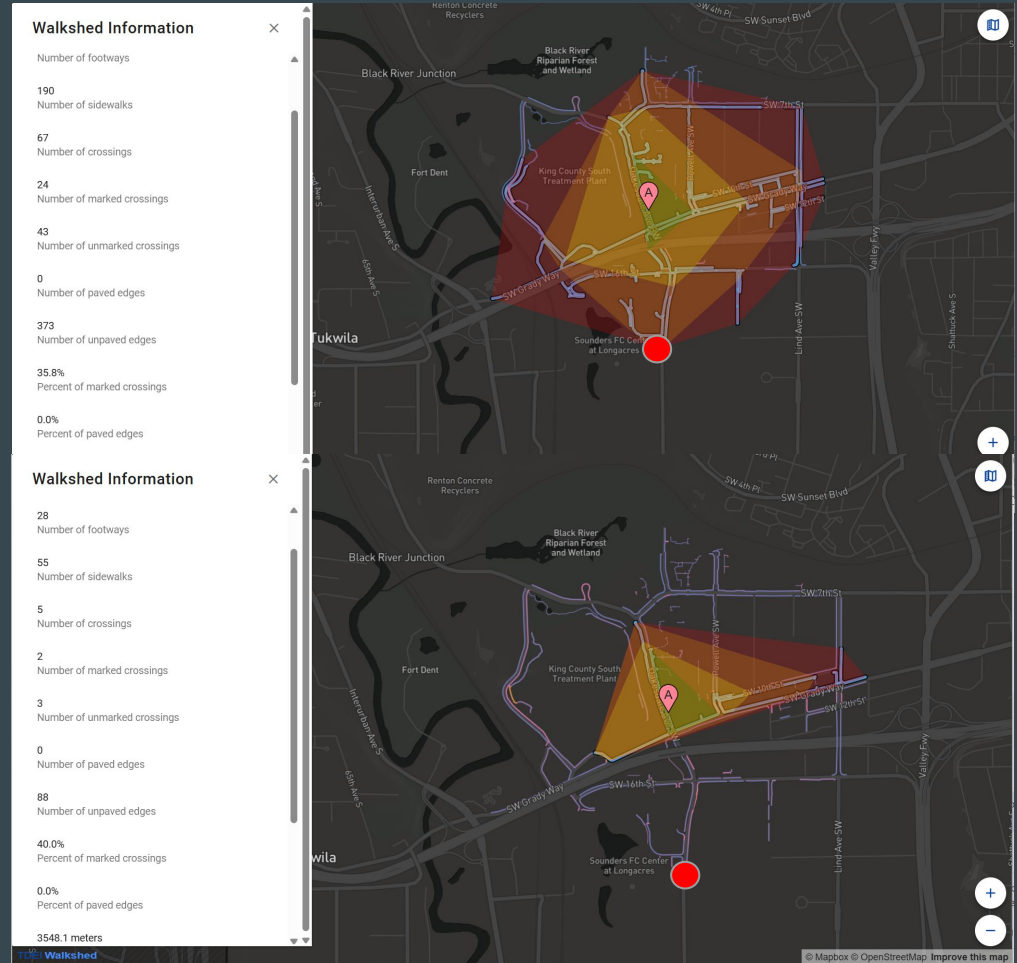"No bus stop is close"
"We need a closer bus stop"
"F line too far away"

WALKSHED 1: No pedestrian restrictions, 1200 second

WALKSHED 2: Pedestrian restrictions: uphill/downhill max: 8/5%; street preference: sidewalks only; curb ramps: necessary, time Cost+ 1200 second

Walkshed Information ✕

Number of footways
190

Number of sidewalks
67

Number of crossings
24

Number of marked crossings
43

Number of unmarked crossings
0

Number of paved edges
373

Number of unpaved edges
35.8%

Percent of marked crossings
0.0%

Percent of paved edges

Walkshed Information ✕

28
Number of footways

55
Number of sidewalks

5
Number of crossings

2
Number of marked crossings

3
Number of unmarked crossings

0
Number of paved edges

88
Number of unpaved edges

40.0%
Percent of marked crossings

0.0%
Percent of paved edges

3548.1 meters

© Mapbox © OpenStreetMap Improve this map

Stewards: tutorials and sustain live data through SCLIOs

SCLIO Funding:

- Identify a specific community problem aligned with project goals.
- Define the scope, including geography and attributes to measure.
- Submit a detailed application (forms and instructions available).

Timeline:

- First 'wave' Application Deadline: 1-18-2025
- Funding Decisions Announced: 1-10-2025

SCLIO Grant support

What We're Looking For:

- Clear identification of the problem.

- Defined project scope and objectives.

- Innovative use of OS-CONNECT data.

- Measurable outcomes and evaluation metrics.

Support Available:

- Technical assistance from TCAT

- Cohort step through guided workshops in winter 2025

- TDEI Fellows cohort will accompany grant awardees

- Access to OS-CONNECT Viewer and tooling

SCLIO Grant support: Stakeholder input

Discussion Points:

- What types of projects do you envision as impactful SCLIOs?
- What additional attributes or tools are needed?
- How can we enhance the funding and application process?

Your Feedback Matters:

- Help us tailor the program to your community's needs.

Preparing for WORKGROUP Mtg #7

- Preparation for next meeting:
  - Annual Report
  - SCLIO applications

THANK YOU and HAPPY HOLIDAYS!

Elements to map in scope

Feature	Notes
sidewalks	Presence of a sidewalk, in a LineString format.
crosswalks	LineString crosswalk available now.
links	LineString - between crosswalks and sidewalks
crosswalk-markings	LineString - crosswalk type, and markings on it.Marked vs unmarked
Curb locations	Point feature for where curbs are
Curb ramps	Point features, with lowered, raised, or flush where possible
Path incline	Elevation change and direction of the elevation change, as perceptible from USGS data
sidewalk-width	Path width with .5m tolerance level

Proviso Language

The appropriation in this section is subject to the following conditions and limitations: tate appropriation is provided solely for the University of Washington's sidewalk inventory and accessibility mapping project to develop a public dataset under an open license and develop the tools needed to publish that data according to an open data specification. The project must include, but is not limited to, utilization of existing data sources, imagery, detailed surveys, and manually collected, detailed data for city streets, county rural and urban local access roads and collectors/arterials, state roads of all types, and roads owned by other entities. The project may draw on partially developed sidewalk data for all state facilities. To the extent practicable, the final product must be suitable for use by the department of transportation, local and regional agencies, tribal governments, and the general public. For the 2023-2025 fiscal biennium, the project will produce a base active transportation data layer for all counties, with priority given to counties with high proportions of overburdened communities. A project status report is due to the transportation committees of the legislature on December 1st of each year until the work is completed.

Designing for the Fullness of Human Experience

Q & A