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of Transportation

**Urban Mass  
Transportation  
Administration**

# Fare and Service Demonstration in Vancouver, WA

UMTA/TSC Evaluation Series

Final Report  
April 1985

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16. Abstract <p>The primary objective of the Vancouver, WA demonstration was to reduce traffic congestion in the 12-mile Interstate 5 corridor between Vancouver and Portland, OR through an increase in transit usage. The innovative aspect of the project was the sequential application of a series of service improvements, marketing activities and fare reductions. The effect of each demonstration activity was analyzed and taken into account in the design and implementation of the succeeding one. The improvements included park-and-ride lots, transit capacity increases in the corridor via trailer buses, service frequency increases, suburban feeder route extensions, a new express service, route modifications and express service fare reductions. All the improvements and changes were supported by promotional activities.</p> <p>The growth of transit ridership on the primary route in the corridor during the two years of the demonstration was greater than would have been expected without the improvements. Revenue recovery on the route dropped from 58 to 44 percent, primarily as a consequence of cost increases unrelated to the improvements. The two suburban route extensions met with limited success. The express service, a more expensive transit option which offered some riders the opportunity to save time, attracted relatively few passengers and did not meet its objective of generating sufficient revenue to cover its costs, although ridership did increase with each fare reduction. The effect of the series of demonstration activities on traffic congestion in the I-5 corridor was negligible.</p>					
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## PREFACE

The evaluation of the Fare and Service Demonstration in Vancouver, Washington was conducted by SYSTAN, Inc. of Los Altos, California under contract to the Transportation Systems Center (TSC) of the U. S. Department of Transportation (DOT) as part of the Service and Methods Demonstration (SMD) Program sponsored by the Urban Mass Transportation Administration (UMTA). Richard Albright of TSC served as technical advisor and monitor during the demonstration and Vincenzo Milione was the UMTA project manager.

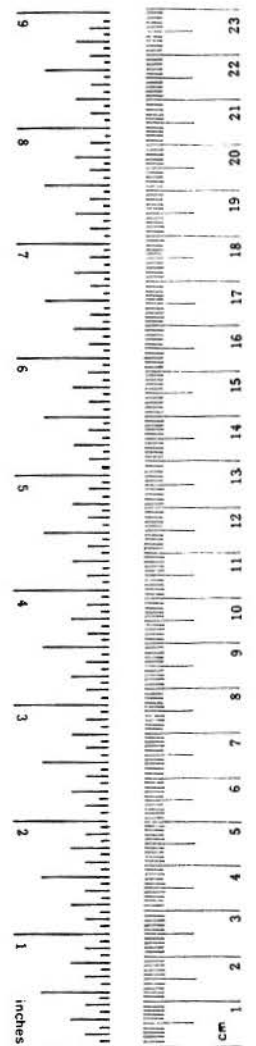
SYSTAN wishes to acknowledge the cooperation and diligence of the TRI-MET, Vancouver Transit and C-TRAN staff who, in spite of other pressing demands on their time, provided the data necessary to evaluate the demonstration improvements.

This report summarizes an extensive unpublished document prepared by Carolyn Fratessa, the SYSTAN evaluator of the project.

## METRIC CONVERSION FACTORS

### Approximate Conversions to Metric Measures

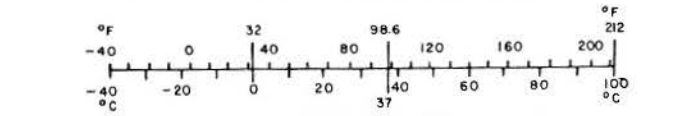
Symbol	When You Know	Multiply by	To Find	Symbol
<b>LENGTH</b>				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
<b>AREA</b>				
in <sup>2</sup>	square inches	6.5	square centimeters	cm <sup>2</sup>
ft <sup>2</sup>	square feet	0.09	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yards	0.8	square meters	m <sup>2</sup>
mi <sup>2</sup>	square miles	2.6	square kilometers	km <sup>2</sup>
	acres	0.4	hectares	ha
<b>MASS (weight)</b>				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
<b>VOLUME</b>				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft <sup>3</sup>	cubic feet	0.03	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.76	cubic meters	m <sup>3</sup>
<b>TEMPERATURE (exact)</b>				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C



### Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
<b>LENGTH</b>				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
<b>AREA</b>				
cm <sup>2</sup>	square centimeters	0.16	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	1.2	square yards	yd <sup>2</sup>
km <sup>2</sup>	square kilometers	0.4	square miles	mi <sup>2</sup>
ha	hectares (10,000 m <sup>2</sup> )	2.5	acres	
<b>MASS (weight)</b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
<b>VOLUME</b>				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m <sup>3</sup>	cubic meters	35	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.3	cubic yards	yd <sup>3</sup>
<b>TEMPERATURE (exact)</b>				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

\*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price \$2.25, SO Catalog No. C13.10 286.



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## EXECUTIVE SUMMARY

### OBJECTIVE

The primary objective of the Vancouver, WA demonstration was to reduce traffic congestion in the I-5 corridor between Vancouver and Portland, OR through an increase in transit usage. A series of service improvements, marketing activities and fare reductions was designed to achieve that objective. The innovative aspect of the project was the sequential application of the improvements. The effect of each improvement was analyzed before the following one was implemented.

### SETTING

Prior to the demonstration, about 10,500 workers residing in Clark County, WA commuted across the Columbia River to jobs in Oregon. Many of these jobs were located in areas along the 12-mile I-5 corridor. Only about two percent of the commuters used transit. A slightly higher percentage of off-peak travellers rode the bus.

Peak hour traffic on the Interstate highway bridge regularly exceeded 5,000 vehicles per hour on the three lanes in the peak direction. Average weekday traffic in both directions was measured at 107,000 vehicles. The highway's capacity was limited by a short four lane section south of the bridge.

Transit service between Vancouver and Portland was provided by Line 5 of TRI-MET, the Tri-County Metropolitan Transportation District of Oregon. Local service in Vancouver was provided by Vancouver Transit (VT), which was absorbed during the project by Columbia Transit (C-TRAN) as part of a general expansion of transit services in Clark County.

### SELECTION OF IMPROVEMENTS

Pre-demonstration planning was begun in October 1978. To provide a basis for the detailed design of the improvements, a two-part program of market research was carried out. The first set of studies investigated travel patterns and potential transit markets between Clark County and Portland. The other sought to determine Clark County residents' attitudes towards transit and their awareness of transportation alternatives.

Based on the results of the market studies, commuters from Clark County to downtown Portland were chosen as the primary target market, and a phased program of transit improvements was developed. The program, which was reviewed and adjusted midway through the project, consisted of the following sequential improvements, all of which were supported by promotional activities:

1. Line 5 capacity increase via trailer buses (separate units that trailed the regularly scheduled buses) and a park-and-ride lot near the Vancouver transit terminal;
2. Line 5 frequency increase;
3. Suburban feeder route extensions to Hazel Dell and Vancouver Mall in Clark County, with park-and-ride lots at the ends of the routes;
4. Hazel Dell express service direct to Portland;
5. Express route modification and fare reduction; and
6. Further reduction of Hazel Dell express fare, and on-board sale of punch card passes.

#### EFFECTS OF IMPROVEMENTS

The growth of Line 5 ridership during the two years of the demonstration, whose first phase began in September 1979, was greater than would have been expected on the basis of an extrapolation of pre-demonstration trends. Average daily ridership during the final month of the demonstration was 2,306, in comparison to the 1,950 riders that would have been expected without the project. Although the demonstration activities and improvements played a role in that increase, other factors also contributed. According to responses to a rider survey, high gasoline prices and freeway congestion were the most important reasons for choosing to ride the bus.

Line 5 revenue recovery dropped from 58 percent prior to the demonstration to 44 percent during its last three months, a result primarily of cost increases unrelated to the demonstration improvements. Fares were increased twice during the project as part of TRI-MET system-wide adjustments. These increases, which were not a component of the demonstration, adversely affected Line 5 ridership growth, especially during off-peak hours, and obscured the success of the service improvements. (Demonstration fare changes were programmed only on the new Hazel Dell express route.) Ridership growth near the end of the project may also have been constrained by a lack of bus capacity during the peak periods.

Local transit ridership in Vancouver increased moderately during the demonstration, especially in the second year. During that year, transfers to TRI-MET Line 5 increased from 16 to 25 percent of all C-TRAN riders.

The two suburban route extensions met with limited success. The Vancouver Mall route, which provided transit service where none had existed before, attracted a shopping clientele and did little to feed passengers to Line 5. The Hazel Dell route fared somewhat better. By the end of the demonstration, an average daily ridership of approximately 400 passengers had been established, about four times that of the Vancouver Mall route. As a feeder service, Hazel Dell buses provided about five percent of all Line 5 morning peak riders. The Hazel Dell route's revenue recovery was slightly better than the Vancouver local norm of 11 percent. The Vancouver Mall route recovered no more than eight percent of its costs.

The Hazel Dell express provided one morning run to Portland and one return run in the afternoon. For a premium fare (initially twice the regular fare), transit riders to Portland could save eight minutes in the morning and 17 in the afternoon. Few riders chose to use the service. However, as the fare was reduced, ridership increased, rising from an average of 18 one way trips per week during the first two months to 57 per week during the final two months of the demonstration. A post-demonstration fare reduction further increased usage to an average of 82 per week. Even with the fare reductions, the express service was not able to generate sufficient revenue to cover its operating costs.

The effect of the demonstration improvements on traffic congestion in the I-5 corridor was minimal. The number of peak hour automobile trips which were eliminated did not exceed 50. An equal or greater reduction in the number of automobile trips resulted from an increase in average vehicle occupancy, which rose during the morning peak from 1.22 to 1.24. Peak hour traffic showed almost no variation during the demonstration, although off-peak traffic did drop slightly, primarily as a consequence of higher gasoline prices.



# 1. INTRODUCTION

## 1.1 BACKGROUND

At the time of the demonstration project described in this report, Clark County and the City of Vancouver, WA were linked to Portland, OR by a single highway route, Interstate 5, which crossed the Columbia River on the only highway bridge within a 40-mile radius. (A second connection, the Interstate 205 bridge about six miles to the east, was opened in 1983, after the conclusion of the demonstration project.) Traffic congestion on the bridge and in the I-5 corridor had grown to severe proportions and had been under study since 1974 by several agencies, including the Columbia Region Association of Governments (CRAG).

In a major study of the I-5 corridor congestion problem, CRAG concluded that the expected continued development of industrial areas in Portland and residential areas in Clark County would only exacerbate the situation. The study recommended several measures for alleviating the congestion, including the expansion of carpool marketing in Clark County, the implementation of traffic management schemes in the Portland portion of the corridor and the development of a coordinated public transit system in the corridor and the suburban residential areas of Clark County.

Because only about two percent of the commuters from Clark County to jobs in Portland (the dominant commute flow) used public transit for their journeys to and from work, planners perceived the existence of a potentially great opportunity for diverting peak hour automobile users to transit through the introduction of marketing and service improvements. This opportunity, together with the similarity of the situation to other regions with well-defined but congested commute corridors, suggested that the Portland-Vancouver region would be an appropriate site for an UMTA SMD demonstration project to test the effectiveness of the proposed transit improvements. An application for an UMTA grant to help finance the demonstration was initiated by the City of Vancouver, and approval of the grant was obtained in October 1978.

## 1.2 OBJECTIVES AND SCOPE OF PROJECT

The primary objective of the Vancouver demonstration was to reduce traffic congestion in the I-5 corridor connecting Vancouver and Portland. The objective was to be achieved through the implementation of a series of transit promotional and service

improvements and fare reductions designed to increase transit ridership at the expense of personal vehicle use. Although none of the improvements was by itself an innovation, the staged implementation of the measures, coupled with the dynamic planning of successive improvements based on the results of prior actions, represented an innovative approach to the achievement of the project's objective.

Two secondary objectives related to the alleviation of I-5 congestion were the reduction of the morning peak period traffic in downtown Vancouver and the increase of transit ridership in Vancouver.

The price, promotional and service improvements which were tested can be classified in the following general categories:

1. Improvement of park-and-ride facilities;
2. Increasing service frequency and capacity;
3. Introduction of express buses;
4. Expansion of service into new areas;
5. Reduction of fares and introduction of new payment methods; and
6. Advertising of service and price improvements.

The project was carried out in several stages. Pre-demonstration planning and market research began in October 1978 and continued for ten months through August of the following year. The "first year" of the demonstration, initiated in September 1979, included promotional activities, a new downtown park-and-ride lot in Vancouver and increased bus capacity, followed by an increased frequency of bus service to Portland. The "second year" began in November 1980 and continued through October 1981. During that period, the service improvements of the previous period were maintained, and improvements in the other categories listed above were sequentially introduced.

## 2. SETTING

### 2.1 PORTLAND-VANCOUVER REGION

The Portland OR-WA Standard Metropolitan Statistical Area (SMSA) encompasses Multnomah, Clackamas and Washington Counties in Oregon and, on the opposite side of the Columbia River, Clark County in Washington (see Figure 2-1). The 1980 population of the SMSA, the 32nd largest in the USA, was 1.24 million, up from 1.0 million in 1970. The population growth occurred almost entirely in the suburban and rural areas of the SMSA. The population of Portland declined from 380,000 to 366,000 and that of Vancouver, WA increased only slightly from 41,800 to 42,800, but Clark, Clackamas and Washington counties each experienced an increase of about 50 percent during the period. The 1980 population of Clark County (which includes Vancouver) was 192,000.

Portland, in Multnomah County, is the commercial and industrial heart of the region. The regional work force in 1970 was estimated at about 400,000 persons, about half of whom were employed in Portland. Although a trend towards decentralization of industrial location has been observed, the greatest concentration of employment by far is still found in Portland.

In 1977, prior to the demonstration, the working population of Clark County was estimated at 47,000. About 10,500 of those workers, or 22 percent of the total, commuted to jobs in Oregon. Commuters in the opposite direction, from Oregon to Clark County, numbered only about 4,000. About 60 percent of the southbound commuters terminated their trips in one of the following four zones of commercial and industrial activity, all of which border the Interstate 5 corridor between Vancouver and Portland (see Figure 2-2):

1. Rivergate/Hayden Island/Jantzen Beach;
2. Swan Island;
3. Northwest industrial area on the Willamette River; and
4. Central Business District (Downtown Portland).

The I-5 corridor extends from 78th Street in north Vancouver to downtown Portland, a distance of approximately 12 miles. On the Portland side of the river, I-5 is paralleled by two relatively high-quality arterials, state routes 99E (Union Avenue) and 99W (Interstate Avenue), as indicated in Figure 2-2. At the time of the demonstration, when the I-5 Columbia River bridge was

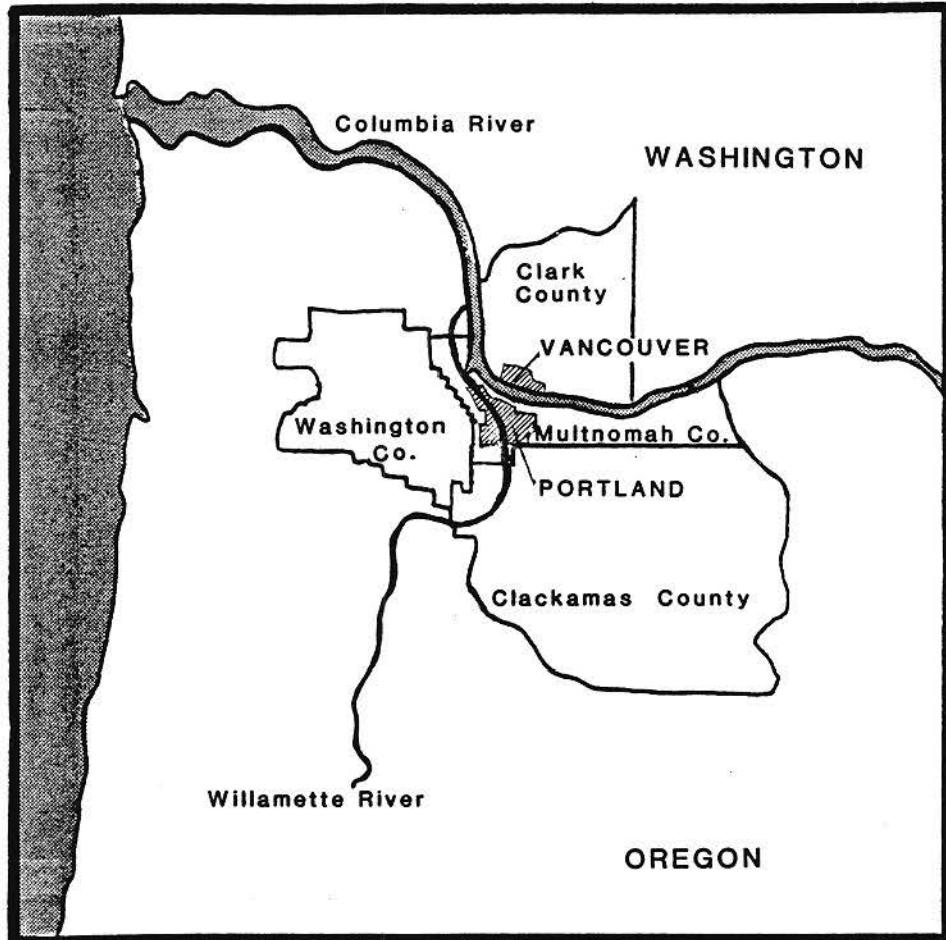


FIGURE 2-1  
PORTLAND OR-WA SMSA



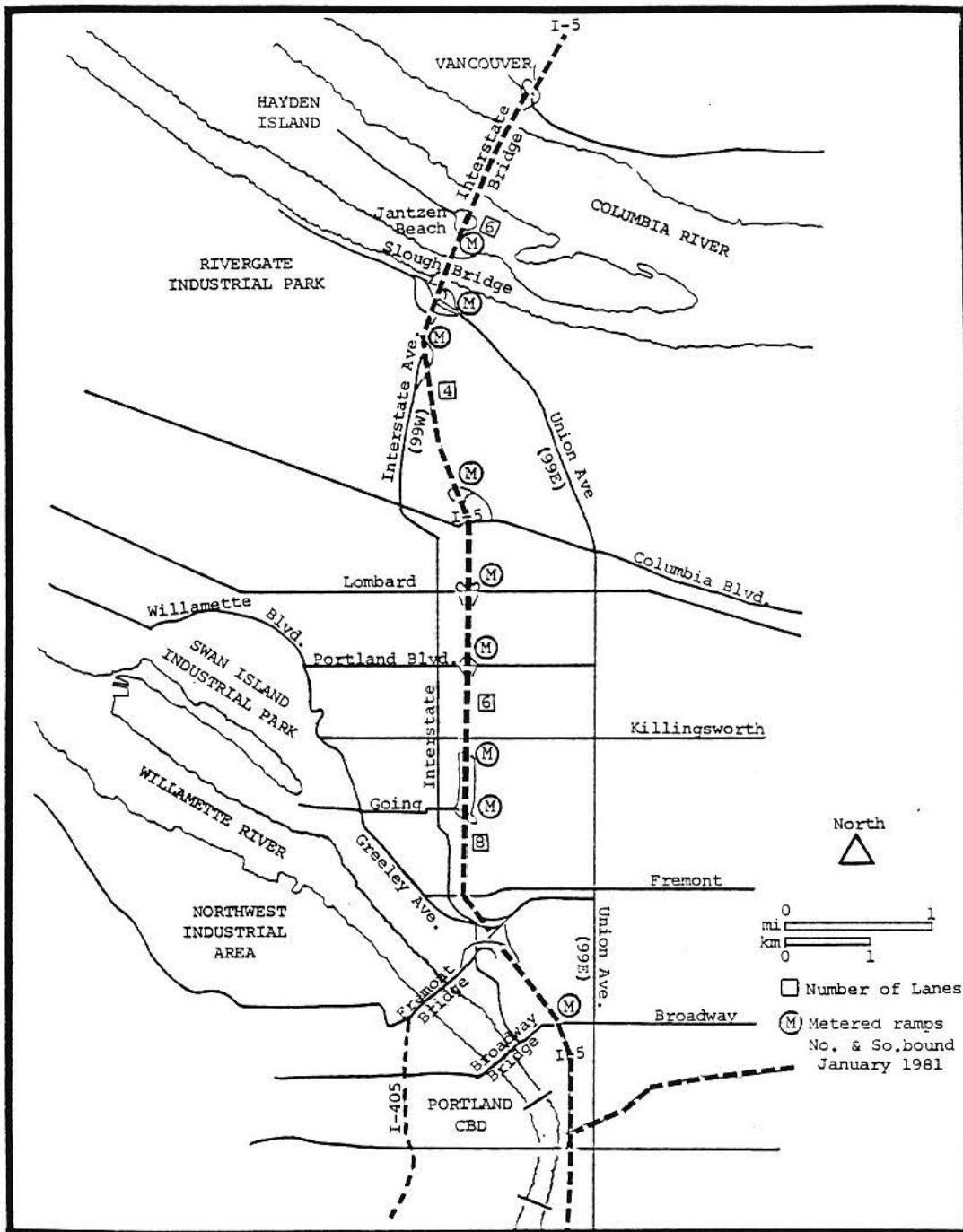


FIGURE 2-2  
 INTERSTATE 5 VANCOUVER-PORTLAND CORRIDOR

the only link between the two cities as well as the principal north-south regional connector, all commute traffic was forced into the corridor along with the heavy interregional traffic.

## 2.2 PARTICIPANTS IN THE PROJECT

A variety of organizations and agencies participated in the demonstration, as illustrated in Figure 2-3. Some of these were created or disbanded during the course of the project. The City of Vancouver, as the applicant for the grant and the recipient of the UMTA demonstration funds, was responsible for implementing and administering the project, a task that was delegated to the manager of Vancouver Transit (VT). At the outset of the demonstration, VT provided service only within the city limits of Vancouver.

In November 1980, at the beginning of the second year of the demonstration, a favorable public vote on an expanded service area led to the creation of Columbia Transit (C-TRAN), a new agency which absorbed VT and, after hiring additional staff, extended transit service outside the city limits into Clark County. Responsibility for the demonstration project was passed from VT to C-TRAN.

The Tri-County Metropolitan Transportation District of Oregon (TRI-MET) operated in the Portland area and provided bus service between Portland and Vancouver under a deficit-sharing agreement with the City of Vancouver and Clark County. That agreement was shifted to C-TRAN in November 1980. TRI-MET also operated a regional carpool matching service and worked with the Washington Department of Transportation on a Clark County ride-sharing program.

A Technical Advisory Committee (TAC) was composed of representatives of ten agencies affected by the demonstration. The TAC was formed in 1978 to advise and reach consensus on project activities. When CRAG, the bi-state metropolitan planning organization was voted out of existence, responsibility for transportation planning in Clark County was assumed by the Clark County Regional Planning Council, a representative of which was added to the TAC. Also represented was the Metropolitan Service District, the transportation planning agency for the Portland area. Other members of the TAC are indicated in Figure 2-3.

The evaluation of the demonstration was performed by SYSTAN, Inc., under contract to the Transportation Systems Center (TSC) of the U. S. Department of Transportation. To insure that an objective evaluation was conducted, SYSTAN prepared evaluation plans, monitored the demonstration, supervised data collection, analyzed results and reported its findings to TSC.

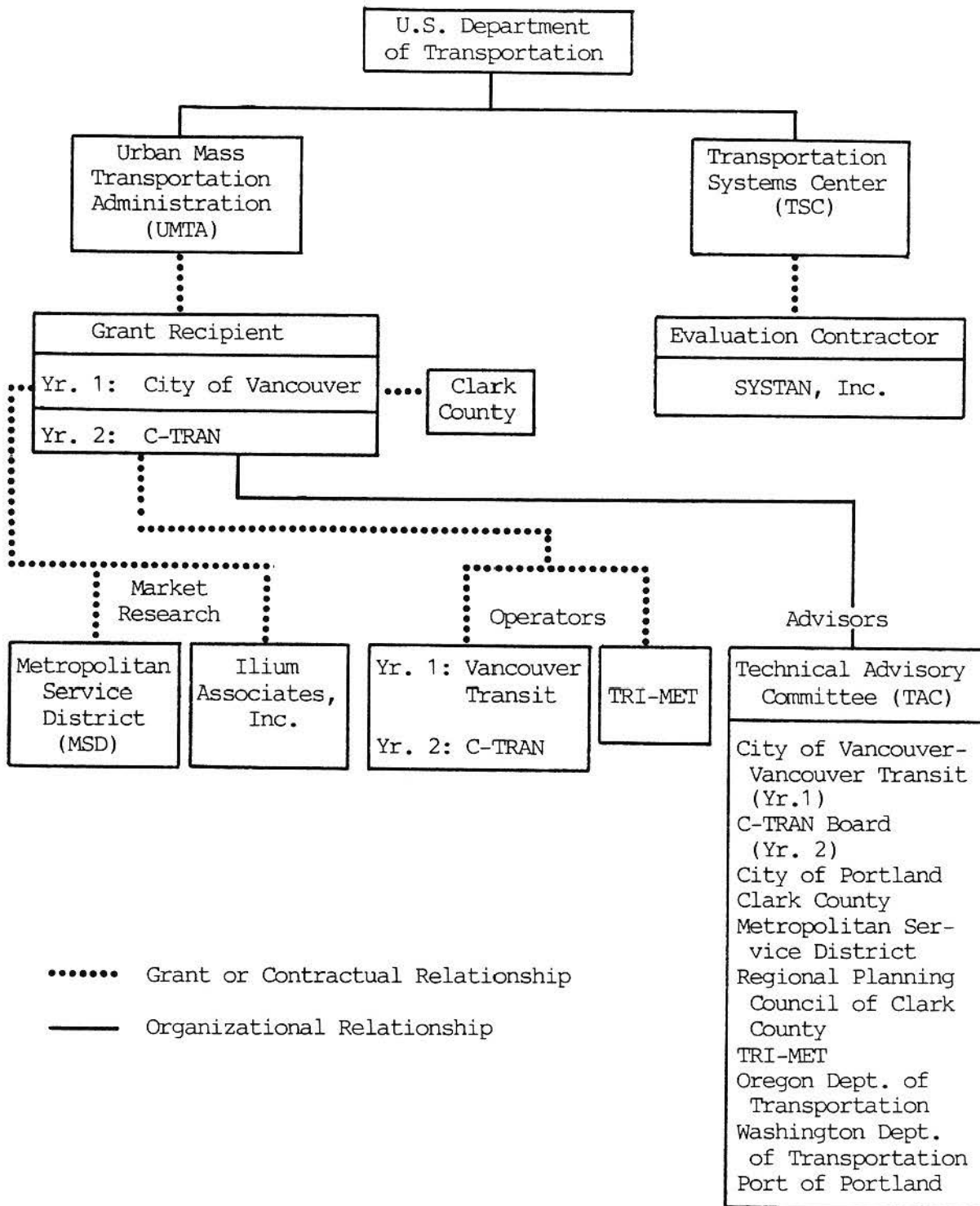


FIGURE 2-3  
PROJECT PARTICIPANTS

### 2.3 PRE-DEMONSTRATION STATUS

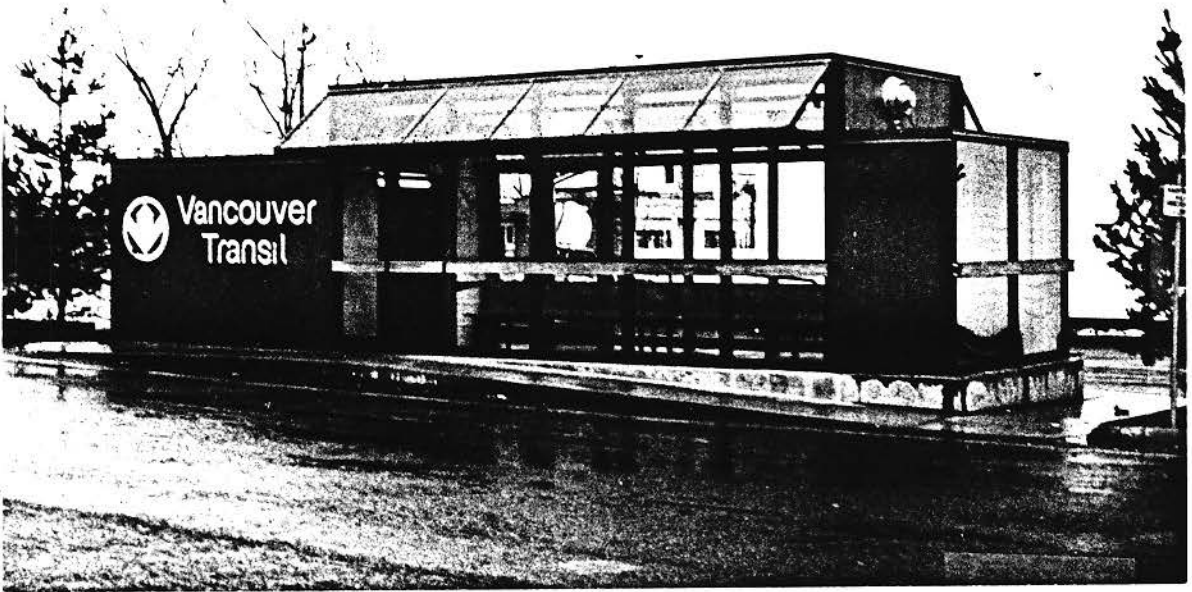
Prior to the demonstration, Vancouver Transit operated eight buses on six routes. Buses met at the downtown transit terminal, where transfers to TRI-MET's Line 5 to Portland were possible. VT weekday ridership averaged about 1,400 passengers. The basic fare was 35 cents, with special fares for the elderly, handicapped and young (15 cents). A monthly pass allowing unlimited rides could be purchased for \$12.00 (\$5.00 for the elderly and handicapped), and a one-day pass cost 70 cents. The use of part-time drivers was allowed.

TRI-MET operated 515 buses on 70 routes. A basic fare of 45 cents was collected; free transfers were provided except for some trips to outer areas, for which a surcharge of 20 cents was added. Many of the routes converged at a ten-block transit mall in the Portland CBD.

The TRI-MET Line 5 route from Vancouver to Portland originated at the VT downtown terminal (see Figure 2-4), although passengers were also boarded at a temporary park-and-ride lot eight blocks south of the terminal which the buses passed on the northbound leg of their route before arriving at the terminal. Line 5 buses crossed the I-5 bridge, left I-5 to stop at Jantzen Beach on Hayden Island, continued on I-5 over the Slough bridge and then exited to 99W (Interstate Avenue), from which they crossed the Broadway bridge and finished their journey at the Portland Mall. The reverse route was similar. One morning southbound trip originated in Hazel Dell, six miles and 20 minutes north of Vancouver, and ran express via I-5 rather than 99W; an afternoon northbound express also terminated in Hazel Dell.

The Line 5 trip of eight miles (from the Vancouver terminal to Portland mall) was scheduled at 26 to 29 minutes during the morning peak, during which the intervals between southbound buses ranged from 12 to 30 minutes. In the afternoon peak period, scheduled northbound headways varied from 16 to 35 minutes and scheduled trip times ranged from 34 to 44 minutes, although delays of five minutes or more were often experienced. These delays adversely affected the programmed connections with VT buses at the Vancouver terminal. Twenty-two runs were made each weekday using five buses in peak periods and two in the off-peaks. The Line 5 pre-demonstration route and schedule are shown in Figure 2-5.

Line 5 morning southbound trips took about 10 minutes longer than a comparable automobile trip between downtown Vancouver and downtown Portland. Northbound afternoon trips required about 15 minutes more than travel by automobile. These differences were approximately doubled for trips between Hazel Dell and downtown Portland.

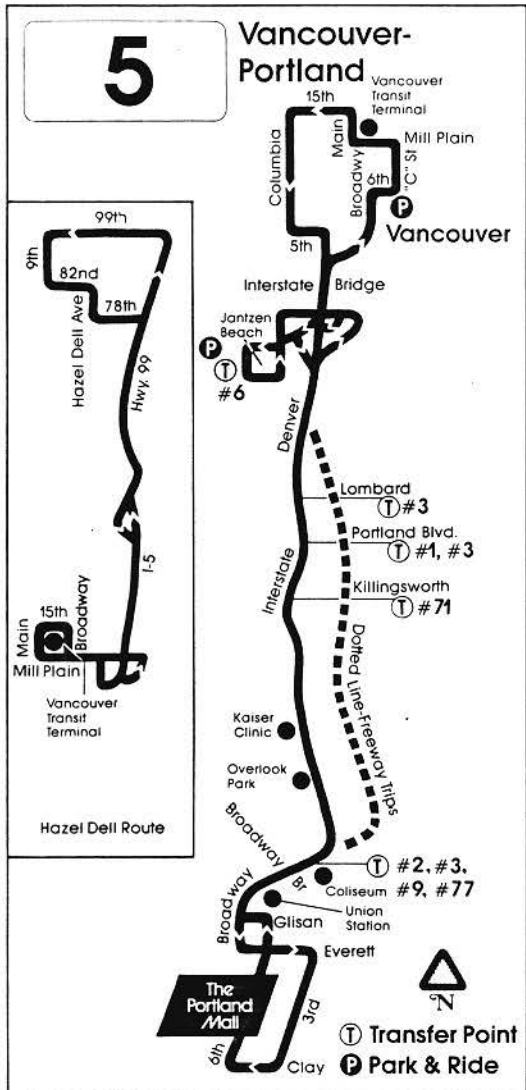


New Vancouver Transit Terminal



Vancouver Transit bus (left) meets TRI-MET Line 5 bus

FIGURE 2 4. VANCOUVER TRANSIT TERMINAL



### Weekday Departure Times

From Hazel Dell & Vancouver to Portland Mall

Hazel Dell 78th & 99w	Vancouver Main & Mill Plain	Jantzen Beach	Interstate & Killingsworth	Interstate & Broadway	3rd & Everett
---	6:25	6:32	6:40	6:46	6:51
---	6:55	7:03	7:12	7:19	7:24
6:54	BA7:13	---	---	7:34	7:39
---	A7:25	7:32	---	---	7:51
---	7:40	7:48	7:57	8:04	8:09
---	8:00	8:07	8:15	8:21	8:26
---	8:30	8:37	8:45	8:51	8:56
---	9:00	9:07	9:15	9:21	9:26
---	9:30	9:37	9:45	9:51	9:56
---	10:00	10:07	10:15	10:21	10:26
---	10:30	10:37	10:45	10:51	10:56
---	11:15	11:22	11:30	11:36	11:41
---	12:00	12:07	12:15	12:21	12:26
---	12:45	12:52	1:00	1:06	1:11
---	1:20	1:27	1:35	1:41	1:46
---	2:03	2:10	2:18	2:24	2:29
---	2:45	2:52	3:00	3:06	3:11
---	3:25	3:32	3:40	3:46	3:51
---	4:25	4:32	4:40	4:46	4:51
---	5:08	5:15	5:23	5:29	5:34
---	6:00	6:19	---	---	---

Light figures are A.M. Dark figures are P.M.

### Weekday Departure Times

From Portland Mall to Hazel Dell & Vancouver

6th & Salmon	Interstate & Broadway	Interstate & Killingsworth	Jantzen Beach	Vancouver Main & Mill Plain	Hazel Dell 78th & 99w
---	---	---	---	6:44	6:54
6:57	7:05	7:12	7:21	7:27	---
BA7:30	7:38	---	---	7:55	---
7:45	7:53	8:00	8:09	8:15	---
8:15	8:23	8:30	8:39	8:45	---
8:33	8:41	8:48	8:57	9:03	---
9:03	9:11	9:18	9:27	9:33	---
9:33	9:41	9:48	9:57	10:03	---
10:03	10:11	10:18	10:27	10:33	---
10:33	10:41	10:48	10:57	11:03	---
11:03	11:11	11:18	11:27	11:33	---
11:48	11:56	12:03	12:12	12:18	---
12:33	12:41	12:48	12:57	1:03	---
1:18	1:26	1:33	1:42	1:48	---
1:53	2:01	2:08	2:17	2:23	---
2:38	2:46	2:53	3:02	3:08	---
3:20	3:31	3:38	3:50	3:59	---
4:00	4:11	4:18	4:30	4:39	---
4:30	4:41	4:48	5:03	5:14	---
A5:00	5:11	---	5:33	5:44	---
BA5:16	5:26	---	---	5:50	6:00
5:43	5:53	6:00	6:10	6:18	---
6:18	6:28	6:35	6:45	6:53	---

Light figures are A.M. Dark figures are P.M.

- A. Via Freeway (I-5)
- B. Does not stop at Jantzen Beach.
- C. Direct to S.E. 7th & Belmont for transfer connections to Downtown Portland.

FIGURE 2-5

TRI-MET LINE 5 PRE-DEMONSTRATION ROUTE AND SCHEDULE

The fare for a ride on Line 5 was 75 cents. A monthly pass was offered for \$27.00. Revenue covered about 58 percent of the operating costs. Sixty percent of TRI-MET's Line 5 operating deficit was reimbursed by the City of Vancouver, the rest being absorbed by TRI-MET.

At the start of the demonstration, Line 5's growing ridership had reached about 1,100 passengers per day, averaging 25 riders per one-way trip. Some peak hour trips were overcrowded, however, with up to 70 people per bus. Almost all the passengers originated or terminated in Vancouver or Hazel Dell, since lower-priced competing services along the southern portion of the route discouraged local demand in Portland.

The Line 5 commute ridership between Vancouver and Portland amounted to only about two percent of all southbound commuters, with the consequence that traffic on the I-5 freeway was heavily congested during the peak periods. Peak hour traffic on the six-lane bridge regularly exceeded 5,000 vehicles in the peak direction. Average weekday traffic in both directions was measured at 107,000 vehicles, with the highest volumes occurring during the summer months when vacationers added to the regular traffic.

The Interstate Highway's capacity was limited by a short four lane section just south of the Slough bridge in Oregon. This bottleneck as well as congestion at a few of the interchanges caused southbound morning peak traffic to back up as far north as 39th Street in Vancouver. A similar phenomenon was experienced in Portland during the afternoon peak. In both cases, traffic on the adjacent local streets was affected as vehicles queued to enter I-5. Volume-to-capacity ratios of 1.4 to 1.8 were experienced in the Oregon northbound lanes during the afternoon peak, reducing speeds to as low as 10 miles per hour.





### 3. PROJECT PLANNING

#### 3.1 PRE-DEMONSTRATION SURVEYS

Pre-demonstration planning was begun in October 1978, shortly after the award of the UMTA grant. To provide a basis for the detailed design of the service improvements to be included in the demonstration project, a two-part program of market research was carried out. The first set of studies investigated existing travel patterns and potential transit markets between Clark County and Portland. The other sought to determine Clark County residents' attitudes towards transit and their awareness of transportation alternatives.

The analysis of existing travel patterns and potential transit markets was conducted by the Metropolitan Service District (MSD), using data from a 1977 household survey. The study determined that the major flow of home-based work trips across the river was southbound from Washington to Oregon, and that most of those trips originated east of downtown Vancouver and I-5, as shown in Table 3-1. Northbound trips from Oregon to Clark County were widely dispersed and much fewer in number.

After correlating the travel patterns with the socioeconomic characteristics of the residents of the origin areas, the study concluded that all four destination areas indicated in Table 3-1 offered a potential for peak period transit service and that three of the four would support off-peak service. A potential for vanpool and carpool programs to all areas except downtown Portland was also recognized. The best location for a park-and-ride lot to serve potential transit users was determined to be east of the I-5 freeway in Vancouver. A relatively low potential for attracting Oregon-based trips to transit was detected.

Additional information on travel patterns was obtained in February 1979 from an on-board survey of 100 TRI-MET Line 5 riders and 100 VT users. Many of the VT users were interviewed at the Vancouver transit terminal. The results showed the destinations of Line 5 riders (of whom 61 percent travelled to and from work) and VT users (28 percent of whom accounted for work trips and 42 percent for shopping trips) to be as follows:

	<u>Downtown Portland</u>	<u>Northwest Portland</u>
Line 5 riders	72%	12%
VT users	41%	35%

TABLE 3-1

WEEKDAY HOME-BASED WORK TRIPS FROM CLARK COUNTY  
TO THE PORTLAND AREA

Origin	Destination				Total
	Rivergate, Hayden Island, St. Johns	Swan Island, Univ. Park	North- west Indus. Park	Down- town Port- land	
Downtown Vancouver	400	240	290	240	1,170
Suburban Clark County east of Interstate 5	3,900	2,430	1,950	1,680	9,960
Suburban Clark County west of Interstate 5	820	490	390	340	2,040
Total	5,120	3,160	2,630	2,260	13,170

The second major study, a telephone survey conducted by a consultant to the City of Vancouver, determined the attitudes of Clark County residents towards transit and their awareness of transit. It also established the characteristics of I-5 corridor users prior to the demonstration as a basis for comparison with the results of later surveys to detect changes in transit usage.

The survey indicated that 44 percent of Clark County residents over 16 years of age made at least one trip per week to Portland. However, only three percent of the sample used transit for their trips to Portland. Most non transit riders travelled to locations in northwest and northeast Portland, areas without direct transit service.

Most transit users, who tended to be female and older and less affluent than the community norm, felt they were receiving good service, but non-users appeared to have little awareness of or experience with transit. TRI-MET Line 5 service was rated as good or very good by 70 percent of both TRI-MET and VT riders; about 50 percent of the former and 85 percent of the latter felt the same way about VT service. About two-thirds of the non-users interviewed were unable to rate the services. Few non-users had seen schedules, route maps or advertisements, although most were aware that information could be obtained by telephone.

The survey highlighted incentives that might induce non-transit users to ride the bus. Most important was an expanded service including direct routes from Vancouver area neighborhoods as well as direct service to more Portland destinations. Better connections between VT and TRI-MET services were also desired. A fare reduction was found to be one of the least important incentives.

### 3.2 SELECTION OF IMPROVEMENTS

Based on the results of the market research studies, project planners designed the service and promotional improvements to be implemented and tested in the demonstration. Chosen as the primary target market were the commuters from Vancouver to downtown Portland. A phased program for introducing the selected improvements was developed.

For the project's first phase, plans were made to increase transit capacity in the I-5 corridor, construct a new park-and-ride lot in Vancouver and promote the improved services. An increased frequency of service and additional promotional activities were scheduled for a second phase to begin about four months later. Service improvements planned for later stages included route extensions into suburban neighborhoods, express buses and more park-and-ride lots.

Of primary concern during the pre-demonstration planning period was a shortage of lease buses caused by rising gasoline prices and a consequent higher demand for transit vehicles. That problem was overcome, however, and a new contract between TRI-MET and the City of Vancouver for the Line 5 improvements was approved in June 1979, enabling the first phase to begin in September 1979.

Although the market surveys had indicated the potential viability of carpool and vanpool programs, these were not included in the demonstration project because of the lack of an appropriate institutional mechanism to manage them.

The planning and design of the marketing and service improvements continued throughout the duration of the project. The effects of each improvement were monitored, evaluated and taken into account in the design and implementation of the following ones. After the completion of the second phase of the demonstration in June 1980, a temporary moratorium on further improvements was observed while the next stages of the project were analyzed and designed.

During the interim planning period, projections of ridership, costs and revenues were developed, and a mix of suburban route extensions and express services was selected for implementation, with the objective of increasing transit usage while recovering a greater portion of costs through the fare box. Also planned for implementation were promotional activities, fare adjustments and pricing incentives. Different options were developed for improvements beyond the first set, enabling the later changes to be adjusted to take into account the results of earlier ones.

The proposed plan was to introduce service changes every three months and, mid-way through each three-month period, to offer pricing incentives to build up ridership. The design of one of the suburban route extensions provided an opportunity to compare the impacts of parallel conventional and express services with different frequencies and fares.

## 4. MARKETING AND SERVICE IMPROVEMENTS

The marketing and service improvements were implemented in six increments. The first two groups of improvements, referred to as Phases I and II, constituted the first year of the demonstration. Phase I began in September 1979 and was followed in January 1980 by Phase II, which continued through June 1980. After an interim planning period, the second year of the demonstration began in late November 1980 and continued through October 1981. The second year was divided into four stages which lasted approximately three, two, two and four months, respectively. The two phases of the first year focused primarily on the mainline TRI-MET service from Vancouver to Portland (Line 5), while the four stages of the second year concentrated on route extensions, feeder services, a new express service and express fare changes in Vancouver and Clark County. The demonstration improvements are summarized in Table 4-1.

### 4.1 PHASE I: LINE 5 CAPACITY; PARK-AND-RIDE

The improvements implemented during Phase I of the project, which began on September 4, 1979, included an increase in Line 5 capacity, the opening of a new park-and-ride lot in downtown Vancouver and a publicity campaign in Clark County to promote the use of transit for trips to Portland.

The increase of capacity on Line 5 was achieved by adding a trailer bus (a separate unit that trailed the regularly scheduled bus) to the 6:55, 7:13 and 7:25 a.m. Vancouver departures and the 4:30, 5:00 and 5:16 p.m. Portland departures. The trailer buses did not accompany the scheduled runs beyond the Vancouver terminal to Hazel Dell, however. The existing route and schedule, shown previously in Figure 2-5, were not changed, nor were the extra buses advertised or indicated in the printed schedule.

The 106-car park-and-ride lot was located at Columbia and 15th, three blocks from the Vancouver terminal along the route to Portland. It opened on September 19. The sign, lighting and landscaping were completed in late October, and a shelter was moved to the site about a month later. The temporary 70-car park-and-ride lot on the northbound route near the I-5 bridge interchange remained in service throughout the demonstration.

Line 5 service was promoted by ads and news stories in the Vancouver press. The newspaper ad shown in Figure 4-1 was run in The Columbian four times in September and once in October, the

TABLE 4-1  
SUMMARY OF DEMONSTRATION IMPROVEMENTS

Period	Duration	Improvements
Year 1, Phase I	Sep 79 - Jan 80	Line 5 capacity increase via trailer buses  Downtown Vancouver park-and-ride lot
Year 1, Phase II	Jan 80 - Jun 80	Line 5 frequency increase
Interim Planning	Jul 80 - Oct 80	(Line 5 service unchanged)
Year 2, Stage 1	Nov 80 - Feb 81	Suburban feeder route extensions to Hazel Dell and Vancouver Mall  Park-and-ride lots at ends of feeder routes
Year 2, Stage 2	Mar 81 - Apr 81	Hazel Dell express service direct to Portland
Year 2, Stage 3	May 81 - Jun 81	Express route modification  Express fare reduction via punch card system
Year 2, Stage 4	Jul 81 - Oct 81	Further reduction of Hazel Dell express fare  On-board punch card sales



# 26 SUPER SAVERS TO PORTLAND DAILY.

Now Tri-Met buses make 26 trips to Portland daily.  
At super savings.

It's just 75¢ one way to Overlook Park, the Kaiser Clinic,  
Coliseum and downtown Portland. All on Tri-Met line 5.

It's convenient. Most Vancouver residents live within a few  
blocks of a Vancouver Transit stop. Just board the nearest  
bus to downtown Vancouver and transfer to Tri-Met.

While others fight bridge traffic you'll finish your morning  
newspaper. In comfort.  
Or drive to the new Park & Ride lot at Columbia & 15th in  
downtown Vancouver. Park all day free and catch Tri-Met  
right there.

For Tri-Met schedules stop by your nearest 7-Eleven store.  
You'll find Vancouver Transit schedules at its office, 15th and  
Main, downtown. Or call 695-0123 for information on both.  
Vancouver Transit in Vancouver. Tri-Met to Portland.

First class service at super savings.

*Tri-it!*



FIGURE 4-1  
PHASE I NEWSPAPER AD

first promotion of Line 5 since TRI-MET took over the route in 1976. An ad was also printed once in January in a Clark County supplement published by The Columbian. The opening of the new park-and-ride lot was featured in a news story, and the installation of the shelter was announced through the printing of a large photograph of the facility.

#### 4.2 PHASE II: LINE 5 FREQUENCY

On January 21, 1980, the frequency of Line 5 service was substantially increased by moving the three morning peak and the three evening peak trailer buses into separately scheduled slots. In addition, two more morning runs and four more midday runs from Vancouver to Portland were scheduled, and six more evening departures from Portland to Vancouver were added (see Figure 4-2).

These changes in the frequency of service increased the number of scheduled departures to Portland during the morning peak (6:00 - 8:30 a.m.) from seven to 12. The number of bus trips to Portland during that period went up from 10 to 12, providing a 20 percent increase in morning peak capacity (in comparison to Phase I capacity). The scheduled runs to Vancouver during the evening peak (4:00 - 6:30 p.m.) increased from six to 10 and the number of bus trips from nine to ten, increasing evening peak period capacity by 11 percent. Five new runs to Vancouver after the evening peak were also programmed, extending service from the 6:18 p.m. latest scheduled departure time before and during Phase I to a new latest scheduled departure time of 9:33 p.m.

The increased frequency was promoted through newspaper ads, brochures mailed to all Vancouver households and interior signs in all VT buses. The newspaper ads appeared in The Columbian four times during February. A local radio station also provided public service announcements of the schedule changes during the first three or four days they were in effect. A collage of the advertising material is shown in Figure 4-3.

Although Phase II was terminated at the end of June, TRI-MET Line 5 service was maintained at the Phase II level throughout the rest of the demonstration.

#### 4.3 STAGE 1: ROUTE EXTENSIONS; PARK-AND-RIDE

Stage 1 of the second year of the project began a series of improvements to local bus services in Vancouver and Clark County in an effort to attract additional I-5 corridor users to transit as well as to increase local transit ridership. The second year got underway at about the same time that the newly created C-TRAN



**Weekday Departure Times**  
From Hazel Dell & Vancouver to Portland Mail

Hazel Dell 78th & 99 W	Vancouver Main & Mill Plain	Jantzen Beach	Interstate & Killingsworth	Interstate & Broadway	Portland S.W. 5th & Stark
---	5:58	6:05	6:13	6:19	6:24
---	6:21	6:28	6:36	6:42	6:47
---	6:40	6:48	6:57	7:04	7:09
---	6:55	7:03	7:12	7:19	7:24
---	7:05	7:13	7:22	7:29	7:34
C6 56	7:15	---	---	7:36	7:41
---	7:25	7:33	7:42	7:49	7:54
---	7:35	7:43	7:52	7:59	8:04
---	7:45	7:53	8:02	8:09	8:14
---	8:00	8:07	8:15	8:21	8:26
---	8:15	8:22	8:30	8:36	8:41
---	8:30	8:37	8:45	8:51	8:56
---	8:45	8:52	9:00	9:06	9:11
---	9:00	9:07	9:15	9:21	9:26
---	9:30	9:37	9:45	9:51	9:56
---	10:00	10:07	10:15	10:21	10:26
---	10:30	10:37	10:45	10:51	10:56
---	11:00	11:07	11:15	11:21	11:26
---	11:30	11:37	11:45	11:51	11:56
---	12:00	12:07	12:15	12:21	12:26
---	12:30	12:37	12:45	12:51	12:56
---	1:00	1:07	1:15	1:21	1:26
---	1:30	1:37	1:45	1:51	1:56
---	2:00	2:07	2:15	2:21	2:26
---	2:30	2:37	2:45	2:51	2:56
---	3:00	3:07	3:15	3:21	3:26
---	3:30	3:37	3:45	3:51	3:56
---	4:00	4:07	4:15	4:21	4:26
---	4:30	4:37	4:45	4:51	4:56
---	4:45	4:52	5:00	5:06	5:11
---	5:00	5:07	5:15	5:21	5:26
---	5:20	5:27	5:35	5:41	5:46
---	5:32	5:39	5:47	5:53	5:58
---	5:55	6:02	6:10	6:16	6:21
---	6:12	6:19	6:27	6:33	6:38
6:00	6:29	---	---	---	---
---	6:30	6:37	6:45	6:51	6:56
---	7:00	7:07	7:15	7:21	7:26
---	7:30	7:37	7:45	7:51	7:56
---	8:15	8:22	8:30	8:36	8:41
---	9:00	9:07	9:15	9:21	9:26
---	9:30	9:36	9:44	9:50	9:56
---	10:04	10:10	10:18	10:24	10:29

Light figures are A.M. Dark figures are P.M.  
Subject to Change Without Notice

C. Via Freeway (I-5) does not stop at Jantzen Beach.

**NOTE:** Limited stop service between Interstate Br. & Fareless Square. Bus will only stop at the following locations: Jantzen Beach, N. Interstate and Willis, Lombard, Portland Blvd., Alnsworth, Killingsworth, Alberta, Going, Falling, Kaiser Clinic, Russell and Broadway.

**Weekday Departure Times**  
From Portland Mail to Hazel Dell & Vancouver

Portland S.W. 6th & Salmon	Interstate & Broadway	Interstate & Killingsworth	Jantzen Beach	Vancouver Main & Mill Plain	Hazel Dell 78th & 99W
6:08	6:17	6:24	6:33	6:39	6:49
6:38	6:47	6:54	7:03	7:09	---
6:56	7:05	7:12	---	7:27	---
7:19	7:28	7:35	7:44	7:50	---
7:34	7:43	7:50	7:59	8:05	---
7:51	8:00	8:07	8:16	8:22	---
8:04	8:13	8:20	8:29	8:35	---
8:21	8:30	8:37	8:46	8:52	---
8:49	8:58	9:05	9:14	9:20	---
9:19	9:28	9:35	9:44	9:50	---
9:49	9:58	10:05	10:14	10:20	---
10:19	10:28	10:35	10:44	10:50	---
10:49	10:58	11:05	11:14	11:20	---
11:19	11:28	11:35	11:44	11:50	---
11:49	11:58	12:06	12:14	12:20	---
12:19	12:28	12:35	12:44	12:50	---
12:49	12:58	1:05	1:14	1:20	---
1:19	1:28	1:35	1:44	1:50	---
1:49	1:58	2:05	2:14	2:20	---
2:19	2:28	2:35	2:44	2:50	---
2:49	2:58	3:05	3:14	3:20	---
3:10	3:22	3:29	3:41	3:50	---
3:40	3:52	3:59	4:11	4:20	---
4:10	4:22	4:29	4:41	4:50	---
4:25	4:37	4:44	4:59	5:10	---
4:40	4:52	4:59	5:05	5:25	---
4:50	5:02	5:09	5:24	5:35	---
5:00	5:12	5:19	5:45	5:45	---
5:08	5:20	5:27	5:42	5:53	---
5:14	5:26	5:33	5:45	5:45	6:00
5:29	5:41	5:48	6:00	6:09	---
5:44	5:56	6:03	6:15	6:24	---
6:14	6:25	6:32	6:42	6:50	---
6:46	6:58	7:03	7:13	7:21	---
7:33	7:44	7:51	8:01	8:09	---
8:00	8:20	8:27	8:37	8:45	---
8:48	8:59	9:08	9:16	9:24	---
9:33	9:42	9:49	9:58	10:08	---

Light figures are A.M. Dark figures are P.M.  
Does not stop at Jantzen Beach.

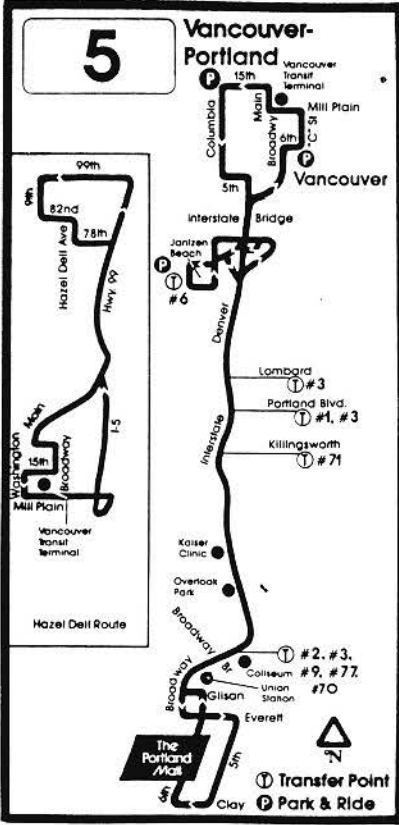


FIGURE 4-2  
TRI-MET LINE 5 PHASE II ROUTE AND SCHEDULE

**TO PORTLAND AND BACK AGAIN, AND AGAIN, AND AGAIN, AND AGAIN, AND AGAIN, AND AGAIN, AND AGAIN, AND AGAIN, AND AGAIN, AND AGAIN, AND AGAIN, AND AGAIN, AND AGAIN, AND AGAIN.**

**EVERY 30 MINUTES.** Now Tri-Met's Line 5 connects with Vancouver Transit more often. Get information at Tri-Met's Customer Assistance Office, 522 S.W. Yamhill. Or call Vancouver Transit at 695-0123.

INTERIOR BUS SIGN

FIGURE 4-3  
 TRI-MET PHASE II ADVERTISING MATERIAL

began to assume from Vancouver Transit the responsibility for transit operation in Vancouver and Clark County.

On November 24, 1980, two new VT routes were established. One extended northward from the Vancouver terminal to Hazel Dell and the other eastward to Vancouver Mall, a major regional shopping center. Conventional (non-express) service was operated on both routes. A 60-car park-and-ride lot was provided at the outermost point of the Hazel Dell route, and a corner of the existing parking lot was made available to transit users at the Vancouver Mall. The two new routes were forerunners of the greatly expanded county-wide transit service which C-TRAN was preparing to initiate several months later.

Two buses were assigned to the Hazel Dell route. They provided half-hour service in the peak periods and hourly service in the off-peak. Convenient connections with TRI-MET Line 5 buses were incorporated into the schedule. The two TRI-MET Line 5 extended runs to the area were discontinued soon after the new service was begun. Whereas the TRI-MET route had terminated at 99th Street, the new route continued northward to 134th Street.

The Vancouver Mall route was operated with one bus which provided hourly service throughout the day. No transit service had existed previously in the area served by the route.

The two route extensions were introduced to the public by running an ad twice in The Columbian. A news story in the same paper preceded the inauguration of the services. The Vancouver Mall management placed a different ad in the paper on two occasions to announce the beginning of regular bus service to their shopping center. Ads were also published five times during January and February in the Hazel Dell News, a weekly supplement to The Columbian which was delivered to over 13,000 households, many of which were not regular subscribers to the paper. The new services were publicized occasionally in regular daily radio spots begun by C-TRAN in the fall of 1980 to disseminate transit information. Stage 1 advertising material is illustrated in Figure 4-4.

#### 4.4 STAGE 2: SUBURBAN EXPRESS SERVICE

On March 2, 1981, while the three buses already in service on the two new routes continued to operate as before, an express bus was added to the Hazel Dell route. This service made three stops in Hazel Dell on Highway 99 and then took the I-5 freeway directly to Portland, bypassing the Vancouver transit terminal. The route was reversed on the return trip. Two runs per day were provided. The morning run arrived at the Portland Mall at 7:35 a.m., and the return trip left the Mall at 5:15 p.m.



FIGURE 4-4  
ROUTE EXTENSION ADVERTISING MATERIAL

The express service was 10 to 15 minutes faster in the morning peak and 20 to 25 minutes faster in the afternoon peak than the combination of the Hazel Dell conventional service and Line 5, but it was also more expensive; a one-way fare of \$2.00 was charged, whereas the total fare of the alternative service was only \$1.00. Monthly passes on the express service were \$70.00, again twice the cost of the alternative. The passes had to be purchased at the downtown Vancouver transit office.

The public was informed of the new express service by a March 1 ad and separate news story in The Columbian, four ads in the Hazel Dell News and occasional announcements during C-TRAN's daily radio spots. Flyers describing the service were distributed prior to its introduction at the downtown Vancouver park-and-ride lot and on board the Hazel Dell buses. Figure 4-5 illustrates the advertising material for the introduction of the express bus and the changes in the express service and fares which were implemented in Stages 3 and 4.

#### 4.5 STAGE 3: EXPRESS SERVICE ROUTE AND FARE ADJUSTMENTS

Effective May 4, 1981, the route of the express service was altered to include a neighborhood loop that was travelled by the regular Hazel Dell bus and had been part of the former TRI-MET route to Hazel Dell. Conventional service on both the Hazel Dell and Vancouver Mall routes continued unchanged. The savings in trip time to and from Portland, in comparison with the alternative conventional service and Line 5, was reduced to 5 to 10 minutes in the morning and 15 to 20 minutes in the afternoon. The express bus trip still took 15 to 20 minutes longer than an equivalent automobile trip, however.

A fare reduction was offered through the sale of punch cards with no limit on validity to replace the time-limited monthly passes. Cards valid for 40 trips and 10 trips sold for \$64.00 (\$1.60 per one-way trip) and \$18.00 (\$1.80 per trip), respectively. The one-way single trip fare remained at \$2.00.

The route change and punch card availability were advertised once in The Columbian, twice in the Hazel Dell News and through the C-TRAN radio spots. Flyers were also distributed at the downtown park-and-ride lot and on board the Hazel Dell buses on the day the changes became effective.

#### 4.6 STAGE 4: EXPRESS SERVICE FARE REDUCTIONS

The fourth and final stage of the second year of the demonstration began in July and continued through October 1981. Fares were lowered once again on the Hazel Dell express. C-TRAN's new

**PUNCHCARDS**

**10 RIDE TICKET**

**C-TRAN  
DEMO EXPRESS**

Reference to Driver on 9th side

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

**40 RIDE TICKET**

**C-TRAN  
DEMO EXPRESS**


Reference to Driver on 9th side

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

**EXPRESS FARE REDUCTION #1**

**HAZEL DELL EXPRESS**

Improved for your convenience



**ROUTED THROUGH YOUR NEIGHBORHOOD**

Effective May 8, 1981 the Vancouver to Portland Express Bus will pick up passengers on the Vancouver Ave loop at the regular Hazel Dell Transfer

<b>SCHEDULE</b>	
Leaves 134th St	8:50 a.m.
9th and 7th Ave	8:55 a.m.
7th and Hwy 99	7:00 a.m.
6th and Hwy 99	7:03 a.m.
Arrives downtown Portland	7:45 a.m.

**CONVENIENT PUNCH TICKETS**

10 Trip Tickets—\$18 / Saves \$2  
40 Trip Tickets—\$64 / Saves \$18

Refer to a monthly pass—  
Trip tickets are good until all trips are taken.

purchase at 1418 Main Street, Vancouver, WA 98660  
OR  
Save by mail

Check and the following coupon to order

10 Main St., Vancouver, WA 98660

**HAZEL DELL EXPRESS**

How did you trip

Express Bus

Transfer

Driver

Card number

Other


Amount of \$

**RADIO SPOT TEXT**

DO YOU LIVE IN HAZEL DELL AND HATE IN PORTLAND AND HATE IN EVERY DAY COMMUTE ABOUT THE TRAFFIC YOU HAVE TO GET TO? WELL, LISTEN TO THIS... VANCOUVER TRANSIT PROUDLY ANNOUNCES EXPRESS... I SAY EXPRESS... SERVICE FROM HAZEL DELL TO THE TRANSIT HALL IN DOWNTOWN PORTLAND. EARLY MORNING COMMUTER SERVICE ARRIVING IN PORTLAND AT 7:15 A.M. AND LEAVING PORTLAND AT 6:15 P.M. CALL VANCOUVER TRANSIT AT 695-0123 FOR MORE INFORMATION ON THIS EXPRESS SERVICE FROM HAZEL DELL TO DOWNTOWN PORTLAND. VANCOUVER TRANSIT...USE IT, IT'S FOR YOU.

**New Express Commuter Bus from Hazel Dell to Portland Starts March 2nd.**

For the commuter who wants to save time and eliminate transfers, try our new "Express" Commuter bus!



The "Express" leaves Hazel Dell Monday through Friday:


- Departs 134th St & Hwy 99 at 8:50 am, with three stops along Hwy 99 at 9th St. at 8:54 am, 7th at 8:57 am and 6th at 8:58 am.
- The "Express" then runs non-stop to the downtown Portland Transit Mall, 5th & Oak at 7:25 am and makes other stops on the mall.
- The "Express" return trip from Portland leaves 5th & Salmon at 5:15 pm with stops along the Portland Transit Mall with non-stop to Hazel Dell.
- One-way fare 12.00
- Monthly passes available.

For additional information call Vancouver Transit 695-0123.

**EXPRESS INTRODUCTION AD**

**HAZEL DELL EXPRESS**

**DISCOUNTED TRIP TICKETS!**



10 Trip Ticket \$16.00  
40 Trip Ticket \$55.00

**HAZEL DELL EXPRESS**

Conveniently routed through your neighborhood

**Saves Time**

Leaves 134th St	8:50 a.m.
9th and 7th Ave	8:55 a.m.
7th and Hwy 99	7:00 a.m.
6th and Hwy 99	7:03 a.m.
Arrives downtown Portland	7:45 a.m.

10 Main St., Vancouver, WA 98660

How did you trip

Express Bus

Transfer

Driver

Card number

Other

Amount of \$

**HAZEL DELL EXPRESS**

10 Main St., Vancouver, WA 98660

How did you trip

Express Bus

Transfer

Driver

Card number

Other

Amount of \$

**EXPRESS FARE REDUCTION #2**

FIGURE 4-5  
HAZEL DELL EXPRESS ADVERTISING MATERIAL

county-wide service, not a part of the demonstration, was introduced on July 6. The Hazel Dell express and the Vancouver Mall service continued to operate as before, but the Hazel Dell conventional service was modified by C-TRAN to add a second residential loop, increase the operating hours, double the midday frequency and decrease slightly the peak period frequencies. The total number of runs of the two buses assigned to the service was increased from 50 to 62 per day.

The price of the 40-trip punch card was lowered to \$55.00 (\$1.38 per trip). The 10-trip card was reduced to \$16.00 (\$1.60 per trip). To make the purchase of the cards more convenient, for nine weeks from August 7 to October 2, a sales person rode the Friday afternoon bus from Portland to Hazel Dell and sold the cards on board.

Stage 4 promotional activities included one ad in The Columbian, C-TRAN radio spots and the distribution of flyers as described above for the Stage 3 route and fare adjustments.





## 5. EFFECTS OF IMPROVEMENTS

The impacts of the improvements in transit service and marketing which were introduced in the demonstration project were measured and evaluated by gathering and analyzing extensive information on transit usage, traffic congestion in the I-5 corridor, community attitudes and awareness of transit, and the operational and financial aspects of the new services. Data were obtained from rider surveys, community surveys, traffic studies, ridership counts and financial and operational results as well as from a variety of other sources, and the evaluation was carried out according to a pre-established program designed to detect significant changes in the above areas.

### 5.1 CHANGES IN TRANSIT DEMAND

The improvements implemented in the demonstration project were designed to attract new riders to transit in the I-5 corridor between Vancouver and Portland as well as on local feeder routes in Vancouver and Clark County. TRI-MET Line 5 and, in the second year of the project, the VT/C-TRAN Hazel Dell express provided transit service in the I-5 corridor. Local service in Clark County was operated first by VT and later by C-TRAN.

#### 5.1.1 TRI-MET Line 5

The growth of Line 5 ridership during the two years of the demonstration was greater than would have been expected solely on the basis of an extrapolation of pre-demonstration trends. If the trend line based on average daily ridership during each month from September 1978 through August 1979 were projected to October 1981, the final month of the demonstration, an average daily ridership of about 1,950 would be expected, other influences being equal and assuming that adequate capacity were available. Actual average daily ridership during that month was 2,306. (A lower projected ridership and, consequently, a more favorable comparison would be obtained from a trend line based on two years of pre-demonstration data, say, instead of one.) Figure 5-1 presents a graphic indication of the ridership growth which was recorded before and during the demonstration.

The rapid increase in Line 5 ridership cannot be attributed only to the demonstration improvements. Although those changes did play an important role, other factors also contributed. According to responses to a rider survey, high gasoline prices and freeway congestion were the most important reasons for choos-

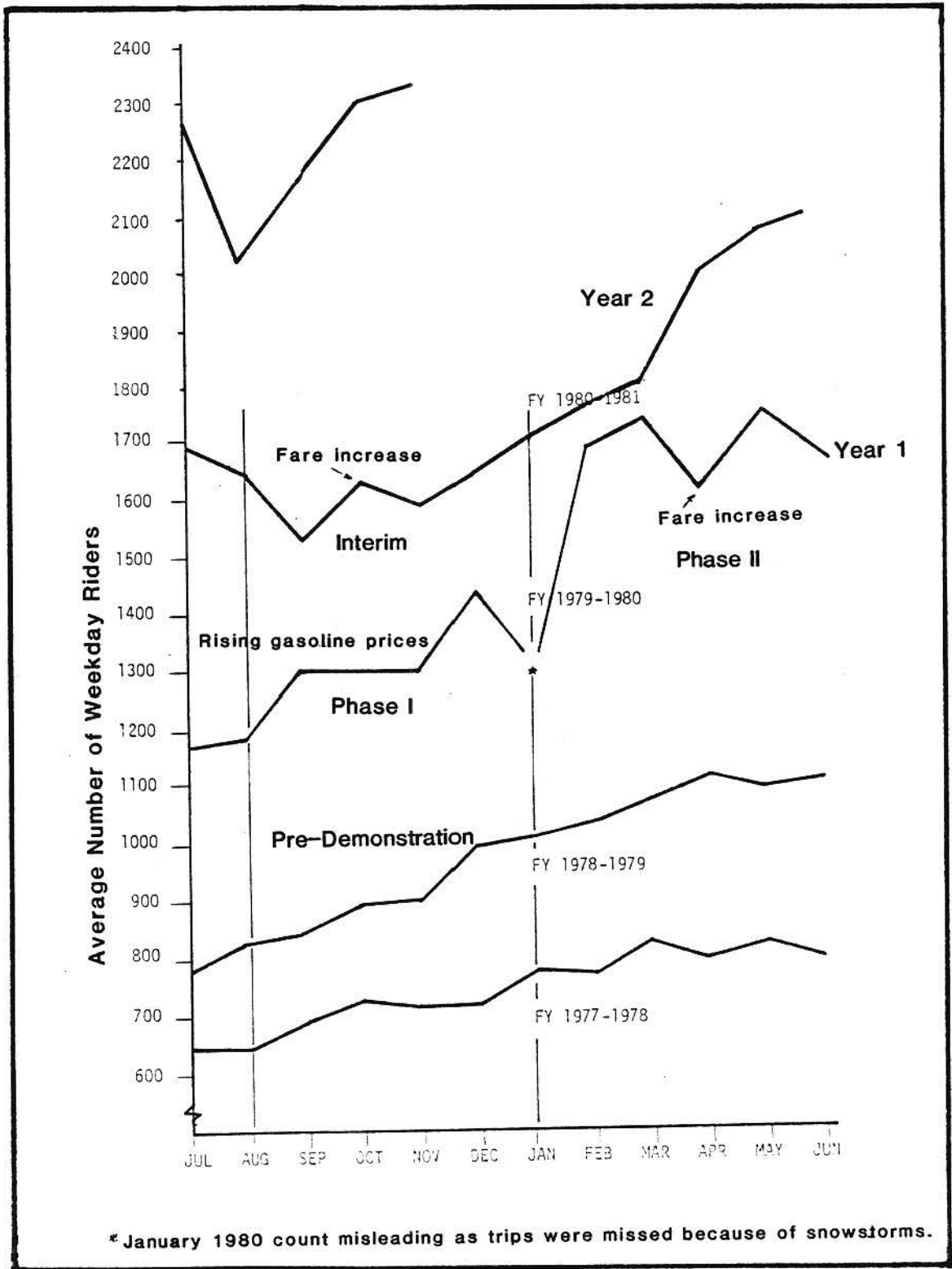


FIGURE 5-1  
 TRI-MET LINE 5 AVERAGE WEEKDAY RIDERSHIP

ing to ride the bus. However, a comparison of Line 5 ridership during the demonstration and the ridership of Lines 3 and 6, two TRI-MET routes in the Oregon portion of the I-5 corridor which were monitored as control routes, would suggest that the Line 5 growth was unique. Line 3 ridership grew slightly during the first year of the demonstration and remained fairly stable thereafter, while Line 6 enjoyed a slight increase during the first year and a substantial decline during the second year.

During Phases I and II of Year 1, Line 5 average weekday ridership rose 42 percent or 3.5 percent per month, increasing from an August 1979 count of 1,179 to 1,669 in June 1980. During the same ten-month period a year earlier, the growth had been 34 percent or 3.0 percent per month. The June 1980 ridership was 52 percent greater than that recorded one year earlier in June 1979.

The greatest first-year increase in Line 5 ridership occurred during Phase I (September through December 1979), when an average monthly rate of growth of 4.9 percent was recorded. (Phase I continued through January 1980, but the ridership counts during that month are misleading since severe snow storms caused abnormal disruptions of service during two weeks of the month.) The monthly growth during Phase II (February through June 1980) dropped to 2.6 percent.

Line 5 demand during the latter months of Phase II was adversely affected by a fare increase, not a part of the demonstration, that was applied to all TRI-MET routes. Without that increase, ridership growth might well have been significantly greater. A second, and larger, fare increase occurred in October 1980, prior to the start of the second year of the project. The second increase appeared to affect ridership less than the first one, however.

Line 5 continued to attract new riders during the second year without any changes in its service, except for the discontinuance of the Hazel Dell trips. Growth during that period averaged about 3.3 percent per month.

The portion of total commute trips in the I-5 corridor made by transit doubled during the demonstration period. By July 1980, morning peak period ridership had increased to an average of 455 passengers. Assuming all peak period riders to be commuters, and based on a Clark County Regional Planning Council estimate that the total number of commuters to Oregon had increased to 12,200, the portion of commuters using transit was calculated at about four percent, in comparison to the pre-demonstration share of two percent. Morning commute ridership increased to 520 per day in July 1981, indicating that the market share was maintained, if not increased, during the second year.

The downtown Vancouver park-and-ride lot played an important role in facilitating the use of Line 5 service. Use of the lot developed slowly and gradually replaced the use of the smaller and less convenient temporary lot. By the end of January, 1980, however, usage of the lot frequently exceeded its design capacity of 106 spaces, with many vehicles being forced to park in the nearby streets. The portion of Line 5 morning peak riders boarding the bus at the lot increased from 10 percent in Phase I to 20 percent in Phase II to 26 percent near the end of Stage 4 of the second year. Many of the park-and-ride lot users (38 percent in Phase II and 39 percent in the second year) were new riders.

### 5.1.2 VT/C-TRAN Services

During the first year of the demonstration, VT ridership continued its historically steady growth. The total ridership for the year ending June 30, 1980 (544,000 passengers) was 18 percent greater than that of the previous year. During the second year, ridership increased at a more rapid rate. A total of 672,000 passengers were transported from July 1980 through June 1981, an increase of 23 percent over the 1979-80 figure. When C-TRAN began its expanded service in July 1981, average weekday ridership jumped from 3,770 in July to 4,200 in October.

Transfers between all VT routes and TRI-MET Line 5 during the first year of the demonstration showed little change from the previous year's rate of 16 percent of Line 5 riders. During the second year, however, 25 percent of the Line 5 passengers transferred to or from the VT/C-TRAN service. Some of this increase occurred during commuter hours. Previously, 17 to 20 percent of the VT morning peak period ridership transferred to Line 5; by September 1981, after the introduction of the new C-TRAN service, this portion had increased to 34 percent.

It can be concluded from these results that the expansion of local service in the Vancouver area contributed to an increase in TRI-MET Line 5 ridership to and from Portland, but, based on the first year results, it would appear that the improvement of Line 5 service had no significant effect on local transit usage in Vancouver.

### 5.1.3 VT/C-TRAN Route Extensions

The two suburban route extensions met with limited success. The Vancouver Mall route, which provided transit service where none had existed before, clearly had a shopping trip ridership and did not exhibit any characteristics of a feeder route to Line 5. Average daily ridership soon reached a plateau of around 100

passengers per day, less than a third of the usage that had been forecast in the planning stage.

The Hazel Dell extension fared somewhat better. After seven weeks of operation, a weekly ridership that fluctuated between 1,100 and 1,200 passengers (220 to 240 riders per day) had been established. When service was expanded in July 1981 with the introduction of the new C-TRAN system, weekly ridership jumped to a range of 1,800 to 2,100 passengers (360 to 420 per day). The average number of riders per service hour--about 10 before the C-TRAN expansion and 12 thereafter--was less than the 20 to 30 riders per service hour normally carried on other VT routes.

In contrast to the Vancouver Mall route, the Hazel Dell route did feed passengers to TRI-MET Line 5. A survey of Line 5 morning peak riders in September 1981 revealed that 18 percent of transfers from C-TRAN, or approximately five percent of all Line 5 morning riders (about 27 passengers), began their trips on the Hazel Dell bus. (Additional riders took the Hazel Dell express directly to Portland.) Before the Hazel Dell route extension was introduced, an average of 32 people had boarded the former TRI-MET run from Hazel Dell.

The park-and-ride lots at the outer ends of the two routes did not appear to attract many riders. The 60-car Hazel Dell lot was seldom more than half filled, and few survey respondents indicated they boarded the bus from the lot. The Vancouver Mall lot was little used since the route served primarily shopping trips to and from the mall.

#### 5.1.4 Hazel Dell Express

The response to the Hazel Dell express service (which provided one morning run to Portland and one return run in the evening) was relatively weak and proved to be quite sensitive to the price charged for the service. Weekly express ridership growth during the three stages of the demonstration and one nine week period after the demonstration is summarized in the following table:

Period	Price		One-Way Riders per Week		
	Discount	Single Trip	Min	Avr	Max
Stage 2	\$70/month	\$2.00	12	18	25
Stage 3	\$64/40 trips	\$2.00	24	33	38
Stage 4	\$55/40 trips	\$2.00	43	57	71
Post-dem.	\$50/40 trips	\$1.50	67	82	102

The Hazel Dell express offered transit riders to Portland an opportunity to evaluate time savings. For a premium fare, they could save eight minutes in the morning and 17 in the afternoon.

Survey responses as well as ridership statistics indicated that many users felt that the time saved was not worth the additional cost. As stated above, up to 27 per day preferred to take the Hazel Dell local service to Vancouver to meet TRI-MET Line 5. Other Line 5 riders drove to the Vancouver terminal.

Apart from the higher fare, other factors also contributed to the low express ridership. These included the inconvenience of purchasing a pass or punch card (except for the once-a-week on-board sales in Stage 4), the lack of an enhanced identity for the express bus and dilution of C-TRAN attention during a time of extensive county-wide service changes. However, as the fare was lowered, ridership increased significantly, indicating that price was a major factor affecting the demand for the express service.

## 5.2 EFFECT ON I-5 CORRIDOR TRAFFIC CONGESTION

The effect of the demonstration improvements on traffic congestion in the I-5 corridor was minimal. Based on the 2,306 daily Line 5 riders reported in September 1981 (including about 520 during the morning peak) plus a few more on the Hazel Dell express, as compared to an expected 1,950 who would have ridden without the demonstration improvements, the number of peak-hour automobile trips which were eliminated probably did not exceed 50 (out of a total of more than 5,000 in the peak direction).

I-5 traffic volumes began to reflect the higher gasoline prices in early 1979, when the annual growth rate, which in previous years had exceeded five percent, became negative. Not until the end of 1980 did positive growth begin again. In June 1981, average weekday traffic reached 113,000 vehicles, about the same as the count for the same month three years earlier.

Peak hour traffic showed almost no variation during the period covered by the demonstration, indicating that most of the variation in traffic volume was registered by non-commute trips. Southbound vehicle occupancy during the morning peak period increased from an average of 1.22 persons to about 1.24, resulting in a savings in vehicle trips somewhat greater than the number saved by the demonstration transit improvements.

## 5.3 OTHER EFFECTS IN I-5 CORRIDOR

Few changes in commute travel patterns as a consequence of the demonstration were detected. Among corridor users (people who travelled at least once a week to Portland), work trips became slightly more frequent and shopping trips slightly less frequent, resulting in a higher percentage of trips being made during the rush hours. As inferred by the vehicle occupancy

statistics above, ridesharing became slightly more common. There was little or no change in the destinations of the users' most frequent trips to Portland.

The incentives which would attract people to transit also showed little change during the course of the demonstration. The three factors most frequently cited before the demonstration--neighborhood service in Vancouver, direct service to more Portland locations and better connections with TRI-MET--remained the most important, although the third became relatively more important than before. About 15 percent of the corridor users surveyed replied that none of the incentives mentioned in the survey would cause them to ride the bus.

The advertising and promotion of the demonstration improvements appeared to have a small impact on community awareness of transit opportunities. In a January 1980 survey of corridor users, 46 percent recalled having seen a newspaper or media ad in the previous six months. In a June 1980 survey at the end of Phase II, only 19 percent did not know if a bus service could be used for their trips, as compared to a pre-demonstration 26 percent. This change was interpreted to reflect a somewhat greater awareness of available transit services. However, 80 percent of the respondents did not know if there had been any changes in bus service between Vancouver and Portland since the previous January. Little of the promotional material was recalled, a fact attributed to a lack of strong transit interest among the target group of the survey. The volume of advertising may also have been insufficient.

#### 5.4 IMPACTS ON TRANSIT OPERATORS

The service improvements introduced during the demonstration project affected the costs, revenues and productivity of TRI-MET, Vancouver Transit and C-TRAN, the operators that provided the services.

##### 5.4.1 TRI-MET Line 5

The impact of the increased capacity and frequency of Line 5 service on TRI-MET costs, revenues and productivity is summarized in Table 5-1. Also reflected in the table are the effects of events unrelated to the demonstration such as higher fuel costs and two fare increases (in April and October 1980).

Ridership growth, although substantial, was not sufficient to offset the higher costs incurred during the demonstration period. The cost per passenger transported increased from \$1.14 during the three months prior to Phase I to \$1.31 during the last

TABLE 5-1

## TRI-MET LINE 5 COSTS AND REVENUES

	Pre- Demo (Jun- Aug 1979)	Phase I (Oct- Dec 1979)	Phase II (Apr- Jun 1980)	Interim (Aug- Oct 1980)	Year 2 (Nov- Oct 1981)
Monthly operating cost	\$29,090	\$36,610	\$58,680	\$66,870	\$67,060
Cost/vehicle hour	21.70	22.50	24.90	25.70	28.40
Cost/vehicle mile	0.76	0.79	0.88	0.90	1.00
Cost/vehicle trip	28.00	31.70	30.50	34.30	34.60
Cost/passenger	1.14	1.18	1.50	1.72	1.31
Monthly revenue	17,000	18,480	25,890	24,830	29,710
Monthly deficit	12,090	18,130	32,790	42,040	37,350
Deficit/trip	11.60	15.70	17.10	21.60	19.20
Deficit/passenger	0.50	0.58	0.84	1.08	0.73
Revenue recovery factor (%)	58	50	44	37	44



three months of the second year of the project. Revenue recovery dropped from 58 percent of costs to 44 percent, and the deficit per passenger rose from \$0.50 to \$0.73 during the same three-month periods.

In spite of the unfavorable differences in the beginning and ending indicators, a favorable trend was established during the second year of the project, with cost per passenger and deficit per passenger showing a decline and revenue recovery an improvement. Had the operating cost increases and the fare increases unrelated to the demonstration not been experienced, Line 5 performance would have improved substantially, perhaps even equaling or surpassing pre-demonstration levels.

#### 5.4.2 VT/C-TRAN Route Extensions

The financial impacts of the two route extensions are summarized in Table 5-2. Operating costs on both routes increased in July 1981 when C-TRAN began its expanded service and part-time drivers could no longer be used. The Hazel Dell route also ran more frequently during midday hours and operated later in the evening, increasing service hours and the number of runs.

The cost per passenger trip on the Hazel Dell route declined substantially as ridership increased, reaching \$2.33 at the end of the demonstration. On the Vancouver Mall route, the cost dropped slightly to \$2.67 until the new operating rules in July 1981 forced it up to \$3.78 per passenger.

During the demonstration, Vancouver Transit (and later C-TRAN) recovered about 11 percent of costs from the farebox. The Hazel Dell extension performed slightly better than the norm, while the Vancouver Mall route recovered less than the norm.

#### 5.4.3 Hazel Dell Express

Table 5-3 shows the financial impact of the Hazel Dell express. The express bus made two round trips per day between Hazel Dell and Portland, travelling 32 miles per round trip and operating 2.7 hours per day. Part-time drivers were employed on the route through June 1981, after which the C-TRAN labor agreement required that full time drivers be used, resulting in a cost increase.

The express service was initially priced so as to cover its operating costs, based on an estimated ridership of 24 passengers per day (12 round trips). It was hoped that the higher fare would not deter potential riders seeking a faster service. However, at the base price, ridership was sufficient to cover only

TABLE 5-2

## ROUTE EXTENSION MARGINAL COSTS AND REVENUES

	Hazel Dell	Vancouver Mall	Total
Monthly operating cost			
Dec 80 - Jun 81	\$13,620	\$7,240	\$20,860
Jul 81 - Oct 81	20,510	8,310	28,820
Cost per vehicle hour			
Dec 80 - Jun 81	27.50	25.30	26.70
Jul 81 - Oct 81	28.00	29.10	28.30
Cost per vehicle mile			
Dec 80 - Jun 81	1.71	1.68	1.70
Jul 81 - Oct 81	1.47	1.93	1.58
Cost per passenger trip			
December 1980	3.90	3.01	3.54
February 1981	2.78	3.34	2.95
April	2.54	2.95	2.67
June	2.70	2.67	2.69
July	2.52	3.78	2.79
August	2.33	3.78	2.62
Monthly revenue			
December 1980			1,450
February 1981			1,840
April			2,280
July	1,960	470	2,430
August	2,230	330	2,560
September	2,890	580	3,470
October	2,150	630	2,780
Revenue recovery factor (%)			
December 1980			7
February 1981			9
April			11
July	10	6	8
August	11	4	9
September	14	7	12
October	10	8	10

TABLE 5-3

## HAZEL DELL EXPRESS 1981 MARGINAL COSTS AND REVENUES

	Base Fare (Mar- Apr)	Reduced Fares		Post- Demo (Nov- Dec)	
		During #1 (May- Jun)	Demonstration #2 (Jul- Aug)		(Sep- Oct)
Monthly operating cost	\$1,012	\$1,012	\$1,234	\$1,234	\$1,234
Cost/vehicle hour	17.04	17.04	20.77	20.77	20.77
Cost/vehicle mile	0.72	0.72	0.88	0.88	0.88
Cost/passenger	12.20	6.10	5.50	4.40	3.30
Monthly revenue:					
Cash	122	140	276	508	442
Passes	35	136	323	449*	546*
Total	<u>157</u>	<u>276</u>	<u>599</u>	<u>957</u>	<u>988</u>
Monthly deficit	855	736	635	277	246
Deficit/bus round trip	19.40	17.60	14.30	8.00	6.50
Deficit/passenger	10.30	4.50	2.80	1.00	0.70
Revenue recovery factor (%)	16	27	49	78**	80**

\*Estimated from total pass sales. Includes all revenue from sale of punch card passes with no time limit on validity, even though many were only partially used during the period in which they were sold.

\*\*Revenue from unused punch card passes contributed substantially to the increase in the revenue recovery factor.

16 percent of the marginal costs of operating the express, and a cost of \$12.20 per passenger trip was incurred.

After the first fare reduction, which provided savings of about 13 percent to punch card purchasers, ridership increased enough to bring the cost per passenger down to \$6.10, and revenue recovery increased to 27 percent of costs. The second fare reduction attracted enough riders during the last two months of the demonstration to drop the cost per passenger to \$4.40. Revenue reported by C-TRAN during that period covered 78 percent of costs, although a significant but undetermined portion of the income was derived from the sale of punch cards (valid for either 10 or 40 rides with no time limit) which were only partially used during the period.

The cash fare throughout the demonstration remained at \$2.00; the fare reductions were achieved through the pricing of the punch card passes, which provided rides at a discount. A post-demonstration price change, which reduced the cash fare to \$1.50 and offered a further punch card discount, increased ridership sufficiently to lower the cost per passenger trip to \$3.30 and recover 80 percent of operating costs. However, unused punch cards again contributed substantially to the reported revenue and falsely increased the revenue recovery factor. Based on the \$1.50 cash fare, a revenue recovery factor of no more than 45 percent rather than the reported 80 percent would be estimated.

## 6. CONCLUSIONS

The primary objective of the demonstration was to reduce traffic congestion in the I-5 corridor through an increase in transit usage. Although the project was successful in achieving a moderate increase in transit ridership between Vancouver and Portland, its impact on traffic congestion was negligible. Other factors, including higher gasoline prices, a slight increase in vehicle occupancy and the congestion itself, had a much greater effect in slowing the growth of traffic on I-5. The decline in traffic which was observed during the demonstration occurred primarily in off-peak hours; peak period traffic remained about the same as before the demonstration.

The success of the Line 5 capacity and frequency improvements was obscured by two TRI-MET fare increases which were not a part of the demonstration and had not been planned for but which occurred during the project. The ridership increases would most likely have been significantly greater, especially during off-peak hours, had the fare increases not occurred.

It can also be concluded that Line 5 commute ridership during the peak periods was somewhat constrained by the available bus capacity, since many buses during the final months of the demonstration carried standing passengers. After the demonstration ended, TRI-MET planned to provide additional capacity on the route through the use of articulated buses.

Only one of the two route extensions in Vancouver had any significant effect in feeding passengers to Line 5 for the journey to Portland. The promotional improvements did result in a moderate increase in transfers from the Vancouver local service to the TRI-MET buses to Portland, however.

A community survey showed that a fare reduction would not be an important factor in a potential rider's decision to use public transit. In contrast to that finding, the Hazel Dell express ridership proved to be very sensitive to price. Potential riders were not willing to pay the premium fare for the time savings which the service provided. Express ridership was much lower than had been projected, although each successive fare reduction resulted in a significant increase in ridership. However, revenues were never sufficient to cover the costs of the service.

The Hazel Dell express experience, when viewed together with the less-than-expected use of the Hazel Dell regular route in combination with TRI-MET Line 5 for trips to Portland, would suggest that, where the automobile is a viable alternative, com-

muters are attracted to transit primarily by low cost direct service, without the inconvenience of transfers.

Promotional activities were important in building transit ridership, but occasional and infrequent advertising appeared to be ineffective. Additional promotion of the Hazel Dell services, as had been originally planned, most likely would have resulted in greater usage.