

Thinking Outside the Bus:

Understanding User Perceptions of Waiting and Transferring in Order to Increase Transit Use

Report Synthesis

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(Caltrans)

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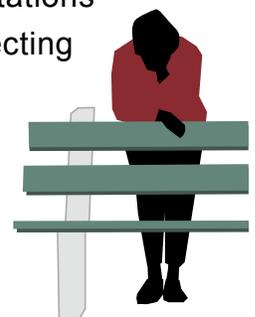


Report Synthesis

This document is a synthesis of the Final Report for the Research Technical Agreement (RTA) between the California Department of Transportation (Caltrans) and the University of California at Los Angeles (UCLA). The RTA is entitled “Tool Development to Evaluate the Performance of Intermodal Connectivity (EPIC) to Improve Public Transportation”.

Efficiently and effectively run public transit systems are essential components of and crucial contributors to the proper functioning of a region’s overall transportation network. However, travel by public transit is a complex process that involves more than simply people moving about on buses and trains. A typical door-to-door trip involves walking from one’s origin to a bus stop or train station, waiting for a vehicle to arrive, boarding the vehicle, traveling in the vehicle, alighting from the vehicle, and then walking to one’s final destination. In many cases, the trip involves transfers; travelers alight from one transit vehicle, move to a new stop or platform, wait for another transit vehicle, board that vehicle and continue this process until they reach their last stop or station at which they walk to their final destination. Transit travelers, in other words, expend a great deal of their time, energy, and patience outside of buses and trains, which contributes greatly to both their actual and perceived burden of transit travel. This, in turn, helps to determine travelers’ decisions whether or not to take transit in the future. Given the relative convenience of door-to-door travel by foot, bicycle, taxi, or private vehicle for many trips, public transit systems are often at a competitive disadvantage when competing for passengers. Accordingly, this research examines ways to increase the attractiveness and reduce the perceived burden of the time spent outside of vehicles during transit trips.

As cities have grown more dispersed and auto-oriented, the out-of-vehicle portion of transit trips has grown. In an effort to accommodate increasingly dispersed patterns of trip-making, many transit systems in U.S. metropolitan areas now require transit users to make frequent transfers among lines, modes, and operators. As such, transit stops and stations are integral parts of transit networks, playing an important role in connecting multiple transportation modes and systems. The effectiveness of these connections governs waiting and walking times at transit stops and stations, and, in turn, travelers’ choices whether or not to take a particular transit



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trip. Given the effect of travel time on travel choices, good connectivity at transit stops and stations is critical to overall transportation network effectiveness.

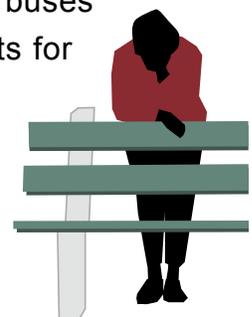
Thus, reducing such burdens can contribute significantly to enhancing the attractiveness of transit as a travel mode resulting in increased transit ridership. Nonetheless, despite the importance of out-of-vehicle transit travel, the in-vehicle travel experience has tended to capture the lion's share of attention from transit managers because acquiring, maintaining, and, in particular, operating vehicles is the core mission of any transit system.

Our primary objective with this work has been to determine the best ways to reduce out-of-vehicle travel burden and improve transit users' experience at stops, stations, and transfer facilities. To achieve our objective, we initially developed a theoretical framework to understand how improvements at stops, stations, and transfer facilities affect people's travel behavior. Clearly, transit systems' primary focus are their passengers and their perceptions and needs are central. Beyond passenger needs, however, transit stops, stations, and transfer facilities also must meet operational needs of transit systems. Additionally, transit stops, stations, and transit facilities affect and are affected by stakeholders from their neighboring communities, such as businesses — both owners and patrons — and residents. We therefore explored the perspectives of these three stakeholders — passengers, transit managers, and stop-adjacent residents and business owners — during the course of our research.

From our analysis of the passengers/users perspective, one principal finding stands out clearly:

The most important determinant of user satisfaction with a transit stop or station is frequent, reliable service in an environment of personal safety, and only indirectly the physical characteristics of that stop or station.

In other words, most transit users would prefer short, predictable waits for buses and trains in a safe, if simple or even dreary, environment, over long waits for late-running vehicles. This is true even if such long waits occur in the most elaborate and attractive transit stations and especially so if users fear for their safety. While this finding will come as no surprise to those familiar with past research on the perceptions of transit users, it does present



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a contrast to much of the descriptive and design-focused research on transit stops and stations.

In total, we surveyed approximately 750 transit users at 12 transit stops and stations in metropolitan Los Angeles about their perceptions of 16 stop/transfer facility attributes. We used a technique known as Importance-Satisfaction Analysis to identify which of these attributes passengers found most important (importance) and which needed the most improvement (satisfaction). Initially we grouped the 16 attributes into the following five categories:

- **Access:** Management of passenger flow control and directional information
- **Connection and Reliability:** Distance and time to make connections; on-time performance/frequency of bus/train
- **Information:** What, where, and how passengers acquire information
- **Amenities:** Comfort, service, weather protection, and cleanliness of station/stop
- **Security and Safety:** Station/stop equipment, infrastructure, or personnel that provide passengers with a safe and secure environment

Respondents' reported level of satisfaction with their wait/transfer experience indicates that, in general, they are least happy with factors related to access, followed by some factors related to security and safety and connection and reliability. When we considered the level of satisfaction and importance ratings in tandem, factors that require improvement at the 12 stops and stations surveyed pertain most to security and safety and connection and reliability, and least to amenities. Regardless of satisfaction levels, however, users ranked safety and service quality factors as most important (the top six of sixteen attributes) as is shown in the following list:

Most Important

1. I feel safe here at night (78%)
2. I feel safe here during the day (77%)
3. My bus/train is usually on time (76%)
4. There is a way for me to get help in an emergency (74%)
5. This stop/station is well lit at night (73%)
6. I usually have a short wait to catch my bus/train (70%)



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In contrast, the following stop and station-area attributes were ranked as least important (bottom six of sixteen attributes) by users:

Least Important

11. It is easy to get route and schedule information at this stop/station (62%)
12. There is a public restroom nearby (59%)
13. This stop/station is clean (58%)
14. It is easy to get around this stop/station (57%)
15. There are enough places to sit (50%)
16. There are places for me to buy food or drinks nearby (34%).

However, when we statistically related users' satisfaction with various stop/station attributes with their overall satisfaction with their wait/transfer experiences we got similar, though not identical, results:

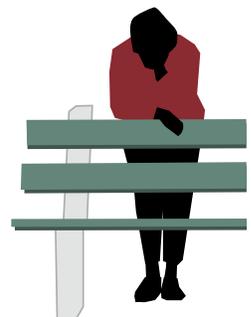
Most Important

1. It is easy to get around this stop/station.
2. I feel safe here during the day.
3. Having security guards here makes me feel safer.
4. It's easy to find my stop or platform.
5. The stop/station is well lit at night.
6. My bus/train is usually on time.

Least Important

11. This stop/station is clean.
12. There is shelter here to protect me from the sun or rain.
13. There is a way for me to get help in an emergency.
14. There are enough places to sit.
15. There are places to buy food or drinks nearby.
16. There is a public restroom nearby.

These findings revealed the power of station/stop attributes to increase overall satisfaction with the transfer experience.



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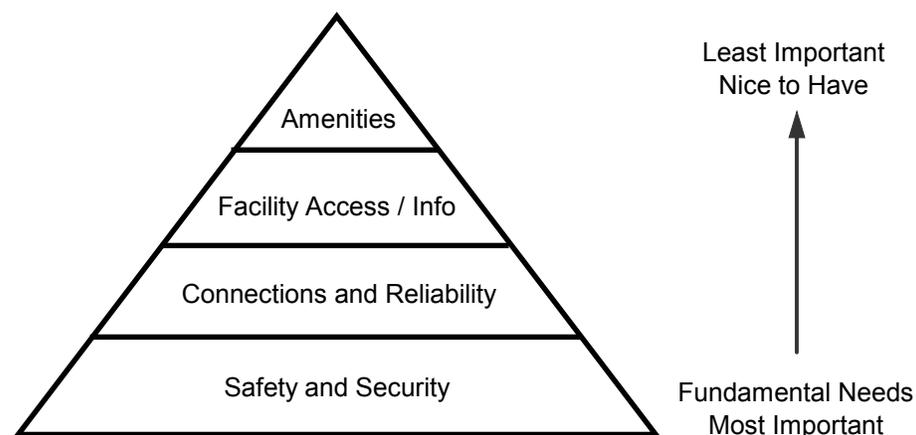
While informative, rank-ordered lists like these can be problematic if users “split their votes” among similar, though important factors such as “I feel safe here at night” and “This stop/station is well-lit at night.” To correct for this problem, we employed an ordered-logit regression model to measure the independent influence of each of 16 wait/transfer attributes on overall user satisfaction. This sort of an analysis tends to eliminate all but one of closely related factors, while elevating ostensibly less-important factors that independently influence users’ overall levels of satisfaction. The results of this modeling exercise are telling:

Most Important

1. My bus/train is usually on time.
2. Having a security guard here makes me feel safer.
3. This stop/station is well lit at night.
4. I feel safe here during the day.
5. It is easy to get around this station/stop.
6. The signs here are helpful.

Of our 16 stop and station attributes evaluated, transit users assigned the highest importance to factors related to security and safety, and then to factors related to connection and reliability. In contrast, stop and station-area amenities were ranked as least important by users. We do not claim that amenities are not important to travelers; more than half ranked information, the presence of public restrooms, cleanliness, and ease of navigation as important attributes. However, travelers prefer safe, frequent, and reliable service over these factors. From this analysis, we have developed what we call the **Hierarchy of Traveler Wait/Transfer Needs** to succinctly summarize the findings of this research.

Hierarchy of Traveler Wait/Transfer Needs



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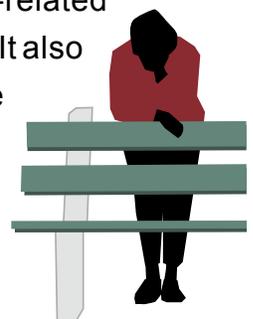
A companion part of our analysis compared how transit managers and neighboring communities viewed transit stops and stations. Perhaps reassuringly, our principal finding precisely matches that of the transit user investigation:

For operators, safety- and security-related factors far outweighed other attribute factors at transit stops, stations, and transfer facilities.

Following safety and security (#1), ten other factors cluster relatively closely as important factors in the views of the transit managers surveyed – some of which obviously relate to factors beyond the experience of transit travelers. They are, in order of priority:

2. Pedestrian/vehicle conflicts
3. Schedule coordination
4. Operating costs
5. Stop/station equipment reliability
6. Comfortable environment
7. Adequate stop/station space
8. Inter-agency coordination
9. Facilitate passenger flows
10. Accommodate vehicle movements
11. Protect passengers from weather.

We also compared transit managers' views of what was important to their riders with riders' own views from our previous analysis of Los Angeles County transit riders. While transit operators appear to have a fairly accurate understanding of what attributes are important to their riders at transit stops and transfer stations, there are several points of disparity. The transit managers surveyed correctly assumed that safety and security were very important to riders, but they tended to underestimate the importance of specific safety-related factors, such as the presence of security guards and emergency assistance. It also appears that, controlling for other factors, transit managers overestimate the importance of station cleanliness and schedule information to their riders. We note, however, that there was a mismatch in geographical coverage for this comparison; our riders' survey collected data from Los Angeles County transit riders, while our operators' survey collected data



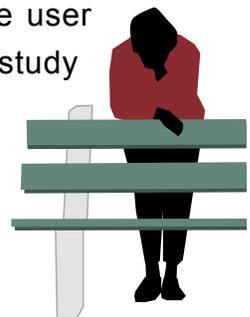
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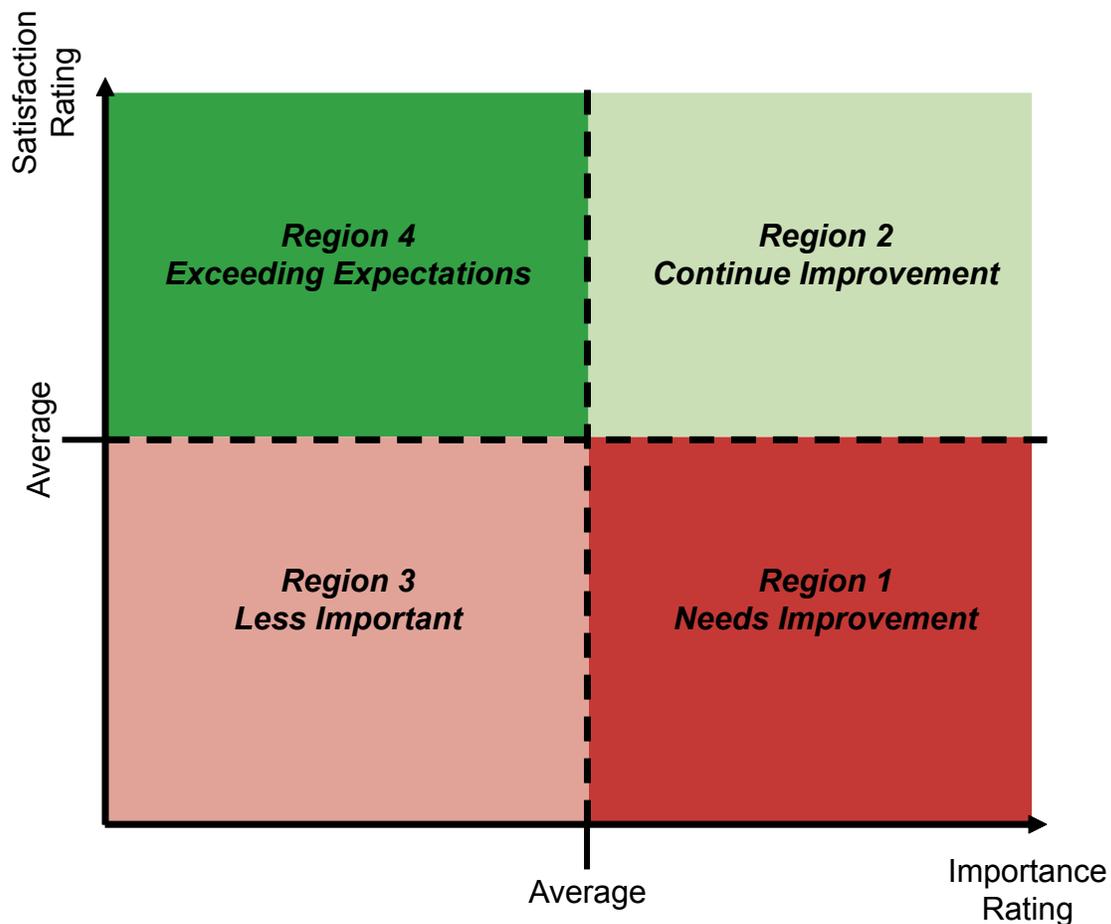
nationwide. It is possible that this mismatch has overemphasized some disparities, while downplaying others. These findings should be considered preliminary and further research should examine both subgroups that cover the same general location to circumvent this problem.

Finally, we spoke with 8 transit operators in telephone interviews regarding the role of stop/station-adjacent stakeholders in planning, operating, and maintaining transit stops and transfer facilities. Many of those interviewed reported community opposition to the development or expansion of stops and stations as a significant issue, with this opposition often coming indirectly through elected officials and community leaders. During the course of this phase of the research we determined that municipal and county governments control most of the land on which bus benches, shelters, and stations sit; moreover they are an integral, and often overlooked part of the transit stop/station planning process. Transit agencies, in other words, often have surprisingly limited control over the siting and design of stations and stops. Accordingly, we intend to examine the roles and perceptions of local governments in the development and operation of transit stops and stations in a subsequent phase of this research.

Based on the projects' findings we developed a Preliminary Assessment Tool beginning with the following 3-step process that transit operators can employ as a tool to guide them as they consider making improvements to already existing transfer facilities or developing initial plans for new facilities.

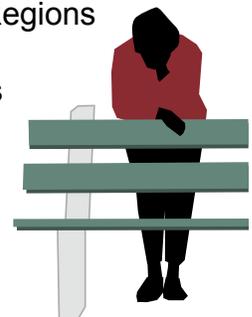
- Step 1: Use the Hierarchy of Traveler Wait/Transfer Needs above to determine the priority of improvements to any stop or station. We endeavored in this research to produce generalizable findings from our analysis by surveying a large number of transit users at a wide variety of facilities.
- Step 2: For transit stops and stations serving particular user populations (children, immigrants, the elderly, etc.) or for stops/stations in unique environments (adjacent to airports, amusement parks, hospitals, etc.), the user perception survey instrument developed and tested in this study can be used to survey the perceptions of passengers.
- Step 3: Analyze the survey results with respect to produce a ratings matrix with respect to the importance and satisfaction levels for the users and/or stops surveyed.





Relative to both the average importance and satisfaction levels, stop/station attributes may fall in to one of the following four regions:

- **Region 1** is an area where – for the surveyed users or stops – facility attributes have above-average importance but a less than average level of satisfaction, meaning that these attributes should be high priorities for improvement.
- **Region 2** is an area where attributes have above-average importance and above-average level of satisfaction, meaning that priority should be given to maintaining the quality of these attributes.
- **Region 3** is an area where attributes have less than average satisfaction levels and less than average importance ratings; improvement to such attributes are warranted only at low cost or if all of the attributes in Regions 1 and 2 have been fully addressed.
- **Region 4** is an area where attributes have above average levels of satisfaction and importance ratings less than average; such attributes exceed expectations and warrant no further attention.



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The next step in the Preliminary Assessment Tool is to identify each attribute within each of these four regions beginning with Region 1 and continuing in sequential order through Region 4. Within each Region attributes are identified in the following order consistent with the above Hierarchy of Traveler Wait/Transfer Needs and based on users' priorities:

1. Safety and Security
2. Connections and Reliability
3. Facility Access and Information
4. Amenities

So, starting with Region 1, we first identify any "Safety and Security" attributes. Any such attributes should be improved in increasing order of satisfaction beginning with the lowest satisfaction level. If there are no "Safety and Security" attributes in Region 1, then we identify any "Connections and Reliability" attributes in Region 1 and continue this process for Region 1. After completing this process for Region 1, repeat the entire process for Region 2's attributes, followed by Region 3's attributes.