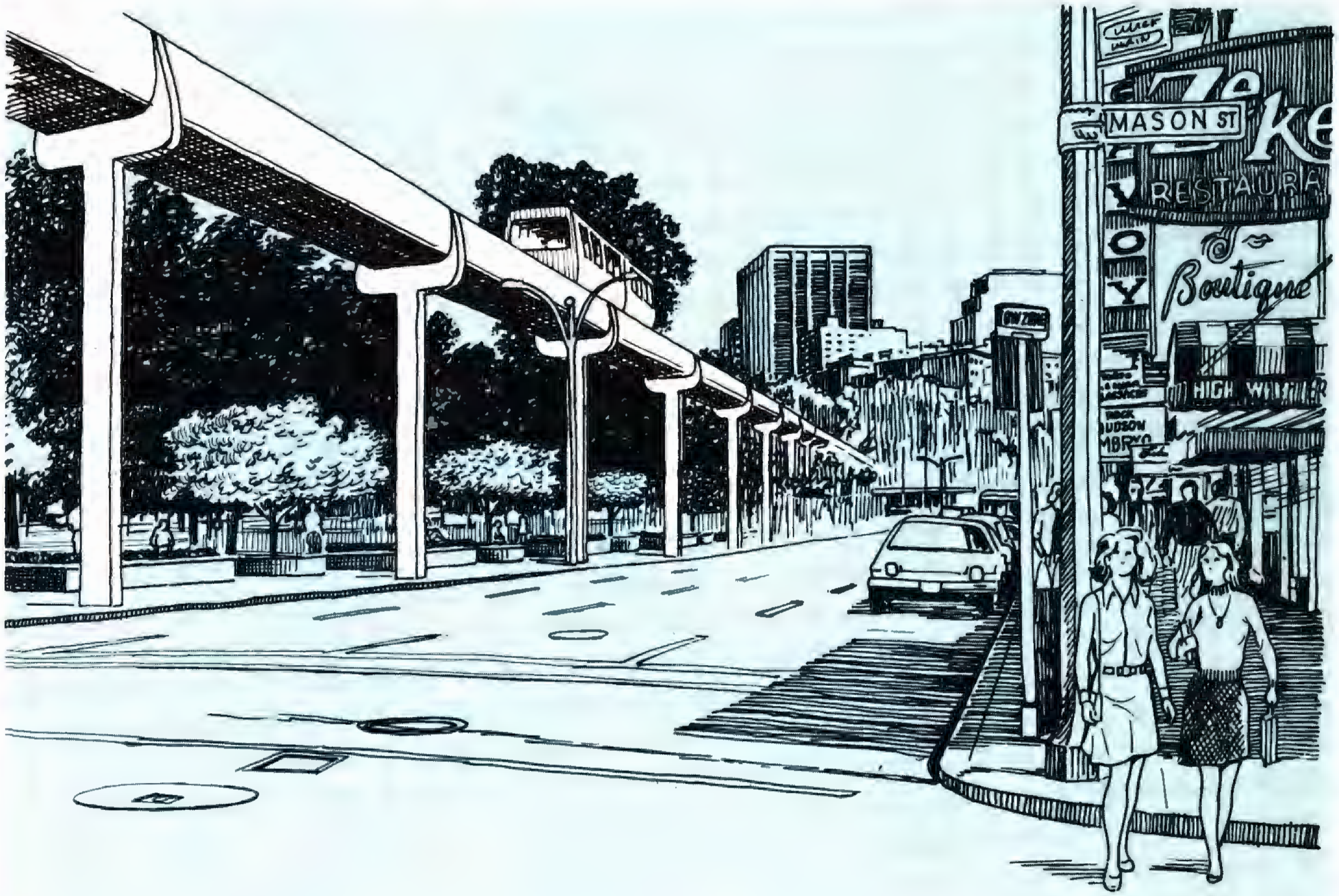
People Mover Profile



U.S. DEPARTMENT
OF TRANSPORTATION

URBAN MASS
\NSPORTATION
MINISTRATION
OFFICE OF
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ORTATION SYSTEMS
CENTER
HNOLOGY SHARING
ROGRAM OFFICE

TECHNOLOGY SHARING A PROGRAM OF THE UNITED STATES DEPARTMENT OF TRANSPORTATION

Introduction

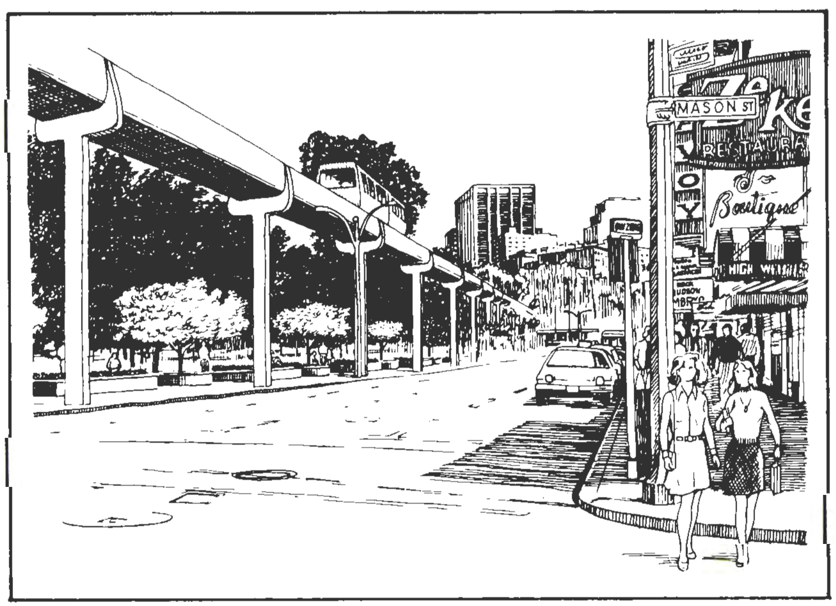
As part of its ongoing commitment to the concept of technology sharing, the U.S. Department of Transportation has initiated a series of publications on transportation topics which focus on a variety of subject areas. The current title in this series, People Mover Profile, has been prepared by the Department's Office of Technology Sharing in cooperation with the Office of Research and Development, Urban Mass Transportation Administration (UMTA).

This publication acquaints readers with the subject of people movers in conjunction with UMTA's Downtown People Mover (DPM) Project. The project's aim is to demonstrate the benefits of fully automated people mover systems in downtown urban areas. To date, people movers, installed in controlled environments such as airports and recreation parks, have demonstrated that they are proven operational systems. The DPM Project will demonstrate the feasibility of installing a people mover system in the harsher and more demanding environment of our downtown urban areas. The text of the UMTA news release announcing the demonstration project and more detailed information about the project are included as supplementary material.

This profile is divided into three sections. The first, a narrative overview, briefly discusses the subject of people movers. The second section consists of detailed technical data and photographs of manufacturers and suppliers of existing people mover systems. The third section, the supplementary material, contains a glossary of terms used in this document in addition to the aforementioned UMTA DPM Project material.

Technical data in this profile were obtained from the people mover manufacturers and suppliers who are responsible for its accuracy. Appreciation is extended to these firms for their cooperation in providing the data.

People Mover Profile



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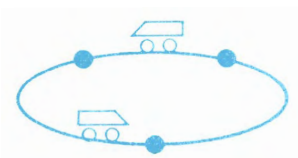
What is a People Mover?

The term people mover refers to one of the three categories of a transportation system called Automated Guideway Transit (AGT). AGT systems consist of driverless vehicles which operate over exclusive guideways. The guideways can be located on elevated structures, at street level, or below ground. The three categories of AGT systems are: shuttle and loop transit (more commonly called people movers), group rapid transit, and personal rapid transit.

Shuttle Transit



Loop Transit

A people mover or shuttle and loop transit (SLT) system is the simplest type of AGT system. The vehicles in this system may be of various sizes and travel on a fixed path which may have provision for several stations, but few or no switches. Vehicles may travel as single units or coupled together as trains to accommodate heavier passenger flows. In a shuttle system vehicles move back and forth over a single guideway while in loop transit they move over a closed path. There are numerous shuttle and loop transit systems currently in operation. (See individual system descriptions pages 9 to 25).

Although this profile and the UMTA Downtown People Mover Project are mainly concerned with shuttle and loop type people movers, descriptions of the other two categories are included in order to better define the relationships among the three categories.

Group Rapid Transit (GRT) differs from shuttle and loop systems in network and operational complexity since it is designed more to serve groups of travellers with similar origins and destinations. For this reason, group rapid transit has switching capabilities which allow for branch routes, and off-line stations so that vehicles on the main line are not delayed by those waiting at stations. There are two examples of GRT systems currently in public use. (Again refer to individual system descriptions.)

Personal Rapid Transit (PRT) systems are characterized by small vehicles, usually carrying less than six people traveling together by choice. The headway, or time interval between the arrival of successive vehicles, is very short (usually less than three seconds), and the guideways are smaller and less obtrusive than SLT or GRT. Plans for PRT systems call for a broad range of service policies and require a high degree of technical sophistication. To date, there are no PRT systems in public use.

Despite the differences in physical arrangement and complexity of the three AGT categories, there are two important features which are common to all:

1. Vehicles travel on an exclusive guideway; their own permanent right-of-way.
2. Vehicles are operated automatically; there is no driver on board the vehicle.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What are the Physical Components of a People Mover System?

A people mover system has four major components - the vehicles, the guideway on which they travel, stations, and the control system employed to manage and operate the system. Brief descriptions of these four elements follow.

Vehicles

People mover vehicles have been designed using a variety of technical and design approaches. There are various types of accommodations, entry and exit provisions for passengers, and overall designs. The size of the vehicle is the prime determinant of its passenger-carrying capacity which may vary from less than 20 to over 100 passengers.

The majority of people mover vehicles are made of aluminum or fiberglass and are lighter than conventional rapid transit cars. This size and weight difference allows for narrower and lighter duty guideways, smaller stations, and lower energy consumption.

Guideway

Reports on existing people mover installations indicate that guideway construction, generally consisting of steel or reinforced concrete sections, is the largest single cost element (as high as 50% to 70% of total capital cost). Vehicular operation requires the use of exclusive guideways to eliminate interference from conflicting traffic. Most installations have elevated guideways, and in this way provide for the required isolation for vehicular flow. These elevated guideways can be designed with a high degree of aesthetic appeal with very little disruption to the existing street pattern. It may also be possible to locate certain elevated sections and stations at the second or third floor levels of downtown buildings, thus facilitating access to the people mover system and blending with the existing building structure.

Street level and underground guideways are also possible. Street level guideways may be less costly to construct than elevated structures, but provision for separation from street traffic would then be necessary. Underground guideways are also possible. However, the cost of tunneling then becomes a significant factor.

Two additional sub-elements of a people mover system are often associated with the guideway — power collection and switching. Power collection is generally accomplished by power rails on the guideway and power collectors on the vehicle. Switching can be accomplished either by a vehicle-mounted mechanism or by moveable beams or sections on the guideway.

Stations

Stations are located along the guideway for passenger access and egress. The location and distance between stations are prime determinants of passenger accessibility to the system. Stations play an important role in system operation since they serve as queue points in peak periods and may serve as vehicle storage points in off-peak hours. Stations also are the main interface between vehicles and passengers; therefore, their design must provide for efficient boarding and alighting procedures.

Control System

Since no driver is needed for the vehicles, a control system which "manages" the people mover system is required. In general, the level of sophistication of the control system increases as the operational capabilities of the system grows, i.e., switching capability, provision for off-line stations, and short headways between vehicles.

Controls for existing systems often differ in the functions they perform. Some of these functions, not all of which are necessarily performed by each of the existing control systems, are:

- regulation of vehicular position, speed, and total vehicular flow;
- dispatching logic to serve trip requests;
- response to emergency conditions;
- system status checks performed by control personnel;
- performance of corrective action commands from control personnel.

Where are People Movers Currently in Operation?

There are 20 installations currently in public use which utilize people mover technology. The systems at these installations were designed either for travel within a well-defined activity area or between two major activity centers. As a result, these installations are predominatly located in recreation parks and airports, as detailed below:

Type of Location	Number of Installations
Recreation Parks	11
Airports	6
Hospital Complex	1
Shopping Center	1
University Community	1

Associated with each of the existing installations is a system manufacturer or supplier. UMTA's intention in its Downtown People Mover Project is to make use of existing people mover technologies with minimum modifications for installation in a downtown area. Therefore, the eight system suppliers, listed below with their installation sites, are eligible to participate in the DPM project.*

Company	Installation Sites
Boeing	Morgantown, WV
DEMAG/MBB	Ziegenhain, West Germany
Ford	Dearborn, MI Windsor Locks, CT
Rohr	Houston, TX
Universal Mobility	Richmond, VA Cincinnati, OH Charlotte, NC Los Angeles, CA Sacramento, CA Hershey, PA Montreal, Canada Fuji Highland, Japan
Vought	Irving, TX
Walt Disney CTS	Anaheim, CA Orlando, FL
Westinghouse	Seattle - Tacoma Airport, WA Tampa, FL Williamsburg, VA Miami, FL

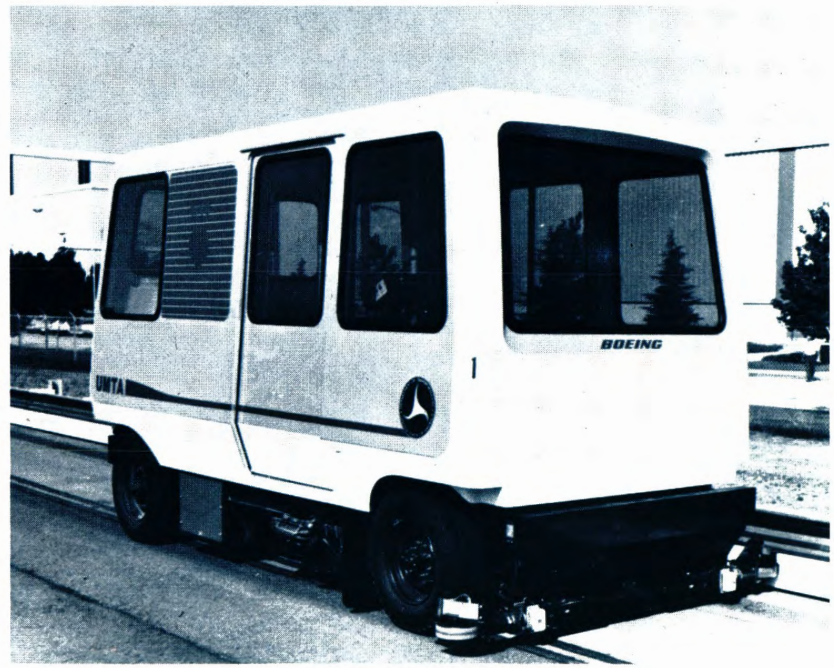
*The Otis Transportation Technology Division system for Duke University will become eligible to participate in the DPM project upon production equipment's successful completion of a 30-day Qualification Test in simulated operation, under UMTA observation (anticipated during the summer of 1977).

Description of Existing People Movers

The Boeing Company - "Morgantown System"

Post Office Box 3999
Seattle, Washington 98124

The Boeing Company is the system manager for the public demonstration project at Morgantown, West Virginia. This installation connects various campuses of the University of West Virginia with 2.2 miles of double guideways over which a total of 45 vehicles operate. The design capacity of each vehicle is 21 passengers and the maximum ride time between any two successive stations is approximately five minutes. The Morgantown System presently has a maximum one-way capacity of 5040 passengers per hour with a future capacity of twice that amount.



VEHICLE

dimensions:	**l**	-	15.50 ft
	w	-	6.67 ft
	h	-	8.75 ft
empty weight		-	8600 lbs
body material		-	fiberglass
design capacity		-	seat 8 stand 13
doorway:	**h**	-	73 in.
	w	-	38 in.
propulsion		-	DC rotary electric
power collection		-	guideway power rails, two collectors per vehicle
suspension		-	air bag dampers, pneumatic tires

GUIDEWAY AND STATIONS

station type	-	multi-channel off-line
station spacing	-	1.3 miles
station dwell time	-	20 sec
guideway material	-	reinforced concrete
min. turn radius	-	30 ft
switching technique	-	on-board steering mechanism

OPERATION AND PERFORMANCE

max line capacity	-	5040 pphpd
min headway	-	15 sec
max velocity	-	30 mph
max grade	-	10%
normal accel	-	2.0 fps^2
normal decel	-	2.0 fps^2
emergency stop	-	174 ft
emergency egress	:	push out rear window to walkway on guideway
noise level:		
interior	-	65 dbA
exterior @ 25 ft	-	65 dbA

Present Sites	Number of Vehicles	Length of Guideway
Morgantown, West Virginia	45	2.2 miles

DEMAG/MBB - "Cabinlift"

DEMAG Fordertechnik	Messerschmitt-Bolkow-Blohm Gmbh
5802 Wetter (Ruhr)	8 Munich 80
P.O.B. 67/87	P.O.B. 801265
West Germany	Munich, West Germany

The "Cabinlift" system is designed by a consortium of two West German engineering firms, DEMAG Fordertechnik and Messerschmitt-Bolkow-Blohm Gmbh. The system operates with single vehicles suspended from elevated guideways propelled by linear induction motors at speeds up to 33 mph. The fully automatic control can maintain system headways as close as four seconds permitting a maximum line capacity of 21,000 passengers per hour per direction (pphpd). The quietness of the vehicles' operation, both interior and exterior, is evidenced by the installation at Ziegenhain (W. Germany) Hospital where shuttle service is provided over the 0.4-mile distance between the main complex and an extended care facility.

VEHICLE

dimensions:	**l**	-	14.8 ft
	w	-	8.2 ft
	h	-	8.2 ft
empty weight		-	5500 lbs
body material		-	aluminum
design capacity		-	seat 12 stand 13
doorway:	**h**	-	79 in.
	w	-	55 in.
propulsion		-	linear induction motors, 4/vehicle
power collection		-	power rails on guideway, collectors on vehicle
suspension		-	springs and dampers, rubber tires

GUIDEWAY AND STATIONS

station type	-	on-line and off-line
station spacing	-	NA
station dwell time	-	20 sec
guideway material	-	steel and concrete
min turn radius	-	30 ft
switching technique	-	lateral switching wheels on-board vehicle

OPERATION AND PERFORMANCE

max line capacity	-	21000 pphpd
min headway	-	4 sec
max velocity	-	33 mph
max grade	-	15%
normal accel	-	3.1 fps^2
normal decel	-	3.1 fps^2
emergency stop	-	180 ft
emergency egress	:	passengers evacuate to service vehicle
noise level:		
interior	-	53 dbA
exterior @ 25 ft	-	57 dbA

Present Sites	Number of Vehicles	Length of Guideway
Ziegenhain Hospital West Germany	1	0.4 miles

Ford Motor Company - "ACT System"

Transit System Operations
Post Office Box 2545
Garrison Place West
Dearborn, Michigan 48123

The Ford Automatically Controlled Transportation (ACT) system is presently in operation at two sites. Bradley International Airport, outside of Hartford, Connecticut has a two-vehicle shuttle system running on a 3600-ft guideway which connects a distant parking lot with the main passenger terminal. The Fairlane Shopping Center in Dearborn, Michigan is also a two-vehicle installation with a 2600-ft guideway. This system serves as a connector between the shopping mall and the Hyatt Regency Hotel. The vehicles in this system carry 24 passengers and can operate at speeds up to 30 mph with headways in the vicinity of 2.5 minutes.

VEHICLE

dimensions:	**l**	-	24.4 ft
	w	-	6.7 ft
	h	-	8.7 ft
empty weight		-	13230 lbs
body material		-	aluminum
design capacity		-	seat 10 stand 14
doorway:	**h**	-	80 in.
	w	-	41 in.
propulsion		-	DC rotary electric
power collection		-	power rails on guideway, 4 collector assemblies per vehicle
suspension		-	coil springs and shock absorbers, foam filled tires.

GUIDEWAY AND STATIONS

station type	-	on-line and off-line
station spacing	-	0.5 miles (typical)
station dwell time	-	10 to 70 sec
guideway material	-	concrete and/or steel
min turn radius	-	50 ft
switching technique	-	on-board switch arms

OPERATION AND PERFORMANCE

max line capacity	-	1350 pphpd
min headway	-	160 sec
max velocity	-	30 mph
max grade	-	6%
normal accel	-	1.9 fps^2
normal decel	-	1.9 fps^2
emergency stop	-	166 ft
emergency egress	:	

through end windows and passenger doors onto guideway

noise level:

interior	-	72.5 dbA
exterior @ 25 ft	-	NA

Present Sites	Number of Vehicles	Length of Guideway
Bradley Int'l Airport, CT	2	0.7 miles
Fairlane Town Ctr Dearborn, Mich.	2	0.5 miles

Rohr Industries, Inc. - "P-Series Monotrain"

Post Office Box 878
Chula Vista, California 92012

Rohr Industries designed the P Series Monotrain for use in low-volume passenger transportation over short distances. The system consists of small, lightweight vehicles grouped in trains travelling over exclusive guideway lanes. The Houston Intercontinental Airport installation carries passengers between eight different on-line stations in six 3-car trains which travel along a closed-loop guideway approximately one mile in length. The design capacity of the system approaches 2100 passengers per hour per direction (pphpd), but three times the present number of trains are required to achieve this figure.

VEHICLE

dimensions:	**l**	-	40.0 ft
(3-car train)	**w**	-	5.0 ft
	h	-	7.5 ft
empty weight		-	7200 lbs/car
body material		-	fiberglass
design capacity		-	seat 6 stand 6
doorway:	**h**	-	78 in.
	w	-	48 in.
propulsion		-	continuous duty cycle DC electric
power collection		-	AC rails on guideway collectors on lead car
suspension		-	air bag springs, pneumatic tires

GUIDEWAY AND STATIONS

station type	-	on-line
station spacing	-	300 to 600 ft
station dwell time	-	20 to 40 sec
guideway material	-	aluminum guideway on concrete running surface
min turn radius	-	14.5 ft
switching technique	-	moveable guidebeams

OPERATION AND PERFORMANCE

max line capacity	-	2100 pphpd
min headway	-	60 sec
max velocity	-	12 mph
max grade	-	2%
normal accel	-	4.4 fps^2
normal decel	-	4.4 fps^2
emergency stop	-	20 ft
emergency egress	:	through normal passenger doors
noise level:		
interior	-	65 dbA
exterior @ 25 ft	-	65 dbA

Present Sites	Number of Vehicles	Length of Guideway
Houston Int'l Airport	6 three-car trains	1.0 mile

Universal Mobility, Inc. - "Unimobil Type II"

Bank of Holladay Plaza
2040 East 4800 South Street
Salt Lake City, Utah 84117

Universal Mobility, Inc. of Salt Lake City, Utah in association with Habegger, Ltd of Thur, Switzerland, markets the Unimobil/Habegger "Type II" system in the United States (known as "Minirail" in Europe). Several small trains consisting of from six to sixteen cars travel on a monorail type guideway with fully automatic operation. This system is currently operational at eight different sites around the world ranging from 0.8 miles to 4.2 miles in length. System capacity is approximately 8100 passengers per hour per direction (pphpd), operating at a headway of sixty seconds. In most situations the maximum vehicle velocity approaches 18 mph.

GUIDEWAY AND STATIONS

station type	-	on-line
station spacing	-	0.2 to 2.0 miles
station dwell time	-	15 to 40 sec
guideway material	-	steel
min turn radius	-	50 ft
switching technique	-	rotating or sliding substitution of guideways

VEHICLE

dimensions:	**l**	-	14.0 ft
	w	-	5.8 ft
	h	-	7.3 ft
empty weight		-	3800 lbs
body material		-	steel, glass and FRP
design capacity		-	seat 12 stand 8
doorway:	**h**	-	70 in.
	w	-	22 in.
propulsion		-	DC electric
power collection		-	slide shoes
suspension		-	pneumatic tires

OPERATION AND PERFORMANCE

max line capacity	-	6000 pphpd
min headway	-	45 sec
max velocity	-	18 mph
max grade	-	10%
normal accel	-	3.0 fps^2
normal decel	-	3.0 fps^2
emergency stop	-	45 ft
emergency egress	:	

through car end onto guideway

noise level:

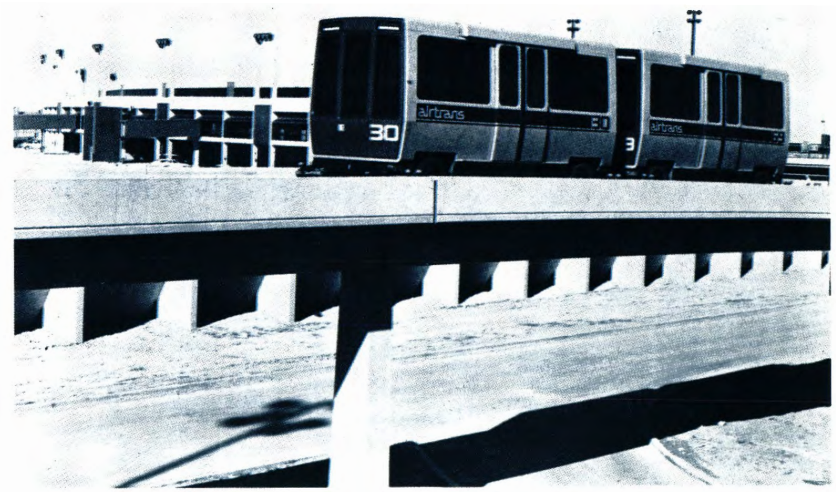
interior	-	65 dbA
exterior @ 25 ft	-	65 dbA

Present Sites	Number of Vehicles	Length of Guideway
Kings Dominion, Richmond, VA	6 nine-car trains	2.0 miles
Kings Island, Cincinnati, OH	7 nine-car trains	2.0 miles
Carowinds, Charlotte, NC	4 eight-car trains	2.0 miles
Magic Mountain, Los Angeles, CA	6 six-car trains	0.8 miles
Fuji Highland, Japan	2 nine-car trains	1.2 miles
	2 nine-car trains	1.1 miles
Hershey Park, Hershey, PA	3 six-car trains	0.8 miles
California Expo, Sacramento, CA	4 eight-car trains	1.3 miles
EXPO 67, Montreal, Canada	32 nine-car trains	4.2 miles
	12 sixteen-car trains	1.3 miles

The Vought Corporation - "Airtrans"

Post Office Box 5907
Dallas, Texas 75222

The Vought Corporation designed and constructed the "Airtrans" system at the Dallas - Forth Worth International Airport. It is the most extensive system network of its kind with 13 miles of reinforced concrete guideways, 53 on- and off-line stations, 51 passenger vehicles each capable of carrying 40 passengers, and 17 utility vehicles. The fully automated operation has the capability to provide 18-second headways giving a maximum line capacity of 12,000 passengers per hour per direction (pphpd) at speeds up to 19 mph. Average trip time between any two successive stations is around eight minutes: the longest passenger trips require about 20 minutes.



VEHICLE

dimensions:	**l**	-	21.0 ft
	w	-	7.0 ft
	h	-	10.0 ft
empty weight		-	14000 lbs
body material		-	fiberglass
design capacity		-	seat 16 stand 24
doorway:	**h**	-	76 in.
	w	-	54 in.
propulsion		-	DC rotary electric
power collection		-	articulated brushes
suspension		-	air bag dampers, foam filled tires

GUIDEWAY AND STATIONS

station type	- -	on-line and off-line
station spacing	-	0.34 miles
station dwell time	-	18 sec
guideway material	-	reinforced concrete
min turn radius	-	100 ft
switching technique	-	mechanical switch on guideway

OPERATION AND PERFORMANCE

max line capacity	-	12000 pphpd
min headway	-	18 sec
max velocity	-	19 mph
max grade	-	7.8%
normal accel	-	3.38 fps^2
normal decel	-	3.38 fps^2
emergency stop	-	NA
emergency egress	:	evacuate through end doors, walk along guideway
noise level:		
interior	-	60 dbA
exterior @ 25 ft	-	68 dbA

Present Sites	Number of Vehicles	Length of Guideway
Dallas/Ft. Worth Int'l Airport	68	13.0 miles

Walt Disney Community Transportation Services Company - "WEDway People Mover System"

1401 Flower Street
Glendale, California 91201

Walt Disney Community Transportation Services (CTS) Company is the supplier of the "WEDway People Mover System" which is now in operation at both Disneyland in California and Walt Disney World in Florida. The Florida system operates on a principle where the vehicle is the passive element in an inductive circuit with the actual motors being contained within the guideway; the older California system used conventional traction drive, rubber tired vehicles. A feature common to both is the provision for dynamic boarding from a rotating station platform where the vehicles remain in motion. This virtually eliminates any delay caused by dwell time in the station. Present installations in California and Florida have 197 and 160 vehicles operating on guideways 0.75 miles and 0.87 miles in length, respectively.

VEHICLE

dimensions:	**l**	-	8.08 ft
(open car)	**w**	-	4.75 ft
	h	-	3.75 ft
empty weight		-	940 lbs
body material		-	NA
design capacity		-	seat 6 stand 0
doorway:	**h**	-	26 in.
	w	-	23 in.
propulsion		-	linear motor(Florida)
power collection		-	hard-wired motor in guideway, passive vehicle (Florida)
suspension		-	rigid bogey, urethane covered wheels. shock mounted body (Florida)

GUIDEWAY AND STATIONS

station type	-	on-line with dynamic loading option
station spacing	-	variable
station dwell time	-	12 sec (0 sec w/dynamic opt)
guideway material	-	steel track on steel or concrete roadbed
min turn radius	-	20 ft
switching technique	-	electromechanical switch on guideway

OPERATION AND PERFORMANCE

max line capacity	-	7700 pphpd
min headway	-	10 sec
max velocity	-	13.6 mph
max grade	-	15%
normal accel	-	2 fps^2
normal decel	-	2 fps^2
emergency stop	-	100 ft
emergency egress	:	
along track catwalk		
noise level:		
interior	-	NA
exterior @ 25 ft	-	NA

Present Sites	Number of Vehicles	Length of Guideway
Disneyland, California	197	0.75 miles
Walt Disney World, Florida	160	0.87 miles

Westinghouse Electric Corporation - "Transit Expressway"

Transportation Division
2001 Lebanon Road
West Mifflin, Pennsylvania 15122

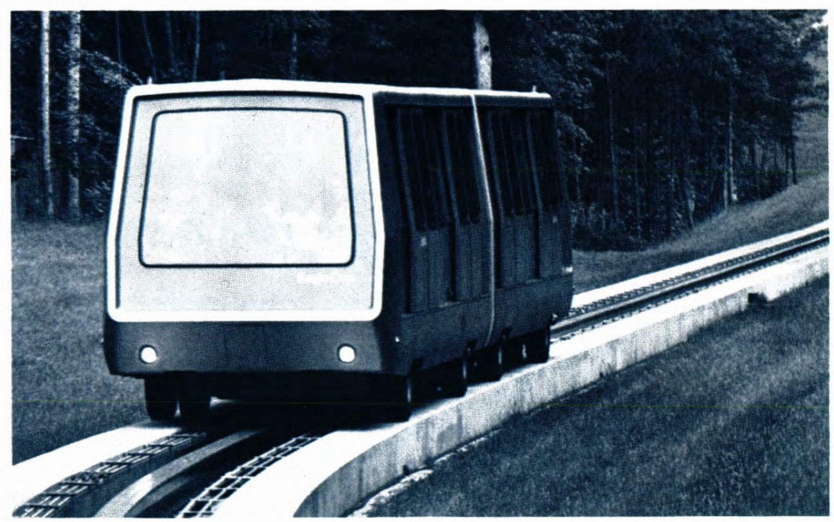
The Westinghouse "Transit Expressway" utilizes relatively large capacity vehicles travelling along steel and concrete guideway sections. The vehicles are capable of speeds up to 30 mph with 100-second headways giving a maximum system line capacity of 7344 passengers per hour per direction (pphpd). Each of the four installations currently in operation have from two to twelve vehicles operating on guideways ranging from 0.5 miles to 1.7 miles in length. The system at Seattle - Tacoma Airport also has an automatic coupling and uncoupling capability.

GUIDEWAY AND STATIONS

station type	-	on-line
station spacing	-	0.2 to 0.5 miles
station dwell time	-	20 sec
guideway material	-	steel and concrete
min turn radius	-	75 ft
switching technique	-	moveable guidebeam sections

VEHICLE

dimensions:	**l** -	-	37.0 ft
	w	-	9.3 ft
	h	-	11.0 ft
empty weight		-	27500 lbs
body material		-	aluminum, steel
design capacity		-	seat 12 stand 90 (Operational configurations vary)
doorway:	**h**	-	80 in.
	w	-	84 in.
propulsion		-	series-wound DC traction, phase control rectifier
power collection		-	power rails on guideway, collector shoes on vehicle
suspension		-	air/taper leaf springs



OPERATION AND PERFORMANCE

max line capacity	-	7344 pphpd
min headway	-	100 sec
max velocity	-	30 mph
max grade	-	10%
normal accel	-	3.67 fps^2
normal decel	-	2.93 fps^2
emergency stop	-	528 ft
emergency egress	:	

through entry doors to guideway

noise level:

interior	-	65 dbA
exterior @ 25 ft	-	60 dbA

Present Sites	Number of Vehicles	Length of Guideway
Seattle-Tacoma Int'l Airport	12	1.7 miles
Tampa Int'l Airport	8	1.5 miles
Busch Gardens, Williamsburg, VA	2	1.4 miles
Miami Int'l Airport	4	0.5 miles

Supplementary Material

UMTA DOWNTOWN PEOPLE MOVER PROJECT

NEWS RELEASE APRIL 6, 1976

A project to demonstrate the benefits of fully automated people mover systems in urban downtown areas was announced today by Robert E. Patricelli, Administrator of the Department of Transportation's Urban Mass Transportation Administration (UMTA).

Up to three cities will be chosen by UMTA in the fall of 1976 for the first public operation of Downtown People Mover (DPM) systems.

Administrator Patricelli stated the DPM project is intended to show whether relatively simple automated systems can provide a reliable and economical solution to the local circulation problems in congested downtown areas. "Such systems have proven effective in controlled environments, such as airports," Patricelli said. "We now want to test their feasibility and public acceptance in the harsher and more demanding environment of a real city."

"We feel this project is important not only because it will provide for the first time hard data on the cost-effectiveness of a simple automated system," Patricelli said, "but also because it responds to one of the broader program goals of the UMTA program, that is, to support the effective economic functioning of our central cities."

The UMTA Administrator explained that the project had three major policy goals:

1) to test the operating cost savings which automated transit systems might deliver;

2) to assess the economic impact of improved downtown circulation systems on the central city; and

3) to test the feasibility of surface or elevated people movers both as feeder distributors and as potential substitutes for certain functions now performed by more expensive fixed guideway systems, such as subways.

The project is expected to provide operating data, planning tools, and experience for use by other communities seeking solutions to similar problems of downtown circulation. The project is also intended to demonstrate the acceptability of modern guideway structures and of driverless vehicles in an urban environment.

The DPM Project is to be funded through local public agencies from funds that are available under UMTA's Capital Assistance program, which will provide up to 80 percent of the capital costs required to implement the project. Local participation for the remaining costs must be provided by or through the sponsoring public agency. In addition, UMTA will fund several research, development, and evaluation efforts in direct support of the project.

A "letter of interest" addressed to the UMTA Administrator is requested by May 15, 1976, from communities interested in participating in the project. These communities must also submit by June 30, 1976, a proposal for the project to the UMTA Office of Research and Development, AGT Application Division.

The proposal must provide sufficient data to permit evaluation of the merits of the proposed project, site opportunities, and the degree to which the proposed project best fulfills the criteria set forth by UMTA (see attachment). Based on its review of the project proposals submitted, UMTA will then select up to three sites to perform project engineering. The number of sites that are selected for construction funding will depend on the engineering results and the availability of funds.

Applicants seeking selection for funding Downtown People Mover (DPM) systems must demonstrate, as a minimum, the following:

1) The candidate city must be willing to select, through a competitive procurement process, one of the existing people mover technologies with minimum modifications to adapt it for urban deployment. The project is not designed to develop new technology.

2) The applicant must give assurance that, upon completion of the installation, successful testing, and initial public operation, it will continue to operate the sytsem.

3) The proposed project should have national relevance; i.e., it should illustrate service patterns that would be widely applicable, show intermodal links, and generally be of a nature that would fairly test the feasibility of urban uses of such systems.

4) The total cost of the installation of the system, including costs for site acquisition, preparation, and integration, should be commensurate with the anticipated benefits. Such benefits as patronage in both peak and off-peak hours, and attainment of local land use and community development goals will be considered.

5) The candidate city will have to demonstrate:

a) that adequate planning for the project has been performed;

b) that the project is consistent with the approved regional transportation plan;

c) that there is support from all elements of the community that share in the responsibility for the project and that the project has been endorsed by appropriate local officals;

d) that adequate financial resources to fund the local share of the capital costs of the project have been firmly identified;

e) that financial resources to fund any deficits that may result from continuing operations and maintenance of the system have been explored;

f) that adequate technological resources to implement and operate the system will be provided; and

g) that the project complies with all requirements under the Urban Mass Transportation Act of 1964, as amended.

Details of UMTA's Downtown People Mover Project*

The Downtown People Mover (DPM) project is one of four elements in UMTA's integrated Automated Guideway Transit (AGT) Program. The DPM project is tailored to take a simple AGT system of proven technology, yet never operated in the harsh environment of a true urban setting, and upgrade it to an urban transit-worthy level to be deployed, under substantial Capital Assistance grant funding, in an urban area. Thus, the goal of the DPM project is to demonstrate the technical and socio-economic feasibility of an people mover or shuttle and loop transit (SLT) system when operating in an urban environment. The objectives of the project are:

1) To demonstrate the feasibility of a people mover (SLT) in an urban environment.

2) To demonstrate proven technology which, however, has only been proven at the more sheltered and benign environments of airports or private activity centers as compared to those imposed on urban transit systems.

3) Establish that automated, relatively simple people movers can be made sufficiently reliable and maintainable while providing adequate service availability at affordable costs to be a viable urban transit alternative.

4) Establish the achievable service levels and the actual economics of the installation and operation of an automated urban people mover system.

5) Establish the social acceptability of automated transit operation and the environmental impact of modern guideways in the urban (CBD) environment.

6) Thoroughly document the entire project, including an evaluation of system performance, the social, economic, and environmental impacts of the people mover installation, the lessons learned from the project, and a set of guidelines and procedures that could be emulated by other potential candidate cities.

UMTA will fund the Downtown People Mover Project for the construction, installation, and initial start-up operations of a people mover system in an urban environment. The system will be completely automated and capable of a 24-hour daily operation.

The three other components of UMTA's AGT program are:

- AGT Socio-economic Studies,
- AGT Technology Program,
- Advanced Group Rapid Transit (GRT) System

The AGT Socio-economic Studies and the AGT Technology Program cover the spectrum of AGT from SLT to PRT and they also have relevance to conventional transit. The former addresses market studies; requirement applications; assessment of the operational, technical, and economic performance of existing AGT systems; comparative analyses of AGT and conventional systems for different applications at different service levels. The latter addresses the critical technologies, subsystems and components, cost reduction, reliability, and service improvements, as well as development of guidelines and verified technical data for planners.

The Advanced GRT (formerly High Performance PRT) System Development is a longer-term R&D project to develop a GRT system with far superior service capabilities above the existing GRT's. It is expected that this will open up many additional potential applications to this form of AGT system.

UMTA's R&D program in AGT is directed toward providing an empirical and analytical foundation for sound deci-

*Excerpts taken from Research and Development in New Systems and Automation by G.J. Pastor, Associate Administrator for Research and Development, Urban Mass Transportation Administration.

sion making and successful deployment of AGT systems. The broad objectives of the AGT program are as follows:

- Determine service requirements which AGT systems (existing, developmental, and hypothetical) must satisfy;
- Identify the range of transit applications for which AGT systems are particularly suitable;
- Establish service characteristics and costs of existing and developmental AGT systems and determine the social and economic factors affecting their acceptance as a form of urban transportation;
- Solve critical technical problems of control, safety, reliability, and maintainability common to a variety of AGT systems;
- Design, develop, and test improved AGT systems and components to reduce capital and operating costs, improve performance and public acceptance, and ensure successful urban installation with relatively low risk; and
- Provide design information, procedures, specifications, and socio-economic data readily usable by planners, manufacturers, and potential operators of AGT systems.

Glossary of Terms

emergency egress — in an emergency situation, the method(s) by which passengers can evacuate a vehicle and proceed to a safe location

emergency stop — the distance required by a vehicle to come to a complete stop from maximum velocity

empty weight — the weight of the individual vehicle without any passengers or cargo

guideway — the surface or track, and the construction supporting it, in or upon which vehicles travel

level of service — multidimensional characteristics of the transportation service provided, indicating the quality and quantity of service; divided into quantifiable elements (e.g., travel time, travel cost, number of transfers, etc.) and those which are difficult to quantify (e.g., comfort, modal attractiveness, etc.)

linear induction motor — a type of electric motor in which the primary winding induces a current in the secondary, thus producing a magnetic field in opposition to that of the primary. One magnetic field is placed aboard the vehicle and the other fixed to the guideway

maximum grade — the maximum incline that the vehicle is able to negotiate under normal system constraints, expressed in percent

maximum line capacity (In this document expressed as pphpd - passengers per hour per direction) — the theoretical maximum number of passengers a given system is able to carry past a fixed point in unit time assuming no station or intersection constraints

minimum turning radius — the minimum radius of horizontal guideway curvature that the vehicle or train is able to negotiate under normal system constraints

normal acceleration — the rate of increase in velocity that the vehicle experiences in regular operation

normal deceleration — the rate of decrease in velocity that the vehicle experiences in regular operation

off-line station — a transit station removed from the main line so that vehicular flow on the main line is not impeded

on-board switching — the mechanisms which cause the vehicle to switch from one guideway path to another are mounted on the vehicle, not on the guideway

on-guideway switching — the mechanisms which cause the vehicle to switch from one guideway path to another are mounted on or in the guideway itself

on-line station — a transit station located on the main line

right-of-way — that land or other space upon which a guideway (including station, terminals, etc.) is placed, including areas required for safe, efficient operation

series motor — type of electric motor in which the field coils are connected in series with the motor armature

station dwell time — the length of time a vehicle remains stopped at a station or terminal for the purpose of passenger boarding and alighting

traction motor — an electric propulsion motor used for exerting tractive force through the wheels of the vehicle

train — two or more transit vehicles physically connected and operated as a unit

vehicle design capacity — the maximum number of passengers that the vehicle is designed to accommodate comfortably (Capacity = number of seats + [Net Floor Space ÷ 2.5 ft^2 for standees])

Publications issued under the U.S. Department of Transportation's Technology Sharing Program are designed to serve the needs of a broad cross-section of the transportation community. Recognizing, however, that user familiarity with specific topics will vary substantially, three publication "levels" have been established--each intended to address a different level of user familiarity with a particular topic:

Level 1: A general-interest publication, introductory in nature, designed to aid the user in gaining basic familiarity with, and understanding of, the subject area.

Level 2: A publication providing technical and related information to augment understanding and decision-making by managerial, planning and operating personnel.

Level 3: A highly technically-oriented publication, specific and detailed in nature, designed for authoritative reference by transportation technical specialists.

(THIS IS A LEVEL 1 DOCUMENT)

Information about the Department's Technology Sharing Program is available from:

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NOTICE

People mover profile