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The Federal Transit Administration

TCRP Report 46

**The Role of Transit Amenities and
Vehicle Characteristics
in Building Transit Ridership:
Amenities for Transit Handbook
and
The Transit Design Game Workbook**

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Report 46

The Role of Transit Amenities and Vehicle Characteristics in Building Transit Ridership: Amenities for Transit Handbook and The Transit Design Game Workbook

PROJECT FOR PUBLIC SPACES, INC.
New York, NY

with

MULTISYSTEMS, INC.
Cambridge, MA

Subject Area

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TRANSIT COOPERATIVE RESEARCH PROGRAM

The nation's growth and the need to meet mobility, environmental, and energy objectives place demands on public transit systems. Current systems, some of which are old and in need of upgrading, must expand service area, increase service frequency, and improve efficiency to serve these demands. Research is necessary to solve operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the transit industry. The Transit Cooperative Research Program (TCRP) serves as one of the principal means by which the transit industry can develop innovative near-term solutions to meet demands placed on it.

The need for TCRP was originally identified in *TRB Special Report 213--Research for Public Transit: New Directions*, published in 1987 and based on a study sponsored by the Urban Mass Transportation Administration--now the Federal Transit Administration (FTA). A report by the American Public Transit Association (APTA), *Transportation 2000*, also recognized the need for local, problem-solving research. TCRP, modeled after the longstanding and successful National Cooperative Highway Research Program, undertakes research and other technical activities in response to the needs of transit service providers. The scope of TCRP includes a variety of transit research fields including planning, service configuration, equipment, facilities, operations, human resources, maintenance, policy, and administrative practices.

TCRP was established under FTA sponsorship in July 1992. Proposed by the U.S. Department of Transportation, TCRP was authorized as part of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). On May 13, 1992, a memorandum agreement outlining TCRP operating procedures was executed by the three cooperating organizations: FTA, the National Academy of Sciences, acting through the Transportation Research Board (TRB); and the Transit Development Corporation, Inc. (TDC), a nonprofit educational and research organization established by APTA. TDC is responsible for forming the independent governing board, designated as the TCRP Oversight and Project Selection (TOPS) Committee.

Research problem statements for TCRP are solicited periodically but may be submitted to TRB by anyone at any time. It is the responsibility of the TOPS Committee to formulate the research program by identifying the highest priority projects. As part of the evaluation, the TOPS Committee defines funding levels and expected products.

Once selected, each project is assigned to an expert panel, appointed by the Transportation Research Board. The panels prepare project statements (requests for proposals), select contractors, and provide technical guidance and counsel throughout the life of the project. The process for developing research problem statements and selecting research agencies has been used by TRB in managing cooperative research programs since 1962. As in other TRB activities, TCRP project panels serve voluntarily without compensation.

Because research cannot have the desired impact if products fail to reach the intended audience, special emphasis is placed on disseminating TCRP results to the intended end users of the research: transit agencies, service providers, and suppliers. TRB provides a series of research reports, syntheses of transit practice, and other supporting material developed by TCRP research. APTA will arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by urban and rural transit industry practitioners.

The TCRP provides a forum where transit agencies can cooperatively address common operational problems. The TCRP results support and complement other ongoing transit research and training programs.

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NOTICE

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The members of the technical advisory panel selected to monitor this project and to review this report were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the project. The opinions and conclusions expressed or implied are those of the research agency that performed the research, and while they have been accepted as appropriate by the technical panel, they are not necessarily those of the Transportation Research Board, the National Research Council, the Transit Development Corporation, or the Federal Transit Administration of the U.S. Department of Transportation.

Each report is reviewed and accepted for publication by the technical panel according to procedures established and monitored by the Transportation Research Board Executive Committee and the Governing Board of the National Research Council.

To save time and money in disseminating the research findings, the report is essentially the original text as submitted by the research agency. This report has not been edited by TRB.

Special Notice

The Transportation Research Board, the National Research Council, the Transit Development Corporation, and the Federal Transit Administration (sponsor of the Transit Cooperative Research Program) do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the clarity and completeness of the project reporting.

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FOREWORD

*By Staff
Transportation Research
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This report consists of a Handbook and a Workbook. The Handbook identifies and describes passenger amenities and transit vehicle characteristics that attract ridership and explores how amenities may affect ridership. The Workbook includes information gathered from passenger surveys, focus groups, discussion sessions, and transit agency staff on the effect of recently implemented transit amenities on passengers. As a companion to the Workbook, a disk, *The Transit Design Game*, enables transit agencies to survey their customers about their priorities for enhancements and estimate the potential effect of enhancements on ridership. The intended audience includes transit planners, designers, general managers, and project managers; transportation policy makers; city and regional planners; and suppliers, vendors, and manufacturers.

Transit systems constantly strive to maintain and increase their ridership. To make transit more attractive to riders and potential riders, there is growing interest in enhancing all stages of the transit experience by providing amenities and improving vehicle design characteristics. There is a need to maximize the effect of investments by focusing resources on those amenities that will have the greatest positive effect on ridership. A comprehensive effort to establish the value and effect of passenger amenities and transit vehicle characteristics was undertaken in this project to provide insights into vehicle design, facility improvement, and investment priorities.

Project for Public Spaces, Inc., in association with Multisystems, prepared the final report for TCRP Project B-10. To achieve the project objectives of identifying the effect of passenger amenities and transit vehicle characteristics on ridership, the researchers performed a literature search and documented the experience of a crosssection of transit agencies with various amenities, combinations of amenities, and transit vehicle characteristics. Data were assembled on the amenities, the combinations of amenities, and transit vehicle characteristics that significantly affect the riders' and potential riders' decision to use transit systems. On the basis of the data collected, an evaluation was performed to determine the effects of various amenities and transit vehicle characteristics in various stages of the transit experience. The final step was to develop this report to assist transit professionals and policy makers in making investment decisions.

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Design Game were Karla H. Karash and Marc Warner of Multisystems. Wendy Feuer and Tony Hiss provided advice in the formulation of the study.

AMENITIES FOR TRANSIT HANDBOOK

TCRP B-10 (PART 1)

**The Role of Transit Amenities and Vehicle Characteristics in
Building Transit Ridership**

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EXECUTIVE SUMMARY

Passenger amenities, both at transit stops and on vehicles, play an integral role in building transit ridership. We hope that this *Amenities for Transit Handbook* and the accompanying *Transit Design Game Workbook* create a greater awareness among transit operators of the true value of passenger amenities and that the cost of providing amenities can be offset through private sector partnerships and from additional public sector support.

Although one transit manager told us that "amenities would have to jump up to make it to the bottom of my priority list," an increasing number of transit agencies have been able to "break out of the mold" and change the way they provide service to their customers, improve their public image, and even redefine their purpose. These transit agencies have shown that investing in amenities to *build* ridership can be a cost-effective alternative to reducing service or eliminating amenities in an effort to cut costs--measures that create a continuing downward spiral.

This Handbook presents the findings and conclusions of a two-year research effort directed at analyzing the role played by amenities and design features at transit stops and vehicles in building transit ridership. The research involved an extensive literature review, interviews, and preparation of the five case studies presented in this report. While all types of transit were considered in the work, special emphasis is placed on buses and bus stops, which carry most transit riders in the U.S. Accompanying this Handbook is a "how-to" Workbook (*The Transit Design Workbook*) that includes a special trade-off survey developed by the research team, called the Transit Design Game. The Game is intended to be easily replicated by a broad range of transit agencies and passenger communities. (A computer disk is provided with the Workbook to facilitate customizing of the survey form and analysis of results.)

The key lessons learned in this project are significant in that they counter numerous misconceptions that transit agencies have about amenities. In fact

- **People react positively to amenities designed to improve their transit experience, both at the stop and on-board vehicles.** Passengers especially appreciate these when they are well placed and well designed, particularly when such basic service characteristics as frequency, efficiency, safety and reliability are perceived by passengers to be well under control. Amenities can help to instill rider confidence in a transit agency, as well as raise passenger optimism regarding the quality of future transit improvements and service.
- **Amenities impact a broad range of passenger experience and the ridership decisions of passengers.** Infrequent or "transit choice" riders, a major target audience for increasing ridership, showed significant interest in amenities in the case study cities surveyed. Amenities do not just help make transit more comfortable, but safer (with lighting and security cameras, for example) and more efficient (with

features such as low-floor buses that are shown to reduce dwell time). Amenities may also impact new riders' perception of transit as a mobility option for themselves.

- **Amenities are not necessarily expensive.** When serving people with disabilities, for example, amenities such as low floor buses represent a saving over wheelchair lifts and on-call van service. In addition, methods to pay for amenities are quite diverse and include options other than advertising. Offsetting the costs of providing amenities may be most easily achieved by developing public/private partnerships with local communities, businesses and governments, as well as redefining the way transit agencies traditionally work with manufacturers.
- **Agencies that have implemented amenity improvement projects are more likely to have actively sought and striven to address other customer concerns, as well.** This is evident in some very simple yet effective steps that transit agencies are taking to assess customer concerns -- focus groups, surveys, and other methods -- that are critical in ascertaining whether or not a particular amenity should be considered. Amenity projects thus become part of a total program geared toward providing customer-friendly service.
- **Knowing what amenities passengers in a particular city want most and determining their willingness to pay for them (or to forego a fare decrease) can help an agency determine which amenities to offer.** This is where the Transit Design Game and passenger surveys developed for this study will continue to be of service to transit agencies in general and amenity program planners in particular. The Transit Design Game is not a final set of guidelines. It is a planning tool for agencies that can be used and changed over time to facilitate ongoing passenger surveying activities in order to ascertain or predict rider preferences for particular amenities.
- **Those agencies that have undertaken amenity programs believe that the benefits to passengers, to adjacent communities, people with disabilities and the agency itself far outweigh the costs.** While we found agencies that would implement projects differently, nearly all the transit agencies contacted in this study felt that their investment in amenities was a worthwhile one, even if a direct ridership impact could not be immediately measured.

This Handbook is divided into four main sections: an introduction to and overview of the issue of amenities; an assessment of the impacts of amenities on ridership, customer experience, communities, and people with disabilities; a description of the key elements of an effective amenity program; and case studies of five cities where amenity projects have been implemented. Appendices include an overview of market studies conducted by transit agencies assessing passenger experience, detailed case study survey results, and the project bibliography.

PART 1

INTRODUCTION AND OVERVIEW

Transit systems across the U.S. are continually striving both to maintain and to increase their ridership. To achieve the goal of making transit more attractive to riders and potential riders, an increasing number of agencies are making significant investments -- or are considering such investments -- in passenger amenities at transit stops and on board vehicles. Agencies are looking at ways, in fact, to enhance all stages of the transit experience for passengers -- from approaching and leaving the boarding area, to waiting at the stop/station, to boarding, riding, and alighting from the vehicle.

To maximize the impact and cost-effectiveness of these investments, transit agencies have long needed "tools" to help them decide where to invest often limited resources and to identify those amenities that will have the greatest potential to increase ridership. This Handbook, the first part of a two-part report resulting from a two-year research effort, addresses key questions facing transit professionals and decision-makers alike.

- To what extent do amenities actually promote ridership?
- Are the costs of providing and maintaining amenities outweighed by the benefits realized from increased ridership?
- Can individual amenities have a significant impact, or are select combinations of amenities necessary to achieve a threshold effect?
- Are specific market segments more responsive to amenities than others?

A second primary product of this two-year research effort is *The Transit Design Game Workbook*, a "how-to" guide, which accompanies this Handbook. The Workbook describes a special survey developed by the research team to enable transit agencies to survey customers about priorities for enhancements and estimate the potential impact of these enhancements on ridership choice. The survey, called "The Transit Design Game," does not simply ask what amenities people want, but determines if riders would be willing to forego fare decreases and to change ridership behavior if the selected amenities were actually provided. While the Workbook is a "how-to" guide, the Handbook creates a holistic picture of the impact of amenities on ridership and the key components of implementing successful amenity programs.

1.1 Focus of the Handbook

It is important to emphasize that neither this Handbook nor the accompanying *Transit Design Game Workbook* focus upon any one amenity. Other specialized TCRP studies (such as those focusing on low floor buses, information technology, and design and location of bus stops) provide comprehensive descriptions of individual amenities. In contrast, this Handbook addresses the broad cumulative impact of amenities on overall passenger transit experience, including ridership choices, as well as the decision-making processes behind developing and implementing changes, and the implications for transit operators today.

Both the Handbook and Workbook develop an approach that can be applied to all modes of transit -- buses, subways, commuter rail, light rail, etc. At the same time, buses have been emphasized because they represent the predominant mode of transit nationally: of 8.4 billion transit trips in 1994, 5.4 billion -- 64% -- were on buses.¹ The design of amenities for bus stops and vehicles is far less advanced than for heavy rail (subways), which ranks second for number of transit trips at 2.2 billion, although there are many worthwhile heavy rail innovations to be studied. Indeed, most transit agencies *only* operate buses.

The following amenity checklist for waiting and vehicle environments (Figure 1) lists the amenities presented in both the Handbook and the accompanying "how-to" *Transit Design Game Workbook*.

Figure 1. AMENITY CHECKLIST



Waiting Environment

Waiting environment includes access to the station or stop, circulation within the area and movement into and out of the train or bus, the waiting space, and the amenities in these areas:

- J Seating or places for people to lean (some people prefer to lean even when a place to sit is available);
- J Shelter from the weather (in various degrees, from a simple cover to heated shelters to "cooling towers" in arid Arizona);
- J Lighting of the shelter and adjacent areas;
- J Information systems (ranging from basic signs, maps, and schedules to electronic, updateable information about actual vehicle arrival times);
- J Telephones and waste receptacles;
- J Special features for people with disabilities such as ramps, elevators, railings, bathrooms, signage, and accessible heights for services like ticket booths;
- J Retail (ranging from a place to simply get a cup of coffee and buy a newspaper to a wide array of other types of passenger-related retail services), and other civic activities and uses, such as libraries, art exhibits and recycling centers.

Figure 1. continued.

Vehicle Environment

Vehicle environment includes the space and facilities provided for people to board or leave the vehicle as well as the space where people stand and circulate on board, sit, get information and pay their fare. Innovations have both centered upon changing the type of amenity and ways of modifying seating layouts and configurations to improve comfort and convenience. Among the features and approaches to consider regarding vehicle environment are

- J Circulation into and through the vehicle, including arrangement of doors and seating;
- J Types of seating (degree of padding, height of the seat back, provision of armrest, type of fabric or material);
- J On-vehicle passenger information displays (visual and audible information about route number and name; next stop, key destination, upcoming stops and connecting route announcements, sometimes performed by a "talking bus," route maps and schedules);
- J Better vehicle access using low floor technology;
- J Lighting (including the type of lighting as well as the ability of passengers to have individual reading lamps);
- J Climate control and ventilation;
- J Security cameras;
- J A quieter and smoother ride resulting from enhanced insulation, particularly of the engine;
- J Multi-modal features, such as bike racks;
- J Storage facilities, such as package racks; and
- J Driver courtesy and assistance.



1.2 What Is an Amenity?

The issues surrounding "amenities" -- what works and how and whether or not they are a worthwhile investment -- are broad and complex. Unlike many other aspects of transit operation, there exists no uniform procedure nor "rule of thumb" to guide decisions regarding amenities, nor even agreement upon how to define or interpret what an amenity is. Thus, it is necessary to clarify the underlying assumptions regarding the meaning of the term "amenity" and set forth the context in which the project was conducted.

The term "amenity" is, itself, misleading. From the research conducted for this Handbook, we learned that some people equate "amenity" with "frill": something costly to implement and maintain and of questionable importance. Since the goal of the research was to identify effective features that enhance the experience of riding transit and that translate into increasing ridership, our concern was not with frills, but with practical features that passengers find attractive and which have a positive effect on ridership. Although there does not appear to be a substitute for the word "amenity," we chose to avoid its use in our surveys -- preferring to use the word "feature" instead.

In addition to being widely perceived as "frills," amenities are often viewed as something that can simply be added to a vehicle or transit stop after the fact. Lou Gambaccini, former director of the Southeastern Pennsylvania Transit Authority (SEPTA), says that "in the normal process of designing and building a vehicle, amenities become afterthoughts."² He attributes this to the fact that design decisions are made by engineers and maintenance departments and neither are usually trained to understand passenger needs. As general manager of the PATH subway car design project, Mr. Gambaccini insisted on retaining an industrial design team with no transit background for the job, because he wanted "fresh thinking" and a holistic approach. Other transit agencies are taking this approach by incorporating new features that often cost no more to provide than the "basics." For example, Seattle Metro has adopted a new approach to designing its buses. Rather than adding amenities to an existing bus, Metro completely re-thought the vehicle's basic design and function and was able to design a better bus that costs no more to build than the existing one. (See *Case in Point 6: New Bus Designs for Seattle Metro Buses* in Section 3.4.)

It is also important to emphasize that what is considered to be an amenity can, over time, become a necessity. For example, fully air-conditioned vehicles are now generally considered to be a necessity, rather than the luxury they were twenty years ago. The absence of air conditioning today might even turn riders away. Also, the Americans with Disabilities Act (ADA), which strives to improve access to transit stops and vehicles for people with disabilities, requires certain design changes that also were once optional. Agencies are finding that by meeting these requirements they can improve the transit environment for the general public as well as for patrons with disabilities. In Ann Arbor, low floor buses fall into this category: the entire bus fleet is being replaced because of positive responses from *all* passengers (Case Study 1).

As Howard Benn, a transportation consultant, cautions, "the nature of amenity is not static, it's very dynamic. You can't just do it, brush off your hands and walk away. You have to keep revisiting it."³ In the early 1970s, the Chicago Transit Authority made tremendous efforts to improve colors, lighting, and materials used in their buses and to provide air conditioning, better sightlines, and large windows in order to attract more riders to the system. These improvements were first introduced on 500 buses, then gradually, the entire fleet of 2400 was upgraded. Initially, there was a definite increase in ridership. Over time, however, ridership dropped off as passengers began to expect these improvements on all buses and to perceive them as standard features.⁴

In addition, it is also important to understand that an amenity does not have to be a physical object. A *person* can be an "amenity" when considered as a "feature." That is why some agencies feel that introducing fare technology, such as Smartcards, will ultimately be successful: theoretically, it will free the driver from the task of collecting fares and enable him or her to concentrate on serving passengers. As Michael Bolton, former general manager of Austin's Capitol Metro, points out, "The human factor is something we keep missing. Drivers and other employees who come into contact with the public should be hired and trained to be friendly and to interact with people."⁵ Tests of the Transit Design Game undertaken for this study showed that driver courtesy was an important issue, especially for women. Other studies cite the driver as one of the main reasons for the success of mini-bus lines and jitney services. "The travel experience becomes personal when you ride the bus day in and day out; passengers get to know the driver and one another, and a sense of community develops," explains Janet Abelson, Chair of the Accessibility Advisory Committee, AC Transit in Oakland, California.

Amenities can come in other less predictable forms as well. In Montreal, news, weather, and sports contests are run by the Metro with clues and giveaways hidden in the form of passwords found in the subway system. These games liven up the transit experience for riders and make the whole experience more fun, colorful, and "high tech." In addition, other improvements, which enhance the overall physical environment (materials, public art and other activities), play a role in user perception. Public art, in particular, has played an increasingly recognized role in its ability to link facilities to communities while giving new life to ordinary transit structures and vehicles. In Seattle, for example, communities paint murals that decorate and help personalize their bus shelters, which also reduces vandalism.

The mode of transit is a factor in determining what constitutes an appropriate level of amenity. Rail stations have, historically, offered the most amenities for passengers simply because they are intended to serve people waiting for somewhat longer periods of time embarking on somewhat longer journeys and paying somewhat higher fares. The traditional train station provides waiting rooms, information, a place to buy snacks, rest rooms, etc. The rail vehicle, like the station, usually offers the most comfort for passengers in terms of padded seating, ambient lighting, double-decked cars with better views, and rest rooms for the same reason. Based on extensive focus groups and market research, Long Island Railroad is providing on-board telephones and outlets for laptop computers on their new double-decker commuter rail cars. In contrast, a downtown shuttle bus that runs every few

minutes is perceived by passengers to require fewer amenities both at the stop and in the vehicle itself. Table 1 summarizes the different types of waiting environments and vehicles for each major transit mode.

Table 1. TYPES OF WAITING ENVIRONMENTS AND VEHICLES FOR MAJOR TRANSIT MODES

<i>Type of Mode</i>	<i>Station/Stop Environment</i>	<i>Vehicle Types</i>
Bus	Neighborhood bus stop Downtown bus stop Bus Terminal	Conventional bus Low-floor High-floor Minibus/van Vintage "trolley"
Subway	Subway station	Subway train
Commuter Rail	Rail Station	Commuter train
Light Rail	Suburban Stop Urban Stop	Light rail train Low-floor High-floor Vintage streetcars
Transfer Stations	Neighborhood facilities Downtown facilities Bus Terminal	Conventional bus Low-floor High-floor
Intermodal	Neighborhood facilities Suburban facilities Downtown intermodal centers	Commuter train Conventional bus

1.3 Recent Innovations

There is no shortage of examples of specific amenity projects that have been implemented on-board vehicles and at transit stations and stops. Scores of transit agencies have actually implemented, or are in the process of implementing, these types of improvements across the country.

Ample evidence that transit agencies are interested in amenities and innovations that increase ridership can be found in the pages of *Passenger Transport*, the magazine of the American Public Transit Association. In 1996-1997, the magazine presented the following projects:

- Memphis, Tennessee's new Main Street vintage trolley is attracting more riders to transit.
- Santa Clara, California has upgraded its fleet with new "talking buses," which have automatic voice announcements of upcoming stops. This feature also satisfies ADA requirements.
- Long Island Railroad is purchasing bi-level commuter rail cars to boost ridership and increase train capacity while improving passenger comfort.
- Scottsdale, Arizona introduced a new system at its bus shelters using mist to keep waiting passengers cool.

- Oakland's transit agency has introduced information plaques in Braille to help riders with visual impairments identify bus stop locations.
- The exteriors of buses in the Bakersfield, California's Golden Empire Transit District are covered in large-format photographs of actual GET customers.
- The Boston MBTA has introduced new subway cars which feature electronic message boards for station announcements, upholstered seats and an additional set of doors for easier boarding and exiting.
- In Tacoma, Washington, Pierce Transit's new downtown bus transfer station includes a public park where noontime concerts and ongoing community cultural events are staged.

Case in Point 1: Investing in Low Floor Buses, Bus Transfer Centers, and Bus Stops to Meet Federal Air Quality Requirements in Phoenix, Arizona



Spurred by Phoenix's status as a non-attainment area for federal air quality requirements, the City's transit agency, Valley Metro, has taken on the challenge of luring drivers from their cars and onto buses by implementing changes to the transit system that promote ridership. Despite severe funding constraints (Valley Metro, like many U.S. agencies, has a very limited budget and struggles to use it as effectively as possible), the agency has invested in numerous amenities throughout the bus system, including amenities at bus stops and bus transfer centers and low floor buses.

(Case in Point 1 continued)

The agency's progressive, recently retired director, Dick Thomas, was the driving force behind Valley Metro's passenger-oriented improvements and provided a real push for innovation. Features implemented in recent years have included:

Bus Transfer Centers

There are four transfer centers in Phoenix. Sunny Slope, in the northern part of the city, has bike lockers, bike racks, and an adjacent park-and-ride. Elementary school children have decorated parts of the center with their artwork, and there are seating and shade trees at the facility. Central Station, the new downtown bus terminal, boasts bike lockers and racks, a bike police patrol office, trees, and restrooms and will have space to accommodate some joint development for food establishments, day care, and dry cleaning services. At the transit customer service office, passengers are able to purchase tickets, obtain routing information, and access a lost and found. All covered areas have a misting system that helps keep air cool.

Bus Shelters, Benches, and Information

Of the 3,700 bus stops within the City of Phoenix, 750 have passenger shelters. The shelters are steel with perforated sidewalks (rather than glass or plastic, which break more easily) and built-in benches. At stops with shelters, the agency provides full scheduling information on either the shelter or a separate kiosk. At larger stops, this information includes a map. Stops without shelters have a signpost indicating the route numbers. Also, the agency plans to install solar panels on the shelters to provide lighting after dark without electricity. New agency guidelines require developers to contribute passenger amenities to bus stops adjacent to their properties, such as landscaping, seating, and waste baskets. One large shopping center developer dedicated \$10,000 for passenger amenities and shelters, including furniture and concrete accessory pads.

Amenities for Bicyclists

At more heavily used stops, bike racks have been installed and, to further encourage biking, all buses have bike racks that hold two bikes. Valley Metro was the first agency in the U.S. to install bike racks directly onto the buses themselves.

Low Floor Buses

There are currently about 96 low floor buses in operation in the City of Phoenix. Eighty percent of Valley Metro's bus fleet is wheelchair accessible, some with lifts and others with low floor. The agency is currently bidding for 150 natural gas, low floor buses, each of which cost \$50,000-60,000 more than a standard transit bus. These buses will reduce emissions and further the agency's commitment to better efficiency and accessibility of the system. Another feature provided credit card fare payment aboard all of its buses.

Between 1988 and 1995, ridership increased from 24.5 million to 35 million trips annually. By finding affordable ways to provide amenities, the agency feels that it is better serving its existing, largely transitdependent passengers and will eventually draw more transit-choice riders. There are a significant number of choice riders using express service from the suburbs to downtown, and Valley Metro hopes to increase that number with the construction of new federally funded park-and-ride lots, served by express routes.

Valley Metro has done a great deal to stretch its limited dollars as far as possible and encourage transit ridership. Its projects also illustrate the potential for transit agencies to leverage clean air funds through federal grants and from local sources to improve service and facilities for passengers.

In Europe, even more transit innovations are being implemented, often in multiple combinations. In France, for example, new low floor buses (i.e., buses without entrance or exit steps) serve bus stops boasting extensive amenities, which are located on sidewalk extensions that allow buses to stop in the moving lane of traffic to pick up or discharge passengers. Combined with the use of passes and tickets purchased at the stops, these new bus systems are operating with great efficiency and project a clear and positive identity.

In Zurich, Switzerland -- where transit ridership is already one of the highest in Europe -- the transit agency still pursues an avowed objective of "a seat for every passenger" on its light rail system. Likewise, bus stops with seating, telephones, mailboxes, easy-to-read schedules, and bike racks are also provided -- all funded by advertisers. These amenities are accompanied by traffic-calming measures to reduce the speed of automobiles while enhancing pedestrian access to stops and giving priority to transit vehicle operations. There are even café cars on light rail trains that circulate around the downtown at frequent intervals and provide a 20-minute tour of the center city. The waiters on board serve refreshments and give out tourist information.

Bus Innovations

"Lots of people are convinced...that buses have many advantages in dispersed metropolitan areas. But they recognize that, to attract riders, bus systems must improve their sex appeal." -- Ruth Eckdish Knack, "In Defense of Buses"⁶

The current state of the art in bus design is also dynamic, reflecting interest on the part of transit agencies and bus manufactures in making vehicles and stops more customerfriendly.

Low Floor Technology

Perhaps the most significant trend in transit innovation is low floor vehicle technology. The technology helps transit operators comply with ADA requirements, reduces the high costs of maintaining wheelchair lifts, and has been widely implemented throughout Europe with great success. While the designs vary, most low floor buses have less seating but more standing room than conventional, high-floor buses. Calgary, Alberta, Canada; Ann Arbor, Michigan; Portland, Oregon; Phoenix, Arizona; and Seattle, Washington are just a few North American cities where low floor buses constitute a significant portion of the bus fleet.

Interior Design Features

The ADA features originally developed for Ontario, Canada, have now become familiar options on vehicles offered by all three major Canadian bus manufacturers and, therefore, may be procured by operators without the cost and effort that would otherwise be required for a custom request. These include

- Better lighting inside the bus, such as at the front and rear doors, at the stairwells, and

- under some of the front seats;
- Brightly colored edging on steps;
- More stanchions that are also more visible;
- Larger signs;
- Stanchion-mounted stop-request buttons to make signaling the driver easier;
- Priority-reserved angled seats over the front wheel wells.⁷

The Northrop-Grumman Advanced Technology Transit Bus (ATTB), a prototype "next generation" bus, is even more high-tech and, in theory, the ideas that the company is developing will be available to all manufacturers.⁸ The prototype which is currently being tested in Los Angeles, includes the following interior design features:

- Better visibility of the exterior streetscape;
- Better location and larger windows for sitters and standees;
- Improved lighting;
- Increased air flow rate for air conditioning systems;
- A fully low floor design (no raised area at the front or rear) with raised wheel wells and some platform seating.

Information Systems

Another major area of technological advancement is in the area of information systems, spurred by ADA requirements for better serving the passenger with visual and/or hearing impairments. Innovations include "talking buses," which call out upcoming stops and free drivers from making ADA-required announcements, LED read-outs of upcoming stops, real-time announcements of vehicle arrivals and departures at bus stops and on buses, and satellite-based computer tracking systems which locate the vehicles along their routes. Real-time information systems, whether on-board or at bus stops, are in development in many cities. This allows passengers waiting at a bus stop to know exactly how long it will be until their bus arrives; on board buses, it allows passengers to know whether there are significant delays.

Smaller Buses

The popularity of small buses seems to be growing. The conversational seating arrangements on many of these smaller vehicles encourages passenger interaction. Their smaller size also enables them to blend more easily into a neighborhood setting. They are generally quieter, emit less exhaust than standard buses, and can go where larger buses cannot (e.g., suburban subdivisions).

Design Esthetics

Two schools of thought are emerging with regard to vehicle design. A study completed by David A. Hensher in Australia demonstrated that the "image of bus service can be significantly enhanced if the vehicles are modern and clean."⁹ This shows that aesthetics and proper maintenance do affect passengers' perception.

While most American transit agencies are seeking a contemporary look for their new transit vehicles, many are giving a nostalgic nod to the past. In cities like Corpus Christi, Houston, San Francisco, Tucson, and Lansing, vintage vehicles are being refurbished or replicated and put into service, not only to appeal to tourists and conventioners, but to daily commuters as well. In Houston, a 1924 open-air touring bus has been added to the Metro bus fleet in an effort to promote ridership. "When parked next to the Metro's new high-tech, carbon-fiber body prototype bus, this vintage model, with its gas headlights and wood-spoke wheels, seems a bit prehistoric. Still, it never fails to capture the imagination or the crowds."¹⁰ In some ways, perhaps, vehicle designers are trying to get the best of both worlds -- combining elements of vintage buses, subways, and trolley cars with newer, fuel-efficient, low-maintenance, ADA-compliant models.

Waiting Environment Amenities

Compared to the recent interest in rethinking vehicle design, little effort has been made to improve the "passenger friendliness" of bus waiting environment amenities, such as shelters. In fact, due to cost, quantity, and the maintenance required, most agencies either do not provide shelters or use standard, catalogue items. Some communities, however, have found it possible to customize even small shelters, making them more welcoming and visible at the same time.

Custom shelters and waiting areas -- which give a bus or light rail system a distinct and visible identity -- are being widely used at major transit centers, such as transit malls, bus transfer facilities, and commuter rail stations, where the volume of passenger use and visibility in the community warrant a more elaborate treatment. These facilities can become new downtown anchors, function as central squares, and help revitalize city centers.

Case in Point 2: The Waterfront Trolley in Corpus Christi



An historic-style trolley-bus has been successfully operating in Corpus Christi for twelve years. It was introduced initially along the waterfront to provide a different transit experience for tourists and hotel conventioners. In trying to come up with a theme vehicle, the Regional Transit Agency (RTA) thought of putting a boat on wheels and other unusual ideas, but was constrained by what was commercially available. The historic trolley was relatively easy to come by. The RTA later replaced several bus lines that served the downtown with this historic circulating trolley shuttle. Its route begins and ends at the Staples Street Station, serving commuters and tourists alike.

The RTA knows that the trolley has been a success because when it is out of service and replaced by a conventional van on the waterfront, ridership plummets. Tourists are reluctant to climb aboard a van, and a conventional bus is ignored. Surveys taken on the trolley also show that people enjoy it more than a standard bus. No one complained about the lack of comfortable seats (the seats are wooden) or other modern amenities that are missing (except for adequate air conditioning), illustrating that sometimes the experience of something unique is more attractive to people than modern comforts.

1.4 About the Handbook

This Handbook contains three main sections. The following two sections deal with the impacts of amenities on passenger experience and elements of successful amenity programs. This information was gathered through a series of interviews with transit experts and operators familiar with various aspects of the planning, design, and implementation of amenity programs around the country. The interviews and literature review also revealed a number of cities where amenity projects had been implemented and, therefore, could be evaluated.

Case Studies

Case studies of projects in five cities are presented in Part 4. These case studies were selected because each demonstrated an approach to implementing amenities that would prove useful to and replicable by other communities and transit agencies. In addition, case studies were selected because there existed an opportunity to make an internal comparison (within a community) about a specific amenity. For example, in Rochester, New York, we analyzed how the same transit population viewed transit stops in the downtown with and without extensive amenities; in Ann Arbor, Michigan, we compared rider's reaction to standard vs. low floor buses. Thus, we learned not just what people thought about a specific amenity but how they viewed it in comparison to a vehicle or transit stop without that amenity and how it affected their decision whether or not to take transit. In addition to these case studies, information collected about nine other projects is also presented as "Cases in Point" throughout the Handbook. While less in-depth than the case studies, these "Cases in Point" provide insight into a special aspect of an amenity program or project.

The Transit Design Game Workbook

The Workbook, which accompanies this Handbook, presents the Transit Design Game, a special "trade-off" survey developed specifically for this study by the Research Team (Figure 2). This survey is not a typical one, as it uses a trade-off method to assess customer interest in amenities and how they might impact ridership choice. Rather than ask, "How many more transit trips would you take per week if there were a bench at your bus stop?," the Game first presents the user with a broad catalogue of features from which to choose -- within a limited budget. This makes individuals consider how important that bench is to them given other priorities. The Game then asks users about how the provision of the amenities selected would affect their frequency of ridership, and whether, if given the choice, they would keep the amenities or reduce the transit fare. Amenities that people are willing to pay for obviously have a higher value than those that users would forego in favor of a fare decrease.

In order to gain further insight into rider priorities, some riders are given a lower budget while others are given a higher budget. These two budgets (12 and 18 points) are used to determine which features passengers assigned the highest value. The "price" of the various features on this survey was based on a ratio, which approximated the real cost of implementing and maintaining a specific design feature.

Once riders have selected features, the survey then allows them the opportunity to keep the amenities they had selected or to forego all or some of the features in order to decrease the fare. In this way, the survey allows a transit agency to see which features riders are willing to pay for. In addition, the survey asks riders whether they would change their ridership patterns if the features they selected were actually provided.

The survey was administered on board buses along different routes in each of the five case studies presented in this Handbook in order to obtain as diverse a sample as possible among a wide range of transit riders, representing a range of incomes, frequency of transit use, age, and sex. Because the Game was administered in cities where different kinds of amenities had been introduced, it allowed us to compare responses between cities where transit passengers were familiar with a specific amenity or amenities, and those where passengers had no direct experience with a particular amenity. In addition to administering the Transit Design Game on board buses, it was also used as a central feature of the passenger focus group discussion sessions conducted by the Research Team.

Included in the *Transit Design Game Workbook* is a computer program developed to assist transit agencies in replicating, customizing, and analyzing the survey in their passenger communities. The Workbook also contains detailed instructions for completing the survey, along with a guide to planning amenities from the customer perspective.

Figure 2. TRANSIT DESIGN GAME SAMPLE SURVEY FORM

Transit Design Game

Hi! We want your opinion about the transit features that are most important to you as a passenger both on the bus and at your bus stops.

Imagine you are designing a bus system from scratch.

You have 12 "points" that you can use to buy the features listed inside. Which would you choose? There are several categories for each item ranging from basic to deluxe.

(Please do not spend more than 12 points)

Your answers will help us in our research but will not negatively affect your current transit service.

Route Number _____

Front Cover

If your transit system had the features you selected on the previous page, how would this affect your decision to use transit?

I would not change my transit riding habits

I probably would ride transit more.

I definitely would ride transit more.

Now imagine that instead of buying the transit features you selected, you can use some or all of your Points on reducing the fare. Instead, Which option would you choose?

Buy only "no frills" (0 point) features: spend all 12 Points on reducing the fare by 10 cents.

Spend only 6 Points on added features: spend 6 Points on reducing the fare by 8 cents.

Spend 12 Points on added features, spend 0 Points on reducing the fare.

Finally, Please tell us about yourself

1. How many one-way transit trips do you usually take each week? _____ Trips

2. How long do you usually have to wait for the bus at this stop? _____ Minutes

3. How long is your usual bus trip? _____ Minutes

Why did you choose to take the bus for this trip?

It is the only way I could have gotten where I want to go.

I could have traveled by some other means, but I prefer to use the bus.

Are you

Male Female

Which of the following best describes your family income per year

Under \$20,000 \$20,000 to \$29,999 \$30,000 to \$39,999 \$40,000 or more

Are you

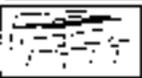
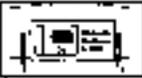
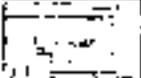
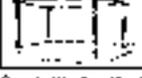
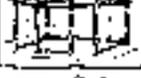
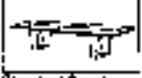
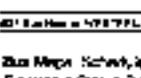
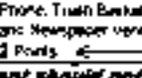
Under 65 65 or over

Thank you for completing our survey.

Back Cover

Figure 2. continued.

Write the number of Points you would spend on each category. Remember, the total number of points cannot exceed 12.

	No Frills	Added Transit Features			Points
On the Bus					
Storage Space	No Storage Facilities 0 Points	or  Package Rack 1 Point	or  Bike Rack 3 Points	or Package and Bike Racks 4 Points	Points
On-board Information	No On-board Information 0 Points	or Paper Maps and Schedules 1 Point	or  Electronic Display 5 Points		Points
Ride Quality	Standard Transit Bus 0 Points	or Comfort and Smoother Ride 6 Points			Points
Courtesy-trained Drivers	Standard Driver Training 0 Points	or  Added Courtesy Training 1 Point			Points
Seating	Unpadded Seating 0 Points	or  Some Padded 2 Points	or  Fully Padded 5 Points	or  Head and Arm Rests 6 Points	Points
Security Camera	No Security Camera on Bus 0 Points	or  Security Camera on Bus 3 Points			Points
Accessibility	Bus with Steps and Wheelchair Lift 0 Points	or "Low Floor" Bus (no need for lift or steps) 1 Point 			Points
At the Stop (How the New City Weather Protection)	No Shelter 0 Points	or  Simple Shelter: Roof, No Walls 1 Point	or  Improved Shelter: Roof and Walls 4 Points	or  Improved Shelter With Heating 5 Points	Points
Bus Stop Seating	No Bus Stop Seating 0 Points	or  Standard Bench 1 Point	or  Comfort Bench 2 Points		Points
Bus Stop Information	No Bus Stop Information 0 Points	or  Bus Maps and Schedules 4 Points	or  Bus Maps, Schedules and Electronic Signs Reports 8 Points		Points
Bus Stop Lighting	Standard Street Light 0 Points	or Special Bus Stop Lighting 1 Point 			Points
Other Bus Stop Features	No Special Features 0 Points	or Phone, Trash Bin and Newspaper Vending 2 Points 			Points
TOTAL amount spent should not exceed 12 points					Points

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