

SPR RESEARCH PROGRAM

SECOND-STAGE PROPOSAL SUMMARY

PROBLEM NUMBER AND TITLE

26-04 Development of Improved Characterizations of Loop Trips as an Input for Activity-Based Modeling

PROBLEM SUMMARY

Loop trips, such as walking a dog, taking a stroll, or cycling for recreation, are common but often unaccounted for in planning models. These trips promote physical activity but may increase injury risk depending on the environment, making them important for transportation decision-makers. Even advanced travel models underestimate active transportation and its benefits, and their impact on bike and pedestrian network assessments remains unclear.

ODOT and its MPO partners are addressing this gap through the **Oregon Travel Study (OTS)** (2023–2024), which passively tracked trips via a smartphone app, with 51% of participants opting in. Simultaneously, ODOT is collecting high-definition bicycle and pedestrian facility data from nearly 50 cities through the **Climate Friendly and Equitable Communities (CFEC) program**. These datasets provide an unprecedented opportunity to analyze loop trip patterns, assess how infrastructure influences them, and develop methods to estimate future loop travel. Findings will enhance Oregon’s **activity-based model (ABM) system**, improving how active transportation is integrated into planning

ODOT OBJECTIVES

This research will leverage data from the **Oregon Travel Survey (OTS)** and the **Climate Friendly and Equitable Communities (CFEC) multimodal inventory** to quantify loop trip activity for active transportation modes. Since loop trips are not currently captured in analytic or planning tools, integrating these datasets will enhance technical capabilities for assessing transportation needs in data-limited areas.

Having tools to analyze loop trips will help ODOT and its partners evaluate how investments improve public health and safety, a key goal outlined in the **Oregon Transportation Plan (OTP)**. The OTP emphasizes promoting **healthy, cohesive communities (Objective EC.3)** and prioritizing projects that benefit **safety, climate resilience, and underserved populations (Strategy SE.3.1.1)**. Without better data and analytic tools, ODOT will struggle to assess how multimodal investments increase active transportation use and related health benefits including safety outcomes.

BENEFITS

This research will inform current understanding of travel behavior in Oregon by documenting the magnitude of loop trip making and related health and safety implications and developing the necessary methods for including this travel in analytic tools used by ODOT and its partners.

SCHEDULE, BUDGET AND AGENCY SUPPORT

Estimated Project Length: 24 months.

Estimated Project Budget: \$100,000

ODOT Support: Alex Bettinardi, Oregon DOT; Ian Clancy, Oregon DOT; LeeAnne Fergason, Oregon DOT

FOR MORE INFORMATION

For additional detail, please see the complete STAGE 2 RESEARCH PROBLEM STATEMENT online at:

<https://www.oregon.gov/odot/Programs/ResearchDocuments/26-04>

SPR RESEARCH PROGRAM

SECOND-STAGE PROBLEM STATEMENT

FY 2025

PROBLEM NUMBER AND TITLE

26-04 Development of Improved Characterizations of Loop Trips as an Input into System Completeness Tool

RESEARCH PROBLEM STATEMENT

Loop trips are a common travel behavior not typically accounted for in planning and analytic models. Examples include walking the dog, going for a stroll at lunch, and riding a bicycle for recreation or exercise. These loop trips offer Oregonians a dose of physical activity but depending on when and where a person makes a loop trip, their exposure to possible injury (e.g., walking along a road without a sidewalk) could increase. Additionally, even the latest generation of travel models fail to adequately capture this type of travel activity, leading to an underestimation of active transportation and related benefits in the results from those analytic models. It is not known how these trips might change analysis of bike and pedestrian networks for ‘system completeness’ as defined under current planning practices. Until recently, data has not been available that would allow transportation professionals to understand the characteristics and importance of loop trips in daily travel patterns.

ODOT along with each MPO (Metropolitan Planning Organization) in Oregon invested in a next-generation travel behavior survey titled the Oregon Travel Study (OTS - <https://oregontravelstudy.com>). This data collection effort, conducted from Spring 2023 through Spring 2024, included an option for households to use a smartphone app that passively monitored their travel and captured a GPS trace of each trip. The app would prompt the individual to provide details of each trip as it took place, instead of relying on recall after the fact. Households opting for the app agreed to use it for seven days, instead of submitting a single day of travel if using the web option. Encouragingly, 51 percent of households that completed the survey selected the smartphone app, providing ODOT, the MPOs and future researchers a data trove of travel patterns unmatched in previous survey efforts. In parallel, the agency is collecting high-definition bicycle and pedestrian facility data from nearly 50 cities across the state as a part of the Climate Friendly and Equitable Communities (CFEC) program. Together these data sets can be utilized to understand loop trip making differences across the communities where data was collected.

The proposed research would determine the prevalence and key characteristics of active travel loop trips in Oregon, investigate how infrastructure changes the likelihood of making a loop trip, and develop methods to estimate future loop trip travel within the urban areas of Oregon given changes in infrastructure. Results would inform the ongoing statewide effort to develop a consistent activity-based model (ABM) system that better captures active travel.

RESEARCH OBJECTIVES

This research will benefit from the recently completed Oregon Travel Survey (OTS) and soon to be completed Climate Friendly and Equitable Communities (CFEC) multimodal inventory. Once integrated, these data can help ODOT and its partner agencies quantify the magnitude of loop trip activity for active modes. Since these trips are not currently accounted for in analytical or sketch planning tools, this

integration can support the development of new technical capabilities, enabling planners and engineers to better assess transportation needs in data-limited areas. Utilizing data from these two novel data sets, this project would meet the following objectives:

- Determine magnitude and key characteristics of loop trip travel activity relative to traditional “A to B” trip making.
- Integrate recently completed OTS trip making data with CFEC multimodal inventory data.
- Analyze how presence and quality of multimodal infrastructure impacts loop trip travel activity, controlling for key contextual factors.
- Develop methods that utilize research findings to allow staff to account for loop trip travel activity. Methods would be compatible with the ABM work under development.
- Provide a foundation for future ABM development work to fully incorporate active loop trip making into the model system to provide more complete and accurate estimates of future walking and biking on the network.

Having analytic capabilities to account for these travel activities would better position ODOT and its partner agencies to assess how investments improve public health and safety. Improving public health through transportation projects and programs is a critical objective of ODOT and documented in the most recent Oregon Transportation Plan (OTP). The OTP features objective EC.3 which states that the state should aim to *Provide transportation systems to promote healthy, prosperous, and cohesive communities* ([Objective EC.3](#)) with key policy to *Emphasize public health outcomes and maintain and restore community cohesion through system design and investments* ([Policy EC.3.3](#)). Lastly, the OTP’s strategy SE.3 states that transportation decision making should: *Invest in projects that would clearly benefit the safety, climate resilience, and public health outcomes of systemically excluded or underserved populations* ([Strategy 3.1.1](#)).

Without a firm understanding of the existing conditions for loop trip active transportation travel activity or analytic tools to account for this travel in current and future years, ODOT and its partners will struggle to describe how investments in multimodal transportation systems will result in more users and how those users will experience health and safety benefits accrued from those infrastructure improvements.

WORK TASKS, COST ESTIMATE AND DURATION

The tasks below are the core activities associated with this proposed research. Following a review of the existing literature on AT loop trips, the research team would set out to integrate the OTS and CFEC multimodal inventory data, followed by an analysis to document the observed travel activity across the state by community and supply of AT infrastructure. Finally, the relationships documented in previous steps would inform the development of methods to measure how infrastructure changes would impact active loop trip making. Results would provide a more complete picture of system usage and associated health and safety benefits when combined with new ABM estimates of traditional “A to B” active travel.

Task 1 – Literature Review (\$10,000)

This task would acquire, review and synthesize existing research literature and public agency reports on active transportation loop trip frequency, characteristics, and incorporation into estimates of total system activity. The review would emphasize any existing methods developed to predict loop trip activity levels and characteristics from infrastructure, household/person, and other contextual factors such as land-use patterns. This synthesis would help inform analysis in the remaining tasks.

Task 2 – Data Development and Integration (\$25,000)

In this task the data from the Oregon Travel Survey (OTS) would be combined with network inventory data

from the CFEC Multimodal Inventory. The travel survey data includes GPS traces of the routes taken by people during their daily activities. This is a key feature for understanding loop trip making but requires significant processing to merge with network infrastructure data. Combined, the two datasets will provide significant explanatory power for explaining differences across the state in loop trip travel activity.

Task 3 – Descriptive and Comparative Analysis (\$25,000)

Once data has been integrated this task will analyze the magnitude and key characteristics of the loop trip making in Oregon and document how patterns might vary across the state. This analysis will account for the presence of active transportation infrastructure to understand how those transportation features impact household trip making decisions given differences in household composition and prevailing land use.

Task 4 – Loop Trip Estimation and Prediction Methods Development (\$30,000)

While documenting the existing loop trip making travel behavior will be instructive, ODOT and its partner agencies will need analytic tools to implement the findings of this research; therefore, this task seeks to build the required framework for initial analysis and to inform present and future ABM development. The methods would allow analysts to test the effects of infrastructure investments on loop trip making so that potential growth in users could be more accurately estimated when combined with ABM-based estimates of traditional “A to B” trips. Improved estimates of total facility use would inform health and safety analyses as well as system performance metrics such as bicycle and pedestrian miles traveled (BMT/PMT).

Task 5 – Final Report (\$10,000)

This task would document the work completed as a part of this project and ensure the data and analysis materials are made available to the agency and its partners. Further, loop trip estimation methods would be wrapped up and documented on the appropriate platform such as GitHub for further refinement, development, and integration with ongoing ABM development.

Key Deliverables:

ODOT and its partner agencies need a better understanding of the magnitude of loop trip travel activity, its relationship with active transportation infrastructure, and a way to incorporate those relationships into decision making. This research will deliver on these items using a novel set of integrated travel survey and infrastructure inventory data with a primary deliverable of methods for understanding how bicycle and pedestrian system improvements impact total system usage and associated public health and safety benefits. Methods would be constructed to ensure compatibility with ongoing ABM development and provide a foundation for further integration of loop trip travel into the statewide ABM system.

Estimated Project Length: 24 months.

Estimated Project Budget: \$100,000

IMPLEMENTATION

Implementation of this research includes the creation of foundational knowledge around observed loop trip making in Oregon and that travel activity's relationship with transportation agency investments. Because current active transportation data focuses on commutes, ODOT and MPOs have an incomplete picture of the prevalence of active transportation and accompanying needs across the state. Data from loop trips, such as walking the dog, going for a stroll in your neighborhood, or riding a bike recreationally, will complement existing active transportation data and inform future investments. Methods developed to estimate changes in active loop trip travel will inform future incorporation of this important walk and bike activity into future ABM development. In this way, findings from the research can be utilized consistently across the state as partner agencies adopt the methods into their own travel model system deployment.

The proposed research would determine the prevalence and key characteristics of active loop trips in Oregon, investigate how infrastructure changes the likelihood of making a loop trip, and develop methods to be used to estimate future loop trip travel within the urban areas of Oregon given changes in infrastructure.

POTENTIAL BENEFITS

This research will inform current understanding of travel behavior in Oregon by documenting the magnitude of loop trip making and related health and safety implications. Additionally, this research will inform the development of analytic methods to ensure proper representation of this travel activity and the impact that infrastructure investments may have on active loop trips. This analytic capability will allow the agency to better understand how its projects and programs are impacting usage, public health and safety outcomes in Oregon now and into the future. Compatibility with ongoing ABM development will lead to a more complete accounting of active travel that supports improved estimates of total walking and biking by facility, a key component of safety and health analyses and active travel performance metrics more generally.

PEOPLE

ODOT champion(s):

Name	Title	Email	Phone
Alex Bettinardi	Senior Integrated Analysis Engineer	Alexander.o.bettinardi@odot.oregon.gov	503-949-2368
Ian Clancy	Multimodal Network Analyst	Ian.Clancy@odot.oregon.gov	503-302-0626
LeeAnne Fergason	Active Transportation Manager	LeeAnne.Fergason@odot.oregon.gov	503-910-8994
Peter Bosa	Metro – Principal Researcher and Modeler	Peter.bosa@oregonmetro.gov	503-797-1771
Ray Jackson	MWVCOG - Senior Planner	rjackson@mwvcog.org	503-540-1607

Problem Statement Contributors:

Alex Bettinardi – ODOT TPAU

Joe Broach – Portland Metro Data Scientist Lead

Ian Clancy – ODOT PTD

Peter Bosa – Portland Metro

Josh Roll – ODOT Research Unit

Ray Jackson – Mid-Willamette Valley Council of Governments

REFERENCES

1. Oregon Department of Transportation. (2023). *Oregon Transportation Plan*. Oregon Transportation Commission.
[https://www.oregon.gov/odot/Planning/Documents/Oregon Transportation Plan with Appendices .pdf](https://www.oregon.gov/odot/Planning/Documents/Oregon_Transportation_Plan_with_Appendices.pdf)
2. Oregon Travel Survey. <https://oregontravelstudy.com/>
3. Oregon Department of Transportation Climate Friendly and Equitable Communities Multimodal Inventory.
[https://www.oregon.gov/odot/Planning/Documents/Multimodal Inventory Project FAQ.pdf](https://www.oregon.gov/odot/Planning/Documents/Multimodal_Inventory_Project_FAQ.pdf)

STAFF REVIEW PAGE

LITERATURE CHECK

TRID&RIP

☒ A review of TRID & RIP databases found no existing research that answers the research question

ODOT DECISION LENSES

Climate: One way to improve the climate is to provide more opportunities to travel with active transportation. This project focuses on better understanding and representing non-motorized travel. Through better information and understanding of non-motorized travel, projects and investments will be able to more correctly/properly assess the value of non-motorized investments.

Equity: One dimension of equity is income. Lower income households are less likely to own a vehicle and are therefore more likely to use active transportation and transit options. The research specifically seeks to develop a complete understanding of active transportation choices, which will better ensure that active transportation projects are properly informed and therefore investment decisions will have a more complete understanding of their impacts and benefits to all communities.

Safety:

The State's highest risk travelers are vulnerable road users traveling on foot or bike. This project works towards obtaining better information on where active travel occurs and better understanding the risks (rates of injury) that exist across the state. By better understanding the level of risk, the state can better invest in locations that improve the highest risk locations (which are currently unknown do to lack of active mode traveler information). While this project doesn't fully fill the data gap for active travel, it does significantly improve the amount of information the state currently has. Further, this information allows for improved information and prioritization of projects that improve traveler health as well as safety (better investing in locations/projects that will allow for greater opportunity for active modes of travel is safe environments).

TECHNOLOGY & DATA ASSESSMENT

☒ No Identified T&D output

☐ At the end of this project, the implementing unit(s) within ODOT will need to coordinate the adoption of new technology or data in order to realize the full potential of this research.

CROSS-AGENCY IMPACTS

- List ODOT partners or impacted units. Active Transportation, Transportation Planning and Analysis, Planning and Traffic & Roadway sections would all benefit from the findings and tool development in this project.
- Identify any issues of concern raised by an ODOT partners. Note expected mitigation that addresses these concerns. One follow on to this research would be development of a module for the activity based travel demand model being implemented at ODOT and at the MPOs. The development of a module to fit into that model system may require more resources than what is available in this project so expectations should be muted on this element of the implementation of the work.

