Research Project Work Plan

for

MEASURING THE PERFORMANCE OF TRANSIT RELATIVE TO LIVABILITY

SPR 735

Submitted by

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Research Section
200 Hawthorne Ave. SE, Suite B-240
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September 2010

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1.0 Identification

1.1 Organizations Sponsoring Research

Oregon Department of Transportation (ODOT)
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and

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1.2 Principal Investigator(s)

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1.3 Technical Advisory Committee (TAC) Members

Amanda Pietz, *ODOT Research Section* (Chair)
Myra Sperley, ODOT Research Section (Interim chair)
Dinah VanDerHyde, ODOT Transit Division
Michael Ward, ODOT Transit Division
Marjorie Lifsey, ODOT Sustainability Coordinator
Lucia Ramirez, ODOT Planning Section

Tom Schwetz, Lane Transit District
Jessica Tump, TriMet
Satvinder Sandhu, FHWA

1.4 Friends of the TAC

Jerri Bohard, *ODOT Transportation Development Administrator*
Scott Bassett*, Performance Measurement Manager*

1.5 Project Coordinator

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1.6 Project Champions

Jerri Bohard
ODOT Transportation Development Administrator

Michael Ward
ODOT Public Transit Division Administrator

Margi Lifsey
ODOT Sustainability Program Manager

2.0 Problem Statement

The U.S. Secretary of Transportation, Ray Lahood, recently laid out the concept of 'livability' as one of the nation's four top transportation priorities. As defined by Secretary Lahood, "Livability means a community where you can take kids to school, go to work, see a doctor, go to the grocery store, have dinner and a movie, and play with your kids in a park, all without having to get into a car." To support this idea, USDOT, US EPA, and US HUD have joined together to form the Partnership for Sustainable Communities to improve access to affordable housing, provide more transportation options, and lower transportation costs while also supporting public health and protecting the environment.

The Partnership has established six livability principles, some of which directly or indirectly target transportation's influence on livability. For example, one of the six principles is to provide more transportation choices by "developing safe, reliable and economical transportation choices to decrease household transportation costs, reduce our nation's dependence on foreign oil, improve air quality, reduce greenhouse gas emissions and promote public health" *(US DOT 2009*). This in conjunction with Secretary Lahood's vision of livability as less auto-dependent, makes the placement and availability of transit options paramount to the livability initiative.

While the importance of transit in developing livable communities is highlighted, the methods for measuring the performance of transit relative to livability are vague and undefined. Further, constituents of livability vary from state to state, highlighting the need to develop local, Oregon-specific performance measures. Within Oregon, livability has explicitly been outlined as a

consideration for the Statewide Transportation Improvement Program (STIP) by HB 2001, and indirectly outlined in Policy 1B of the Oregon Highway Plan (OHP), which directs the state to work with local governments to coordinate land use and transportation planning.

There is a need to identify the contribution of transit (e.g. location, access, and connections) to components of livability (e.g. access to employment, and commercial/retail spaces), and to quantify transit's performance (use). This information is critical for the optimization of transit investments, not only to increase livability, but to promote alternate mode use, thereby decreasing auto congestion and vehicle emissions.

2.1 Background and Significance of Work

Increasing the amount of transit use has been a goal for decades, but is coming into sharper focus within the current livability paradigm. What is encouraging about this new environment is that the potential for increased transit use is being thought of in all the complexities of urban design and development, such as density, land use mix, roadway connectivity and design, parking facility design and building design (*Calthorpe and Poticha 1993; Ewing 1995; Cervero et al. 1995; Bernick and Cervero 1997; Cervero et al. 2002*).

Equally important is the recognition that increased transit use is dependant on local characteristics of the pedestrian environment "since all transit trips involve some degree of walking, it follows that transit-friendly environments must also be pedestrian-friendly" (*Bernick and Cervero 1997*). There are many potential pedestrian conditions that enhance or impede one's ability or desire to reach a destination, including safety issues, existence of appropriate paths, and an interesting viewscape at the pedestrian scale (*Calthorpe and Poticha 1993; Ewing 1997*). Other measures include transportation infrastructure (i.e., number of vehicle lanes, bike lanes, and sidewalks), street design (i.e., cul-de-sacs, grid), neighborhood design (i.e., traditional, suburban, neo-traditional), and accessibility (i.e., proximity of destinations and number of destinations within a given distance) (*National Research Council (U.S.) Committee on Physical Activity Health Transportation and Land Use 2005*).

Inclusion of these micro-level built environment characteristics adds to the more standard existing measures of transit performance. Together, then, we can think of the following general characteristics to understand current and potential performance of transit:

- Demographics: who uses transit and what is the potential to expand the transit pie
- Characteristics of service: how frequent is transit service, what is on-time performance, etc.
- Physical environment: how well does the physical layout and structure of the city support or impede access to transit. This accessibility component has two main elements:
    - *Regional scale*: access to jobs, service coverage, etc.
    - *Local scale*: stop-based characteristics of connectivity, design, and integration with adjacent uses

In other words, transit performance can be measured in two main ways: 1) How well does existing transit get delivered; and 2) how well does a region support transit through its basic urban form? Linking indicators of the urban environment with actual transit usage by transit stop will reveal which combinations of transit service and urban form maximize the potential for transit utilization. And understanding whether and where land use, connectivity, new transit placement, or transit enhancements would best result in increases in ridership will help statewide transit investments be

best targeted, efficient, and useful. Such a framework can help with a Least Cost Planning approach to decision making.

3.0 Objectives of the Study

The proposed research will develop GIS-based quantitative transit system performance indicators for livability criteria. The research will examine two spatial scales (regional and neighborhood) with two frameworks for evaluation (coverage and accessibility). At a regional scale, performance metrics will focus on the needs of people getting to destinations (particularly jobs) in addition to the geographic coverage of transit. At the neighborhood level (the area surrounding each transit stop) the urban form will be investigated to determine if it supports or hinders access to and use of the transit facility. The indicators will be validated using transit use/performance data (e.g. ridership) and performing regression analysis.

3.1 Benefits

Transit investments increase the mobility of the general population, and especially benefit those that prefer not to drive, cannot afford a car, or cannot drive due to age or disability. This additional mobility can lead to increased job and educational opportunities, and increased housing options. These, among other benefits, help the overall economic health and livability of a community. Developing Oregon-specific transit livability performance measures may help transit projects compete for funding by showing the measurability of transit projects relative to livability considerations. In addition, the measures will go a long way towards better understanding the relationship between land use and public transportation and helping implement OHP Policy 1B. Better understanding this relationship will allow decision makers to more effectively make investments to increase ridership and use of transit, promote compact urban development, increase livability, and work towards more sustainable, healthy communities.

4.0 Implementation

The study will develop transit performance measures relative to livability. In line with the national agenda, the measures will be used to benchmark existing conditions, measure progress toward achieving community visions and transportation goals, and increase accountability. The data will be considered in the evaluation of transit investments and be made available for developing evaluation and prioritization strategies for transportation investments including least cost planning and greenhouse gas reduction planning. Local transit agencies, counties, and cities may use the measures when developing land use plans, particularly in relationship to their transportation system plans (TSPs). Local land use planners may use the data to improve their plans. The performance data can also be used by local transit agencies to apply and better compete for federal transit grants.

5.0 Research Tasks

The following are the basic tasks (some occurring concurrently):

Task #1: Literature Review and Identification of Measures
Measures will be identified and preliminarily evaluated at the regional level (e.g. transit job accessibility, % of trips using public transit (work and non-work), and square footage of commercial/retail space within x distance of transit stops), and at the neighborhood level (e.g. intersection density, Pedestrian and Impeded Pedestrian Catchment Area (PCA), and transit stop design).

Time Frame: Three months
Responsible Party: Marc Schlossberg
Deliverable: Literature Review Chapter
TAC Decision/Action: Review and comment on draft literature review

Task #2: Assessment of Data Availability
The researchers will work with Oregon transit agencies (e.g. Lane Transit District and TriMet) to determine the availability of stop-based transit ridership data, and local and regional governments to gather GIS and related data.

Time Frame: Two months
Responsible Party: Marc Schlossberg and Jennifer Dill
Deliverable: None
TAC Decision/Action: None

Task 3: Selection of Study Areas
Based upon the availability of data, the researchers will select a range of study areas (e.g. from low-density, low-transit use, to residential downtown areas with high ridership, including small, medium, and large cities) to use to develop the measures.

Time Frame: Three months
Responsible Party: Marc Schlossberg, Jennifer Dill and Nico Larco
Deliverable: Memo documenting findings from Tasks 2 & 3 information
TAC Decision/Action: Guide selection of case study areas

Task 4: Develop Measures
Tasks 1-3 will inform the development of measures. Measures will be selected and developed which have the greatest potential for measuring transit's performance relative to livability in Oregon. This includes data consolidation, formatting and cleaning. Measures will be developed using GIS. The ability to automate a process to generate the measures will also be evaluated so that practitioners can implement them easily.

Time Frame: Six months
Responsible Party: Marc Schlossberg and Nico Larco
Deliverable: List of Measures
TAC Decision/Action: Review Measures (No meeting)

Task 5: Validate Measures

The researchers will use statistical analysis to assess the relationships between the livability measures and transit ridership, controlling for transit service characteristics (e.g. headway, fare, and type of vehicle) and demographics (e.g. income, and age). The relationships are unlikely to always be linear. Therefore, the researchers will examine whether there are certain thresholds below or above which ridership levels off or declines sharply.

Time Frame: Five months
Responsible Party: Jennifer Dill
Deliverable: Report chapter
TAC Decision/Action: Review and comment on chapter

Task 6: Urban Design Evaluation

A separate urban design analysis will be conducted on a cross-section of transit stops, including looking at informal paths that people use to access transit and the implication for distance and design consideration in thinking about reasonable access sheds.

Time Frame: Eight months
Responsible Party: Nico Larco
Deliverable: Report Chapter
TAC Decision/Action: Review and comment on chapter

Task 7: Final Report

The final report will include a set of performance indicators, data needs, and instructions for use for measuring the livability performance of the state's transit systems, in addition to background and explanation of the analysis/research.

Time Frame: Three months
Responsible Party: Marc Schlossberg and Jennifer Dill
Deliverable: Final Report
TAC Decision/Action: Review and comment on report

6.0 Time Schedule

Project Tasks	ODOT Fiscal Year (FY)				
	2011			2012	
	Qtr 2 Oct - Dec	Qtr 3 Jan - Mar	Qtr 4 Apr - Jun	Qtr 1 Jul - Sep	Qtr 2 Oct - Dec
Task 1: Literature Review and Identification of Measures Deliverable: Literature Review PI: Marc Schlossberg	*				
Task 2: Assessment of data availability PI: Marc Schlossberg & Jennifer Dill					
Task 3: Selection of study areas Deliverable: Memo documenting findings PI: Marc Schlossberg, Jennifer Dill, & Nico Larco		*			
Task 4: Develop measures Deliverable: List of measures PI: Marc Schlossberg & Nico Larco			*		
Task 5: Validate measures Deliverable: Report Chapter PI: Jennifer Dill				*	
Task 6: Urban Design & Informal Path Evaluation Deliverable: Report Chapter PI: Nico Larco				*	
Task 7: Final Report Deliverable: Final Report PI: Marc Schlossberg & Jennifer Dill					*

*Deliverables

Task Duration *[shade cells to show length of task]*

7.0 Budget Estimate

		FY2010-11	FY2011-12
Personnel			
Total Salaries	41,612	18,000	23,612
Fringe Benefits	9,236	3,995	5,241
Total Personnel Costs	**50,848**	**21,995**	**28,853**
Travel	6,000	3,000	3,000
Services and Supplies (Tuition and Other supplies)	31,834	31,834	-
Total Direct Costs	**88,682**	**56,829**	**31,853**
Total Indirect Costs	**24,163**	**15,484**	**8,679**
Total Project Costs	**112,845**	**72,313**	**40,532**

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