Figure 2. Median Household Income by Transportation Analysis Zone, I-5 North Corridor Study Area (2008)

Map provided by LSA Associates and Cambridge Systematics.
Appendix A. Detailed Literature Summaries

Following are summaries of the key research and academic papers that were found to be most relevant to potential equity concerns in implementation of the I-5 North HOT lanes. Page numbers in the text refer to the respective documents being summarized.

- **Traffic Congestion: Road Pricing Can Help Reduce Congestion, but Equity Concerns May Grow** (U.S. Government Accountability Office [GAO], 2012)

As of January 2012, this report identified 12 HOT lane projects in operation around the U.S. Four HOT lane projects have been evaluated for equity concerns (p. 21): SR-91 in Orange County, CA, I-394 in Minneapolis, SR 167 in Seattle, and I-15 in San Diego. I-95 HOT lanes in Miami-Ft. Lauderdale were evaluated, but not for equity concerns. Evaluations of the first three of these HOT lane projects found that “high-income drivers used them more often than low-income drivers” (with varying definitions of high- and low-income). For all four of these facilities, drivers “liked having the option of using the HOT lanes and thus were supportive of them” – independent of income level.

The report states that “[b]oth travel time and travel speed improved on at least some sections of all five HOT lane projects that were evaluated.” However, evaluations used inconsistent performance measures, so it is difficult to draw clear conclusions about whether drivers in parallel unpriced lanes – who are more likely to include low-income drivers or commuters – will benefit from the implementation of a priced Express Lane. Such effects were found in Miami on I-95 and on SR 167 in Seattle. Some HOT lane projects involved adding new capacity while others involved only HOV lane conversion, but in the evaluations, the effects of adding capacity were not distinguished from the effects of implementing pricing.

- **Equity of Evolving Transportation Finance Mechanisms** (Transportation Research Board, 2011)

This report provides a comprehensive overview of equity concerns in transportation finance methods, including tolling. It provides guidance to policy makers and analysts based on the best current understanding of the key issues that can be raised by various means of paying for road infrastructure. For example, it is important to consider new mechanisms (like tolls or HOT lanes) in comparison with traditional or existing means of project funding, such as sales taxes and gas taxes. Four commissioned scholarly papers by noted academics underpin this report.
The report includes a concise yet powerful list of questions that policy makers should consider in an equity analysis for a transportation project or a transportation finance policy. These questions have been used to guide and structure the I-5 North equity assessment since they are based on the best current research:

- Who makes direct payments?
- Who receives direct benefits, including time and reliability savings?
- Who is most likely to change behavior to avoid a new or increased tax or toll? Are there social implications beyond the individual burden of changing travel behavior, such as loss of an industry or isolation of the elderly?
- Are there viable alternatives that satisfy the travel needs of those who reduce their automotive travel in response to new or increased taxes or tolls?
- What businesses are likely to be affected and how?
- How will the revenues be likely to be affected and how?
- How will the revenues be spent, and who is likely to benefit from these expenditures?
- How will the costs and benefits be distributed over time (generations)?
- Are land prices likely to shift in response to changes in transportation costs? If so, will the burdens of the policy shift to different groups? How will location patterns (e.g., gentrification, areas of job growth, retail development) respond to shifts in land prices? (p. 63)

The report points out the following:

- “People tend to favor the status quo strongly, and sometimes even irrationally, over potential alternatives” to traditional road project finance methods, such as tolled express lanes. (p. 132)
- “Empirical evidence about the effectiveness of strategies for remedying inequities resulting from transportation finance policies is very limited.” (p. 134)
- “Suitable models for predicting...shifts [in behavior in response to a new toll, e.g.] are not widely available, so logical reasoning may well be needed to develop a qualitative picture of the redistribution of the burden of a new policy.” (p. 136)

The report recommends that policy makers take the following steps:

- Assess likely impacts of finance strategies.
- Use lessons learned elsewhere to inform discussions.
- Develop outreach programs and educational materials.
Explore possible remedies for inequities.

**Road Pricing: Public Perceptions and Program Development** (Transportation Research Board, National Cooperative Highway Research Program, 2011)

This detailed planning guide compiles lessons learned from road pricing (RP) projects implemented around the United States. It observes that “[t]he most popular and widespread RP concept to date has been conversion of high-occupancy vehicle (HOV) lanes to high-occupancy toll (HOT) lanes and new-capacity HOT lane projects. These projects have shown initial success in managing traffic more effectively, raising revenue for system investment, advancing greater travel reliability for roadway users, and creating new travel options.” (Foreword)

In a summary table on HOT lane conversion (Exhibit 20, p. 44), the report observes that:

- “Income equity has not been a major issue; usage surveys of I-15 lanes in San Diego and I-394 lanes in Minneapolis showed high support for HOT lanes across all income groups, with lowest and highest income groups expressing about equal support.”
- “HOT lanes are likely to be used by all income groups…; no disadvantage caused to transit and carpool users.”
- “…optional nature of HOT lanes reduces concerns about some travelers being worse off than before.”
- “Requirement of an electronic tolling account…can be a concern for low-income or other groups without credit cards or access to checking accounts.”

**Just Pricing: the distributional effects of congestion pricing and sales taxes** (L. Schweitzer, University of Southern California, and B.D. Taylor, University of California, Los Angeles, 2008)

In response to the often-voiced concerns that roadway tolls are unfair to low-income drivers, this paper points out that it is important to compare the equity effects of tolling with those of traditional means of financing transportation infrastructure. The paper compares the cost burden of State Route 91 in Orange County, CA, which includes priced high-occupancy lanes, with its cost burden under the County’s transportation sales tax measure. The analysis finds that the sales tax redistributes about $3 million in revenues from less affluent residents to more affluent residents, just for State Route 91.
“The sales tax, because it is paid by virtually everyone, spreads the costs of infrastructure across a broad base of consumers. It costs each family comparatively little, but these burdens are regressive distributed. In comparison to higher-income groups, low-income households pay the highest proportion of their income on sales taxes; we find in our geographically constrained estimation that households in the lowest income group would contribute over $3 million out of the $34 million in SR91 revenues were these monies to come from sales taxes rather than tolls.” (Conclusions, paragraph 3) A toll, by contrast, is a user fee that is paid directly by the recipient of the benefit, in this case an uncongested driving trip. “Using sales taxes to fund roadways creates substantial savings to drivers by shifting some of the costs of driving from drivers to consumers at large, and in the process disproportionately favors the more affluent at the expense of the impoverished. Others have shown such transfers to be inefficient; we argue it is inequitable as well.” (Conclusions, last paragraph)