Re-examining TODs through the Lens of Disability and Care Responsibilities: How Street and Network Structure Perpetuate Inequity of Access and Opportunity

Recipient/Grant (Contract) Number: University of New Orleans; University of Colorado Denver/69A3552348337

Center Name: Center for Equitable Transit Oriented Communities (CETOC)

Research Priority: Preserving the Environment

Principal Investigator(s): Aditi Misra; University of Colorado Denver; aditi.misra@ucdenver.edu; ORCiD: 0000-0002-5600-5973

Wesley Marshall; University of Colorado Denver; wesley.marshall@ucdenver.edu; ORCiD: 0000-0002-3106-7342

Manish Shirgaokar; University of Colorado Denver; manish.shirgaokar@ucdenver.edu; ORCiD: 0000-0001-6458-1885

Project Partners: None

Project Funding: $100,000 (USDOT) + $50,000 (matching funds) = $150,000

Project Start and End Date: 10/01/2024 - 09/30/2025

Project Description: Transit-oriented developments are generally viewed as equity- and accessibility-focused transportation investments with high returns in terms of GHG reductions and equitable opportunity outcomes. In fact, recent literature suggests that households in transit-oriented developments (TODs) spend less on the combined cost of housing and transportation (Zhou & Zolnik 2013, Dong 2021). Other research suggests that TOD residents engage in more physical activity due to the built environment factors than people living in other areas (e.g., suburbs) (Langlois et. al. 2016, Appleyard et al. 2019). In this research project, we start by asking the question what it means for a TOD to be truly accessible and equitable for people of all abilities. We will then investigate and quantify the relationship between the access network structure and different users' ease of access to destinations in a variety of built environment archetypes. We will consider a variety of destinations related to social mobility and well-being such as educational facilities, healthy food, health care facilities, and job opportunities. Instead of assuming an average user and commuting trip purpose, we will examine access through the lens of users with different abilities and travel needs. This approach is based on the hypothesis that person-level attributes strongly affect accessibility and the lack of available research on this topic. For example, even when seemingly adequate transit is available, women are less likely than men to use transit at night if the bus stop or the first/last mile travel does not feel safe (Chowdhury and Van Wee, 2020). The reason for including trip purpose is that our previous research has shown that people value trips differently depending on the purpose. In other words, people might be unwilling to take transit with certain trips such as a medical appointment due to concerns over reliability. We propose to adopt the framework and protocols suggested by Ewing

et al. in their article 'Identifying and Measuring Urban Design Qualities Related to Walkability' (2006). We will use a similar framework for measuring transit accessibility for a sample of stops within a few selected Regional Transit District (RTD) bus and train routes. The transit stops will be selected based on whether they serve lower income neighborhoods or not (counterfactual) and high versus low ridership to contrast and compare barriers to access and their impact in ridership for different communities. Routes will be selected based on whether they lie on or in close connectivity to the proposed BRT corridors in the Denver Metro so that preemptive policies and measures can be designed to support and boost ridership post launch of the BRT services. The project is also tied to a transit design class that will be offered at CU Denver in Fall 2024. Through projects, students will get hands-on experience of identifying urban design elements that support and promotes universal access to transit and destinations.

USDOT Priorities: *Equity*: The focus of this proposed project is equity. The project aims to fill the gap of designing equitable access infrastructure for people with different abilities and need even within transit-oriented communities. Thus, our project aligns with the objectives of expanding access, power of community and proactive intervention and planning with the goal of equity. *Climate and Sustainability*: This project is designed to support and promote use of transit systems and to remove access barriers to these sustainable modes of travel. Thus, with this USDOT goal, this project addresses the objective of path to economy-wide net-zero emissions by 2050 by supporting options to reduce trips and shift trips to climate-friendly vehicles and modes.

Outputs: The proposed outputs of this research are: i) At least one conference paper to be submitted to Transportation Research Board Annual Meeting ii) At least two peer reviewed journal publications iii) An open source map of the accessibility metric for the routes and stops so that users can change different parameters of the metric and visualize the change in outcome iv) Design project reports with recommendations from the class which will be hosted on the class website in the future.

Outcomes/Impacts: The outcomes of this research are to: i) Understand how different current and potential transit users experience access to transit, and ii) Identify design and infrastructure features that can be remedied to improve transit ridership and user experience. The findings from this research are relevant for social and environmental justice-oriented policies at the local and regional level. Our aim is to understand the gap between what transit-oriented communities hope to achieve and actually achieve, and how it can be reduced, if not removed. Our project underscores the importance to understand that transit users have different abilities and needs, and access to transit starts with the ability to access the transit stop itself, depends on perceptions of the reliability and quality of service, and the ability to reach their preferred destinations with minimum and reliable transfers. Because the project delves into design and infrastructure features, it also can generate recommendations for the maximum return on transit investment, as measured by potential increase in ridership for the investment made.

Final Research Report: (Link to be provided after project completion).