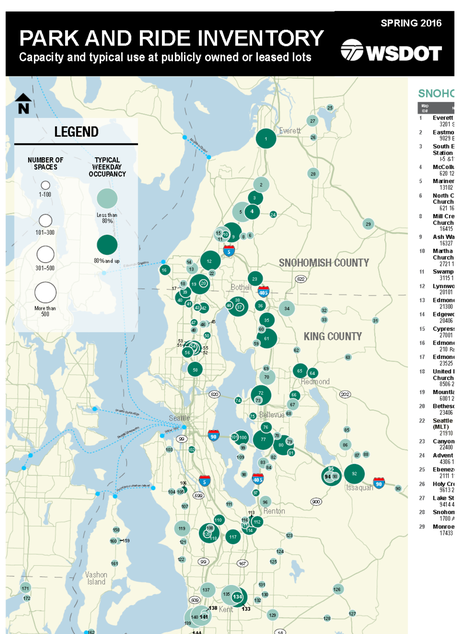
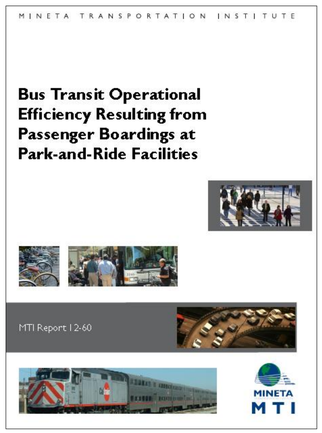
Park-and-Ride for Transit Customers Yields Higher Ridership and Operating Efficiency

Abstract

Across the United States, park-and-ride (P&R) lots with frequent bus service to urban employment centers have proven to be very popular. Such facilities are often filled to capacity on work days. At the same time, the very idea of P&R has been criticized by transit advocates because government-funded construction and operation of parking at transit centers is perceived as an expensive way to grow transit ridership, and is also viewed as problematic because it encourages commuters to use their automobiles instead of more environmentally benign means.
This study explores the effect on bus efficiency of the drive-and-park-and-ride means of transit access and its fiscal implications. Transit's economic efficiency is defined by passenger boardings per vehicle hour in revenue service.
As an example of financial impact, 53 suburban Seattle bus routes of King County Metro were examined where the strongest influence on boardings per revenue hour was found within the data set. Calculations show that 50 thousand transit service hours, worth $17 million, are saved annually – ten percent of annual operating costs for this sub region – because passengers are picked up at P&R facilities instead of at bus stops not at P&R lots.
The study also shows that reasonable daily parking charges (compared to the cost of driving to more expensive parking downtown) would provide sufficient capital to build and operate new P&R capacity without subsidy from other revenue sources.

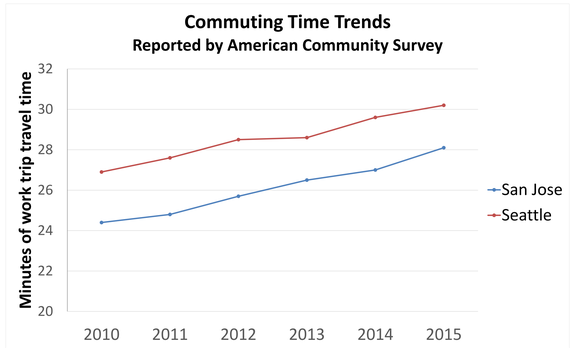




Authors appreciate funding of this work from the Mineta Transportation Institute at San Jose State University and the California Department of Transportation.

"RATIONALIZING AUTOMOBILE PARK-AND-RIDE ACCESS TO BUS TRANSIT FOR SUBURBAN CUSTOMERS"

Transportation Research Board 2017 Annual Meeting, Paper 17-02153



https://www.kpff.com/portfolio/v2-files/eastgate-park-ride/b---detention-pond-perspective-view---eastgate-park--ride.jpg

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Parking finds its place in Sound Transit vote

BIGGER PARK-AND-RIDES FOR SUBURBANITES

Critics say that wastes cash on car-dependent strategy

By MIKE LINDBLOM
Seattle Times transportation reporter

Sleep in, and you'll be too late to find parking in the six-story garage at the Federal Way Transit Center. All 1,900 spaces will be taken.
Same goes for hundreds of spots at Kingsgate in Kirkland, south Renton near the S curves, or just about any major express-bus or commuter-train station.
With that appetite in mind, the Sound Transit 3 ballot measure proposes an increase of 5,960 park-and-ride stalls, at stations open between 2024 and 2041.
Even so, Sound Transit CEO Peter Rogoff acknowledged during a debate, "Whatever amount of parking is provided is probably to be insufficient."
ST3's investment in parking is likely to strike voters' support to expand light rail deep into the suburbs — north to Everett, east to Issaquah and Redmond, and south to Tacoma. The $54 billion, 25-year package also includes increased Sounder commuter-train capacity, and bus-rapid transit lines north and east of Lake Washington.
But to some green- and urbanist thinkers, the plan wastes money and land to subsidize car trips vs. Spend less on parking, they purport.

See > TRANSIT, A8

MIKE SIEGEL / THE SEATTLE TIMES
Commuters wait to get on a Metro bus after parking at the Kingsgate Park-and-Ride in Kirkland early Thursday morning.

https://upload.wikimedia.org/wikipedia/commons/5/52/ParkAndRideSignOxford200509010.JPG

Goal One:

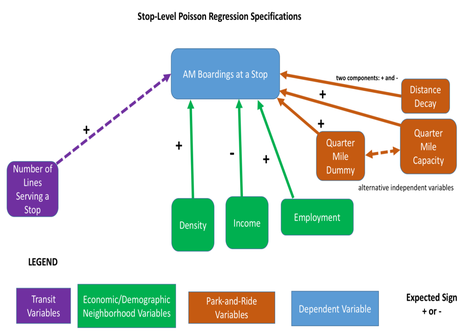
Develop a model to determine the marginal impact of a park-and-ride lots on performance measures

The first goal was addressed using cross-sectional stop-level boardings data paired with American Community Survey data, and employing Poisson regression methods.

Goal Two:

Develop a predictive model that forecasts service productivity along routes served by park-and-ride lots.

The second goal was addressed with ordinary least squares regression using route-level data on a selection of routes known to be corridors for suburban commuters.



	Poisson Regression 1			Poisson Regression 2			Poisson Regression 3		
		Robust			Robust			Robust	
TOTALAMBOARDINGS	Coef.	Std. Err.	z	Coef.	Std. Err.	z	Coef.	Std. Err.	z
Number of lines serving stop	1.592366	0.0718154	10.32	1.642585	0.0747829	10.9	1.644256	0.0744324	10.99
QuarterMileDummy	2.235686	0.2354349	7.64						
QuarterMileCapacity				1.001614	0.0001951	8.28			
Gravity							1.195957	0.0323441	6.62
MedianHHIncome	0.9999966	9.00E-07	-3.82	0.9999965	8.95E-07	-3.88	0.9999964	8.91E-07	-4.09
Number of workers	1.000296	0.0001113	2.66	1.000393	0.0001101	3.57	1.000438	0.0001079	4.06
PopDens	1.000042	5.97E-06	7.01	1.000043	6.12E-06	6.99	1.000038	6.25E-06	6.1
constant	0.8200538	0.1381353	-1.18	0.7365527	0.1228395	-1.83	0.7564601	0.1251046	-1.69
Pseudo R2	0.1128			0.1097			0.0935		

http://www.virginiadot.org/travel/parkride/img/PandRsign.jpg

$$Peak\ boardings\ per\ service\ \mathbf{hour} = \beta_0 + \beta_1(P\&R\ Influence) + \beta_2(Boardings\ per\ mile) + \beta_3(Stops\ per\ mile) + \epsilon$$

	OLS Regression		
		Robust	
Peak Boardings per Service Hour	Coef.	Std. Err.	t
P&R Influence	16.649	4.847	3.43
Boardings per Mile	15.480	1.218	12.71
Stops per Mile	-2.413	0.572	-4.22
constant	7.907	2.137	3.7
R-squared	0.908		

Recommended Next Steps:

Replicate methodology in other urban regions of North America to raise understanding of how aggregating transit customers at P&R facilities generates operational efficiencies in transit service.

Develop a mathematical model that simulates an ample supply of peripheral parking spaces managed for all-day availability via user pricing to understand how to optimize boardings per service hour in both peak and off-peak periods.

Develop quantitative models comparing expansion of (a) user-supported park & ride versus (b) transit-oriented housing for cost-effectiveness as policy alternatives for growing transit ridership.

Measure the cost-effectiveness of alternative, less-parking-intensive methods -- such as ride-hail services-- for bringing customers to transit centers.

John Niles
Global Telematics
Seattle, Washington USA
jniles@alum.mit.edu
1-206-781-4475

J.M. (Mike) Pogodzinski
Department of Economics
San Jose State University
San Jose, California USA
j.m.pogodzinski@gmail.com
1-415-516-6144