

The Cost Effectiveness of Park and Ride Lots

Park and Ride Lots – A Purpose and Need

Park and Ride (P&R) facilities are an integral part of the existing transportation system. They increase the sustainability of the highway network by taking traffic off of the roads and encouraging other modes of travel – by bus, car- or van-pool, walking or other means. Formal P&R networks have existed since the 1970’s. P&R’s have a tremendous upside, which includes reduced accidents, energy consumption, traffic congestion, most vehicle emissions, and savings in project funding. However, P&R’s do have their drawbacks, such as increased travel time and person miles travelled. The numbers of P&R facilities as follows in [Figure 1](#).

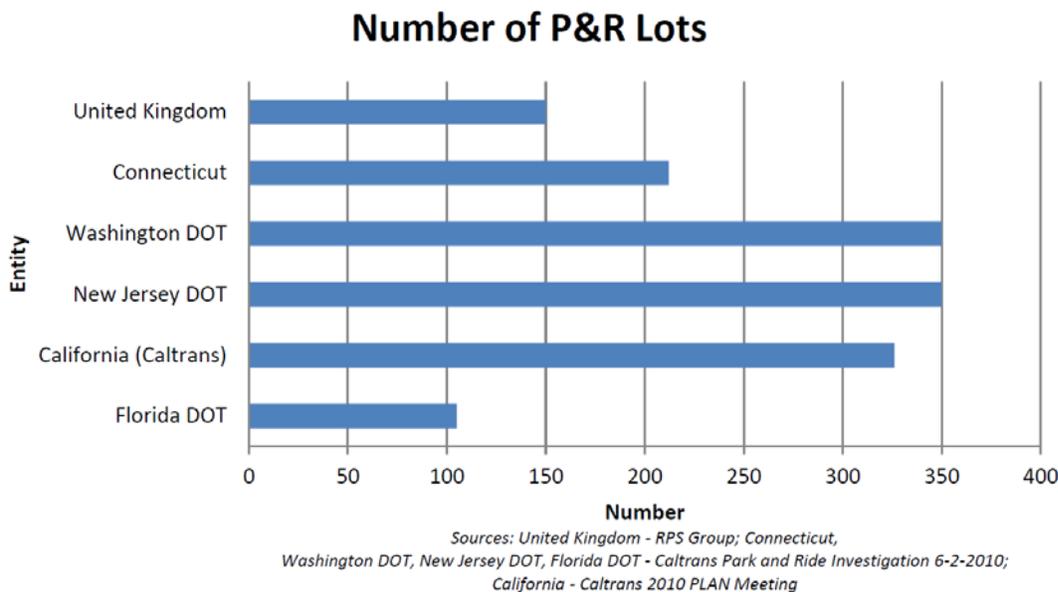


Figure 1

Joe Caputo, Caltrans District 3 Deputy Director of Engineering, replied this way on the nature of P&R Cost Effectiveness. “*Cost-effectiveness relates to the value an investment provides versus its life cycle cost. In the case of a P&R lot, it would be a reduction in congestion and increase in user benefit in the corridor it serves versus its life cycle cost (initial capital cost, and annual maintenance and operation over its useful life).*” (Master’s Thesis Survey Response, January 2014)

Measures of Effectiveness

In 1983, the Washington Department of Transportation (WSDOT) studied various Measures of Effectiveness in regards to P&R facilities. Travel times (per person) and person miles travelled went up – which makes sense because most P&R facilities are not on direct routes from every person’s origin to their destinations (work to home, or vice versa). However, accidents went down and energy consumption went down significantly. These figures can be seen in [Table 1](#).

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<i>Measure of Effectiveness</i>	<i>Units</i>	<i>Percent Change (P&R vs. Previous Mode Trip)</i>
Travel Time	Minutes / person trip	+13.3%
Person Miles Travelled	Miles / Person Trip	+3.9%
Accidents	\$ equivalent / person trip	-35.5%
Energy Consumption	Gallons of gas / person trip	-21.3%

In addition, the 1983 WSDOT *Cost Effectiveness of Park and Ride Lots* study revealed some interesting statistics in regards to various components of a typical P&R trip versus a previous mode (driving alone, for example). WSDOT performed this analysis with and without sunken highway costs. The results can be seen in [Table 2](#).

Trip Type	<i>With Sunk Highway Costs</i>		<i>Without Sunk Highway Costs</i>	
	Previous Mode	Park and Ride	Previous Mode	Park and Ride
Time	\$2.80	\$3.04	\$2.80	\$3.04
Road	\$0.93	\$0.38		
Other Public	\$0.26	\$0.20	\$0.26	\$0.20
Congestion	\$1.36	\$0.52	\$1.36	\$0.52
Auto	\$2.69 (\$7.15)	\$1.57 (\$4.16)	\$2.69 (\$7.15)	\$1.57 (\$4.16)
Parking	\$0.89	\$1.28	\$0.89	\$1.28
Bus	\$1.21	\$1.93	\$1.21	\$1.93
Total	\$10.14 (\$26.97)	\$8.92 (\$23.72)	\$9.21 (\$24.50)	\$8.54 (\$22.72)

Note: There was a 266 percent increase in the Consumer Price Index (CPI) between 1983 and 2013. (United States Bureau of Labor Statistics)

This trend means that there was a \$3.25 cost highway project cost savings per trip in 2013. Assuming that P&R's would save 20 million trips in California [assuming 10 million commuters taking two trips per Working Day (WD)], \$1.7 billion per year (\$65 million per WD x 256 WD/year) would be saved. Yes, that is assuming many commuters change their driving habits. However, the \$1,540 per year wear-and-tear cost savings (roughly \$3 per trip x 2 trips/WD x 256 WD/year) and gas savings serve as additional incentives for commuters to switch habits.

Funding Challenges and Prioritizing Projects

P&R's provide for a more sustainable transportation system. The California Department of Transportation's (Caltrans) Mobility Pyramid provides a 'bottoms-up' approach to maintaining a highway network. That is, the intent is to apply the least expensive levels first; (1) and then (2) through (6) if needed. The levels of the pyramid are as follows:

- System Monitoring and Evaluation (1);
- Maintenance and Preservation (2);
- Smart Land Use – Demand Management / Value Pricing (3);
- Intelligent Transportation Systems; Traveler Information / Traffic Control; Incident Management (4);

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- Operational Improvements (5); and
- System Completion and Expansion (6).

Exiting P&R facilities fall within the Levels 1, 2, and 3 of the Mobility Pyramid. P&R's are a much cheaper alternative than a Level 5 or 6 expansion project (i.e., Lane Addition).

In 2010, \$2 million was devoted statewide in California towards the construction and maintenance of P&R facilities. For a large system (367 P&R facilities (in 2010) and 1,061 HOV lane miles, [Caltrans, 2005]) that figure is arguably an insignificant amount. Assuming 75% was set aside for P&R facilities, that leaves \$1.5 million / 367 P&R facilities = \$4,087 per P&R facility for maintenance, modernization, or expansion. According to the Victoria Transport Policy Institute (VTPI), “*Surface parking lot construction costs ranged from \$1,000 to \$15,000 per space, with an average of \$5,000 per space.*”(VTPI, 2013)

VTPI summarizes the benefits of P&R facilities in [Table 3](#), with factors ranked from 1 (least effective) to 3 (most effective). P&R's ranked a “2” in *Road and Parking Savings* in part because of the difficulty in funding these facilities.

Table 3 -- Park and Ride Benefit Summary (VTPI, 2014)		
<i>Objective</i>	<i>Rating</i>	<i>Comments</i>
Congestion Reduction	2	Encourages use of alternative modes.
Road and Parking Savings	2	Encourages use of alternative modes.
Consumer savings	3	Allows use of alternative modes, reduces crime costs.
Transport Choice	2	Allows greater use of alternative modes.
Road Safety	2	Encourages use of alternative modes, reduced risk to users.
Environmental Protection	2	Encourages use of alternative modes.
Efficient Land Use	3	Encourages use of alternative modes and higher-density development.
Community Livability	3	Encourages use of alternative modes and makes neighborhoods more livable.

Given such funding constraints, steps must be taken to prioritize P&R projects and make them as cost-effective as possible. Two reports provide the basis for this P&R study. WSDOT produced the first in 1986 and the second by The Woodlands Township (Texas) in 2013. Both found P&R to be cost-effective. In fact, 93.5 percent of survey respondents in the second survey found P&R to be a ‘good value.’ (Park and Ride Study for The Woodlands, Texas; by Goldman Corporation and the Brazos Transit District; 2013).

Various government agency models were examined: Chicago, San Francisco, States of Florida (FDOT) and California (Caltrans) Departments of Transportation, and governments of Capetown, South Africa and Singapore. By and large, all of these models show that Primary Data has to be collected from existing P&R facilities. After that, Performance Evaluations are

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performed and a P&R is categorized as: (1) successful, (2) operating, (3) marginal, or (4) unsuccessful. After being categorized, Site-Specific data are collected and Corrective Actions are taken. These actions range from expanding for successful P&R's, to revising services, and finally to closing unsuccessful P&R's.

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Be Aware of Travelling Public Needs

Transportation agencies need to reach out to the P&R users and ask them what they need. In order to be truly cost-effective, it is imperative that P&R facilities address the needs of the travelling public. The purpose of the survey used in this study was to gauge what characteristics were most essential for a successful P&R facility. Survey takers indicated that a P&R facility that had *easy access to roadways* was more important than *security* of the facility. Both were essential. However, the automatic assumption that security would be more important would be incorrect.

Prioritize Projects

Because P&R projects compete with larger highway projects for state, federal, and local funding, a reason exists to prioritize P&R's. Linda Tong, Caltrans District 4, sums this up: "*State P&R facilities have no dedicated federal /state/ regional/ local program funding and often competes unsuccessfully for limited funds with other transportation related projects.*" (Master's Thesis Survey Response, February 2014)

There are many ways to prioritize projects. Different agencies use somewhat different models. The models discussed in this paper come from FDOT, Caltrans, San Francisco, and Chicago.

Perform a B/C analysis

Another way to prioritize projects would be to perform a B/C analysis. There are many tools available to do this. When using these tools, however, caution should be used when making assumptions for user inputs.

Have a Justifiable Purpose and Need

The better the purpose and need, the higher the chance of getting the funding required for the completion of the desired project. Therefore, the projects with the greatest benefit will get the available funding. For example, if there was \$100 million funding available through SB 45, \$75 million would be assigned to projects in 'high risk' areas. Only \$25 million would be available for projects that are not in these areas. So, if there were 50 projects proposed that would make P&R facilities transit accessible (i.e., addition of bus stops, ramps, and/or shelters), only twenty percent of these would get an average of \$2.5 million. Four-in-five would receive no funding through SB 45.

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Establish Public Private Partnerships (PPP's)

Caution, however, should be used when establishing PPP's. These should only be used when they are judged to be within the travelling public's best interest. For example, if a local business offers its parking lot for a potential PPP, the State DOT should verify the condition of the existing facility. If, for example, a lot is full of potholes and is poorly maintained (for example, the condition of the Elkhorn P&R facility) and a complete tear-out and reconstruction is required, then a PPP should be avoided. The business would benefit at a cost to the state taxpayers. *"Common sense public interest protections must be built into any future transportation P3 authorizations. Specifically, a cost benefit analysis should be performed by public agency employees to protect the public interest."*(Professional Engineers in California Government)

Relinquish P&R Facilities where there is not adequate funding to maintain

Following a suitable relinquishment process is a great way to ensure that the transfer of property between state and local agencies is done properly. The agencies involved (who), facility involved (what and where), date of relinquishment (when) and the issues involved in the facility (the why) are discussed as outlined in the *Relinquishment Information Sheet*. The cost involved, local agency protests, and any Cooperative Agreements that Caltrans has with the local agency regarding this facility are referenced in this document. All such property transfers are brought before the Relinquishment Resolution Committee (RRC), as it is known in California.

Conclusion

This study found through various studies that P&R facilities are cost-effective. However, they do have problems – a lack of funding and security to name a few. P&R facilities are a critical part of the transportation system and will have greater value as the demand is increased on existing highways. In order to efficiently manage the existing and future P&R facilities, the system needs to be in place to identify problems and fix them at a manageable cost. Efficient P&R system management only happens if all transit providers, government agencies, and community members work together.

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