



Freeway Mass Transit

cowritten with Chuck Fuhs*

One day in the late 1960s veteran engineer Bill Ward was pondering the future of the Houston freeway. Most of the freeways in Houston's central urban system were either complete or under construction. The engineering and design phase for the first wave of freeways was, for the most part, over. It was time to start thinking of what would come next—a new generation of freeways. In particular, the antiquated Gulf Freeway, Houston's first freeway, would need to be modernized.

The idea of dedicated bus or mass transit lanes on freeways had been around since large-scale freeway construction was first contemplated in the 1930s, but the first wave of freeways in the United States, from 1945 to the late 1960s, was designed exclusively for the private automobile. The first true bus lane in the United States would not open until 1969, when a dedicated lane was opened on present-day Interstate 395 in Virginia, just outside Washington, D.C. In Houston, studies of mass transit in the early 1960s had identified express bus service as the most promising option.¹

Ward believed that the time for the busway had arrived. He envisioned a reversible busway in the center of the modernized Gulf Freeway, separated from traffic by barriers, allowing buses to bypass congestion and providing unimpeded travel for commuters. The busway would extend for more than 19 miles (30 km), connecting directly to transit stations, park-and-ride lots, and employment centers along the freeway.

Ward sketched his ideas for a freeway with the reversible busway. He then embarked on a soft-sell campaign to gain support for the idea. He kept the drawings in his desk and selectively showed them to individuals passing through his office. Slowly, Ward worked to promote the concept of integrating mass transit into Houston's freeways.

The Houston transitway was born. But the process of putting the idea into concrete moved with baby steps through the 1970s. It would take nearly 20 years before Ward's concept would become reality, but by the late 1980s fully integrated transitways were taking shape on most of Houston's radial freeways, and transitways became the backbone of Houston's commuter transit system.

(*Opposite page*) **Fork in the road:** This view shows the transitway access structure on the North Freeway near FM 1960. (Photo: James Lyle, TTI, June 2001)

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Throughout its history Houston has always been a city built by business, for business. And in the world of business, everything eventually comes down to one number—the rate of return on investment, or as some would say, “bang for the buck.” In the era of government-subsidized transit systems, mass transit hasn’t normally been designed around rates of return. Houston’s transit planners have always had their eyes on costly rail systems. But in Houston, the influence of the business mindset seems to extend further than in most other cities. The story of commuter mass transit in Houston has been one of building the best bottom line—getting the most ridership for the minimum investment. Getting improvements to the market quickly. Getting the most bang for the mass transit buck. Houston voters and highly influential members of the business community have steered Houston’s transit down this path.

So how do you get the most bang for the mass transit buck in a sprawling, low-density freeway metropolis like Houston? By incorporating mass transit into the freeway system. Houston has developed one of the nation’s most extensive systems of dedicated transit lanes on its freeways. Houston’s transit lane system was born in response to a crisis, grew through gritty opportunism and the can-do spirit of highway and transit officials, benefited from the demise of competing transit options, and ultimately became the backbone of Houston’s commuter transit system. No comparable city has been able to achieve Houston’s level of transit and rideshare usage for the investment made.

Since the beginning of Houston’s bus lanes in the 1970s, the Houston office of TxDOT has been the most consistent supporter and promoter of the dedicated transit lane system. Houston’s commuter transit system is a product of Houston’s freeway builders. Officials with Houston’s mass transit agency, the Metropolitan Transit Authority, have always envisioned the dedicated bus lanes as an interim solution, to be used until a rail system could be built. But as one rail opportunity after another failed to materialize, the freeway transit lane system grew bigger, better, and more successful. Houston’s transit lane system continues to evolve. In 2003 Houston is poised to become a leader in the next generation of freeway-based mass transit: the managed-lane freeway.

Origins of Express Bus Transit

In the early 1960s the first serious consideration was given to commuter-oriented mass transit in Houston. Because of Houston’s similarity to Los Angeles, city officials, including Mayor Louis Cutrer, carefully studied the transit plan that was recommended for Los Angeles in 1960. The Los Angeles proposal included rubber-tired transit cars similar to rail cars, running on elevated fixed guideways positioned in the freeway medians. By 1962 Houston had completed its first comprehensive study of mass transit possibilities. The study ruled out any kind of fixed-rail mass transit, citing Houston’s low population density, the increasing use of automobiles, and the emerg-



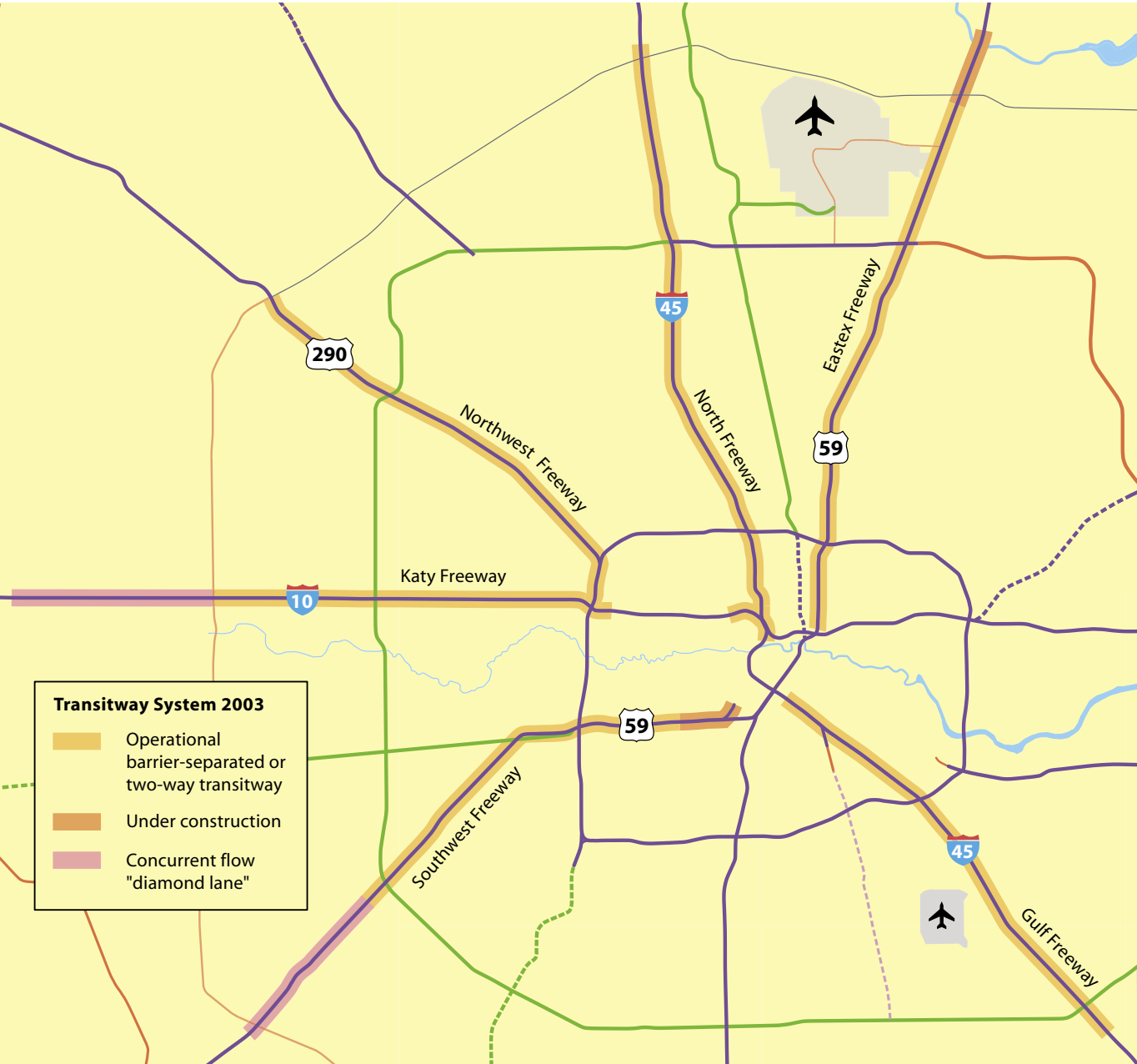
The father of Houston’s transitways: TxDOT engineer William V. “Bill” Ward (born 1927) first developed the ideas for Houston-style freeway bus lanes in the late 1960s and promoted the concept for Houston’s second generation of freeways. Ward was appointed head of the TxDOT Houston Urban Project Office in 1972. The ultimate realization of Houston’s transitways included many of the features envisioned by Ward in the late 1960s. (Photo: TxDOT, 1970)

ing freeway network as reasons why fixed rail was unsuitable for Houston. “In none of the sections of the metropolitan area is there a sufficient density of population to warrant development of the fixed type of rapid transit service,” the report stated. Houston’s population density of 2,600 per square mile was about half of the 5,413 in Los Angeles, and only a small fraction of the 24,387 in New York City, 16,599 in San Francisco, and 15,772 in Chicago. Instead, the report recommended the development of express bus routes on freeways, with supporting feeder systems to take passengers to the express buses.²

The idea of buses on freeways just wasn’t a concept capable of sparking a surge of interest among local authorities, however. It simply wasn’t very glamorous. Various interests had been promoting a futuristic monorail for Houston since the 1950s. Others, including Mayor Louie Welch, were more interested in fixed-rail “rapid transit.” Even as freeway construction proceeded at full speed during the 1960s, talk of the need for mass transit continued to intensify. Concepts and ideas for various types of fixed transit would come and go during the 1960s and over the next 30 years, but until 2001 only one would have staying power: the freeway transitway.

Saving the Bus System

When TxDOT engineer Bill Ward sketched his concepts of the Houston busway in the late 1960s, he began TxDOT’s long-running support for transitways. These dedicated, barrier-separated lanes for buses and high occupancy vehicles (HOV) are often called HOV lanes. But TxDOT couldn’t make it happen alone. Houston’s bus service provider would be the other key player, and



Houston's Transitway System	
First dedicated transit lane	North Freeway contraflow lane opened August 28, 1979
First barrier-separated transitway	Katy Freeway opened October 29, 1984
Operational facilities, July 2003	
Barrier-separated reversible transitway and elevated two-way transitway	88.2 miles (141 km)
"Diamond" lane	6.6 miles (10.6 km)
Under construction, or complete but not yet operational, July 2003	
Barrier-separated	6.1 miles (9.8 km)
"Diamond" lane	5.0 miles (8.0 km)
Daily passenger trips, December 2002	121,090
Daily vehicles, December 2002	39,150
Data: Houston High Occupancy Vehicle Lane Operations Summary, TTI, December 2002	



North Freeway contraflow lane in operation, circa 1980: One lane from the off-peak direction was taken and marked off with pylons spaced every 40 feet (12 m). Buses and vanpools travelling in the peak direction had access to the traffic-free contraflow lane. The contraflow lane was implemented as a demonstration project and was operational from August 28, 1979, to November 23, 1984. (Photo: Texas Transportation Institute)

in the 1970s Houston's privately owned bus service, Rapid Transit Lines, was in a dreadful condition. Investment needs in buses and facilities had not been met and maintenance had been neglected. The bus system operated out of a decrepit, turn-of-the-century streetcar maintenance facility called the Milby Bus Barn. The more passengers that Rapid Transit Lines carried, the more money it lost. Ward had to put his plans for the Gulf Freeway transitway on hold due to the lack of a bus operating partner. When TxDOT held public meetings in 1973 for planned improvements to the Gulf Freeway, the plans did not include a transitway. On October 6, 1973, Houston voters rejected the creation of a regional transit authority called HARTA, Houston Area Rapid Transit Authority. The purpose of HARTA was to build a proposed fixed-rail transit system and busway system, including the Gulf Freeway transitway.

The city of Houston had resisted buying out the private bus operator because of the associated costs, but with the defeat of HARTA and the continued deterioration of Rapid Transit Lines, Houston soon had no choice. Negotiations

began in 1972, and in April of 1974 the city of Houston closed the deal to purchase Rapid Transit Lines and renamed the bus agency HouTran. While the city's purchase was a step in the right direction, it did not solve the bus service problem overnight. HouTran did not have a funding mechanism other than the city of Houston, and even if substantial funding could be found, it would take years to undo the decades of neglect. The city of Houston brought a commitment to improved bus service, and leading the way was Houston's pro-transit mayor Fred Hofheinz, who entered office in January 1974.³

Fast and Cheap

One of Mayor Hofheinz's top priorities was to show that commuter bus service was viable in Houston. However, any kind of major construction would take years to complete. Something fast and cheap to demonstrate the potential of commuter bus service was needed. In November 1974 Hofheinz asked TxDOT to evaluate the feasibility of a contraflow lane. In a contraflow lane system, one lane of freeway traffic from the off-peak direction is "borrowed" and used to provide an extra lane in



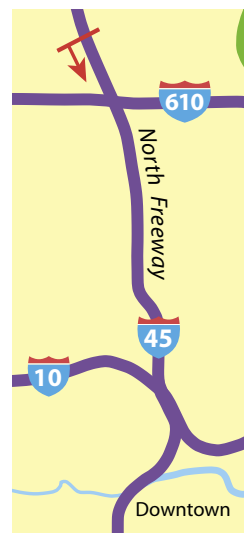
Pylon operations: Setting and removing the 1,300 pylons twice each day to designate the contraflow lane was a big job. Operators in a small convoy of trucks manually inserted the pylons into holes drilled in the pavement. For the morning rush hour, pylon installation began at 3:30 A.M. and removal began around 9:00 A.M. For the evening rush hour, pylon placement began at 2:30 P.M. and by 8:00 P.M. the lanes were clear. (Photo: Metropolitan Transit Authority)

the peak direction, with transit vehicles authorized to use the borrowed lane. In Houston's plan, the borrowed lane would be marked off by pylons inserted into holes in the pavement at 40-foot (12 m) intervals. Studies conducted by the Texas Transportation Institute and the city of Houston examined Houston's freeways and the limited number of dedicated transit lanes operating in the United States. Findings indicated that a very high potential existed in the IH 45 North Freeway corridor for a contraflow lane. The corridor had strong directional characteristics—a 65-35% split in the peak/off-peak directions—and already had the city's highest concentration of vanpools. Many of Houston's large employers, particularly the oil companies, had established vanpools in response to the 1970s energy crisis and Houston's traffic congestion. Approximately five other contraflow systems were in operation in North America at the time, including three in the New York-New Jersey area.

The contraflow project and park-and-ride lots would indeed be very inexpensive, approximately \$6.8 million in 1978 dollars (roughly 15.6 million in 2003 dollars), but it wouldn't be as fast as everyone had hoped. Three years

were required to obtain grants, complete feasibility studies, obtain approvals, and complete the final design. In November 1977 a construction contract was awarded. During the construction phase on August 12, 1978, public transit took a big step forward when Houston voters approved the creation of the Metropolitan Transit Authority (Metro) and a 1% sales tax to support it. Now the previously cash-starved transit agency would have a reliable stream of cash flowing into its coffers. But at its creation, Metro would still need to recover from the underinvestment of the previous private and city of Houston ownership. Houston had one of the oldest bus fleets in the country, and maintenance was still performed at the outmoded Milby Bus Barn. Efforts were undertaken almost immediately to upgrade bus operations, but acquiring new buses and building the required maintenance facilities would take years. Things would get worse before they could get better.

For Metro, 1979 was a disastrous year. Bus service





Opening day banner-busting:

On October 29, 1984, Houston's Metropolitan Transit Authority (Metro) began service on the Katy Freeway transitway. And what better way to get Texans excited than with a Friday night football banner-busting. The Katy Freeway transitway was Houston's first barrier-separated transitway. Since this was the second freeway to receive express bus service, Metro proclaimed that it was "coming through again." (Photos: Chuck Fuhs)



collapsed in January when the transit agency ran out of spare parts for its barely functional buses, and nearly half of Metro's routes could not be served. There were between 100 and 200 in-service bus breakdowns on a daily basis. It was easy to find broken-down and abandoned buses on city streets. Newspaper reports ran a daily count of the number of buses that were out of service, and in the dark days of the service crisis, it was common to have more buses out of service than in service.⁴

In the meantime, the North Freeway contraflow project continued to move forward. Because of Metro's inability to provide reliable bus service, it contracted with private bus operators for the contraflow project. Metro secured lease agreements for several park-and-ride lots, leased space for training and deployment of the operating crew, and contracted enforcement to the City of Houston Police Department. On August 28, 1979, the contraflow lane opened for service with a big opening day celebration

featuring nearly all local political leaders. With Houston descending into a traffic congestion quagmire, politicians were more than pleased to finally open the lane, which at least provided the perception of action to help ease the traffic crisis. Although the North Freeway contraflow lane was not the first in the United States, its 9.6-mile (15 km) length was the longest such facility in the nation and the only such facility to operate during both peak periods.⁵

The contraflow lane got off to a good start. First day usage was reported to be 1,458 passenger trips with 27 bus trips and 96 vanpool trips. Commuters reported saving up to 20 minutes as the buses and vans on the contraflow lane cruised past the freeway parking lot. After one year, usage had increased to 8,724 passenger trips on 125 bus trips and 412 vanpool trips. In spite of some minor incidents and a collision fatality in April 1980, the facility proved to be safe and reliable. In 1980 the transit lane was extended two miles (3 km) northward in a "concurrent flow" or

The retrofit transitway: The Katy Freeway transitway was incorporated into a pavement repair project and built where the interior shoulders previously existed. Less than 30 months after the Katy Freeway transitway idea was conceived, buses and vanpools began using it on October 29, 1984. Later the lane was opened to high occupancy private automobiles. The major expansion of the Katy Freeway, scheduled for 2003 to 2008, will replace the transitway lane with four managed lanes. (Photo: September 2002)



“diamond lane” configuration by converting the existing median shoulders into traffic lanes. In August 1982, three years after its opening, the contraflow lane was serving 15,600 passenger trips per day. The contraflow lane was a big success.⁶

The contraflow lane had always been a temporary demonstration project and was never intended for long-term operation. By 1983 time was running out for the contraflow project. Traffic congestion was increasing in the off-peak direction due to the loss of a lane for the contraflow service, and TxDOT formally notified Metro that an alternative was needed. Metro was planning a heavy rail system on the nearby Hardy Road corridor, but voter rejection of a \$2.35 billion bond issue in June 1983 by a 61-39% margin scuttled the rail plans. Metro turned its attention back to bus lanes and accelerated plans to replace the contraflow lane with a reversible, barrier-separated transitway lane in the median of the freeway. On November 23, 1984, the North Freeway contraflow lane ended its five-year run and was replaced with a the central transitway. The transitway, or a pavement set-aside for a future transitway, was extended northward in conjunction with TxDOT’s reconstruction and widening projects, which

were completed to the Woodlands in 2003.⁷

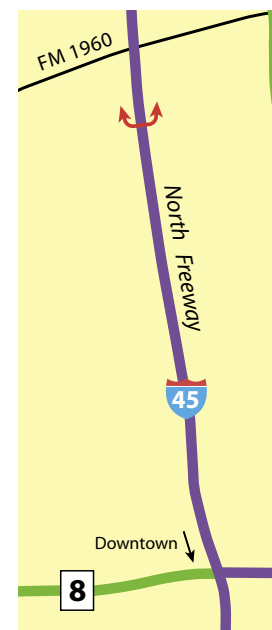
From Fast and Cheap to Quick and Dirty

The success of the North Freeway contraflow lane soon had officials turning their attention to another severely congested freeway, IH 10 West, the Katy Freeway. The Katy Freeway west of Loop 610 was slated for a pavement repair project to begin in 1983. In 1982 Metro proposed a plan that would turn the repair project into a new transitway construction project by converting the interior emergency shoulders into a barrier-separated bus lane. Local agencies had developed a close working relationship during the North Freeway contraflow lane construction and operation. This relationship would make it possible to build a new transitway lane in record time.

Once an agreement had been reached, Metro immediately developed plans for the bus lane. Since the project was on a very fast track, there was no time to seek federal funding—the \$12 million cost was borne entirely by Metro. The transitway and a complicated flyover structure to provide access to the bus lane were opened on October 29, 1984, less than 30 months after the idea was conceived. This remains the fastest transit guideway facility ever



The wishbone: The wishbone access ramp is one of the distinctive structures on Houston's freeway system, allowing vehicles to make a direct connection between a central transitway and the freeway frontage roads. There are four full wishbone ramps in Houston: two on the North Freeway, one on the Gulf Freeway, and one on the Eastex Freeway. This wishbone ramp is on the North Freeway just south of FM 1960 and was completed in 1998. (Photo: James Lyle, TTI, June 2001)



implemented and was a testament to the enthusiasm and motivation of both Metro and TxDOT to see improvements happen very quickly.

The Katy Freeway transitway was improved and extended in the following years. In December 2002 it was the most heavily used transitway in Houston, serving 29,530 passenger trips and 10,050 vehicles daily. In October 2000, an impressive 1.5-mile (2.4 km) high-level connector ramp providing buses and high occupancy vehicles direct access into downtown was completed. Heavy usage of the transitway on the chronically congested Katy Freeway required raising vehicle occupancy to a minimum of three persons during peak periods in order to keep the transitway traffic free flowing.

The Original Vision Is Realized

The first two transitways were a demonstration project and a project of opportunity. But in 1980 a plan began to take shape to build the Gulf Freeway transitway as a carefully planned facility that integrated all the elements needed to provide transit service effectively: bus services, park-and-ride lots, transit centers, and direct-access ramps to the transitway. It was the realization of Bill Ward's 1960s vision, and a design that would define the next wave of transitways to be built on Houston's freeways. Ward had become head of TxDOT's Houston Urban Project Office in 1972, so he was now in charge of TxDOT's participation in the project. The project was a cooperative effort between TxDOT and Metro, and was entirely funded with state and federal highway funds.⁸

Construction began in 1983, and the first section of the



The half-wishbone: This structure on the Eastex Freeway allows southbound transitway vehicles to exit to the freeway main lanes. (Photo: September 2002)

transitway from downtown to the South Loop 610 opened on May 16, 1988. The transitway was pushed southward during the 1990s, culminating with the 1997 opening of a wishbone entrance ramp just south of the Beltway 8 interchange. In August 1999 a plan recommending further southward extension of the transitway facility was finalized. Non-barrier-separated “diamond lanes” are planned from the current transitway terminus to a point nine miles (14 km) south at FM 518.

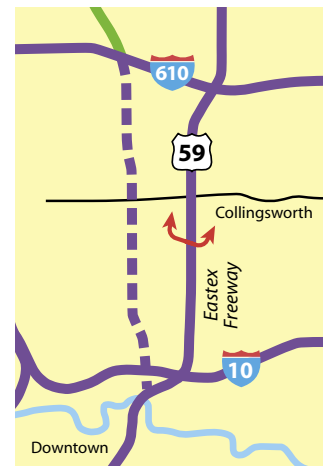
Regional Transitway Development

Following the June 1983 defeat of Metro’s \$2.3 billion bond package for a rail system, transitways became the centerpiece of regional transit planning. Many of Metro’s staff resources were refocused from rail system planning to the development of transitways. Plans were formulated to add transitways to the Northwest (US 290) and Southwest (US 59) Freeways. Using the same design template as the Gulf Freeway, each of these would be reversible with direct-access ramps to transit facilities located adjacent to the freeway. Both the Northwest and Southwest Freeway projects were funded by Metro, using the Federal

Transit Administration’s “new start” guideway funds. This funding was rarely applied to facilities for rubber-tired vehicles, and the ability to compete with rail transit for funding showed the new respect transitway solutions had earned.

The Northwest Freeway project was carved from existing median shoulders with an average width of 19.75 feet (6.0 m) between barriers, just wide enough for one vehicle to pass another at reduced speeds if a stall occurs. Metro assisted with design and awarded the construction contracts, with transitway operations starting on August 29, 1988. The most distinctive feature of the Northwest Freeway transitway is its elevated structure and connections along the West Loop. An extension from Little York Road to Highway 6 was opened for service on February 6, 1990.

The Southwest Freeway project was built in conjunction with a major freeway reconstruction project which took place between 1989 and 1992. It became the first





The “Texas T”: The T-ramp is the most common structure on Houston’s transitway system. In the transportation engineering community, this type of structure is informally called a “Texas T” because of its widespread use in Houston. It connects the transitway to an adjacent transit center or park-and-ride lot, crossing over the freeway main lanes and the frontage road. This T-ramp is located on the Eastex Freeway near Tidwell. (Photo: September 2002)

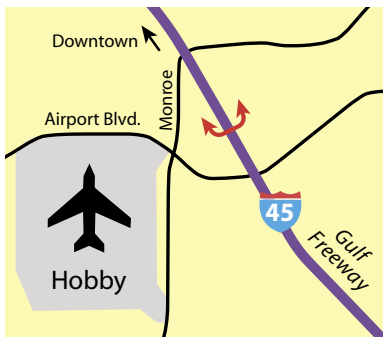
transitway in the region to be designed so that it could later be converted to two-way operation. This marked a major change in what was then the accepted design practice of serving commute trips in the peak direction only. The extension of the Southwest Freeway transitway into downtown Houston became the system’s most controversial project. Original plans called for an elevated structure towering over the existing elevated Southwest Freeway lanes near Montrose, just west of the exit into downtown. Opposition from neighborhoods resulted in a redesign of the project, placing both the 10 regular freeway lanes and the 2 transitway lanes in a new trench that will replace the existing elevated structure. Work on the complicated project began in late 2002. Freeway expansion in Sugar Land, southwest of Houston, was completed in May 2003 and included two non-barrier-separated “diamond” lanes, extending the dedicated transit facility to SH 6.

The final corridor to receive a transitway in the first generation of transitway construction would become the crowning achievement in transitway design. US 59 North,

the Eastex Freeway, was slated for a major expansion during the 1990s. A substantial amount of right-of-way acquisition would be required to expand the corridor width to 400 feet (122 m), making available sufficient space for a state-of-the-art transitway. The major freeway expansion began in the early 1990s, with work substantially complete by 1998 and construction in progress in far north Harris County in 2003. The Eastex Freeway transitway opened in March 1999 and features some of the most distinctive transitway structures in Houston, including a wishbone, a half-wishbone, four T-ramps, and an interchange bypass. The transitway will be integrated into the major new downtown interchange at US 59 and IH 10, planned for completion in 2004.

Additional work in the 1990s and 2000s focused on improving access to the transitways, improving connections into downtown Houston, and adding new park-and-ride lots. Throughout the 24-year period of transitway operation, the Texas Transportation Institute has continuously monitored the performance of each facility and the system as a whole. The performance data has helped local agencies make planning and operational decisions that have enhanced the effectiveness of the transitway system.

The dual T-ramp: This structure on the Gulf Freeway provides access to the transitway from both sides of the freeway. (Photo: James Lyle, TTI, June 2001)

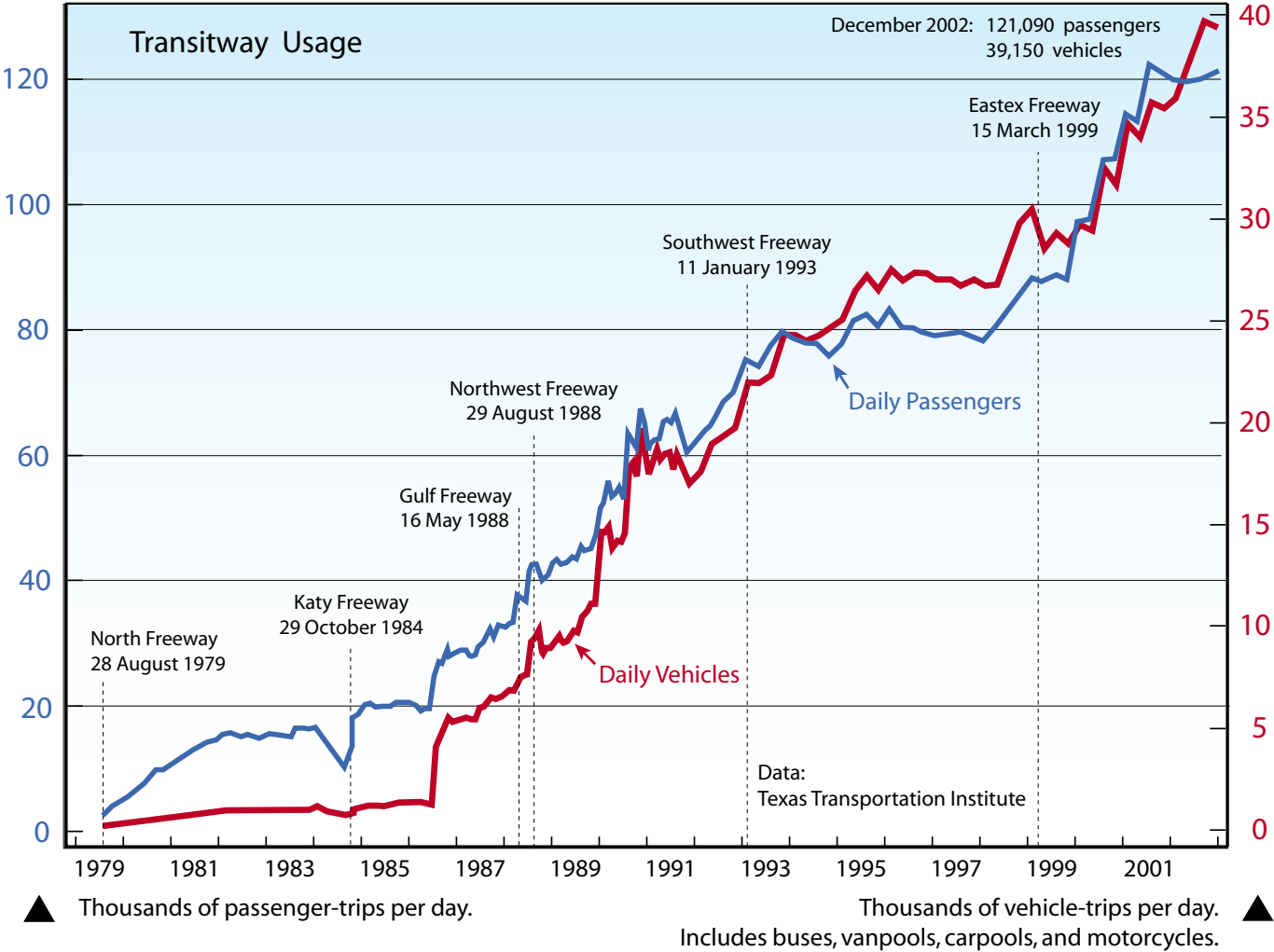


In December 2002 the system had 88.2 miles (141 km) of barrier-separated and dedicated two-way facilities operational and 6.1 miles (9.8 km) under construction, plus an additional 11.6 miles (18.6 km) of diamond lanes operational or about to become operational. The total number of weekday passenger trips was 121,090, including 40,190 via buses and 80,900 via high occupancy vehicles, van-pools, and motorcycles. A total of 39,150 vehicles used the transitways daily.⁹

The Future of the Houston Transitway

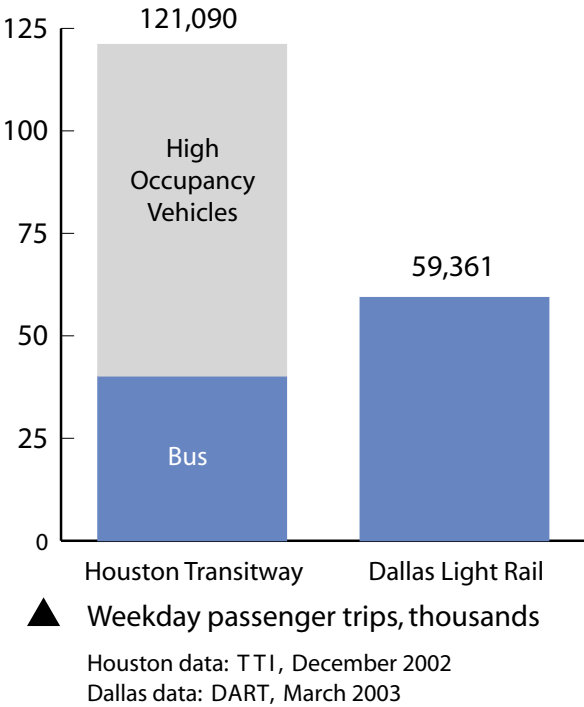
In 1998 there was a shift in the political climate in Houston. Mayor Bob Lanier, one of the key architects

of Houston's bus and transitway strategy, exited office due to term limitations. He was replaced by Lee Brown, Houston's first black mayor and a strong proponent of building rail transit. Building a light rail line became one of Brown's top priorities, and a route on South Main Street, away from any freeways, was selected for the \$325 million project. The project was small enough to be built with available funds, precluding the need for a bond election. Brown pushed the rail line forward as fast as he could, and after a period of litigation that was resolved in March 2001, construction began. After more than 40 years of acrimonious debate on the subject of rail, Houston would get a rail line on Main Street. Perhaps



Transitway patronage: Houston transitway vehicle and passenger volume has risen steadily since the opening of the first transit lane in 1979. In early 2003 Houston's system was carrying twice as many weekday passenger trips as Dallas' light rail system.

Key dates in Houston's transitway system	
1962	A study identifies express bus service as the most promising transit option for Houston.
1974	Local officials initiate efforts to build an express bus lane on the North Freeway.
1979	The North Freeway contraflow lane opens.
1984	The first reversible, barrier-separated transitway opens on the Katy Freeway.
1988	The Gulf Freeway transitway opens. It is the first transitway designed into a comprehensive freeway reconstruction project and includes all needed features for complete transit service.
1999	The most advanced transitway opens on the Eastex Freeway.
2008	Scheduled completion of the Katy Freeway reconstruction including managed-lane transitway.





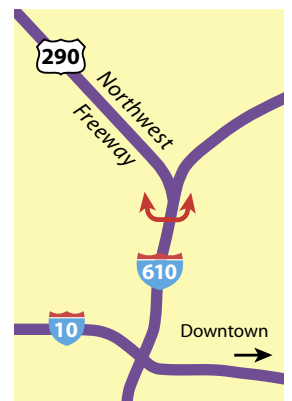
The elevated bypass: Carpools and buses on the two-way elevated transitway structure along the West Loop North zoom past backed-up traffic on the freeway main lanes. (Photo: September 2002)

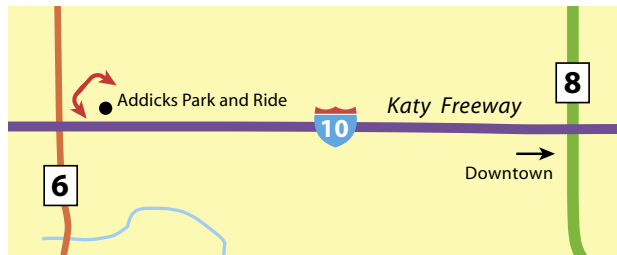
more significant was the shift in Metro's strategy. Brown believed that a city the size of Houston should have a rail system, and he redirected Metro's long-term objective to constructing rail. The performance merits and cost effectiveness of rail transit remained a point of sharp disagreement in Houston, and will surely continue to be an issue in the future. Brown will exit office at the end of 2003 due to term limits, and Metro's long-term strategy could once again be revised. Long-term plans unveiled by Metro in April 2003 included three new light rail lines, but also strengthened the transitway system and included plans to integrate transit into the upcoming generation of new managed lanes and tollways to be built in Houston. The transitway system will continue to be the backbone of Houston's commuter mass transit for the foreseeable future. All existing transitways will be extended in the intermediate or long-term future as suburban freeways are

reconstructed and widened.

In the late 1990s a new player and a new concept arrived on the Houston transitway scene with the promise to define the next generation of transportation facilities. The new player was the Harris County Toll Road Authority (HCTRA), which during the 1990s had become one of the most powerful forces on the Houston transportation landscape. The concept that arrived was the idea of managed lanes—freeway lanes that may be used by buses, high occupancy vehicles, or single-occupant vehicles, with single-occupant vehicle access restricted or subject to variable tolls, depending on the time of day. These lanes are also called HOT lanes, or high occupancy toll lanes.

A comprehensive study of the Katy Freeway corridor





The park-and-ride lot: This park-and-ride lot along IH 10 in west Houston is the largest in the system with 2,441 spaces. The lot is typically near capacity Monday through Thursday. Park-and-ride lots are integrated into all the transitways on Houston's freeways. (Photo: James Lyle, TTI, June 2001)

(Opposite page upper) **The Pretzel:** This structure on the Northwest Freeway, just west of Loop 610, provides access to both freeway frontage roads. (Photo: James Lyle, TTI, June 2001)



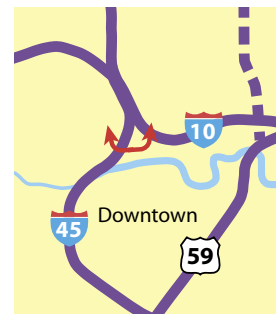
(Opposite page lower) **Southwest Freeway:** The Southwest Freeway transitway was constructed in conjunction with the freeway expansion. The first phase of the expansion was completed in 1992, and the transitway opened in January 1993. (Photo: Metropolitan Transit Authority)



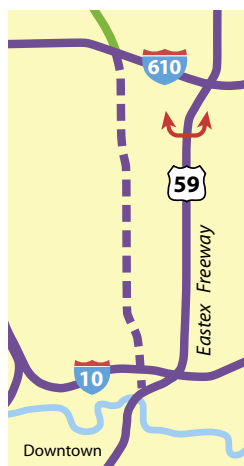




The interchange bypass: Transitways were added to freeways after the original freeway construction, necessitating structures to get around existing interchanges. A long elevated structure allows transitway vehicles to bypass the IH 10-IH 45 interchange north of downtown. The elevated bypass opened on October 16, 2000. (Photo: May 2002)



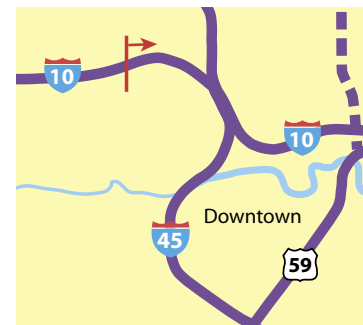
Eastex bypass: This view shows the Eastex Freeway transitway veering away from the freeway main lanes to bypass the interchange at the North Loop. The transitway rejoins the freeway at the upper right corner of the photo. This transitway was completed in 1999. (Photo: September 2002)





Downtown access ramp: This view shows the elevated structure for the two-way transitway ramp along the downtown approach of the Katy Freeway (IH 10). (Photo: May 2002)

from 1995 to 1997 concluded that the best strategy for improving traffic flow was the creation of four managed lanes, two in each direction, to replace the reversible transitway lane. By making the managed lanes available to buses, high occupancy vehicles, and toll-paying single occupant vehicles, optimal use could be achieved by allowing in the maximum number of vehicles that would still provide free-flow of traffic. In April 2001, local officials announced that HCTRA was considering taking a large role in the project by constructing the four managed lanes as a toll road. In March 2002, the Federal Highway Administration approved the construction of the toll road as part of the massive Katy Freeway expansion project. Finally, on January 30, 2003, the deal was closed when the Texas Transportation Commission officially approved the agreement for HCTRA participation. The can-do spirit that had built Houston's transitway system had once again prevailed, this time with a new player, launching the next



generation of transit facilities for Houston. Construction is scheduled for 2003-2008, although the project faces a legal challenge and probable delays resulting from right-of-way acquisition difficulties as of mid-2003.

In September 2002 a second managed lane system for Houston was recommended by the Northwest Freeway major investment study. The recommended managed lane facility has four lanes and will be constructed along Hempstead Highway inside Beltway 8 and along the Northwest Freeway outside Beltway 8. Construction is expected to occur between 2008 and 2015, although the managed-lane facility could be built sooner.