APPENDICES

APPENDIX A. OVERVIEW OF MARKET STUDIES ON PASSENGER EXPERIENCE

Previous Market Research: What do Passengers Expect from Transit?

Our effort to gain an understanding of the value to passengers of different amenities began with collecting a variety of existing research pertaining to passengers' expectation of public transit. This research is drawn from market surveys, consumer focus groups, and observational studies. While each of these methods provides different insights, each has its limitations.

Market Research Surveys

Market research surveys provide much useful information but are sometimes misleading in terms of understanding the role played by amenities. This is because amenities, by themselves, will *never* be more important to riders than the reliability, frequency, and safety of the service itself. As a result, market research conducted for the B-10 study seeks to take a different approach to understanding amenities and their impact on passengers.

A series of passenger surveys was collected from a variety of transit agencies across the country (see Appendix C). We were especially interested in surveys that evaluated what customers wanted, in order of priority, as opposed to ratings about existing local service. In general, efficient, on-time service and safety (in terms of absence of crime) appeared in different ways on different surveys as the highest priority among transit passengers:

1. A 1994 study of riders in Boston rated staying on schedule, frequency of service, and personal safety (from crime) as the most important attributes of transit service. While riders rated "adequate space" as a high priority (just after those mentioned above), fewer than 10% of riders cited temperature of vehicles, availability of information at stations, and lighting at stations as among the three most important attributes.

2. A survey of commuter bus alternatives in Northern Virginia found that half of respondents would pay more for service that was always on time and included express service. Few were willing to pay more for a highback seat, restrooms, newspapers, and luggage racks.

3. A survey of New York suburban rail commuters showed that their highest priorities were fewer stops, fewer delays, and faster trains; low priorities included more benches and seats to wait for trains, more comfortable temperatures on the train, and shelters on the platform.

4. A Chicago study of important factors in using the bus rated safe/competent bus operation, safety from crime while riding the bus, and safety from crime at stops as most important. Lower priority was availability of shelters at stops, and the lowest was availability of seats at stops.

5. In Portland, Oregon, riders said that safe operation of the bus or light rail train, personal safety when riding, and on-time service were the most important factors in deciding whether or not to use transit. A shelter for passengers to wait was a lower priority, although more important than a guaranteed seat on the bus or train.

6. In Denver, the most important areas for bus service improvements were convenience, travel time, and security; least important were customer information, comfort, and park-and-ride lots.

While the conclusion that might be drawn from this research is that amenities are relatively unimportant, other research methods and closer analysis reveal a different side to the story. It would appear from these surveys that, once the needs for safety, reliability and frequency were taken into account, amenities, such as transit shelters, padded seats and added lighting, rose to the top of the list. Once could argue that, were a transit agency to improve efficiency and safety, passengers would begin to demand more in the way of amenities, both on the vehicles and at the transit stops. For example, in New York City, the Transit Authority was successful in eliminating graffiti from subway trains; however, passenger attention then shifted to concern over station environments.

"Disutility Analysis"

Another way that passenger experience has been assessed is in terms of the "disutility of travel"--an approach which is more of a theory or econometric model than a technique based on market research. Developed in a series of studies by the General Motors Research Laboratories (GMRL), the theory of disutility analysis states that the decision to use transit versus an auto depends on the "disutility" of each of its components, properly weighted. Some of the transit-related factors that are "penalized" are unproductive waiting, queue time, traveling while standing, unprotected transfers between vehicles, etc. While one might argue with some of the weights and penalties, this approach is a useful tool for transit agencies to use when considering how to better address passenger needs.

These penalties address several specific aspects of the travel experience, including travel, transfer, and waiting time (see Table 1). The authors write: "Time while waiting, either initially or during a transfer, is perceived by travelers to be worse than while riding. Many planners have adopted a rule-of-thumb that says that the value of time while waiting is twice the value of time while riding." This rule-of-thumb has been reconfirmed so often that it is now accepted without much question. A modal operator can achieve the same improvement in the disutility of a trip by eliminating two minutes of riding or by eliminating one minute of waiting. Waiting can be reduced by better schedule coordination, better passenger information, better on-time performance and by eliminating transfers whenever possible.

"It is most often assumed in transportation analyses that waiting time is wasted time. This may be true for short waits. But, given a sufficiently large block of time and the necessary resources, some passengers can use waiting time productively. The ability to work, eat, socialize, learn and attend to personal needs can contribute to a positive perception of waiting time."[1] The Music Under New York program operated by the MTA's Arts for Transit program provides musical entertainment for waiting passengers at subway stations throughout the system, which serves to lessen perceived waiting time and enhances the subway environment for all users. Many subway art programs developed worldwide are designed to accomplish this goal as well: stations in Boston, Baltimore, and Los Angeles, for example, provide many artistic distractions for waiting passengers.

Table 1. SUGGESTED WEIGHTS, PENALTIES, TIME VALUES

Time Component	Weight
Riding	1.00
Walking	1.25
Walking with Baggage	3.00
Unproductive Waiting	2.00
Productive Waiting	1.00
Queue Time	3.00
Traveling while Seated	1.00
Traveling while Standing	3.00
Weather Condition	**Weight Adjustment**
Rain	(+) 1.25
Below Freezing	(+) 4.25
Action	**Penalty**
Unprotected Vehicle to Vehicle	32 minutes
Protected Vehicle to Vehicle	16 minutes
Unprotected Time Vehicle to Vehicle	8 minutes
Protected Time Vehicle to Vehicle	4 minutes
Walk to Vehicle	8 minutes
Vehicle to Walk	0 minutes
Trip Purpose	**Time Values**
Travel to/from work	0.333 of wage rate
Work Related Travel	2.000 of wage rate
Non-work Travel	0.167 of wage rate

Source: As presented in A. Horowitz and N. Thomas, "Evaluation of Intermodal Passenger Transfer Facilities," 1994.

Consumer Focus Groups

In recent years, several transit agencies, in an effort to be more "customer-friendly", have undertaken extensive focus group programs to involve passengers in decisions regarding the design and selection of amenities for vehicles and waiting environments. These efforts are useful, as they emphasize real concerns of passengers in terms of design characteristics that impact the convenience, efficiency, and comfort of their journey.

A set of studies by the Canadian Urban Transit Association (CUTA) on interior bus design is particularly useful. *Customer Perspectives on Interior Bus Design Issues: An Analysis Based on Focus Groups*, and *Industry Perspectives on Interior Bus Design Issues: Background Research on Current Practice and Issues,* provide information about customers' views of amenities such as seating, climate control, handholds, route signage, and route maps on buses, electronic stop requests, exiting patterns, etc.

Focus groups were asked (as confirmed in a follow-up mini-survey) about the design feature they most wanted changed.[2] These were, in order of priority:

- Boarding, including climbing stairs into the buses, paying the fare, and handling children and parcels;
- Climate control, including less overheating in winter and a better balance between air conditioning and natural ventilation;
- Walking and standing on the bus, including hand holds, acceleration changes on the bus, and crowding of aisles;
- Sitting. For buses at five minute headways, the great majority of riders reported that they will wait for the next bus if no seat is available, if their trip is over 10 minutes in length.

Passengers made numerous additional recommendations, including:

- Easier access to buses (different steps, no steps, better hand rails);
- Easier control of the rear door;
- Padded or upholstered seats (to prevent slipping and sliding) with more leg room;
- Preference for stanchions or flexible straps, as opposed to overhead rails or handles on seat back, for standing;
- Improved ventilation (with less use of air conditioning when it was not needed);
- Better route maps and announcements of stops;
- Storage areas for baby strollers and parcels.

The authors of this study cautioned that "members of the riding public should always be considered the incontrovertible experts on their own perceptions. But when it comes to notions of what would represent a better state of affairs, the views expressed in a focus group research setting should not be taken in a literal sense. Suggestions which people make for the future *can* be taken to indicate their general approach or as a metaphor of their preference." One woman in Winnipeg provided a not uncommon scenario for why she felt

that boarding areas on buses needed to be improved: "I had a shopping bag on this arm; I had a purse and another shopping bag on this arm, and I held out my fare to the bus driver and he refused to take the money off of me... so I had to put my parcel down and in the meantime everyone is waiting for me..."[3]

Ironically, in a follow-up study, the transit agencies surveyed showed that they had *different* views of what passengers "wanted." In general, CUTA found that standard practice was to maximize the number of seats by compromising seat comfort and passenger movement; to provide air conditioning, but with small or restricted ventilation potential; to provide few on-board announcements; and to reduce visibility by eliminating rear windows.[4]

Observational Studies of Transit Facilities

Another research method, used by Project for Public Spaces for this study, is the actual observation of people at transit facilities, mainly in waiting environments. In the early 1980's, PPS evaluated bus shelters in over a dozen cities. On the basis of this research, several design requirements for shelters that met passenger needs were identified. These results are presented in Part 3.3; results of observational analyses are presented in case studies, where applicable.

ENDNOTES

[1] As described in A.J. Horowitz and N.A. Thompson, *Evaluation of Intermodal Passenger Transfer Facilities*, Sept. 1994, pp.19-21 (The study was conducted by the General Motors Research Lab.)
[2] CUTA, STRP Report #2, pp. 41-42
[3] CUTA, STRP Report #2, p. 17
[4] CUTA, STRP Report #7, p. I

APPENDIX B. CASE STUDY SURVEY OF DATA

Bus Stop Comparisons

	Rochester		Portland	
	Main Street	St. Paul/ Clinton	NW23rd Avenue	Transit Mall
How many times a week do you use this stop?				
Five or more times a week	56%	58%	50%	43%
3-4 times a week	14%	26%	21%	16%
Once or twice a week	16%	9%	12%	18%
Less than once a week	14%	7%	16%	22%
Rarely or never	0%	0%	0%	1%
Where are you coming from?				
From home	14%	23%	81%	41%
From work	38%	33%	9%	13%
From school	29%	26%	0%	3%
From shopping	13%	12%	5%	24%
Other	6%	6%	5%	20%
Where are you going?				
To home	78%	58%	10%	42%
To work	10%	21%	60%	13%
To school	3%	0%	18%	4%
To shopping	2%	7%	4%	11%
Other	7%	14%	8%	31%
About how long do you usually wait for the bus at this stop?				
Less than 5 minutes	2%	2%	23%	4%
5-10 minutes	40%	40%	59%	36%
11-20 minutes	38%	30%	12%	39%
21-30 minutes	10%	23%	1%	13%
More than 30 minutes	5%	0%	0%	4%
Don't know	6%	5%	5%	4%
Have you changed how often you ride the bus over the past year?				
Ride more frequently	34%	26%	37%	57%
Ride less frequently	10%	14%	7%	15%
Ride about the same amount	56%	60%	56%	28%
Did you have a car available for this trip today?				
Yes	15%	5%	51%	22%
No	85%	95%	49%	78%
Please rate this bus stop for the following:				
Overall attractiveness				
Good	34%	31%	52%	40%
Fair	49%	52%	47%	54%
Poor	15%	12%	0%	4%
Don't know	2%	5%	1%	2%
Overall comfort				
Good	30%	21%	43%	41%
Fair	47%	50%	49%	34%
Poor	23%	26%	8%	24%
Don't know	0%	2%	0%	2%

Bus Stop Comparisons continued.

	Rochester		Portland	
	Main Street	St. Paul/ Clinton	NW23rd Avenue	Transit Mall
Ability to get schedule and routing information				
Good	59%	49%	36%	71%
Fair	20%	27%	26%	21%
Poor	21%	20%	36%	5%
Don't know	0%	5%	3%	3%
Amount of space away from pedestrian traffic / width of sidewalks				
Good	62%	26%	65%	77%
Fair	25%	45%	32%	19%
Poor	10%	21%	3%	1%
Don't know	3%	7%	0%	3%
Cleanliness				
Good	43%	14%	40%	35%
Fair	39%	41%	50%	44%
Poor	18%	36%	10%	16%
Don't know	0%	10%	0%	4%
Amount of seating				
Good	32%	16%	24%	23%
Fair	32%	50%	63%	25%
Poor	37%	29%	13%	49%
Don't know	0%	5%	0%	3%
Comfort of seating				
Good	29%	26%	24%	30%
Fair	49%	37%	61%	33%
Poor	20%	26%	15%	31%
Don't know	2%	11%	0%	6%
Protection from weather				
Good	42%	17%	58%	50%
Fair	27%	39%	43%	37%
Poor	32%	39%	0%	10%
Don't know	0%	5%	0%	3%
Adequacy of lighting				
Good	49%	21%	41%	43%
Fair	32%	48%	38%	34%
Poor	14%	14%	7%	12%
Don't know	5%	17%	13%	12%
Safety during the day				
Good	69%	48%	55%	56%
Fair	25%	43%	35%	37%
Poor	3%	7%	10%	3%
Don't know	3%	2%	0%	4%
Safety in the evening				
Good	37%	12%	31%	30%
Fair	27%	43%	49%	45%
Poor	14%	29%	20%	15%
Don't know	22%	17%	0%	10%

Bus Stop Comparisons continued.

	Rochester		Portland	
	Main Street	St. Paul/ Clinton	NW 23rd Avenue	Transit Mall
Ease in walking to the stop				
Good	69%	48%	59%	65%
Fair	26%	33%	41%	29%
Poor	3%	10%	0%	3%
Don't know	2%	10%	0%	3%
Ease in boarding the bus				
Good	67%	50%	72%	57%
Fair	28%	41%	25%	32%
Poor	3%	5%	1%	4%
Don't know	2%	5%	1%	6%
The design of bus stops on this street makes me more likely to use transit.				
Agree	40%	26%	38%	46%
Neutral	30%	43%	41%	27%
Disagree	23%	19%	13%	13%
No opinion	7%	12%	7%	14%
The design makes me more likely to recommend riding transit to a friend.				
Agree	41%	31%	38%	40%
Neutral	28%	45%	47%	40%
Disagree	22%	14%	10%	11%
No opinion	9%	10%	4%	10%

Vehicle Comparisons

	San Francisco		Ann Arbor		Aspen	
	F Line *	Bus	LF **	RTS**	New #	Old
How many times a week do you use this stop?						
Five or more times a week	50%	58%	59%	51%	52%	56%
3-4 times a week	18%	24%	15%	19%	20%	23%
Once or twice a week	15%	5%	17%	17%	16%	7%
Less than once a week	18%	13%	9%	14%	8%	7%
Rarely or never	0%	0%	0%	0%	5%	7%
Where are you coming from?						
From home	35%	66%	40%	35%	60%	48%
From work	25%	13%	14%	18%	34%	47%
From school	10%	11%	23%	18%	3%	0%
From shopping	10%	3%	12%	18%	0%	4%
Other	20%	6%	11%	10%	3%	3%
Where are you going?						
To home	30%	16%	40%	51%	40%	58%
To work	20%	43%	11%	19%	40%	34%
To school	8%	3%	20%	9%	1%	1%
To shopping	20%	19%	15%	14%	3%	3%
Other	23%	19%	14%	8%	15%	4%
Have you changed how often you use transit?						
Ride more frequently	38%	34%	38%	36%	47%	41%
Ride less frequently	23%	17%	14%	19%	9%	11%
Ride about the same	40%	46%	48%	46%	44%	49%
Did you have a car available for this trip today?						
Yes	28%	27%	15%	16%	60%	56%
No	72%	73%	85%	84%	40%	44%
Please rate this vehicle for the following:						
Overall attractiveness						
Good	82%	18%	60%	46%	81%	46%
Fair	16%	68%	37%	51%	16%	49%
Poor	0%	15%	0%	4%	2%	5%
Don't know	3%	0%	3%	0%	0%	0%
Overall comfort						
Good	69%	18%	48%	47%	78%	32%
Fair	26%	74%	43%	51%	20%	48%
Poor	0%	9%	6%	1%	2%	19%
Don't know	5%	0%	3%	0%	0%	0%
Ability to get schedule and routing information						
Good	33%	17%	75%	40%	79%	86%
Fair	39%	38%	19%	50%	17%	11%
Poor	15%	44%	5%	10%	2%	3%
Don't know	13%	3%	2%	0%	2%	0%
Cleanliness						
Good	79%	14%	52%	41%	74%	59%
Fair	18%	60%	41%	51%	22%	40%
Poor	3%	26%	2%	6%	4%	0%
Don't know	0%	0%	6%	1%	0%	2%

Vehicle Comparisons continued.

	San Francisco		Ann Arbor		Aspen	
	F Line *	Bus	LF *	RTS**	New #	Old
Amount of seating						
Good	64%	30%	57%	64%	72%	53%
Fair	28%	64%	36%	35%	19%	36%
Poor	8%	6%	5%	1%	9%	6%
Don't know	0%	0%	3%	0%	0%	5%
Comfort of seating						
Good	63%	17%	42%	55%	74%	19%
Fair	32%	60%	45%	44%	21%	47%
Poor	5%	23%	11%	1%	4%	34%
Don't know	0%	0%	2%	0%	1%	0%
Adequacy of lighting						
Good	76%	34%	68%	62%	70%	42%
Fair	18%	60%	27%	35%	26%	37%
Poor	3%	6%	0%	1%	4%	21%
Don't know	3%	0%	5%	3%	1%	0%
Ease in getting on and off the vehicle						
Good	73%	37%	63%	58%	83%	75%
Fair	24%	51%	15%	41%	16%	25%
Poor	3%	11%	0%	1%	1%	0%
Don't know	0%	0%	2%	0%	0%	0%
Ease in walking through the vehicle						
Good	76%	30%	68%	54%	78%	68%
Fair	16%	49%	30%	44%	21%	27%
Poor	10%	21%	2%	1%	1%	3%
Don't know	3%	0%	3%	0%	0%	2%
Safety during the day						
Good	77%	37%	75%	60%	86%	78%
Fair	18%	43%	16%	34%	13%	17%
Poor	3%	11%	3%	0%	1%	5%
Don't know	3%	9%	6%	1%	0%	0%
Safety in the evening						
Good	54%	26%	57%	54%	81%	70%
Fair	22%	40%	27%	36%	13%	22%
Poor	5%	14%	3%	0%	2%	3%
Don't know	19%	17%	13%	11%	4%	5%
Smoothness/safetness of ride						
Good	53%	21%	26%	42%	59%	30%
Fair	42%	35%	55%	50%	37%	60%
Poor	5%	44%	11%	8%	5%	6%
Don't know	0%	0%	8%	0%	0%	2%
Please respond to the following statements:						
The design features on this vehicle make me more likely to use transit						
Agree	74%	14%	39%	38%	52%	10%
Neutral	23%	46%	37%	46%	35%	61%
Disagree	0%	19%	4%	6%	5%	8%
No opinion	3%	22%	20%	12%	9%	21%

Vehicle Comparisons continued.

	San Francisco		Ann Arbor		Aspen	
	F Line +	Bus	LF *	RTS**	New #	Old
The design features on this vehicle make me more likely to use transit						
Agree	74%	14%	39%	36%	52%	10%
Neutral	23%	46%	37%	46%	35%	61%
Disagree	0%	19%	4%	6%	5%	8%
No opinion	3%	22%	20%	12%	9%	21%
The features make me more likely to recommend riding transit to a friend						
Agree	66%	14%	39%	48%	54%	11%
Neutral	29%	37%	32%	33%	31%	54%
Disagree	0%	26%	8%	8%	6%	13%
No opinion	5%	23%	22%	14%	9%	23%
The transit agency seems concerned about the needs of its customers						
Agree	35%	19%	54%	57%	67%	52%
Neutral	41%	22%	32%	30%	20%	20%
Disagree	11%	43%	2%	7%	7%	13%
No opinion	14%	16%	14%	7%	6%	15%

(+) Historic PCC Streetcars
(*) Low Floor Buses
(**) Conventional Bus w/ Steps and Lifts
(#) New Neoplan Buses

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