

Diverting Automobile Users to Transit: Early Lessons from the Chicago Transit Authority's Orange Line

SARAH J. LABELLE AND DARWIN G. STUART

After only 12 months of operation, the Chicago Transit Authority's new Orange Line, providing rapid rail service from Chicago's Loop to Midway Airport, had reached a weekday ridership of 37,500 passengers. Preliminary analysis indicated that the line had increased transit ridership overall in the southwest corridor by 31.0 percent, raising transit's mode share of work trips from 16.4 percent to 21.5 percent. Based on an on-board rider survey done after 4 months, nearly one-quarter of daily boardings were new to transit, representing former automobile commuters or new trips for which the automobile was a candidate. That share grew to over 25 percent by the end of the first year. Core, secondary, and tertiary markets were defined in March 1994 in the southwest corridor, together providing 84 percent of the line's ridership. Demographic and travel characteristics of the transit riders surveyed are compared with comparable market-area data from the 1990 U.S. Census. Survey data regarding the intensive marketing campaign that accompanied the line's opening are analyzed. A separate analysis comparing diverted and new transit riders with those who shifted from other transit services is given. A series of guidelines is drawn for successfully inaugurating major transit-service improvements designed to decrease reliance on automobiles. The origin-destination and access-mode data from the March survey were also used to measure the net decrease in automotive cold starts and vehicle kilometers traveled. These measures were developed to estimate the air-quality benefits of this new rapid-rail service.

The Chicago Transit Authority's (CTA's) new Orange Line is the first entirely new rapid transit line in Chicago and its suburbs since 1969, when the Dan Ryan Expressway median line opened, and it is the first rapid rail in the southwest corridor, which connects the Loop to Midway Airport. The Orange Line opened for service on October 31, 1993. Proponents, who fought long and hard for southwest side rail transit, said people would come out of their cars to use good, fast transit.

The environmental impact statement, completed in 1982, counted on those automobile diversions for the anticipated environmental benefits (1). It was projected then that one-quarter of the riders would come from cars, generating less tailpipe emissions, thereby lessening Chicago's ozone and carbon monoxide problems.

The purpose of this study was to determine whether these expectations have been realized. It also presents a profile of the riders at this early stage in what will be long years of rapid-rail service in the southwest side.

The Orange Line runs around the Chicago Loop, connecting with the Brown, Red, Blue, and Purple line trains, and the soon-to-be reborn Green Line. It travels 18.8 km (11.75 mi) to Midway Airport

following freight rail rights-of-way, close to the population centers of the southwest side. The line was built by the city of Chicago, as a new rail start funded in part by the U.S. Department of Transportation (DOT). It was completed within budget and on schedule.

The map in Figure 1 presents the market area of Orange Line riders, as determined from a March 1994 survey of home zip codes (2). The boundaries shown indicate the home location of 84 percent of weekday riders in an area extending from Dearborn Park on the northeast through the southwest-side neighborhoods as far as Hickory Hills. Other suburbs in the market area include Burbank, Bedford Park, Bridgeview, Hometown, Justice, Merrionette Park, Oak Lawn, and Summit. Two subareas are also shown, depicting the home location of 51 percent and 17 percent of Orange Line riders. Remaining trip origins are drawn from across the entire CTA service area, such as commuting-to-work trip (the "work trip") destinations lying within the corridor or to the airport for air travel. Of all Orange Line riders, 84 percent resided in Chicago (north and south sides), 13 percent were suburban residents (12 percent south and 1 percent north), and 3 percent were from outside the region.

CTA received a 2-year \$1 million grant from the federal Congestion Mitigation and Air Quality (CMAQ) program to market the new Orange Line, which serves 16 stops from the Loop to Midway Airport. Adequate marketing was deemed essential to attract projected new riders to transit and to realize the promise of reduced air-pollutant emissions. The CTA budget did not allow significant marketing expenditures; hence the grant was sought.

CORRIDOR DEMOGRAPHIC AND WORK TRAVEL CHARACTERISTICS: 1990 U.S. CENSUS

To provide an understanding of the overall travel market in the southwest corridor, basic demographic and work travel characteristics from the 1990 U.S. Census were compiled. These data were sorted by the three markets shown in Figure 1, as revealed by the March 1994 transit rider survey. These commuter-travel markets were termed core, secondary, and tertiary markets, and are oriented primarily toward the work trip.

The southwest corridor can be characterized as middle class, with median household income at \$24,900; there is a fairly even distribution of incomes across lower and middle income ranges. Household size averages 3.0, higher than the average for either Cook County or the city of Chicago as a whole, for which the average is 2.7. Automobile ownership is relatively high. One-half of corridor residents are white, with a significant portion having Eastern European heritage; nearly one-quarter are Hispanic, and one-quarter are African-American.

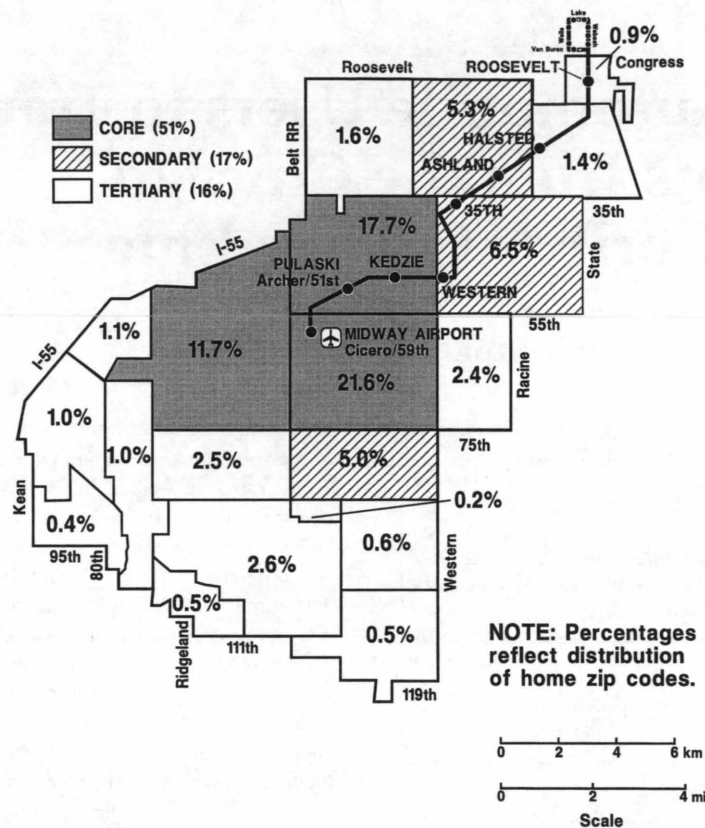


FIGURE 1 Orange Line market area: March 1994 home zip codes of 84 percent of weekday riders (2).

Driving alone was the primary work-trip mode in 1990, followed by carpooling (16.8 percent) and a relatively large (14.6 percent) usage of CTA buses. About 75 percent of this bus travel was via express routes along the Stevenson Expressway into the Chicago Loop. Among the three commuter markets, the level of bus and car-pool use was highest in the secondary market and lowest in the tertiary market. This comparison indicates that there was higher availability of and reliance on the automobile in the tertiary market, and that transit access (before the existence of the Orange Line) was better for the secondary market (also indicated by the 3.6 percent use of other rapid transit lines).

Multiworker households form a significant component of the work force in the southwest corridor, with 53 percent of households containing two or more workers. This factor may influence both the pre-Orange Line level of transit use, as well as the level of additional transit ridership attracted by the Orange Line after its opening. Work-trip travel times in 1990 averaged 33.6 min in the corridor. There is relatively little difference among the three commuter markets.

TRANSIT RIDER DEMOGRAPHICS AND TRAVEL CHARACTERISTICS: 1994 SURVEY

The March 1994 survey of riders on CTA's Orange Line, although undertaken only 4 months after the opening of the line, gives a useful profile of the travel and demographic characteristics of new southwest side CTA rail passengers (3). An important feature of the survey was to learn more about those riders who formerly traveled

by automobile, to allow measurement of the line's air-quality benefits. No standard methods are in place from either the U.S. DOT or the Environmental Protection Agency on how to assess fairly the air-quality benefits of a new rail line.

Survey Design

Although origin-destination (O-D) information was desired primarily for current and former automobile users and those making new trips, all riders were asked trip purpose, names of the street intersection and city of their trip's origin and destination, and mode of access to the Orange Line. For the air-quality analysis, only the new rider O-D information was used in the analysis of trip length.

The survey also asked riders how they made the trip before the Orange Line opened, and where they had seen or heard about the line. Riders were also asked for standard demographic information, including sex, zip code at home, ethnicity, age, household size, household vehicle availability, and income. Suggestions for improvements to the line and respondent contact information were also requested.

On the basis of this survey of initial riders, the market area was larger than planners envisioned in 1982, and larger than was estimated from a more recent analysis of market potentials (4). There were patterns within the area: core riders (51 percent) came from three zip codes (60629, 60632, and 60638) that encompassed the Kedzie, Pulaski, and Midway stations and the area west and south of Midway Airport beyond the rail line (see Figure 1). To cover

two-thirds (67.8 percent) of the home locations, three additional zip code areas (60608, 60609, and 60652)—the “secondary” market—must be added, covering the Western, 35th, and Ashland stations and a neighborhood further south of those three core zip codes. The last one-third of the riders were spread out over a large area, and included out-of-town riders using Midway Airport.

Survey results are presented here in two ways. First, basic trip characteristics and demographic characteristics of all survey respondents are described. This includes trip purpose, mode of access, geographic distribution of riders, prior mode used, automobile ownership, household income, and related characteristics. Second, many of these characteristics for new riders—not previous CTA bus or rail passengers—are given, including trip length.

Demographic Characteristics

Fifty-four percent of survey respondents were female. The age distribution of riders was primarily among the working-age population, with 53 percent of all riders aged 18 to 34. Ethnicity and race generally reflected overall corridor characteristics: 61 percent of respondents were white, 22 percent Hispanic, and 13 percent African-American.

Just over one-third (36 percent) of respondents were from one- or two-person households, although another 40 percent were from three- or four-person households. The mean household size was 3.4 persons. Household incomes were fairly evenly distributed across a range of \$10,000 increments, with 9 percent under \$10,000 and 16 percent over \$60,000. The income levels of survey respondents were generally higher than the 1989 incomes reported in the 1990 Census, which is partly explained by inflation. Only 15 percent of households reported having no automobiles available, with 37 percent having one car and 33 percent having two cars. Automobile ownership of CTA-rider households was significantly higher than that reported for the market area in the 1990 Census, in which households with no automobile were measured at 25 percent.

Travel Characteristics

Trip Purpose

Trips made on the Orange Line were most likely for work (60.6 percent) or school (13.6 percent); 3.4 percent were strictly for airline travel (see Table 1). Another 6.4 percent were work-related trips. Only 2.2 percent were shopping trips, and 5.0 percent were social. Work was more dominant as a trip purpose for Orange Line passengers than for CTA riders in general (44 percent) (5).

Ridership was heaviest during the morning peak (6 a.m. to 10 a.m. for this survey). Riders were surveyed in proportion to boardings by time of day, using the hourly data from the new turnstiles at the branch stations and annual observation of the Loop stations' daily patterns.

Prior Travel Mode

Nearly one-quarter (23.7 percent) of all riders formerly drove all the way to their destinations, got a ride, or had just started traveling in the corridor (new residents or new workers from automobile-owning households). The latter were assumed to represent potential automobile commuters as a part of the total market share diverted from automobiles (see Table 2). Sixty-five percent of all users formerly used the rather extensive diagonal bus service in the corridor, which focuses on radial service to downtown Chicago. A surprisingly large group (8 percent) used other CTA rapid transit lines, most likely the Red Line to the east and the Blue Line to the north. Very few had used the commuter rail network, Metra (2 percent), reflecting the low level of Metra service convenient to this corridor.

This level of automobile diversions, about 25 percent of line ridership, is consistent with the original ridership forecast of the 1982 alternatives analysis, although the total ridership on the Orange Line currently falls short of opening-day forecasts by about 35 percent. This result reflects significant changes experienced nationwide in the ability of transit to compete with the automobile over the last

TABLE 1 Transit Rider Trip Purpose: 1994

Trip Purpose	Commuter Travel Market			
	Core	Secondary	Tertiary	Total
Work	66.6%	58.8%	71.1%	60.6%
School	12.8%	16.6%	15.4%	13.6%
Work-Related	5.7%	4.4%	5.4%	6.4%
Work, Multiple Response	3.1%	4.3%	0.0%	3.4%
Airline Travel	0.1%	1.5%	6.5%	3.3%
Shopping	2.4%	2.6%	1.6%	2.2%
Social	4.9%	4.8%	1.9%	5.0%
Other	4.0%	6.0%	3.4%	4.9%
Non-Work, Multiple Response	0.4%	1.0%	0.7%	0.7%
	100.0%	100.0%	100.0%	100.0%

TABLE 2 Prior Mode Used by Transit Riders: 1994

Prior Mode	Commuter Travel Market			
	Core	Secondary	Tertiary	Total
Transit				
CTA Bus	75.2%	68.9%	50.4%	62.8%
CTA Rapid Transit	4.8%	7.5%	13.7%	8.3%
Metra	0.6%	2.2%	8.8%	2.3%
Auto				
Drove All the Way	9.2%	11.3%	13.7%	11.4%
Got a Ride	3.6%	4.4%	4.0%	4.7%
Auto, Multiple Response	2.2%	1.1%	2.5%	1.9%
Taxi	0.0%	0.0%	0.0%	0.3%
Just Started/New	2.4%	3.0%	5.5%	5.4%
Other	2.0%	1.6%	1.4%	2.6%
	100.0%	100.0%	100.0%	100.0%

decade. Transit's market share has steadily decreased, competing against a base of increasing automobile ownership and trip-making rates (6,7). Nevertheless, the Orange Line's October 1994 ridership levels of 37,500 daily rides represents a 43 percent gain over its first month, and compares quite favorably with new starts of other rail lines across the country (8).

One of the primary variables influencing the Orange Line's success in attracting former automobile travelers is comparative travel time. As indicated in Table 3, the Orange Line provides significantly faster service, with more reasonable waiting times, than predecessor express and local bus routes. In the morning peak it is 33 to 39 percent faster than express bus service, and 41 percent faster

TABLE 3 Travel Time Comparison: Orange Line Versus Former Bus Services

Sample Bus & Rapid Transit Trip	AM Peak (6-9 AM)				Midday (Noon-3 PM)			
	Sched. Wait Time (min.)*	Sched. Travel Time (min.)	Combined Travel Time (min.)	Percent Time Savings, Orange Line	Sched. Wait Time (min.)*	Sched. Travel Time (min.)	Combined Travel Time (min.)	Percent Time Savings, Orange Line
Midway Airport Station to Downtown (State/Lake Station)								
Orange Line	3.3	31.0	34.3	--	5.0	31.0	36.0	--
99M Express Bus	10.0	43.6	53.6	36.0%	--	--	--	--
Pulaski Station (Pulaski/Archer) to Downtown (State/Lake Station)								
Orange Line	3.3	28.0	31.3	--	5.0	28.0	33.0	--
162 Express Bus	7.5	39.0	46.5	32.7%	--	--	--	--
62 Express Bus	7.5	43.5	51.0	38.6%	15.0	36.0	51.0	35.3%
62 Local Bus	3.0	49.9	52.9	40.8%	3.3	46.0	49.3	33.1%

*Based on 1/2 of the average minutes between scheduled service frequencies.

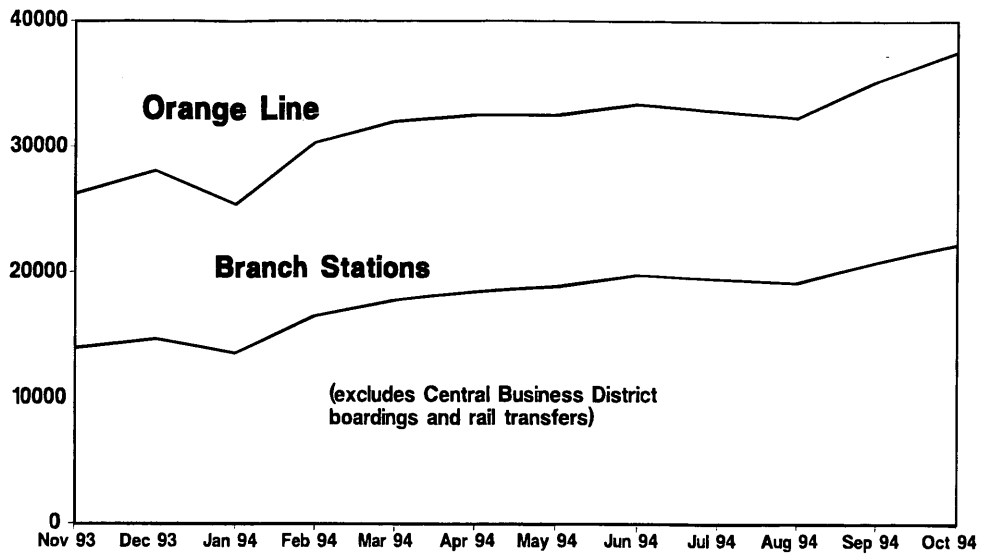


FIGURE 2 Orange Line—entering traffic (average weekday, 1993-1994).

Figure 5 summarizes the air-quality improvement implications of these former automobile travelers diverted to the Orange Line for each of the three observation points during 1994. An analysis method was developed that relies on the rider survey, transit boardings in the corridor, and Loop-bound transit-trip counts. No standardized method to estimate air-quality benefits of new rail lines was known, a topic worth consideration for uniform evaluations within a region and nationwide. The number of automobile vehicle kilometers that were avoided because the Orange Line captured former (and potentially new) automobile trips is indicated, based on a survey-derived 18.1 km (11.3 mi) average O-D trip length. Trip distances for former automobile trips were calculated using an algorithm relating O-D address locations to the grid street network in the survey analysis. Figure 5 also indicates the number of cold starts avoided, assuming one cold start for every automobile trip diverted to transit (ignoring possible automobile driver versus passenger differences).

Figure 5 also indicates an adjustment for net counterbalancing of air-quality impact, taking into consideration automobile access to

transit by new or shifted Orange Line riders. In this calculation, any automobile access to past CTA service was ignored, assuming that all automobile access trips are new, making a new impact, and not just a continuation of past behavior by shifted riders. For example, those who may have driven to an Archer or Narragansett express bus are not considered. Had they been, they would have lessened somewhat the impact of new automobile access trips. For simplicity, the March 1994 survey result of 13.0 percent of weekday boardings representing travelers using the Park & Ride lots (or the Kiss & Ride dropoff points) was assumed to hold constant with ridership growth.

In fact, limited parking at the outermost two stations and the imposition of neighborhood parking restrictions near several stations may indicate an overestimate of this counterbalancing subtraction of automobile access to transit vehicle kilometers and cold starts avoided. The estimate of air-quality improvements achieved by October 1994 may be somewhat low. A survey-derived average length of automobile access trips of 6.4 km (4.0 mi) was used in the calculations.

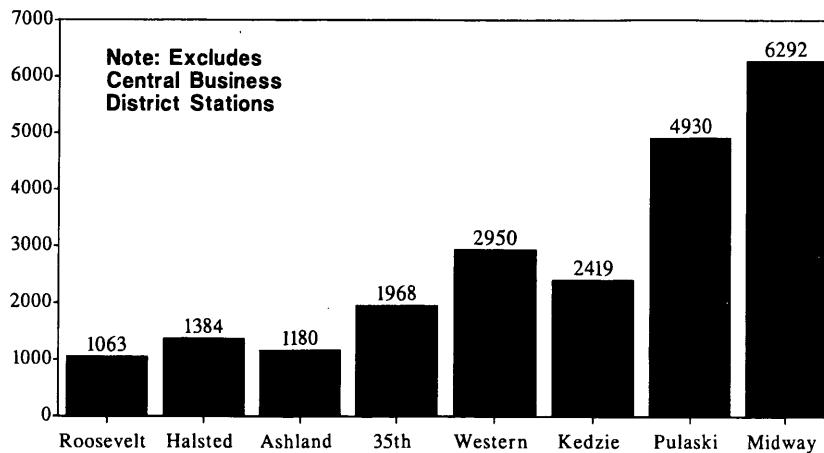


FIGURE 3 Orange Line—entering traffic (average weekday, October 1994).

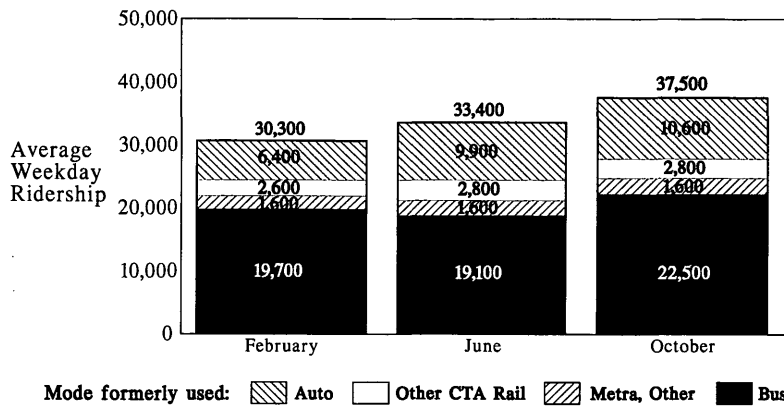


FIGURE 4 1994 Orange Line ridership growth.

Figure 5 indicates that by October 1995, a total of 5,700 average weekday cold starts and 160,500 average weekday automobile vehicle kilometers were being avoided through use of the Orange Line. These significant impacts indicate a positive contribution to air quality in the service corridor.

IMPORTANCE OF CONSISTENT SERVICE QUALITY AND EFFECTIVE MARKETING

The significantly improved service quality offered by the Orange Line was the key factor in attracting both former bus riders (many of whom are required to make a transfer, as compared with their former one-seat bus ride) and former automobile travelers. As a part of establishing a positive overall image for the line and building significant ridership from opening day a major marketing campaign was deemed by CTA management an essential undertaking (9,10). Although it is not possible to indicate separately that portion of additional ridership that could be directly attributed to marketing efforts, the rider survey also established clearly that CTA's marketing efforts reached most Orange Line riders and helped contribute to their "conversion" to rail transit.

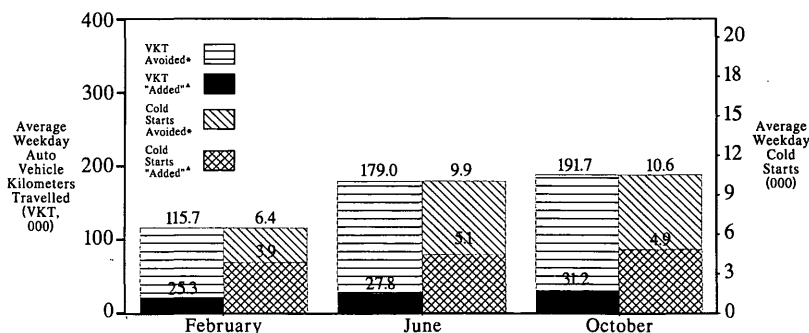
Even before a marketing program was formulated, CTA Service Delivery staff conducted a series of community forums over the summer and early fall of 1993. The purpose of the forums, held in

cooperation with local community organizations in the market area, was to alert residents to the forthcoming line, outline its basic service features, and answer questions about changes in overall transit service. Of particular concern to many residents were proposed changes to the bus service to which they had become accustomed. In fact, for that portion of riders who still expressed preference for express bus service, explanations were necessary to indicate the advantages (and disadvantages) of the new rail line.

CTA's CMAQ-funded marketing campaign was one of the largest CTA has ever undertaken, using almost all paid media. The line's opening was also well-reported on television news. Most riders (about four in five) saw the paid promotions. The "free" media—television, radio, or print news reports—were seen or heard by somewhat less than one-half of surveyed riders. And, most importantly, new riders saw the paid promotions; about three-quarters identified a billboard, print advertisement, or radio advertisement they had seen.

Sources of Riders' Information

Orange Line riders were asked in the survey to indicate how they had seen or heard about the Orange Line before riding it. Answers were divided into three groups: advertising, news accounts, and other sources (Table 5).



* Avoided due to shift from auto to Orange Line
 ▲ "Added" due to use of auto for Park-Ride only

FIGURE 5 Air quality improvement implications.

TABLE 5 Sources of Information About Orange Line

Ads (79%)		News Accounts (44%)		Other Places (49%)	
14%	Magazines	29%	Television	37%	Friends
32	Radio	20	Radio	21	Family Members
43	Newspapers	25	Newspapers	22	Co-Workers
43	Billboards	6	Magazines	10	CTA Employees
63	CTA Buses			4	Other
43	CTA Train Stations				

NOTE: Respondents could mention more than one information source. The total percentage for each of the three categories is consequently higher than for any one of them, since multiple mentions were given. 1,858 respondents.

CTA's advertising and promotional campaign clearly had a major impact on Orange Line riders, because 79 percent of them mentioned at least one of the various promotional efforts. Fewer than half of all riders mentioned news accounts (44 percent) or other sources, such as friends and family (49 percent).

The single most successful method for informing CTA riders about the Orange Line was car cards on CTA buses, noticed by 63 percent of Orange Line riders. Other successful methods included:

- Similar advertisements at CTA train stations (seen by 43 percent of Orange Line riders),
- Billboards along the Stevenson Expressway and elsewhere (seen by 43 percent),
- Newspaper advertisements (seen by 43 percent),
- Radio advertisements (heard by 32 percent), and
- Magazine advertisements (read by 14 percent).

New Rider Profile

Further stratification of survey results for the one-quarter who were new riders was undertaken as a guide to future marketing efforts for the Orange Line, to be carried out in 1994 and 1995.

The 23.7 percent of survey respondents who represented new riders differed from other survey respondents in several ways.

- Work and school were less significant as trip purposes, accounting for 62 percent of new riders versus 77 percent of shifted riders. To and from a work-related activity increased from 5 percent for shifted riders to 10 percent for new riders. Airline travel was also an important trip purpose for new riders, accounting for 9 percent, versus 2 percent for shifted riders.

- Park & Ride was more important as a mode of access, accounting for 25 percent of new riders versus 10 percent of shifted riders, whereas CTA or Pace bus access was 52 percent of shifted riders compared to 28 percent of new riders. Fourteen percent of new riders got a ride, compared with 10 percent of shifted riders, and 28 percent walked, compared with 26 percent of shifted riders.

These results match expectations from the Midway Line Market Potential Survey of 1992 (4). In that survey people who did not use transit said they were more likely to gain access to the line by auto-

mobile. Nevertheless, over one-half of new transit riders rode the bus or walked to the Orange Line.

- Most new riders (52 percent) used to drive all the way, 22 percent used to get a ride, and 25 percent started making this trip since the Orange Line opened.

- Eighty percent of Orange Line riders who shifted from other transit services formerly rode buses, 11 percent rode another CTA rail line, 3 percent took Metra, and 6 percent took other modes.

- New riders were more likely to be male (56 percent versus 44 percent of shifted riders). The number of female riders declined correspondingly.

- More whites (68 percent) and fewer Hispanics (14 percent) were represented among new transit riders, as compared with 59 percent and 24 percent, respectively, among shifted riders.

- Automobile ownership was somewhat higher for new users, with 42 percent classed as zero- or one-auto households and 54 percent classed as two- or three-automobile households, versus 55 percent and 41 percent, respectively, of shifted riders. This is an interesting commentary on the increased success of rail over bus in attracting transit users.

- Combined household income was higher for new users. Only 28 percent reported incomes under \$30,000 (compared with 42 percent for shifted users), whereas 23 percent (compared with 13 percent) reported incomes over \$60,000.

Sources of Information for New Riders

New transit riders, like riders shifted from other transit, learned of the new line from various promotional materials, rather than by observing the line's construction. Because transit ridership typically turns over 15 to 20 percent every 12 to 18 months or so, it is of value to know whether new trip-makers (who responded on the survey, "just started making this trip") learned about Orange Line service from a different source than did those traveling by automobile who made the change to rail transit. About 5 percent of all respondents were making a new trip in the corridor; these riders represented about one-fifth of the overall market of new transit riders.

The single most successful method of informing CTA riders about the Orange Line was car cards placed on CTA buses, noticed by over half of new Orange Line riders. Presumably these signs were noticed during earlier (perhaps infrequent) CTA bus rides,

other than the ride surveyed in March. This was similar for both trips formerly made by automobile and new trips.

- Riders making new trips were less likely to have seen advertisements at CTA train stations (20 percent) than were former auto travelers (31 percent).
- Billboards along the Stevenson Expressway and elsewhere were seen by both former automobile users (40 percent) and those making new trips (36 percent).
- Newspaper advertisements were seen by 38 percent of former automobile travelers and 32 percent of those making new trips.
- Radio advertisements were heard by 35 percent of former automobile users and 27 percent of those making new trips.
- Magazine advertisements were read by 16 percent of former automobile travelers and a similar 15 percent of those making new trips.

CONCLUSIONS: EARLY LESSONS LEARNED

Improved Service Levels

- To divert a significant number of automobile users to transit, competitive travel times are essential, both in relation to conventional mixed-traffic bus service (even express) and automobile travel.
- Even more important, potential riders must perceive travel times favorably, particularly in terms of schedule reliability and wait time, smooth, uninterrupted interstation vehicle flow, and efficient passenger movement through stations.
- New grade-separated and express transit service must get off to a good start, both in terms of press coverage and in having all the operational bugs worked out before opening day.
- Transit must not only initially establish a positive image, but maintain good service as a reliable, dependable feature, especially for new riders.
- "Extra effort" should be a major training theme for employees who inaugurate new service, as a part of building transit-ridership habits on the part of the market served.

Marketing and Community Outreach

- Good paid promotion campaigns, using print media, billboards, radio, and in-vehicle advertising, can be very effective in reaching potential riders and should be employed as a part of a creative marketing campaign.
- Good press coverage up to, on, and after opening day can also play a major, although not determining, role in building a favorable image in the community for major transit improvement projects. Every effort should be made to establish a good relationship with the press as a part of inaugurating new service.
- Preopening community forums, in which transit agency representatives explain the features of major new service improvements—particularly addressing the specific changes in present

service—can help increase rider awareness and acceptance on opening day.

Attracting New Riders

- Park & Ride facilities, particularly at outlying stations, must be large enough and convenient enough for a potentially sizable portion of new riders, in spite of air-quality-related cold-start issues.
- Park & Ride can be controversial as an access mode, not only because it compromises air-quality gains achieved by the shift to transit, but because it can create neighborhood frictions when overflow demand spills out onto local residential streets near rail stations whose Park & Ride facilities may be too small or nonexistent.
- The most important promotional medium for reaching potential new riders, as well as achieving the shift from express bus to rail, was bus car card advertising. Because of the extensive bus coverage in the southwest corridor and the central area before the opening of the Orange Line, even occasional bus riders saw the advertisements.
- Billboards, newspaper advertisements, and radio spots were also effective marketing tools, and should be coordinated in a common-theme, multimedia marketing program, targeted particularly at new riders.
- For opening day, the basic Orange Line message was "Rail Service is Here." Later marketing campaigns can target specific submarkets, with varied themes, based on research on the rail line's appeal.

REFERENCES

1. *Alternatives Analysis/Draft Environmental Impact Statement for the Southwest Transit Corridor*. Chicago Department of Public Works, Bureau of Transportation Planning and Programming, Sept. 1982.
2. *Orange Line Travel Survey*. PMR-x94035. Chicago Transit Authority, Market Research Department, May 1994.
3. LaBelle, S. J. CTA's Orange Line: A Preliminary Evaluation. Presented at the 1994 Chicago Metropolitan Conference on Public Transportation Research, University of Illinois at Chicago, June 1994.
4. Marketing Strategy & Planning, Inc. *Midway Line Market Potential Survey*. SP92-06. Chicago Transit Authority, June 1992.
5. *1990 Traveler Behavior and Attitudes Survey*. PR91-10. Chicago Transit Authority, Planning and Research Department, Sept. 1991.
6. Rosetti, M. A. and B. S. Eversole. *Journey to Work Trends in the United States and Its Major Metropolitan Areas*. National Transportation Systems Center, U.S. Department of Transportation, Cambridge Mass., Nov. 1993.
7. Pisarski, A. E. *New Perspectives in Commuting*. FHWA-PL-92-026. FHWA, U.S. Department of Transportation, July 1992.
8. *Light Rail Transit: Planning, Design, and Operating Experience*. In *Transportation Research Record 1361*, TRB, National Research Council, Washington, D.C., 1992.
9. Flannelly, K. J., et al. Direct Comparison of Commuters' Interests in Using Different Modes of Transportation. In *Transportation Research Record 1321*, TRB, National Research Council, Washington, D.C., 1991.
10. Silkunas, S. Customer Satisfaction: The Next Frontier, Presented at TRB Annual Meeting, Washington, D.C., Jan. 1993.

Publication of this paper sponsored by Committee on Rail Transit Systems.