SEPTA R5 LANSDALE/DOYLESTOWN RAIL LINE PARKING DEMAND STUDY

SUMMARY REPORT

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION

The Bourse Building
111 S. Independence Mall East, Philadelphia, PA 19106

April, 1995

(Amended: June, 1995)

SEPTA R5 LANSDALE/DOYLESTOWN RAIL LINE PARKING DEMAND STUDY

SUMMARY REPORT

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION

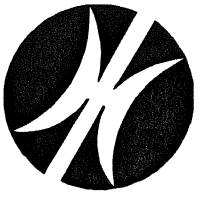
The Bourse Building
111 S. Independence Mall East, Philadelphia, PA 19106

April, 1995

(Amended: June, 1995)

This report, prepared by the Transportation Planning Division of the Delaware Valley Regional Planning Commission, was financed by the Federal Transit Administration. The authors, however, are solely responsible for its findings and conclusions, which may not represent the official views or policies of the funding agency.

Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency which provides continuing, comprehensive and coordinated planning for the orderly growth and development of the Delaware Valley region. The region includes Bucks, Chester, Delaware, and Montgomery counties as well as the City of Philadelphia in Pennsylvania and Burlington, Camden, Gloucester, and Mercer counties in New Jersey. The Commission is an advisory agency which divides its planning and service functions among the Office of the Executive Director, the Office of Public Affairs, and three line Divisions: Transportation Planning, Regional Information Services Center, which includes the Office of Regional Planning, and the Office of Administration and Finance. DVRPC's mission for the 1990s is to emphasize technical assistance and services and to conduct high priority studies for member state and local governments, while determining and meeting the needs of the private sector.



The DVRPC logo is adapted from the official seal of the Commission and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole while the diagonal bar signifies the Delaware River flowing through it. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey. The logo combines these elements to depict the areas served by DVRPC.

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

Publication Abstract

TITLE	Date Published:
SEPTA R5 LANSDALE/DOYLESTOWN RAIL LINE PARKING DEMAND STUDY - *SUMMARY REPORT*	April, 1995 (Amended: June, 1995)
	Publication No.:
	95020

Geographic Area Covered:

BUCKS COUNTY, PA (Bedminster, Buckingham, Doylestown, East Rockhill, Hilltown, New Britain, Plumstead, Warrington, West Rockhill townships, and; Chalfont, Doylestown, Dublin, New Britain, Perkasie, Sellersville, Silverdale, Telford boroughs) and MONTGOMERY COUNTY, PA (Franconia, Hatfield, Horsham, Lower Gwynedd, Lower Salford, Montgomery, Springfield, Towamencin, Upper Dublin, Upper Gwynedd, Whitemarsh, Whitpain, Worcester townships, and; Ambler, Hatfield, Lansdale, North Wales, Souderton, Telford boroughs)

Key Words:

Regional Rail Stations, Parking Demand, Parking Supply, Regional Rail Ridership, Commutershed, Rail Capture Ratio, Journey to Work, Latent Demand for Station Parking, Rail Station Activity Assignment Model

ABSTRACT

At the request of SEPTA, the Delaware Valley Regional Planning Commission (DVRPC) examined current and future parking demand at 17 regional rail stations along the Lansdale/Doylestown (R5) rail line between the North Hills Station in Montgomery County and the Doylestown Station in Bucks County. The study's methodology included collecting data on recent services, facilities and patronage, defining the commutershed for the corridor, determining the ridership capture ratio of the rail line, and estimating latent and future demand components for the line for the purposes of projecting future ridership and parking demands.

For More Information Contact:

Delaware Valley Regional Planning Commission
Regional Information Services Center
The Bourse Building
111 S. Independence Mall East
Philadelphia, PA 19106-2515
(215) 592-1800

TABLE OF CONTENTS

page

EXECUTIVE OVERVIEW . . . . . EO 1

I. INTRODUCTION 1

II. EXISTING CONDITIONS 1
- SERVICES AND FACILITIES 1
- STUDY AREA/COMMUTERSHED 5
  - Primary Study Area 7
  - Secondary Study Area 12
- RAIL CAPTURE RATIO 14

III. FUTURE CONDITIONS 18
- METHODOLOGY 18
- BASE CONDITIONS 19
- LATENT DEMAND FOR STATION PARKING 19
- FUTURE DEMAND 20
  - Trend Growth Scenario 20
  - High Growth Scenario 25

IV. ASSESSMENT OF FUTURE CONDITIONS 28
- RIDERSHIP 28
- PARKING 28

V. CONCLUSIONS 33

APPENDIX . . . . . follows page 33

LIST OF TABLES

page

1. SELECTED SERVICE CHARACTERISTICS OF THE R5 LINE 2

2. HISTORICAL VIEW OF DAILY BOARDINGS ALONG THE R5 LINE 3

3. STATION PARKING CHARACTERISTICS ALONG THE R5 LINE 4

4. STATION PARKING CHARACTERISTICS ALONG THE R5 LINE 6

5. NUMBER OF MATCHED PASSENGER/LICENSE PLATE SURVEYS ALONG THE R5 LINE 13

6. 1990 RAIL CAPTURE RATIO IN PRIMARY STUDY AREA 15

7. MUNICIPAL LATENT DEMAND ESTIMATES WITHIN THE PRIMARY STUDY AREA 21

8. 2005 and 2020 RAIL RIDERSHIP ESTIMATES IN PRIMARY STUDY AREA 23

9. COMPARISON OF A.M. PEAK PERIOD BOARDINGS ALONG THE R5 LINE 26

10. COMPARISON OF DAILY BOARDINGS ALONG THE R5 LINE 27

11. ESTIMATES OF DAILY BOARDINGS ALONG THE R5 LINE (Trend Growth Scenario) 29

12. ESTIMATES OF DAILY BOARDINGS ALONG THE R5 LINE (High Growth Scenario) 30

13. ESTIMATES OF STATION PARKING DEMAND ALONG THE R5 LINE (Trend Growth Scenario) 31

14. ESTIMATES OF STATION PARKING DEMAND ALONG THE R5 LINE (High Growth Scenario) 32

LIST OF FIGURES

page

1. PRIMARY STUDY AREA 8

2. GENERALIZED SHED AREAS (For Highlighted Stations) 9

3. GENERALIZED SHED AREAS (For Highlighted Stations) 10

4. GENERALIZED SHED AREAS (For Highlighted Stations) 11

5. SEPTA'S CAPTURE RATIO 17

EXECUTIVE OVERVIEW

At the request of SEPTA, the Delaware Valley Regional Planning Commission (DVRPC) examined current and future parking demand at 17 regional rail stations along the Lansdale/Doylestown (R5) rail line between the North Hills Station in Montgomery County and the Doylestown Station in Bucks County. The study's methodology included collecting data on recent services, facilities and patronage, defining the commutershed for the corridor, determining the ridership capture ratio of the rail line, and estimating latent and future demand components for the line for the purposes of projecting future ridership and parking demands.

EXISTING CONDITIONS

According to September 1994 SEPTA parking data, representative of a typical weekday, R5 Line parking lots were operating at 83 percent of capacity (1,802 of 2,178 spaces were occupied). While there was surplus parking capacity along the line, many key stations such as Lansdale, North Wales and Fort Washington were operating at or above capacity. From a perspective of fare zones along the line, the September 1994 parking data indicates that fare zone 5 (Doylestown to Pennbrook) has an overall parking space utilization of 92 percent, fare zone 4 (North Wales to Pennlyn) has a parking space utilization rate of 106 percent while fare zone 3 (Ambler to North Hills) maintains a 66 percent parking space utilization rate.

SEPTA conducted passenger surveys or license plate surveys at thirteen stations along the line during 1991 and 1992. From the survey effort it was possible to identify the primary commutershed of the R5 Rail Line as 36 municipalities surrounding the line. Within Montgomery County's portion of the study corridor there are 19 municipalities, within Bucks County there are 17 municipalities. The survey responses also related the contribution of each municipality to parking demand at a station. This information proved fundamental in developing the Rail Station Activity Assignment Model used for estimating future ridership and parking demands in this study.

Definition of the primary study area, in the manner described above, also allowed the use of 1990 Census Journey to Work data to ascertain SEPTA regional rail's capture ratio of all work trips to Center City Philadelphia. The portion of the primary study area within Montgomery County contributes about five times the amount of daily work trips commuting by rail than are generated in the Bucks County portion. However, the overall capture ratios for the counties are about equal. Overall 38 percent of the study area commuters to the Philadelphia CBD use the regional rail system.

FUTURE CONDITIONS

SEPTA's on-going station parking expansion program proposes that an additional 1,060 spaces be constructed at five stations along the R5 Line over the next two years (Doylestown - 100 spaces, Colmar - 225 spaces, Lansdale - 350 spaces, North Wales - 200 spaces and Fort Washington - 185 spaces). If parking demand were to remain at current levels, the proposed additional supply would eliminate existing parking constraints in fare zone 5 and would relieve existing parking shortages in fare zone 4.

However, growth in parking demand at the stations is expected to occur over time, and this study accounts for two components of growth. They are:

- Existing latent demand - new ridership and parking demand resulting from the proposed parking expansions at Doylestown, Colmar, Lansdale, North Wales and Fort Washington stations, and;
- Background growth - new ridership and parking demand emanating from increased residential development along the R5 Line.

In order to prepare future station activity estimates, a special planning tool was created for this study -- the Rail Station Activity Assignment Model. The Rail Station Activity Assignment Model was developed to provide sketch planning responses for sensitivity analyses, taking current regional rail service levels and ridership characteristics into account. The model is a stepped procedure incorporating both latent demand (where appropriate) and background growth components into future conditions.

Existing latent demands were estimated guided by municipal capture ratios, and actual parking demand changes occurring at the Ambler Station after a SEPTA parking expansion was completed. As a result of latent demand, an approximate 10 percent increase in parking demand is projected for the five SEPTA stations proposed for expansion.

Two scenarios for background growth were estimated for two planning horizons (2005 and 2020). The Trend Growth Scenario and the High Growth Scenarios use different indicators for projecting rail activity change within the study area.

- Trend Growth rates are based upon population and employment forecasts as well as preliminary transit ridership data from DVRPC's travel simulation model. By 2005, rail commutation between the study area and Center City is expected to increase 11 percent; by 2020, it will be approximately 25 percent higher than 1990 levels (illustrating gains of about 0.7 percent per year).
- For the High Growth Scenario, background growth rates are based upon actual station activity trends. A review of ridership displayed a decline in transit usage along the R5 since 1990, largely attributable to the adverse affects of the RailWorks® construction project. However, according to the most recent parking data, and subsequent to the resumption of normal train operations after RailWorks® was completed, there was a 1.3 percent increase in parking demand between 1993 and 1994. The High Growth Scenario is based on this observation, in effect, approximately doubling the Trend Growth rate.

FINDINGS

By the Year 2005, projected total demand for parking at the 17 regional rail stations along the Lansdale/Doylestown Rail Line will be in the range of 2,146 (Trend Growth) to 2,382 (High Growth) vehicles on a typical weekday. These figures represent an increase of 344 to 580 vehicles over current levels. If no additional parking is provided, Year 2005 parking demand will exceed existing parking availability at almost all R5 stations. On the other hand, if SEPTA's parking expansion program is implemented, the line will have enough total spaces to meet the increased demand (parking occupancies between 66 percent and 74 percent are calculated). Still -- parking demand within fare zone 4 (and especially at the North Wales and Gwynedd Valley stations) will continue to operate between constrained and over-capacity conditions (parking occupancies of 96 percent to 108 percent). As many as 125 additional parking spaces should be considered to supplement the programmed supply of expansion spaces within fare zone 4.

By the Year 2020, typical weekday maximum parking demands will increase to between 2,466 and 3,002 vehicles -- an addition of 644 to 1,200 vehicles above today's demand. With an expected total of 3,238 spaces available, overall parking demand along the line will operate between 76 percent (assuming the Trend Growth Scenario) to 93 percent (assuming the High Growth Scenario) of parking capacity. One-half to three-quarters of the stations within fare zones 4 and 5 will experience parking supply shortages. The abundance of parking supply proposed for the Lansdale Station will mitigate parking conditions within fare zone 5 such that overall parking utilization rates between 69 percent and 91 percent are expected. Projected parking utilization rates within fare zone 4 will range between 111 percent and 137 percent with all stations' proposed parking supply exceeded. To fully satisfy projected Year 2020 parking needs, SEPTA's currently programmed supply of expansion parking should be increased by 350 spaces within fare zone 4.

I. INTRODUCTION

SEPTA commissioned DVRPC to examine regional rail station parking demand along the Lansdale/Doylestown (R5) rail line between the North Hills Station, in Montgomery County, and the Doylestown Station, in Bucks County. The study's methodology included collecting data on recent services, facilities and patronage, defining the commutershed for the corridor, determining the ridership capture ratio of the rail line, and estimating latent and future demand components for the line for the purposes of projecting future ridership and parking demands.

II. EXISTING CONDITIONS

The baseline for the study's analysis is set between 1990 and 1994 because of the availability of journey to work information from the 1990 Census, SEPTA station boarding counts (1990, 1991 and 1993), rider and license plate survey data (1991 and 1992), and SEPTA parking lot count data (1993 and 1994). Where possible historical comparisons of data are presented to illustrate recent trends.

SERVICES AND FACILITIES

Table 1 summarizes selected line service characteristics according to the R5 schedule effective October 28, 1990.[1]

Table 2 presents an historical account of daily inbound boardings between 1986 and 1991 and for 1993 at each of the stations. Examination of those trends indicates that line ridership peaked in 1988. Outbound station boardings are shown only for 1993 and represent only about five percent of the inbound volume.

Table 3 illustrates the supply and demand for parking at the study area's 17 stations during the Spring of 1993 and 1994 according to SEPTA Rail Utilization Report data. While the overall rail segment experienced a parking supply surplus of 15 percent in 1993 closer examination of many of the line's more attractive stations[2] indicate that they are at capacity. A case in point is the Ambler Station during 1993.

---

[1] Service characteristics from the October 28, 1990 schedule are provided for their applicability to journey to work information from the 1990 Census.

[2] Note: attractive stations as referenced here connotes those stations having higher passenger levels and parking supplies in response to such factors as: highway access to the station, location within fare zone and/or frequency of rail service provided to the station.

TABLE 1: SELECTED SERVICE CHARACTERISTICS OF THE R5 LINE, OCTOBER 28, 1990

Station	Inbound Service					
	Fare Zone	Trains per AM Peak	Trains per Midday	Mi to C.C.	AM Peak Travel Time (minutes)	AM Peak Travel Speed (mph)
DOYLESTOWN	5	4	7	34.7	76.0	27.4
DEL. VAL. COLLEGE	5	4	7	33.1	73.8	26.9
NEW BRITAIN	5	4	7	31.8	70.8	26.9
CHALFONT	5	4	7	30.0	65.8	27.4
LINK BELT	5	4	7	27.7	62.5	26.6
COLMAR	5	4	7	27.1	59.5	27.3
FORTUNA	5	4	7	26.2	57.5	27.3
LANSDALE	5	11	13	24.8	55.9	26.6
PENNBROOK	5	8	13	24.0	55.6	25.9
NORTH WALES	4	11	13	22.9	50.6	27.2
GWYNEDD VALLEY	4	8	13	20.5	49.5	24.8
PENLLYN	4	8	13	19.3	46.5	24.9
AMBLER	3	11	13	17.7	41.9	25.3
FT. WASHINGTON	3	11	13	16.4	39.0	25.2
FELLWICK	3	7	13	15.3	40.0	23.0
ORELAND	3	7	13	14.3	37.0	23.2
NORTH HILLS	3	8	13	13.5	35.0	23.1

source: SEPTA R5 schedule, effective 10/28/1990 (service characteristics shown for their applicability to the 1990 Census)

TABLE 2: HISTORICAL VIEW OF DAILY BOARDINGS ALONG THE R5 LINE, 1986 to 1991 and 1993

	Fall 1986	Fall 1987	Fall 1988	Fall 1989	Fall 1990	Fall 1991	Fall 1993	
Station	Inbound	Inbound	Inbound	Inbound	Inbound	Inbound	Inbound	Outbound
DOYLESTOWN	175	163	285	212	236	209	290	0
DEL. VAL. COLLEGE	34	22	15	14	20	21	13	1
NEW BRITAIN	32	13	31	24	16	23	38	2
CHALFONT	85	75	93	105	90	86	101	5
LINK BELT	0	0	50	35	31	26	19	0
COLMAR	79	73	123	104	146	109	137	1
FORTUNA	43	31	62	39	34	63	72	0
LANSDALE	765	726	836	707	645	634	659	16
PENNBROOK	145	155	169	117	122	81	81	4
NORTH WALES	479	604	499	491	549	561	549	11
GWYNEDD VALLEY	146	135	143	130	147	135	131	3
PENLLYN	120	225	106	101	107	97	101	5
AMBLER	686	801	749	655	652	661	659	35
FT. WASHINGTON	350	458	561	759	463	461	458	44
FELLWICK	12	13	25	13	12	14	10	4
ORELAND	261	241	201	274	236	190	175	22
NORTH HILLS	202	166	214	158	143	140	122	17
TOTAL	**3,614**	**3,901**	**4,162**	**3,938**	**3,649**	**3,511**	**3,615**	**170**

source: SEPTA Regional Rail Ridership Census statistics (1992 data unavailable due to Rail Works construction project)

TABLE 3: STATION PARKING CHARACTERISTICS ALONG THE R5 LINE, Spring 1993 and Spring 1994

Station	Daily Parking Fee	Number of Spaces Spring 1993	Spaces Utilized Spring 1993	% Utilized Spring 1993	Number of Spaces Spring 1994	Spaces Utilized Spring 1994	% Utilized Spring 1994
DOYLESTOWN	$0.50	105	87	83%	105	87	83%
DEL. VAL. COLLEGE	$0.00	6	4	67%	6	4	67%
NEW BRITAIN	$0.50	39	10	26%	39	21	54%
CHALFONT	$0.50	50	50	100%	50	48	96%
LINK BELT	---	---	---	---	---	---	---
COLMAR	$0.50	85	85	100%	87	87	100%
FORTUNA	$0.50	30	30	100%	30	30	100%
LANSDALE	$0.50	192	192	100%	192	192	100%
PENNBROOK	$0.50	88	50	57%	88	40	45%
NORTH WALES	$0.50/$10 Monthly	387	340	88%	392	392	100%
GWYNEDD VALLLEY	$0.50	104	94	90%	100	100	100%
PENLLYN	$0.00	39	39	100%	39	36	92%
AMBLER	$0.50/$10 Monthly	349	349	100%	588	382	65%
FT. WASHINGTON	$0.50/$10 Monthly	186	186	100%	186	186	100%
FELLWICK	---	---	---	---	---	---	---
ORELAND	$0.50/$10 Monthly	143	109	76%	147	61	41%
NORTH HILLS	$0.50	147	42	29%	147	51	35%
TOTAL		**1,950**	**1,667**	**85%**	**2,196**	**1,717**	**78%**

source: SEPTA Rail Utilization Report data

Table 3 also points to the consequences of adding 239 parking spaces at the Ambler Station between the Spring 1993 and the Spring of 1994. Parking utilization at the Ambler Station declined to 65 percent even while demand rose by 33 parked cars (plus 9.5 percent). Similarly, the overall line's parking supply surplus increased to 22 percent in 1994 because of the Ambler parking expansion. Between the Spring of 1993 and the Spring of 1994, there had also been a net increase of 50 parked cars at the study area train stations, representing an overall demand increase of about three percent.

Table 4 presents parking data collected during September 1994, obtained from SEPTA's Planning and Development Department. In contrast to the Spring 1994 data, The September 1994 counts show that excess demands for parking spaces are present at the North Wales, Gwynedd Valley, and Fort Washington stations and that the overall rail segment may, in fact, only be experiencing parking surpluses on the order of 17 percent.

From a perspective of fare zones along the line, the September 1994 parking data indicates that fare zone 5 has an overall parking space utilization of 92 percent, fare zone 4 has a parking space utilization rate of 106 percent while fare zone 3 maintains a 66 percent parking space utilization rate.

STUDY AREA/COMMUTERSHED

SEPTA conducted passenger surveys at the Colmar Station in March 1991 and at the Fort Washington Station in March 1992. Additionally, in December 1992, surveys of parked vehicle license plates were conducted at 11 other stations along the R5 line. Delaware Valley College, New Britain, Link Belt and Fellwick stations were not included in either of the survey efforts. In regard to excluding the latter stations -- ridership is low and few parkers are observed at the stations.

From the survey effort a total of 1,325 data records (license plate and/or passenger surveys) were collected, tabulated and analyzed[3]. The analysis focused initially on the distribution of the data records based upon postal zip codes for generalizing the R5's market area.[4] From the analysis of the zip codes it was determined that 1,123 of the data records, or about 85 percent of the surveyed users, come from the primary study area. A total of 202 records were associated with addresses outside the primary study area.

[3] It should be pointed out that the customer surveys reflect riders who are using the regional rail line for all trip purposes and all destinations served by the line.

[4] Subsequent address matching was accomplished to more clearly define the service's shed on a municipal basis. Address matching, and its ramification in this effort, will be more fully explained later in this report.

TABLE 4: STATION PARKING CHARACTERISTICS ALONG THE R5 LINE, Spring 1993 and September 1994

Station	Daily Parking Fee	Number of Spaces Spring 1993	Spaces Utilized Spring 1993	% Utilized Spring 1993	Number of Spaces Sept. 1994	Spaces Utilized Sept. 1994	% Utilized Sept. 1994
DOYLESTOWN	$0.50	105	87	83%	90	79	88%
DEL. VAL. COLLEGE	$0.00	6	4	67%	---	---	---
NEW BRITAIN	$0.50	39	10	26%	39	17	44%
CHALFONT	$0.50	50	50	100%	50	50	100%
LINK BELT	---	---	---	---	---	---	---
COLMAR	$0.50	85	85	100%	87	87	100%
FORTUNA	$0.50	30	30	100%	29	29	100%
LANSDALE	$0.50	192	192	100%	196	196	100%
PENNBROOK	$0.50	88	50	57%	88	76	86%
NORTH WALES	$0.50/$10 Monthly	387	340	88%	392	421	107%
GWYNEDD VALLLEY	$0.50	104	94	90%	100	104	104%
PENLLYN	$0.00	39	39	100%	39	39	100%
AMBLER	$0.50/$10 Monthly	349	349	100%	588	398	68%
FT. WASHINGTON	$0.50/$10 Monthly	186	186	100%	186	196	105%
FELLWICK	---	---	---	---	---	---	---
ORELAND	$0.50/$10 Monthly	143	109	76%	147	63	43%
NORTH HILLS	$0.50	147	42	29%	147	47	32%
TOTAL		**1,950**	**1,667**	**85%**	**2,178**	**1,802**	**83%**

source: parking lot checks from September 1994 obtained from Planning & Development, SEPTA

Primary Study Area

The immediate study area consists of 19 municipalities in Montgomery County and 17 municipalities in Bucks County which were determined to be the primary commutershed of the R5 Lansdale/Doylestown line (Figure 1). Working quality station shed area maps within the primary study area were prepared based upon the zip codes encompassing the tabulated responses. Analysis of those maps served as the basis for the following discussion.

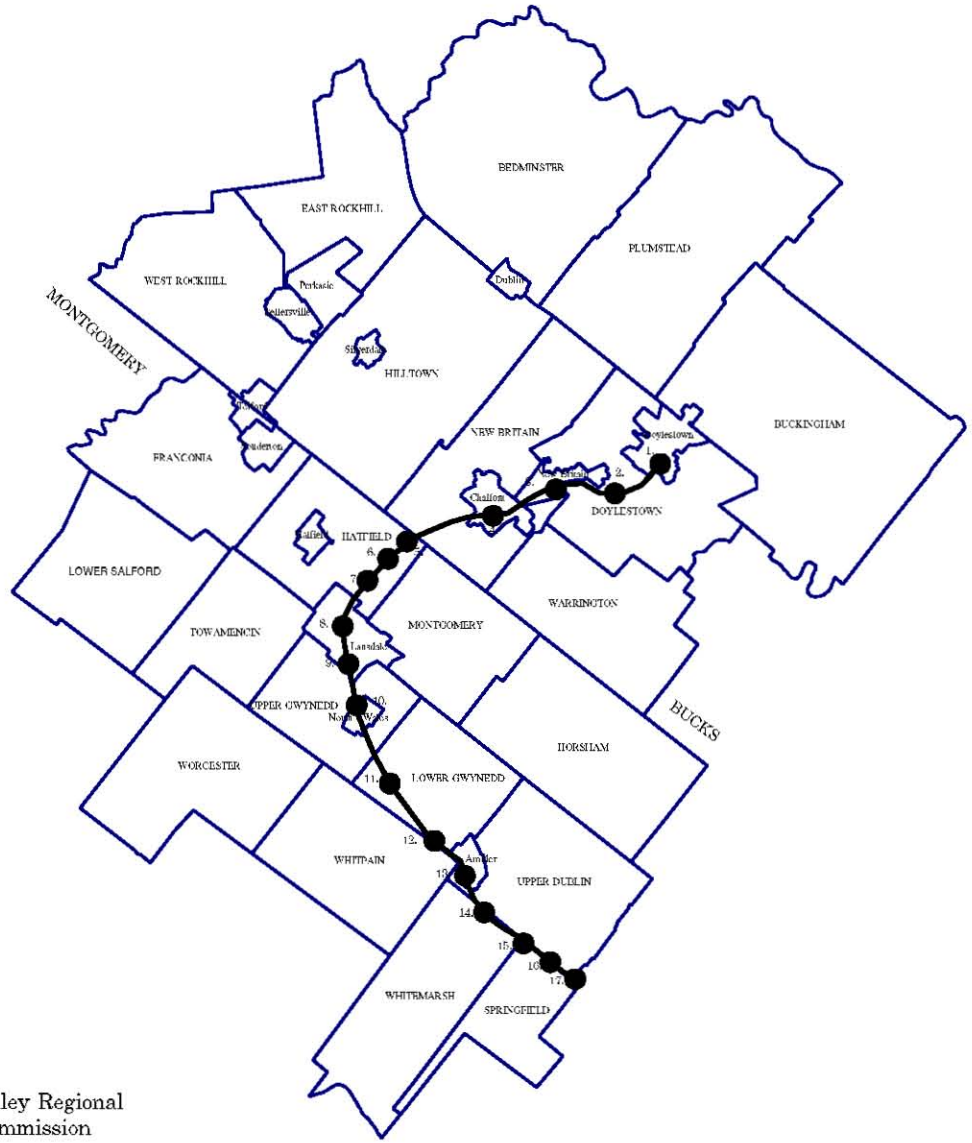
The four highest patronized stations along the R5 line accommodate the highest share of primary study area commuters. Riders from within the primary study area using the Lansdale Station represented 141 records (or approximately 11 percent of the tabulated surveys) and generally originated in zip codes covering Hatfield (most), Lower Salford and Towamencin townships and Lansdale Borough. Primary study area riders using the North Wales Station totaled 182 respondents (or an estimated 14 percent of the surveyed ridership) and come predominantly from the post offices serving Montgomery, Upper Gwynedd and Towamencin townships, as well as the boroughs of Lansdale and North Wales. At the Ambler Station, which represents 252 survey data records (or 19 percent of the surveyed ridership), most riders come from and are fairly evenly spread over the post offices serving Whitpain, Horsham and Lower Gwynedd townships and Ambler Borough. At the Fort Washington Station, primary study area riders account for 170 data records (or about 13 percent of the surveyed ridership totals), and originate in zip codes serving Upper Dublin (predominantly), Horsham and Whitemarsh townships.

Graphical representations of the R5 line's station shed areas, within the boundaries of the primary study area, are shown on Figures 2, 3 and 4 (the groupings of train stations, shown on the figures, generally conform with, though do not exactly match, fare zones along the line). In each case, the station shed area encompasses the postal zip code(s) from which a plurality of station patrons originated, according to the tabulated responses of the customer surveys.

It must be pointed out that address matching was subsequently performed on all the responses tabulated within the primary study area for all the surveyed stations except the Doylestown Station[5]. Address matching provides a more exact method of determining the municipality from which the customer originated. Establishing the most precise relationship between municipality of residence and rail station patronized is critical in estimating future station activity. The Rail Station Activity Assignment Model, developed for this study to provide this information, is more fully explained in Section III ("Future Conditions") of this report.

[5] The Doylestown Station shed area was estimated based upon the distribution of survey responses by postal zip code.

FIGURE 1.
PRIMARY STUDY AREA



R5 STATIONS

1. DOYLESTOWN
2. DEL VAL. COL. (F)
3. NEW BRITAIN
4. CHALFONT
5. LINK BELT (F)
6. COLMAR
7. FORTUNA
8. LANSDALE
9. PENNBROOK
10. NORTH WALES
11. GWYNEDD VAL.
12. PENLLYN
13. AMBLER
14. FORT WASHINGTON
15. FELLWICK (F)
16. ORELAND
17. NORTH HILLS

(F) FLAG STATION

SCHEMATIC NOT TO SCALE

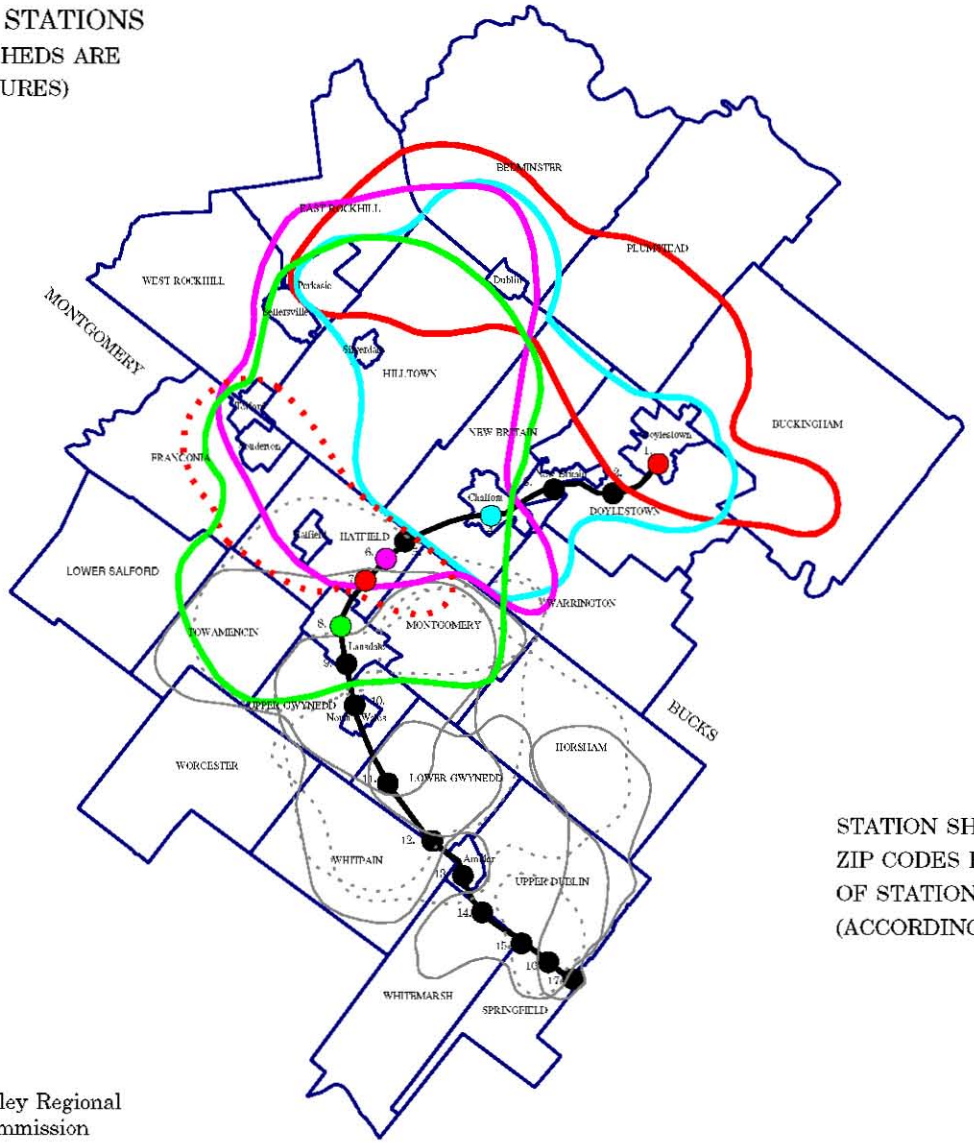
Delaware Valley Regional
Planning Commission
APRIL, 1995

FIGURE 2.

GENERALIZED SHED AREAS

FOR HIGHLIGHTED STATIONS

(ALTERNATE STATION SHEDS ARE SHOWN ON OTHER FIGURES)



R5 STATIONS

1. DOYLESTOWN
N.A. 2. DEL VAL. COL. (F)
N.A. 3. NEW BRITAIN
4. CHALFONT
N.A. 5. LINK BELT (F)
6. COLMAR
7. FORTUNA
8. LANSDALE
9. PENNBROOK
10. NORTH WALES
11. GWYNEDD VAL.
12. PENLLYN
13. AMBLER
14. FORT WASHINGTON
N.A. 15. FELLWICK (F)
16. ORELAND
17. NORTH HILLS

(F) FLAG STATION

N.A. NOT SURVEYED

STATION SHED AREAS ENCOMPASS THE ZIP CODES FROM WHICH THE MAJORITY OF STATION PATRONS ORIGINATED (ACCORDING TO TOTAL SURVEYS TABULATED).

SCHEMATIC NOT TO SCALE

Delaware Valley Regional Planning Commission

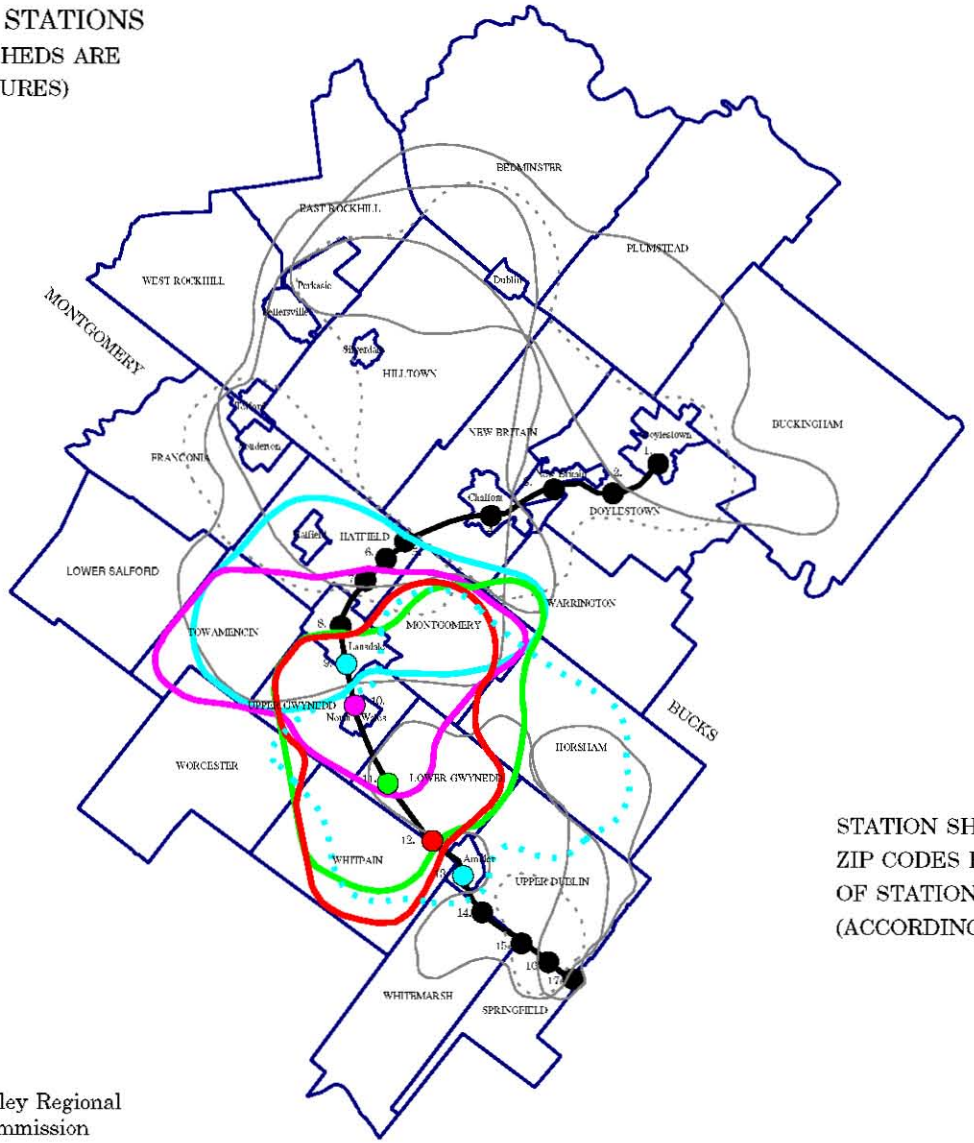
APRIL, 1995

FIGURE 3.

GENERALIZED SHED AREAS

FOR HIGHLIGHTED STATIONS

(ALTERNATE STATION SHEDS ARE SHOWN ON OTHER FIGURES)



R5 STATIONS

- 1. DOYLESTOWN
- N.A. 2. DEL VAL. COL. (F)
- N.A. 3. NEW BRITAIN
- 4. CHALFONT
- N.A. 5. LINK BELT (F)
- 6. COLMAR
- 7. FORTUNA
- 8. LANSDALE
- 9. PENNBROOK
- 10. NORTH WALES
- 11. GWYNEDD VAL.
- 12. PENLLYN
- 13. AMBLER
- 14. FORT WASHINGTON
- N.A. 15. FELLWICK (F)
- 16. ORELAND
- 17. NORTH HILLS

(F) FLAG STATION

N.A. NOT SURVEYED

STATION SHED AREAS ENCOMPASS THE ZIP CODES FROM WHICH THE MAJORITY OF STATION PATRONS ORIGINATED (ACCORDING TO TOTAL SURVEYS TABULATED).

SCHEMATIC NOT TO SCALE

Delaware Valley Regional Planning Commission

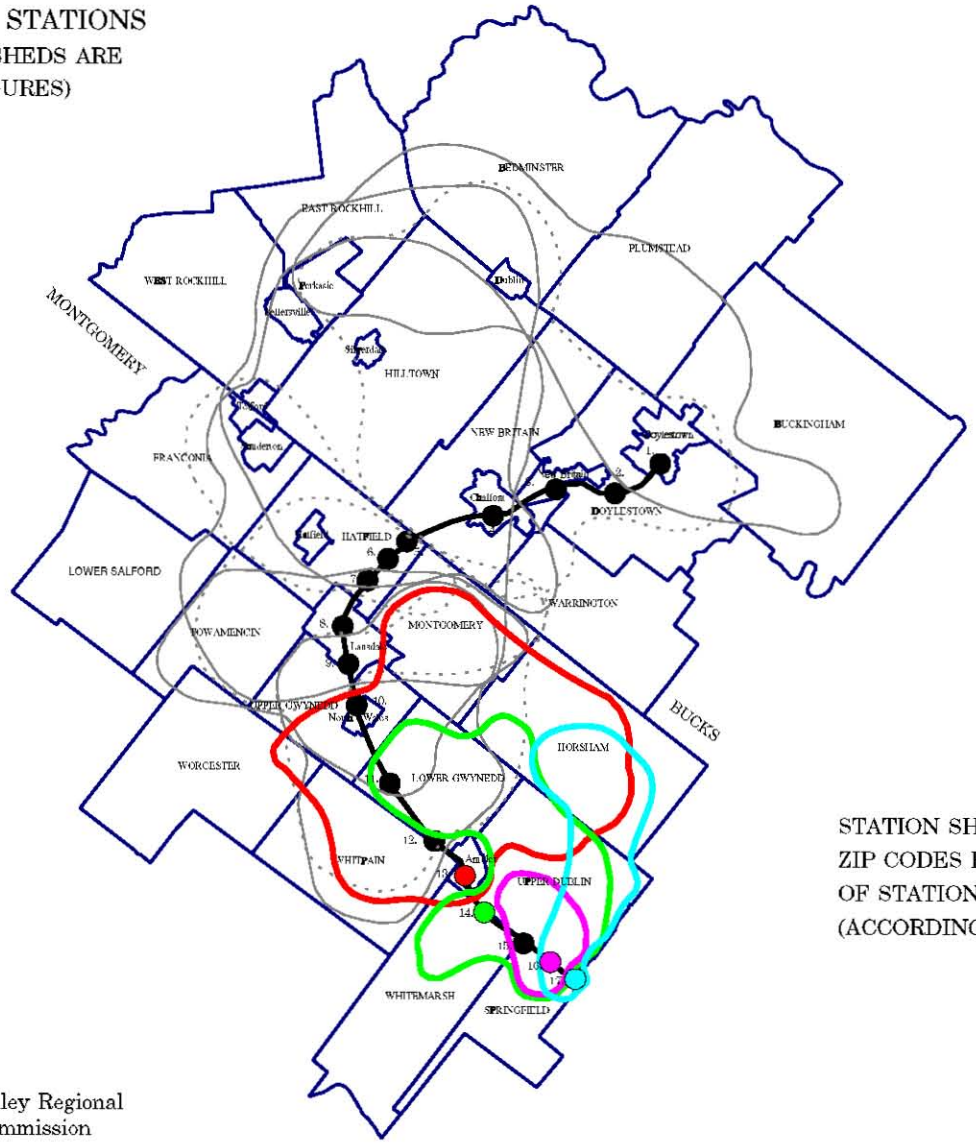
APRIL, 1995

FIGURE 4.

GENERALIZED SHED AREAS

FOR HIGHLIGHTED STATIONS

(ALTERNATE STATION SHEDS ARE SHOWN ON OTHER FIGURES)



R5 STATIONS

- 1. DOYLESTOWN
- N.A. 2. DEL VAL. COL. (F)
- N.A. 3. NEW BRITAIN
- 4. CHALFONT
- N.A. 5. LINK BELT (F)
- 6. COLMAR
- 7. FORTUNA
- 8. LANSDALE
- 9. PENNBROOK
- 10. NORTH WALES
- 11. GWYNEDD VAL.
- 12. PENLLYN
- 13. AMBLER
- 14. FORT WASHINGTON
- N.A. 15. FELLWICK (F)
- 16. ORELAND
- 17. NORTH HILLS

(F) FLAG STATION

N.A. NOT SURVEYED

STATION SHED AREAS ENCOMPASS THE ZIP CODES FROM WHICH THE MAJORITY OF STATION PATRONS ORIGINATED (ACCORDING TO TOTAL SURVEYS TABULATED).

SCHEMATIC NOT TO SCALE

Delaware Valley Regional Planning Commission

APRIL, 1995

Table 5 lists the total number of passenger/license plate surveys, within the primary study area, which were capable of being "address matched" (total 951[6]). Table 5 also compares the number of matchable responses to Fall 1991 station boarding levels and Spring 1993 parking demands. As can be seen in the table there is a reasonably consistent relationship when comparing the number of matched responses to the parking demands at individual stations (between 45 percent and 75 percent). Additionally, the number of tabulated responses reflect between 15 percent and 45 percent of daily station boardings at any given station and about 28 percent of the surveyed stations' total ridership.

Exhibit A in the APPENDIX summarizes the results of this study's address matching component.

Secondary Study Area

Approximately 81 of the total tabulated survey records (or an estimated 6 percent of the study rail segment riders) originated in zip codes outside the primary study area, areas which might be considered secondary markets -- those with potential for additional riders. Examples include: post offices serving lower Lehigh County - 25 records (Allentown - 12, Coopersburg - 7), zip codes covering lower Northampton County - 18 records (Bethlehem - 12, Easton - 2), lower Berks County post offices - 4 records, upper Bucks County zip codes - 12 records, and post offices serving upper Montgomery County - 22 records. Favored stations used by the Lehigh and Northampton riders are Colmar and Lansdale (the latter station is also favored by the riders from Berks County). Riders from upper Bucks County prefer to use the Doylestown Station, while upper Montgomery County patrons were most frequently found at the Lansdale and North Wales stations.

About 121 data records (or an estimated 9 percent of the line's market) come from post offices serving addresses outside the primary and secondary study areas and are attributable to: 1) areas entirely beyond the region - 38 records (i.e., those visiting the area, on business for the day or just moved to the area and haven't changed their vehicle's registration), and; 2) areas within the region which are presently serviced by other SEPTA rail lines - 83 records (e.g., Philadelphia - 19, Norristown - 17, Plymouth Meeting - 4 and Collegeville - 4). Lansdale, North Wales and Ambler stations serve two-thirds of these riders, with Ambler accommodating roughly twice the activity of either Lansdale or North Wales.

[6] Fewer surveys were "matchable" than were collected due in part to the fact that many addresses included only post office box numbers. As a result, they could not be identified with a specific municipality.

TABLE 5: NUMBER OF MATCHED PASSENGER/LICENSE PLATE SURVEYS ALONG THE R5 LINE

		Daily Boardings Fall 1991			
Station	Customer Surveys Matched	Inbound	Outbound	Total	Spaces Utilized Spring 1993
DOYLESTOWN	N.A.	209	0	209	87
DEL. VAL. COLLEGE	---	21	1	22	4
NEW BRITAIN	---	23	2	25	10
CHALFONT	28	86	5	91	50
LINK BELT	---	26	0	26	---
COLMAR	50	109	1	110	85
FORTUNA	20	63	1	64	30
LANSDALE	119	634	26	660	192
PENNBROOK	16	81	17	98	50
NORTH WALES	165	561	10	571	340
GWYNEDD VALLEY	59	135	0	135	94
PENLLYN	35	97	4	101	39
AMBLER	244	661	20	681	349
FT. WASHINGTON	140	461	43	504	186
FELLWICK	---	14	2	16	---
ORELAND	51	190	8	198	109
NORTH HILLS	24	140	18	158	42
TOTAL	**951**	**3,511**	**158**	**3,669**	**1,667**

RAIL CAPTURE RATIO

For this study, the capture ratio is defined as the share of all work trips destined to Center City Philadelphia which use SEPTA regional rail. Center City was selected as the focus of the analysis since travel to the downtown area at present represents the vast majority of the commuter rail market. Additionally, Center City usually defined as the area from Vine Street to South Street between the Delaware and Schuylkill Rivers has been expanded for this study. University City/30th Street and the area between Vine Street and Spring Garden Street from Broad Street to the Schuylkill River were added to account for the relatively large number of commercial and institutional employers located on the fringes of the CBD.

The 1990 capture ratio was determined at the municipal level by dividing the number of work trips using regional rail by the total volume of work trips, using all modes of travel, bound for Center City. The source of the data is 1990 Census Journey-to-Work data.

Table 6 shows the volume of riders, column (e), and the capture ratio, column (f), of each municipality within the primary study corridor[7]. In absolute terms, within the primary study area, municipalities within Montgomery County contribute about five times the amount of work trips commuting by rail as are generated in Bucks County. However, the overall capture ratios for the counties are about equal. Approximately 41 percent of Center City bound workers use SEPTA regional rail within Bucks County and 37 percent of Montgomery County's commuters use the regional rail system. Overall within the primary study area 38 percent of the commuters to the Philadelphia CBD use the regional rail system.

Figure 5 presents SEPTA's capture ratios expressed in ranges for each of the municipalities within the corridor. Upon inspecting the graphic it can be generalized that higher capture ratios typically exist within municipalities which are located closer to the rail line.

---

[7] The data in Table 6 is shown to give a sense of the magnitude of use of the regional rail system throughout the study area, the data was more important to the overall study effort in its utility as a baseline for calculating 2005 and 2020 station estimates. It should be noted that the Census journey to work data and the SEPTA ridership counts are not necessarily comparable for the following reasons. SEPTA's boarding count data accounts for all trips using the R5 line -- journey to work in the CBD; journey to work at locations other than the CBD, and; non-work trips throughout the SEPTA system. The Census data focuses exclusively on work trips to Center City. Additionally, the journey to work data reflects the total of all municipal residents using the regional rail mode. In some cases, within the primary study area, some municipalities are also conveniently served by parallel regional rail lines (for example: the Warminster line and the Chestnut Hill East line). As a consequence, rail commuters from selected municipalities may not exclusively be using the Lansdale/Doylestown line (e.g., Springfield Township, Montgomery County).

TABLE 6: 1990 RAIL CAPTURE RATIO IN PRIMARY STUDY AREA, Work Trips to Center City Philadelphia

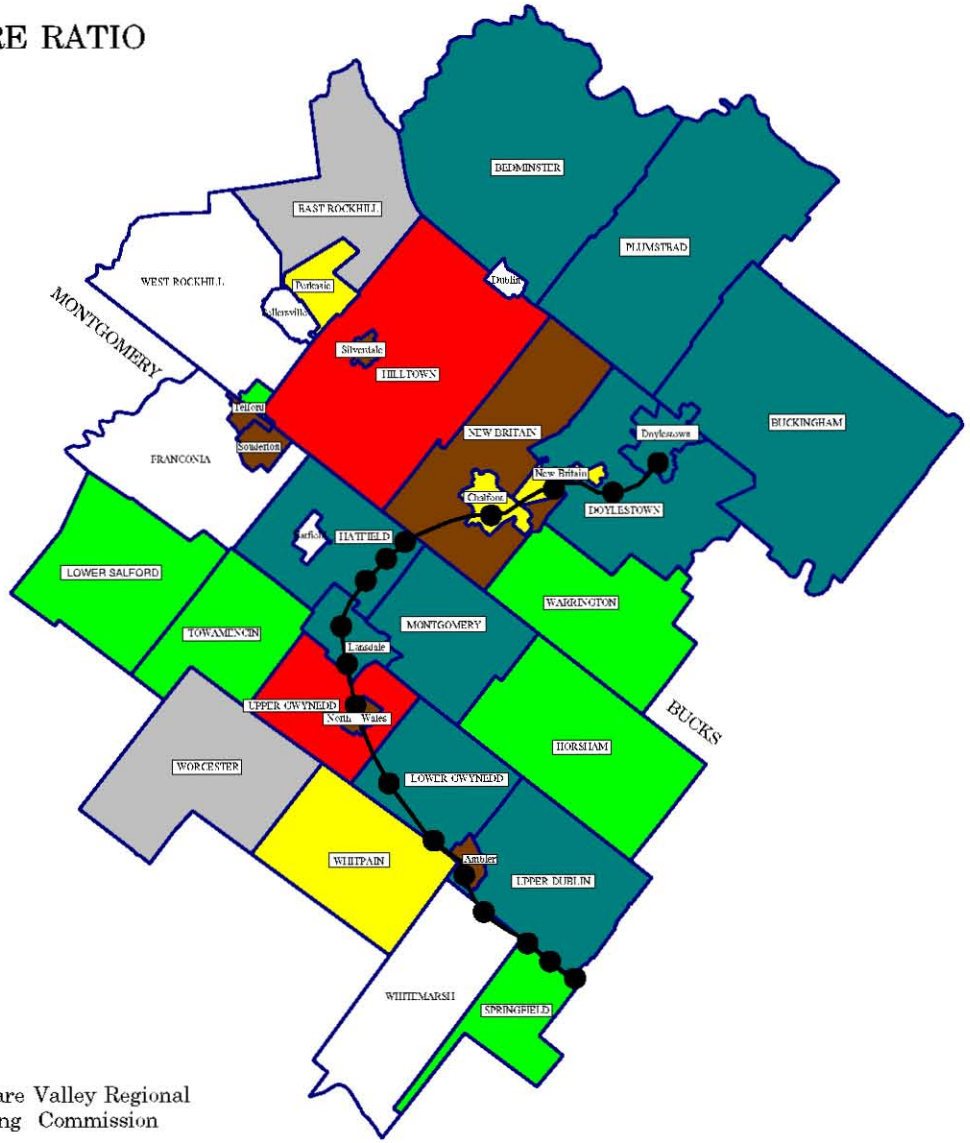
Municipality	(a) Total Population	(b) Employed Residents	(c) Persons Working in CBD	(d) Persons Working in CBD (%) (c/b)*100	(e) Persons Using Rail to CBD	(f) SEPTA's Capture Ratio (%) (e/c)*100
BEDMINSTER TOWNSHIP	4,602	2,463	40	1.6%	19	48%
BUCKINGHAM TOWNSHIP	9,364	4,932	58	1.2%	27	47%
CHALFONT BOROUGH	3,069	1,758	35	2.0%	9	26%
DOYLESTOWN BOROUGH	8,575	4,279	100	2.3%	47	47%
DOYLESTOWN TOWNSHIP	14,510	6,723	180	2.7%	89	49%
DUBLIN BOROUGH	1,985	1,160	4	0.3%	0	0%
EAST ROCKHILL TOWNSHIP	3,753	2,095	20	1.0%	4	20%
HILLTOWN TOWNSHIP	10,582	5,695	36	0.6%	21	58%
NEW BRITAIN BOROUGH	2,174	1,168	27	2.3%	8	30%
NEW BRITAIN TOWNSHIP	9,099	5,089	114	2.2%	70	61%
PERKASIE BOROUGH	7,878	4,075	43	1.1%	9	21%
PLUMSTEAD TOWNSHIP	6,289	3,194	36	1.1%	17	47%
SELLERSVILLE BOROUGH	4,479	2,460	8	0.3%	0	0%
SILVERDALE BOROUGH	881	475	2	0.4%	2	100%
TELFORD BOROUGH	1,673	808	22	2.7%	8	36%
WARRINGTON TOWNSHIP	12,169	6,745	190	2.8%	62	33%
WEST ROCKHILL TOWNSHIP	4,518	2,236	38	1.7%	0	0%
BUCKS COUNTY TOTALS	105,600	55,355	953	1.7%	392	41%

TABLE 6: 1990 RAIL CAPTURE RATIO IN PRIMARY STUDY AREA, Work Trips to Center City Philadelphia

Municipality	(a) Total Population	(b) Employed Residents	(c) Persons Working in CBD	(d) Persons Working in CBD (%) (c/b)*100	(e) Persons Using Rail to CBD	(f) SEPTA's Capture Ratio (%) (e/c)*100
AMBLER BOROUGH	6,609	3,564	137	3.8%	91	66%
FRANCONIA TOWNSHIP	7,224	3,871	0	0.0%	0	0%
HATFIELD BOROUGH	2,650	1,609	7	0.4%	0	0%
HATFIELD TOWNSHIP	15,357	8,705	230	2.6%	115	50%
HORSHAM TOWNSHIP	21,869	13,099	485	3.7%	179	37%
LANSDALE BOROUGH	16,362	9,168	215	2.3%	89	41%
LOWER GWYNEDD TOWNSHIP	9,958	4,645	314	6.8%	157	50%
LOWER SALFORD TOWNSHIP	10,735	5,748	108	1.9%	37	34%
MONTGOMERY TOWNSHIP	12,179	6,849	253	3.7%	123	49%
NORTH WALES BOROUGH	3,802	2,132	42	2.0%	35	83%
SOUDERTON BOROUGH	5,957	3,181	23	0.7%	16	70%
SPRINGFIELD TOWNSHIP	19,612	9,296	985	10.6%	378	38%
TELEFORD BOROUGH	2,565	1,450	7	0.5%	7	100%
TOWAMENCIN TOWNSHIP	14,167	7,672	207	2.7%	64	31%
UPPER DUBLIN TOWNSHIP	24,028	12,927	934	7.2%	420	45%
UPPER GWYNEDD TOWNSHIP	12,197	6,741	223	3.3%	132	59%
WHITEMARSH TOWNSHIP	14,863	8,006	745	9.3%	66	9%
WHITPAIN TOWNSHIP	15,673	8,274	557	6.7%	148	27%
WORCHESTER TOWNSHIP	4,686	2,352	82	3.5%	16	20%
MONTGOMERY COUNTY TOTALS	220,520	119,289	5,554	4.7%	2,073	37%
PRIMARY STUDY AREA TOTALS	326,120	174,644	6,507	3.7%	2,465	38%

source: US Census

FIGURE 5.
SEPTA'S CAPTURE RATIO



R5 CAPTURE RATIOS

- >60 %
- 51-60 %
- 41-50 %
- 31-40 %
- 21-30 %
- 11-20 %
- < 10 %

SCHEMATIC NOT TO SCALE

Delaware Valley Regional
Planning Commission
APRIL, 1995

III. FUTURE CONDITIONS

Analyses were undertaken to determine levels of activity the R5 Lansdale/Doylestown line and its facilities would experience in the future. The specific analysis considered station ridership/parking changes that would result from realizing latent demand as a result of SEPTA sponsored station parking expansions expected by 1996. Furthermore, intermediate range future (for 2005) and long range future (for 2020) analyses were undertaken to examine station activity changes which would occur in response to forecasted demographic changes within the primary study area and Center City Philadelphia (i.e., municipal population and employment growth).

In order to prepare the future estimates, a special planning tool was created for this study -- the Rail Station Activity Assignment Model. The Rail Station Activity Assignment Model was developed to provide reasonably quick, reliable and consistent estimates of rail station activity levels for use in conducting this study or any similar studies for SEPTA[8].

METHODOLOGY

The model's foundation is the "connection" between the municipality of residence and the rail station patronized provided by the information contained within the matched riders matrix (Exhibit A). Quantifying the residence-to-rail station relationship allows the proclivity to use rail within the municipalities to be connected with projected demographics within the study corridor.

The methodology of the Rail Station Activity Assignment Model uses the "addressed matched" station survey responses as surrogates for present (1990) rail station ridership. These become the base assigned ridership inputs to the model. Growth related to latent demand manifested at the municipal level from station parking expansion (expected by 1996) is then added to the station's base ridership assignments. Finally, projected station ridership growth responding to forecasted changes in municipal population and employment between 1990 to 2005, and 2020 are summed with the 1996 assigned ridership totals.

The **percent changes** (increases or decreases) **in assigned ridership at the station(s)**, between alternate scenarios, **are** then **applied to actual levels of passengers (boardings) and parked vehicles at the station** to yield future year station forecasts.

---

[8] The station activity assignment model developed for and used under the auspices of this study is not intended to supplant the regional travel forecasting model which is maintained by DVRPC. Rather, it provides sketch planning, best guesstimate responses to sensitivity analysis questions taking current regional rail service levels and ridership characteristics into account. The DVRPC regional travel forecasting model, when applied in a focussed fashion, is more capable of estimating ridership levels in response to service changes, and many more external variables.

BASE CONDITIONS

Base conditions within the model were taken from the information drawn from the address match component of the customer survey effort. Exhibit A (in the APPENDIX) displays what are considered in this step to be the Base 1990 station assignments.

LATENT DEMAND FOR STATION PARKING

The theory behind the latent demand ridership factor is that new customers will be enticed to the R5 line's stations given readily available supplies of parking. Latent demand can be expected to be most significant within municipalities which are sheds to stations with highly constrained parking availability.

The basis for the latent demand estimates are observations of actual parking supply and demand changes which took place at the Ambler Station between Spring 1993 and Spring 1994 (i.e., before and after the parking expansion improvement). According to parking reports provided by SEPTA, 239 parking spaces were added at the Ambler Station between 1993 and 1994. Over the same time interval, parking demand at the station increased by 9.5 percent. Demand for parking throughout the remainder of the line between 1993 and 1994 increased about 1.3 percent, while the supply of parking did not (appreciably) change. From these observations it has been concluded that the increased parking demand at the Ambler Station has resulted in large part from realizing latent ridership demands of 8.2 percent within the municipalities which feed the Ambler Station.

Estimating latent demand throughout the primary study area is a required input to use the model for predicting latent demand in ridership at any/all of the R5 line stations. Guidelines used for determining the municipal latent demand factors throughout the entire study area are listed below.

1. Municipalities surrounding the stations with presently fully utilized parking lots have typically higher latent demand percentages than those which don't.
2. Municipalities along the rail line which are closer to the CBD or are closer to a parallel rail line, typically have lower latent demand percentages.
3. Municipalities which are closer to the rail line generally have higher latent demand percentages[9].

[9] An exception is cited in the case of the smaller boroughs which have, historically, developed in a dense fashion in response to the presence of a train station. Generally, as a result, they are not estimated to produce significant rail ridership increases in response to station or facility improvements.

The final municipal latent demand increments, derived from the observations and the guidelines explained above, are shown on Table 7. Exhibit B (in the APPENDIX) shows the results of applying the modeled latent demand factors to those municipalities feeding the Ambler Station to reflect station activity increases after the parking expansion was implemented in 1994. Note that total assigned ridership at the Ambler Station, yielded by the model, has increased to 266 commuters, an increase of 9.0 percent (+22 "riders") over the station's Base assigned ridership shown in Exhibit A.

Exhibit C (in the APPENDIX) shows the results of applying the parking expansion/latent demand estimating procedure to the stations identified on SEPTA Planning and Development's Proposed Parking Expansion Projects: 1994-1996 list (dated April 1994, includes: Doylestown, 100 parking spaces; Colmar, 225 parking spaces; Lansdale, 350 parking spaces; North Wales, 200 parking spaces; Fort Washington, 185 parking spaces -- totalling 1,060 spaces along the line).

The resultant changes in activity at the stations proposed for parking expansion by 1996 versus the values shown in Exhibit B (improvement at Ambler only) are summarized below and reflect an overall increase of about 5.3 percent in assigned ridership activity along the line.

1. Doylestown +9.6 percent in assigned ridership (+5 "riders");
2. Colmar +10.0 percent in assigned ridership(+5 "riders");
3. Lansdale +9.2 percent in assigned ridership (+11 "riders");
4. North Wales +13.9 percent in assigned ridership (+23 "riders");
5. Fort Washington +7.1 percent in assigned ridership (+10 "riders").

FUTURE DEMAND

Analyses were undertaken to determine future levels of activity for the R5 Lansdale/Doylestown Rail Line and its facilities. Future demand considers normal ridership changes which will occur as a consequence of ongoing population growth in the primary study area and ongoing employment growth in Center City Philadelphia[10]. An intermediate term analysis for 2005 and a long range analysis for 2020 were undertaken for two scenarios of future growth -- 1) Trend Growth and 2) High Growth.

Trend Growth Scenario

In order to estimate ridership changes for this scenario several data sources and analytical steps were examined and used.

[10] Source of demographic data: Direction 2020 Plan, DVRPC.

TABLE 7: MUNICIPAL LATENT DEMAND ESTIMATES WITHIN THE PRIMARY STUDY AREA

Bucks County Municipality	Latent Demand %	Montgomery County Municipality	Latent Demand %
BEDMINSTER TOWNSHIP	11%	AMBLER BOROUGH	0%
BUCKINGHAM TOWNSHIP	11%	FRANCONIA TOWNSHIP	3%
CHALFONT BOROUGH	3%	HATFIELD BOROUGH	3%
DOYLESTOWN BOROUGH	0%	HATFIELD TOWNSHIP	11%
DOYLESTOWN TOWNSHIP	15%	HORSHAM TOWNSHIP	8%
DUBLIN BOROUGH	11%	LANSDALE BOROUGH	17%
EAST ROCKHILL TOWNSHIP	7%	LOWER GWYNEDD TOWNSHIP	13%
HILLTOWN TOWNSHIP	11%	LOWER SALFORD TOWNSHIP	3%
NEW BRITAIN BOROUGH	11%	MONTGOMERY TOWNSHIP	14%
NEW BRITAIN TOWNSHIP	17%	NORTH WALES BOROUGH	7%
PERKASIE BOROUGH	7%	SOUDERTON BOROUGH	7%
PLUMSTEAD TOWNSHIP	11%	SPRINGFIELD TOWNSHIP	3%
SELLERSVILLE BOROUGH	3%	TELFORD BOROUGH	17%
SILVERDALE BOROUGH	11%	TOWAMENCIN TOWNSHIP	15%
TELFORD BOROUGH	17%	UPPER DUBLIN TOWNSHIP	8%
WARRINGTON TOWNSHIP	11%	UPPER GWYNEDD TOWNSHIP	15%
WEST ROCKHILL TOWNSHIP	3%	WHITEMARSH TOWNSHIP	7%
		WHITPAIN TOWNSHIP	11%
		WORCESTER TOWNSHIP	15%

Step 1. a) Study area municipal population and employed residents, and Center City Philadelphia employment levels were examined to ascertain their growth trends between 1990 to 2005, between 1990 to 2020 and from 2005 to 2020. From that analysis it was determined that: population within the study area will increase by 15 percent to the year 2005, and employment in the CBD will increase by ten percent to the year 2005. Also, consistent rates of growth in both population and employment are forecasted to continue between 2005 and 2020.

b) Emanating from step 1a above, current employment trends within the CBD and journey to work characteristics were applied to year 2005 and year 2020 municipal levels of employed residents to project the number of workers that will commute to the CBD from each of the study area municipalities.

Step 2. Travel simulations for the years 1990 and 2005, per DVRPC's regional travel forecasting model, were examined to determine the amount of trips and the change in forecasted municipal transit ridership from the study area to Center City Philadelphia. The overall change in forecasted rail use per the travel forecasting model indicated an approximate area-wide increase of five percent between 1990 and 2005[11].

Final year 2005 municipal rail ridership estimates for the Trend Growth Scenario were derived by averaging the municipal values provided in Steps 1b and 2 above. Year 2020 municipal rail ridership values were derived by applying the same growth rate as exhibited between 1990 and 2005 to the time interval spanning 2005 and 2020. The basis for this assumption is from the prediction of consistent growth as identified in Step 1a above. Table 8 summarizes the resulting estimates of municipal rail ridership within the primary study area for the years 2005 and 2020.

By the year 2005 there is anticipated to be a 10.9 percent increase[12] in rail commutation within the study area (i.e., plus 268 riders over 1990 levels) with almost equal absolute shares within Bucks and Montgomery counties. The largest absolute gains will occur in Doylestown Township and New Britain Township, Bucks County, and in Montgomery Township, Montgomery County. By 2020 there will be increases in rail ridership on the order of 25.0 percent within the study area (e.g., plus 616 riders over 1990 levels). The largest absolute increases will take place in Bucks County: Doylestown Township, Hilltown Township, New Britain Township and Warrington Township in Bucks County. In Montgomery County the biggest gains in rail riders will come from Lower Salford Township, Montgomery Township, Springfield Township and Upper Gwynedd Township.

---

[11] Note: Year 2020 forecasts were not available for this analysis.

[12] 10.9 percent increases between 1990 and 2005 compute to an annual compounded rate of growth just under 0.7 percent.

TABLE 8: 2005 and 2020 RAIL RIDERSHIP ESTIMATES IN PRIMARY STUDY AREA, Work Trips to Center City Philadelphia

Municipality	2005			2020		
	Persons Using Rail To CBD	Change (1990 to 2005)		Persons Using Rail To CBD	Change (1990 to 2020)	
		abs.	%		abs.	%
BEDMINSTER TOWNSHIP	23	4	21.1%	28	9	47.4%
BUCKINGHAM TOWNSHIP	33	6	22.2%	39	12	44.4%
CHALFONT BOROUGH	11	2	22.2%	13	4	44.4%
DOYLESTOWN BOROUGH	52	5	10.6%	58	11	23.4%
DOYLESTOWN TOWNSHIP	137	48	53.9%	211	122	137.1%
DUBLIN BOROUGH	0	0	0.0%	0	0	0.0%
EAST ROCKHILL TOWNSHIP	7	3	75.0%	12	8	200.0%
HILLTOWN TOWNSHIP	36	15	71.4%	60	39	185.7%
NEW BRITAIN BOROUGH	10	2	25.0%	13	5	62.5%
NEW BRITAIN TOWNSHIP	97	27	38.6%	135	65	92.9%
PERKASIE BOROUGH	10	1	11.1%	11	2	22.2%
PLUMSTEAD TOWNSHIP	21	4	23.5%	27	10	58.8%
SELLERSVILLE BOROUGH	0	0	0.0%	0	0	0.0%
SILVERDALE BOROUGH	3	1	50.0%	4	2	100.0%
TELFORD BOROUGH	9	1	12.5%	10	2	25.0%
WARRINGTON TOWNSHIP	76	14	22.6%	93	31	50.0%
WEST ROCKHILL TOWNSHIP	0	0	0.0%	0	0	0.0%
BUCKS COUNTY TOTALS	525	133	33.9%	714	322	82.1%

TABLE 8: 2005 and 2020 RAIL RIDERSHIP ESTIMATES IN PRIMARY STUDY AREA, Work Trips to Center City Philadelphia

Municipality	2005			2020		
	Persons Using Rail To CBD	Change (1990 to 2005)		Persons Using Rail To CBD	Change (1990 to 2020)	
		abs.	%		abs.	%
AMBLER BOROUGH	96	5	5.5%	100	9	9.9%
FRANCONIA TOWNSHIP	0	0	0.0%	0	0	0.0%
HATFIELD BOROUGH	0	0	0.0%	0	0	0.0%
HATFIELD TOWNSHIP	125	10	8.7%	135	20	17.4%
HORSHAM TOWNSHIP	188	9	5.0%	198	19	10.6%
LANSDALE BOROUGH	89	0	0.0%	89	0	0.0%
LOWER GWYNEDD TOWNSHIP	163	6	3.8%	170	13	8.3%
LOWER SALFORD TOWNSHIP	48	11	29.7%	62	25	67.6%
MONTGOMERY TOWNSHIP	172	49	39.8%	240	117	95.1%
NORTH WALES BOROUGH	36	1	2.9%	37	2	5.7%
SOUDERTON BOROUGH	17	1	6.3%	18	2	12.5%
SPRINGFIELD TOWNSHIP	390	12	3.2%	402	24	6.3%
TELEFORD BOROUGH	7	0	0.0%	7	0	0.0%
TOWAMENCIN TOWNSHIP	68	4	6.3%	72	8	12.5%
UPPER DUBLIN TOWNSHIP	429	9	2.1%	437	17	4.0%
UPPER GWYNEDD TOWNSHIP	143	11	8.3%	155	23	17.4%
WHITEMARSH TOWNSHIP	72	6	9.1%	79	13	19.7%
WHITPAIN TOWNSHIP	148	0	0.0%	148	0	0.0%
WORCESTER TOWNSHIP	17	1	6.3%	18	2	12.5%
MONTGOMERY COUNTY TOTALS	2,208	135	6.5%	2,367	294	14.2%
PRIMARY STUDY AREA TOTALS	2,733	268	10.9%	3,081	616	25.0%

Stations presently favored by commuters from these municipalities, based upon inspection of the matched riders matrix (Exhibit A), are:

- Doylestown Township - Doylestown and Chalfont stations;
- New Britain Township - Chalfont and Lansdale stations;
- Hilltown Township - Colmar and Lansdale stations;
- Warrington Township - Ambler and Fort Washington stations;
- Montgomery Township - North Wales, Colmar, Penllyn and Ambler stations;
- Springfield Township - Fort Washington, Oreland and North Hills stations;
- Upper Gwynedd Township - North Wales, Gwynedd Valley and Lansdale stations.

Municipal rail ridership growth rates were then applied within the station assignment model, to the assigned 1996 municipal trip levels which include the latent demand factors. That is, the baseline for the future projections assumes that SEPTA's proposed parking expansions at the Doylestown, Colmar, Lansdale, North Wales, Ambler and Fort Washington stations (per Exhibit C) are in place.

Exhibit D (in the APPENDIX) illustrates the final estimates of rail station activity levels assuming the Trend Growth Scenario. The resultant **growth** in assigned study area rail use is 17.6 percent by the year 2005 (or a plus 1.1 percent per year) if **compared to** a 1994 base condition which assumes that only the Ambler Station parking expansion has taken place (per **Exhibit B**). By the year 2020, an increase of 34.0 percent in assigned study area rail ridership is projected. The greatest changes to ridership by the year 2005 are projected to occur at the outer end of the line between Doylestown and Colmar stations (plus 40 percent to plus 50 percent). As one looks southward along the line, projected increases diminish. Increases between ten and 30 percent are anticipated between Fortuna and Penllyn stations, while station level activity increases of five to ten percent are indicated between Ambler and North Hills stations. Percentage increases in station activity levels by the year 2020 are, in round numbers, twice the changes shown for 2005.

High Growth Scenario

SEPTA requested that an additional indicator for rail activity change along the Lansdale/Doylestown line be explored and evaluated. In response, DVRPC investigated two additional study area growth scenarios and prepared rail station level activity estimates for one of them.

First, actual rail ridership changes taking place along the line during the A.M. peak period and daily between Fall 1990 and Fall 1993 were examined. Comparisons of the data are shown on Tables 9 and 10. The conclusion of this investigation is that both peak and daily ridership decreased in the time period spanning 1990 and 1993. Therefore, no additional analyses using these particular indicators were undertaken.

TABLE 9: COMPARISON OF A.M. PEAK PERIOD BOARDINGS ALONG THE R5 LINE, Fall 1990 and Fall 1993

Station	Fall 1990			Fall 1993		
	Inbound	Outbound	Total	Inbound	Outbound	Total
DOYLESTOWN	145	0	145	145	0	145
DEL. VAL. COLLEGE	3	0	3	2	0	2
NEW BRITAIN	10	3	13	25	0	25
CHALFONT	52	1	53	80	1	81
LINK BELT	0	0	0	3	0	3
COLMAR	103	0	103	102	0	102
FORTUNA	30	0	30	64	0	64
LANSDALE	394	10	404	402	0	402
PENNBROOK	60	0	60	27	0	27
NORTH WALES	418	7	425	412	1	413
GWYNEDD VALLEY	101	1	102	105	2	107
PENLLYN	68	1	69	56	1	57
AMBLER	475	14	489	451	8	459
FT. WASHINGTON	267	30	297	276	32	308
FELLWICK	0	0	0	1	4	5
ORELAND	186	0	186	140	6	146
NORTH HILLS	103	2	105	82	4	86
TOTAL	**2,415**	**69**	**2,484**	**2,373**	**59**	**2,432**

source: SEPTA Regional Rail Ridership Census data

TABLE 10: COMPARISON OF DAILY BOARDINGS ALONG THE R5 LINE, Fall 1990 and Fall 1993

Station	Fall 1990			Fall 1993		
	Inbound	Outbound	Total	Inbound	Outbound	Total
DOYLESTOWN	236	0	236	290	0	290
DEL. VAL. COLLEGE	20	0	20	13	1	14
NEW BRITAIN	16	3	19	38	2	40
CHALFONT	90	5	95	101	5	106
LINK BELT	31	1	32	19	0	19
COLMAR	146	4	150	137	1	138
FORTUNA	34	1	35	72	0	72
LANSDALE	645	33	678	659	16	675
PENNBROOK	122	1	123	81	4	85
NORTH WALES	549	15	564	549	11	560
GWYNEDD VALLEY	147	1	148	131	3	134
PENLLYN	107	3	110	101	5	106
AMBLER	652	41	693	659	35	694
FT. WASHINGTON	463	44	507	458	44	502
FELLWICK	12	0	12	10	4	14
ORELAND	236	10	246	175	22	197
NORTH HILLS	143	13	156	122	17	139
TOTAL	**3,649**	**175**	**3,824**	**3,615**	**170**	**3,785**

source: SEPTA Regional Rail Ridership Census data

While ridership decreases occurred between 1990 and 1993 there was, as described earlier, an increase in the amount of total parked cars along the R5 line between Spring 1993 and Spring 1994. Therefore, as a second alternative, we compared the basis of the trend growth rate (an estimated 0.7 percent annual growth in area-wide rail journey to work trends) with the annual rate of change in demand for parking spaces along the R5 line observed between 1993 and 1994 (1.3 percent annual growth[13]). In contrast to the previous scenario, the High Growth Scenario (plus 1.3 percent annual growth) suggests that the rate of rail ridership will increase at roughly twice the rate used previously. As a result, the High Growth Scenario doubles the rate of growth used in the Trend Growth Scenario to the study horizon years of 2005 and 2020. Exhibit E (in the APPENDIX) illustrates the final estimates of rail station activity levels assuming the High Growth Scenario.

IV. ASSESSMENT OF FUTURE CONDITIONS

The appropriate **modeled station growth percentages**, calculated from changes in assigned station ridership values between those shown in Exhibit B to those shown in Exhibits D or E, were subsequently **applied to actual** Fall 1990 total daily **station boardings** (highest and most conservative values available, and also corresponds with 1990 Census journey to work data) **and actual**, September 1994 total **station parking levels** (highest and most conservative values available, and also corresponds with current parking conditions, i.e., after Ambler Station parking expansion) to project year 2005 and year 2020 station conditions. Projected station boardings and parking levels are shown on Table 11 through Table 14 for the Trend Growth Scenario and the High Growth Scenario.

RIDERSHIP

Table 11 and Table 12 present existing and projected 2005 and 2020 daily station boardings assuming the Trend Growth Scenario and the High Growth Scenario, respectively.

PARKING

Table 13 and Table 14 show projected parking levels and parking utilization rates at the R5 line's stations for 2005 and 2020 assuming that SEPTA's 1994-1996 parking expansion program along the line has been implemented (affording a total of 1,060 additional parking spaces).

---

[13] Whether this increase is a short term phenomenon or the beginning of a long term trend, is uncertain. However, it does provide these analyses a basis for an additional and high-side estimate of rail station activity levels for planning purposes.

TABLE 11: ESTIMATES OF DAILY BOARDINGS ALONG THE R5 LINE, 2005 and 2020, Assuming Trend Growth Scenario

	1990			2005			2020		
Station	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
DOYLESTOWN	236	0	236	350	0	350	486	0	486
DEL. VAL. COLLEGE	20	0	20	29	0	29	39	0	39
NEW BRITAIN	16	3	19	22	4	26	30	6	36
CHALFONT	90	5	95	119	7	126	161	9	170
LINK BELT	31	1	32	45	1	46	61	2	63
COLMAR	146	4	150	222	6	228	312	9	321
FORTUNA	34	1	35	37	1	38	41	1	42
LANSDALE	645	33	678	780	40	820	873	45	918
PENNBROOK	122	1	123	130	1	131	145	1	146
NORTH WALES	549	15	564	719	20	739	838	23	861
GWYNEDD VALLEY	147	1	148	157	1	158	172	1	173
PENLLYN	107	3	110	119	3	122	134	4	138
AMBLER	652	41	693	684	43	727	723	45	768
FT. WASHINGTON	463	44	507	523	50	573	552	52	604
FELLWICK	12	0	12	13	0	13	14	0	14
ORELAND	236	10	246	245	10	255	254	11	265
NORTH HILLS	143	13	156	149	14	163	149	14	163
TOTAL	**3,649**	**175**	**3,824**	**4,343**	**201**	**4,544**	**4,984**	**223**	**5,207**

TABLE 12: ESTIMATES OF DAILY BOARDINGS ALONG THE R5 LINE, 2005 and 2020, Assuming High Growth Scenario

	1990			2005			2020		
Station	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
DOYLESTOWN	236	0	236	440	0	440	708	0	708
DEL. VAL. COLLEGE	20	0	20	36	0	36	57	0	57
NEW BRITAIN	16	3	19	27	5	32	43	8	51
CHALFONT	90	5	95	148	8	156	228	13	241
LINK BELT	31	1	32	55	2	57	89	3	92
COLMAR	146	4	150	283	8	291	467	13	480
FORTUNA	34	1	35	41	1	42	48	2	50
LANSDALE	645	33	678	851	44	895	1,046	54	1,100
PENNBROOK	122	1	123	137	1	138	160	1	161
NORTH WALES	549	15	564	812	22	834	1,051	29	1,080
GWYNEDD VALLEY	147	1	148	169	1	170	197	1	198
PENLLYN	107	3	110	128	4	132	159	4	163
AMBLER	652	41	693	716	45	761	794	50	844
FT. WASHINGTON	463	44	507	546	52	598	605	58	663
FELLWICK	12	0	12	14	0	14	15	0	15
ORELAND	236	10	246	254	11	265	268	11	279
NORTH HILLS	143	13	156	186	17	203	233	21	254
TOTAL	**3,649**	**175**	**3,824**	**4,843**	**221**	**5,064**	**6,168**	**268**	**6,436**

TABLE 13: ESTIMATES OF STATION PARKING DEMAND ALONG THE R5 LINE, 2005 and 2020, Assuming Trend Growth Scenario

Station	Number of Spaces Sept. 1994	Spaces Utilized Sept. 1994	Proposed Number of Spaces 1996	Spaces Utilized 2005	% Utilized 2005 (vs 1996 SUPPLY)	Spaces Utilized 2020	% Utilized 2020 (vs 1996 SUPPLY)
DOYLESTOWN	90	79	190	117	62%	163	86%
DEL. VAL. COLLEGE	---	---	---	---	---	---	---
NEW BRITAIN	39	17	39	23	59%	32	82%
CHALFONT	50	50	50	66	132%	89	178%
LINK BELT	---	---	---	---	---	---	---
COLMAR	87	87	312	132	42%	186	60%
FORTUNA	29	29	29	32	110%	35	121%
LANSDALE	196	196	546	237	43%	265	49%
PENNBROOK	88	76	88	81	92%	90	102%
NORTH WALES	392	421	592	551	93%	643	109%
GWYNEDD VALLEY	100	104	100	111	111%	122	122%
PENLLYN	39	39	39	43	110%	49	126%
AMBLER	588	398	588	418	71%	441	75%
FT. WASHINGTON	186	196	371	221	60%	234	63%
FELLWICK	---	---	---	---	---	---	---
ORELAND	147	63	147	65	44%	68	46%
NORTH HILLS	147	47	147	49	33%	49	33%
TOTAL	**2,178**	**1,802**	**3,238**	**2,146**	**66%**	**2,466**	**76%**

TABLE 14: ESTIMATES OF STATION PARKING DEMAND ALONG THE R5 LINE, 2005 and 2020, Assuming High Growth Scenario

Station	Number of Spaces Sept. 1994	Spaces Utilized Sept. 1994	Proposed Number of Spaces 1996	Spaces Utilized 2005	% Utilized 2005 (vs 1996 SUPPLY)	Spaces Utilized 2020	% Utilized 2020 (vs 1996 SUPPLY)
DOYLESTOWN	90	79	190	147	77%	225	118%
DEL. VAL. COLLEGE	---	---	---	---	---	---	---
NEW BRITAIN	39	17	39	29	74%	46	118%
CHALFONT	50	50	50	82	164%	127	254%
LINK BELT	---	---	---	---	---	---	---
COLMAR	87	87	312	169	54%	278	89%
FORTUNA	29	29	29	35	121%	41	141%
LANSDALE	196	196	546	259	47%	318	58%
PENNBROOK	88	76	88	86	97%	100	114%
NORTH WALES	392	421	592	623	105%	806	136%
GWYNEDD VALLEY	100	104	100	120	120%	139	139%
PENLLYN	39	39	39	47	121%	58	149%
AMBLER	588	398	588	437	74%	485	82%
FT. WASHINGTON	186	196	371	231	62%	256	69%
FELLWICK	---	---	---	---	---	---	---
ORELAND	147	63	147	68	46%	72	49%
NORTH HILLS	147	47	147	49	33%	51	35%
TOTAL	**2,178**	**1,802**	**3,238**	**2,382**	**74%**	**3,002**	**93%**

Examining the Trend Growth Scenario on Table 13, a line-wide average parking utilization rate of 66 percent will exist in the year 2005. Selected stations within fare zones 4 and 5 will experience parking supply shortages. On the other hand, excess supply at adjacent stations will be sufficient to accommodate overflow. Fare zone 4 will experience the highest rate of parking utilization -- 96 percent, while 55 percent utilization rates are calculated in fare zone 5, and 59 percent parking utilization rates are projected in fare zone 3. By 2020, Trend Growth indicates that 76 percent of the R5 line's parking spaces will be utilized. A 111 percent parking utilization rate within fare zone 4 is projected while parking utilization within the adjacent fare zones will be 69 percent within zone 5 and 63 percent in fare zone 3.

Table 14 displays the projected parking situation assuming the High Growth Scenario. By 2005 approximately 74 percent of the line's parking spaces will be occupied on a peak basis. Fare zone 4's parking supply will be about 108 percent utilized, while supply within the adjacent fare zones will be between 60 and 65 percent utilized. By 2020, line-wide parking will be 93 percent utilized. On an average basis, fare zone 4 will experience an overage in demand for parking of 37 percent. Fare zone 5 will be at 91 percent occupancy and fare zone 3 will retain a buffer supply of parking spaces of about 31 percent.

V. CONCLUSIONS

Based upon the foregoing demand analysis, the following conclusions have been reached with respect to SEPTA's Proposed Parking Expansion Project: 1994-1996 (dated April 1994) along the R5 Lansdale/Doylestown Rail Line:

1. The full supply of parking spaces afforded through SEPTA's parking expansion program (adding 1,060 parking spaces along the line) will be necessary in satisfying future rail station parking demands.
2. Rail station parking demands, projected to increase at trend growth rates, will be satisfied by the program's proposed supply through the year 2005. However, it would be desirable to increase the supply of parking spaces being pursued within fare zone 4 by approximately 100 to 125 parking spaces to meet year 2020 needs.
3. Rail station parking demands, projected to increase at high growth rates, will require the additional supply of 75 to 100 parking spaces in fare zone 4 by the year 2005. As many as 225 more parking spaces within fare zone 4 (above year 2005's needs) are required to meet the year 2020 demands assuming a long term continuance of recent rail station parking growth trends.

SEPTA R5 LANSDALE/DOYLESTOWN RAIL LINE PARKING DEMAND STUDY

SUMMARY REPORT
APPENDIX

Overview of and
Worksheets from the
Rail Station Activity Assignment Model

OVERVIEW OF THE RAIL STATION ACTIVITY ASSIGNMENT MODEL

The following exhibits show worksheets summarizing inputs to and outputs from the Rail Station Activity Assignment Model as applied to the SEPTA R5 Lansdale/Doylestown Rail Line Parking Demand Study (DVRPC, April 1995). This narrative serves as a guide to the Model and to those exhibits.

It is important to keep in mind that the Model's predictive ability is best at a sketch planning level and that its most important output/indicator is **percent change(s)** in station activity between alternatives or scenarios. The calculated changes in activity levels from the Model, between scenarios, are ultimately applied to actual station boarding and parking demand levels to forecast future demand conditions.

EXHIBIT A - ADDRESS MATCHING COMPONENT

Addresses obtained as part of the customer and license plates surveys, conducted at the R5 stations in 1991 and 1992, were "matched" with the appropriate municipality. Exhibit A indicates actual relationships between residences and stations as tabulated from those surveys within the primary study area. Positively linking the rider's origin municipality and boarding station, in correct proportions, provides the foundation of the Model. Accurately defining the station shed area allows future demographic conditions, within the shed, to be accounted for in forecasting future station activity levels.

The following examples are given, using Exhibit A, as a means of explaining the exhibit. At the Lansdale Station 119 surveyed riders were capable of being "addressed matched" to a specific municipality, 23 (or 19.3%) originated in Hatfield Township and 20 (or 16.8%) came from Towamencin Township. Another example: most of the study area's surveyed riders came from Upper Dublin Township (177 addresses matched), the largest share of Upper Dublin riders use the Fort Washington Station (87 responses).

The information contained within Exhibit A has the following ramifications for the Model:

1. The number of matched survey responses serve as surrogates for present rail station ridership;
2. The rates of forecasted municipal growth within each station's shed area can be applied in proportion to the number of riders at the station -- yielding a weighted average of growth for the station.

EXHIBIT B - CALIBRATING LATENT DEMAND

Exhibit B arranges "matched ridership" values from Exhibit A by station, eliminating all cells with values of zero. The fourth (discontinuous) column, in Exhibit B, shows incremental "ridership" activity from each municipality in the Ambler Station shed as a consequence of modeled latent municipal ridership demand. Those changes are being modelled to reflect the Ambler parking expansion which took effect by Spring 1994. Estimated municipal latent demand increments (%s) throughout the primary study area are shown in Table 7 of the main report. Comparing Exhibit B with Exhibit A indicates an increased station activity of nine percent (+22 "riders") after adding parking at the Ambler Station. Actual observed increases at the Ambler Station were estimated at 8.2 percent.

This step, in the Model, calibrates the Model for estimating latent demand at the stations identified for parking expansion in the SEPTA Planning and Development Department's Proposed Parking Expansion Projects: 1994-1996 list (dated April 1994).

EXHIBIT C - ESTIMATING FUTURE LATENT DEMANDS

Exhibit C illustrates modeled station ridership activity changes (due to latent demand increments) responding to parking expansions proposed at the Doylestown, Colmar, Lansdale, North Wales and Fort Washington stations (per the SEPTA Planning and Development's Proposed Parking Expansion Projects: 1994-1996 program). The worksheet uses Exhibit B's 1994 output as inputs, and is derived in a similar fashion as Exhibit B.

Upon completion of the expansion program in 1996, the following changes in station activity are projected:

1. Doylestown +9.6 percent in assigned ridership (+5 "riders");
2. Colmar +10.0 percent in assigned ridership(+5 "riders");
3. Lansdale +9.2 percent in assigned ridership (+11 "riders");
4. North Wales +13.9 percent in assigned ridership (+23 "riders");
5. Fort Washington +7.1 percent in assigned ridership (+10 "riders").

Throughout the line there will be an increase of 5.3 percent (+54 "riders") in station activity over 1994 station activity levels.

EXHIBIT D - ESTIMATING FUTURE TREND GROWTH

Exhibit D illustrates the changes in municipal/station rail ridership activity responding to forecasted changes in study area population and Center City employment (for the years 2005 and 2020). Inputs to the worksheet are projected 1996 station "volumes" -- conditions after SEPTA's proposed parking

expansion program is realized (per Exhibit C). The fourth and sixth columns of the worksheet show the projected percent changes in rail journey to work trips by 2005 and 2020, respectively, from each study area municipality (as listed in Table 8 of the main report). The outputs of Exhibit D are assigned station activity levels for the years 2005 and 2020 reflecting forecasted demographic trends (hence the title: "Trend Growth Scenario").

Consider the Doylestown Station in an example of the Exhibit's derivation and use. Doylestown Station is projected to serve 57 "riders" by 1996 -- after the planned parking expansion. Three municipalities comprise the station's shed: Doylestown Township, Doylestown Borough and Buckingham Township. Based upon forecasted demographics (see Table 8 in the main report), each of these municipalities is projected to increase its share of rail riders by 53.9 percent, 10.6 percent and 22.2 percent, respectively, by the year 2005. By the year 2020 Doylestown Township will increase by 137.1 percent over current conditions, Doylestown Borough will increase by 23.4 percent and Buckingham Township will rise by 44.4 percent. The weighted sum of the municipal ridership change at the Doylestown Station is 77 "riders" in 2005 and 107 "riders" in 2020. These results indicate that activity at the Doylestown Station will increase by 35 percent by the year 2005 and 88 percent by the year 2020. (Note: Activity change percentages for stations where no surveys were conducted, for example: Delaware Valley College, New Britain, etc., were interpolated from the results of the adjacent stations for which survey information was available.)

The station "ridership"/growth conditions on Exhibit D reflect changes in demographic characteristics within each station shed between 1996 to 2005 and/or 2020. On the other hand, the overall station activity compared to conditions which exist today must be calculated from the 1994 station "rider" baseline which is contained in Exhibit B. Therefore by 2005, compared to today's situation, there is projected to be an increase in Doylestown Station ridership activity of 48 percent {[(77/52)-1]*100}. By 2020 there will be an increase of 106 percent {[(107/52)-1]*100}. These latter percentage increases in station activity were used as the basis for expanding actual ridership and parking volumes as contained in Table 11 and Table 13 within the main report.

EXHIBIT E - ESTIMATING FUTURE HIGH GROWTH

Essentially doubles the rate of station activity growth used in Exhibit D based upon a comparison of the annual trend rate of growth versus the rate of growth associated with observed parking demand changes along the R5 line between Spring 1993 and Spring 1994. The procedure for calculating and applying station activity gains are similar to those explained for Exhibit D. The resultant forecasts for station ridership and parking, in the years 2005 and 2020, are shown in Tables 12 and 14 in the main report.

EXHIBIT A
SEPTA R5 LANSDALE/DOYLESTOWN RAIL LINE
DISTRIBUTION OF MATCHED RIDERS BY STATION* AND MUNICIPALITY

	(e) Doylestown		Chalfont		Colmar		Fortuna		Lansdale		Penn–brook		North Wales		Gwynedd Valley		Penllyn		Ambler		Fort Wash.		Oreland		North Hills		Total
Ambler	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	1.7%	0	0.0%	24	9.8%	0	0.0%	0	0.0%	0	0.0%	25
Franconia	0	0.0%	0	0.0%	0	0.0%	2	10.0%	8	6.7%	0	0.0%	1	0.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	11
Hatfield Borough	0	0.0%	0	0.0%	0	0.0%	2	10.0%	6	5.0%	1	6.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	9
Hatfield	0	0.0%	0	0.0%	5	10.0%	11	55.0%	23	19.3%	2	12.5%	3	1.8%	0	0.0%	0	0.0%	2	0.8%	0	0.0%	0	0.0%	0	0.0%	46
Horsham	0	0.0%	1	3.6%	1	2.0%	0	0.0%	1	0.8%	0	0.0%	1	0.6%	0	0.0%	0	0.0%	25	10.2%	22	15.7%	0	0.0%	2	8.3%	53
Lansdale	0	0.0%	0	0.0%	0	0.0%	0	0.0%	18	15.1%	5	31.3%	21	12.7%	0	0.0%	0	0.0%	3	1.2%	1	0.7%	0	0.0%	0	0.0%	48
Lower Gwynedd	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3	1.8%	20	33.9%	10	28.6%	30	12.3%	3	2.1%	0	0.0%	0	0.0%	66
Lower Salford	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	1.7%	0	0.0%	4	2.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	6
Montgomery	0	0.0%	0	0.0%	5	10.0%	2	10.0%	3	2.5%	1	6.3%	35	21.2%	4	6.8%	4	11.4%	7	2.9%	3	2.1%	1	2.0%	0	0.0%	65
North Wales	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	8	4.8%	1	1.7%	1	2.9%	1	0.4%	0	0.0%	1	2.0%	0	0.0%	12
Souderton	0	0.0%	0	0.0%	5	10.0%	1	5.0%	3	2.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	9
Springfield	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	2.9%	33	64.7%	2	8.3%	39
Telford	0	0.0%	0	0.0%	0	0.0%	2	10.0%	3	2.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	5
Towamencin	0	0.0%	0	0.0%	0	0.0%	0	0.0%	20	16.8%	3	18.8%	32	19.4%	2	3.4%	0	0.0%	3	1.2%	0	0.0%	0	0.0%	0	0.0%	60
Upper Dublin	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.8%	0	0.0%	0	0.0%	2	3.4%	2	5.7%	50	20.5%	87	62.1%	15	29.4%	20	83.3%	177
Upper Gwynedd	0	0.0%	0	0.0%	0	0.0%	0	0.0%	5	4.2%	3	18.8%	43	26.1%	7	11.9%	4	11.4%	2	0.8%	1	0.7%	0	0.0%	0	0.0%	65
Whitemarsh	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	1.6%	8	5.7%	0	0.0%	0	0.0%	12
Whitpain	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3	1.8%	19	32.2%	11	31.4%	79	32.4%	4	2.9%	1	2.0%	0	0.0%	117
Worcester	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	2.4%	0	0.0%	0	0.0%	1	0.4%	0	0.0%	0	0.0%	0	0.0%	5
Bedminster	0	0.0%	1	3.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1
Buckingham	9	17.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1 **
Chalfont	0	0.0%	5	17.9%	1	2.0%	0	0.0%	3	2.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	9
Doylestown Borough	17	32.7%	1	3.6%	0	0.0%	0	0.0%	2	1.7%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	1.6%	0	0.0%	0	0.0%	0	0.0%	7 **
Doylestown	26	50.0%	2	7.1%	0	0.0%	0	0.0%	1	0.8%	0	0.0%	0	0.0%	0	0.0%	2	5.7%	1	0.4%	1	0.7%	0	0.0%	0	0.0%	7 **
Dublin	0	0.0%	1	3.6%	2	4.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3
East Rockhill	0	0.0%	1	3.6%	0	0.0%	0	0.0%	2	1.7%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3
Hilltown	0	0.0%	1	3.6%	16	32.0%	0	0.0%	3	2.5%	0	0.0%	1	0.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	21
New Britain Borough	0	0.0%	2	7.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	1.4%	0	0.0%	0	0.0%	4
New Britain	0	0.0%	11	39.3%	9	18.0%	0	0.0%	6	5.0%	0	0.0%	5	3.0%	3	5.1%	0	0.0%	4	1.6%	1	0.7%	0	0.0%	0	0.0%	39
Perkasie	0	0.0%	2	7.1%	0	0.0%	0	0.0%	5	4.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	7
Plumstead	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.4%	0	0.0%	0	0.0%	0	0.0%	1
Sellersville	0	0.0%	0	0.0%	2	4.0%	0	0.0%	2	1.7%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4
Silverdale	0	0.0%	0	0.0%	1	2.0%	0	0.0%	1	0.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2
Telford	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1
Warrington	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	6.3%	0	0.0%	0	0.0%	1	2.9%	3	1.2%	3	2.1%	0	0.0%	0	0.0%	8
West Rockhill	0	0.0%	0	0.0%	3	6.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3
Total	52		28		50		20		119		16		165		59		35		244		140		51		24		951 **

(e) Estimated

* Stations excluded are DEL. VAL. COLLEGE, NEW BRITAIN, LINK BELT, AND FELLWICK

** Totals exclude Doylestown station estimates

EXHIBIT B

ASSIGNED STATION RIDERSHIP
W/ PARKING EXPANSION AT AMBLER

STATIONS	MUNICIPALITY	1990 ASSIGNED STATION RIDERSHIP (1)	LATENT DEMAND AT AMBLER	SPRING 1994 ASSIGNED STATION RIDERSHIP WTIH LATENT DEMAND AT AMBLER
DOYLESTOWN				
	DOYLES TWP.	26		26
	DOYLES BORO.	17		17
	BUCKINGHAM	9		9
	TOTALS	52		52
DEL. VAL. COLLEGE				
NEW BRITAIN				
CHALFONT				
	NEW BRITAIN TWP	11		11
	BEDMINSTER	1		1
	DUBLIN	1		1
	CHALFONT	5		5
	DOYLES TWP.	2		2
	DOYLES BORO.	1		1
	PERKASIE	2		2
	E. ROCKHILL	1		1
	HILLTOWN	1		1
	HORSHAM	1		1
	NEW BRITAIN BORO	2		2
	TOTALS	28		28
LINK BELT				
COLMAR				
	HILLTOWN	16		16
	HORSHAM	1		1
	SILVERDALE	1		1
	DUBLIN	2		2
	CHALFONT	1		1
	HATFIELD TWP	5		5
	MONTGOMERY	5		5
	NEW BRITAIN TWP	9		9
	W. ROCKHILL	3		3
	SELLERSVILLE	2		2
	SOUDERTON	5		5
	TOTALS	50		50
FORTUNA				
	HATFIELD TWP.	11		11
	HATFIELD BORO.	2		2
	SOUDERTON	1		1
	MONTGOMERY	2		2
	FRANCONIA	2		2
	TELFORD (MONT)	2		2
	TOTALS	20		20
LANSDALE				
	FRANCONIA	8		8
	HATFIELD	6		6
	HATFIELD BORO	23		23
	HORSHAM	1		1
	LANSDALE	18		18
	LOWER SALFORD	2		2
	MONTGOMERY	3		3
	SOUDERTON	3		3
	TELFORD (MONT)	3		3
	TOWAMENCIN	20		20
	UPPER DUBLIN	1		1
	UPPER GWYNEDD	5		5
	CHALFONT	3		3
	DOYLESTOWN BORO	2		2
	DOYLESTOWN	1		1
	HILLTOWN	3		3
	NEW BRITAIN	6		6
	PERKASIE	5		5
	SELLERSVILLE	2		2
	SILVERDALE	1		1
	TELFORD (BUCKS)	1		1
	EAST ROCKHILL	2		2
	TOTALS	119		119
PENNBROOK				
	U. GWYNEDD	3		3
	LANSDALE	5		5
	TOWAMENCIN	3		3
	WARRINGTON	1		1
	HATFIELD	2		2
	MONTGOMERY	1		1
	HATFIELD BORO	1		1
	TOTALS	16		16
NORTH WALES				
	FRANCONIA	1		1
	HATFIELD	3		3
	HORSHAM	1		1
	LANSDALE	21		21
	LOWER GWYNEDD	3		3
	LOWER SALFORD	4		4
	MONTGOMERY	35		35
	NORTH WALES	8		8
	TOWAMENCIN	32		32
	UPPER GWYNEDD	43		43
	WHITPAIN	3		3
	WORCESTER	4		4
	BUCKINGHAM	1		1
	HILLTOWN	1		1
	NEW BRITAIN	5		5
	TOTALS	165		165
GWYNEDD VALLEY				
	AMBLER	1		1
	L. GWYNEDD	20		20
	MONTGOMERY	4		4
	NORTH WALES	1		1
	TOWAMENCIN	2		2
	UPPER DUBLIN	2		2
	U. GWYNEDD	7		7
	WHITPAIN	19		19
	NEW BRITAIN TWP	3		3
	TOTALS	59		59
PENLLYN				
	DOYLESTOWN	2		2
	L. GWYNEDD	10		10
	MONTGOMERY	4		4
	NORTH WALES	1		1
	UPPER DUBLIN	2		2
	U. GWYNEDD	4		4
	WARRINGTON	1		1
	WHITPAIN	11		11
	TOTALS	35		35
AMBLER *				
	AMBLER	24	0	24
	HATFIELD	2	0	2
	HORSHAM	25	2	27
	LANSDALE	3	1	4
	LOWER GWYNEDD	30	4	34
	MONTGOMERY	7	1	8
	NORTH WALES	1	0	1
	TOWAMENCIN	3	0	3
	UPPER DUBLIN	50	4	54
	UPPER GWYNEDD	2	0	2
	WHITEMARSH	4	0	4
	WHITPAIN	79	9	88
	WORCESTER	1	0	1
	DOYLESTOWN BORO	4	0	4
	DOYLESTOWN	1	0	1
	NEW BRITAIN	4	1	5
	PLUMSTEAD	1	0	1
	WARRINGTON	3	0	3
	TOTALS	244	22	266
FT. WASHINGTON				
	HORSHAM	22		22
	LANSDALE	1		1
	LOWER GWYNEDD	3		3
	MONTGOMERY	3		3
	SPRINGFIELD	4		4
	UPPER DUBLIN	87		87
	UPPER GWYNEDD	1		1
	WHITEMARSH	8		8
	WHITPAIN	4		4
	DOYLESTOWN	1		1
	NEW BRITAIN BORO	2		2
	NEW BRITAIN	1		1
	WARRINGTON	9		9
	TOTALS	140		140
FELLWICK				
ORELAND				
	MONTGOMERY	1		1
	NORTH WALES	1		1
	SPRINGFIELD	33		33
	UPPER DUBLIN	15		15
	WHITPAIN	1		1
	TOTALS	51		51
NORTH HILLS				
	UPPER DUBLIN	20		20
	HORSHAM	2		2
	SPRINGFIELD	2		2
	TOTALS	24		24
GRAND TOTALS		1003	22	1025

* PARKING EXPANSION ASSUMED
1) NUMBER OF ADDRESSES MATCHED PER SURVEY SORTED BY STATION, SEE EXHIBIT A

EXHIBIT B

EXHIBIT C

ASSIGNED STATION RIDERSHIP
W/ PARKING EXPANSION PER SEPTA'S
1994–1996 IMPROVEMENT PROGRAM

STATIONS	MUNICIPALITY	SPRING 1994 ASSIGNED STATION RIDERSHIP WITH LATENT DEMAND AT AMBLER	LATENT DEMAND AT EXPANDED STATIONS	1996 ASSIGNED STATION RIDERSHIP WTIH LATENT DEMAND PER SEPTA'S IMPROVEMENT PROGRAM
DOYLESTOWN *				
	DOYLES TWP.	26	4	30
	DOYLES BORO.	17	0	17
	BUCKINGHAM	9	1	10
	TOTALS	52	5	57
DEL. VAL. COLLEGE				
NEW BRITAIN				
CHALFONT				
	NEW BRITAIN TWP	11		11
	BEDMINSTER	1		1
	DUBLIN	1		1
	CHALFONT	5		5
	DOYLES TWP.	2		2
	DOYLES BORO.	1		1
	PERKASIE	2		2
	E. ROCKHILL	1		1
	HILLTOWN	1		1
	HORSHAM	1		1
	NEW BRITAIN BORO	2		2
	TOTALS	28		28
LINK BELT				
COLMAR *				
	HILLTOWN	16	2	18
	HORSHAM	1	0	1
	SILVERDALE	1	0	1
	DUBLIN	2	0	2
	CHALFONT	1	0	1
	HATFIELD TWP	5	0	5
	MONTGOMERY	5	1	6
	NEW BRITAIN TWP	9	2	11
	W. ROCKHILL	3	0	3
	SELLERSVILLE	2	0	2
	SOUDERTON	5	0	5
	TOTALS	50	5	55
FORTUNA				
	HATFIELD TWP.	11		11
	HATFIELD BORO.	2		2
	SOUDERTON	1		1
	MONTGOMERY	2		2
	FRANCONIA	2		2
	TELFORD (MONT)	2		2
	TOTALS	20		20
LANSDALE *				
	FRANCONIA	8	0	8
	HATFIELD	6	1	7
	HATFIELD BORO	23	1	24
	HORSHAM	1	0	1
	LANSDALE	18	3	21
	LOWER SALFORD	2	0	2
	MONTGOMERY	3	0	3
	SOUDERTON	3	0	3
	TELFORD (MONT)	3	1	4
	TOWAMENCIN	20	3	23
	UPPER DUBLIN	1	0	1
	UPPER GWYNEDD	5	1	6
	CHALFONT	3	0	3
	DOYLESTOWN BORO	2	0	2
	DOYLESTOWN	1	0	1
	HILLTOWN	3	0	3
	NEW BRITAIN	6	1	7
	PERKASIE	5	0	5
	SELLERSVILLE	2	0	2
	SILVERDALE	1	0	1
	TELFORD (BUCKS)	1	0	1
	EAST ROCKHILL	2	0	2
	TOTALS	119	11	130
PENNBROOK				
	U. GWYNEDD	3		3
	LANSDALE	5		5
	TOWAMENCIN	3		3
	WARRINGTON	1		1
	HATFIELD	2		2
	MONTGOMERY	1		1
	HATFIELD BORO	1		1
	TOTALS	16		16
NORTH WALES *				
	FRANCONIA	1	0	1
	HATFIELD	3	0	3
	HORSHAM	1	0	1
	LANSDALE	21	4	25
	LOWER GWYNEDD	3	0	3
	LOWER SALFORD	4	0	4
	MONTGOMERY	35	5	40
	NORTH WALES	8	1	9
	TOWAMENCIN	32	5	37
	UPPER GWYNEDD	43	6	49
	WHITPAIN	3	0	3
	WORCESTER	4	1	5
	BUCKINGHAM	1	0	1
	HILLTOWN	1	0	1
	NEW BRITAIN	5	1	6
	TOTALS	165	23	188
GWYNEDD VALLEY				
	AMBLER	1		1
	L. GWYNEDD	20		20
	MONTGOMERY	4		4
	NORTH WALES	1		1
	TOWAMENCIN	2		2
	UPPER DUBLIN	2		2
	U. GWYNEDD	7		7
	WHITPAIN	19		19
	NEW BRITAIN TWP	3		3
	TOTALS	59		59
PENLLYN				
	DOYLESTOWN	2		2
	L. GWYNEDD	10		10
	MONTGOMERY	4		4
	NORTH WALES	1		1
	UPPER DUBLIN	2		2
	U. GWYNEDD	4		4
	WARRINGTON	1		1
	WHITPAIN	11		11
	TOTALS	35		35
AMBLER				
	AMBLER	24		24
	HATFIELD	2		2
	HORSHAM	27		27
	LANSDALE	4		4
	LOWER GWYNEDD	34		34
	MONTGOMERY	8		8
	NORTH WALES	1		1
	TOWAMENCIN	3		3
	UPPER DUBLIN	54		54
	UPPER GWYNEDD	2		2
	WHITEMARSH	4		4
	WHITPAIN	88		88
	WORCESTER	1		1
	DOYLESTOWN BORO	4		4
	DOYLESTOWN	1		1
	NEW BRITAIN	5		5
	PLUMSTEAD	1		1
	WARRINGTON	3		3
	TOTALS	266		266
FT. WASHINGTON *				
	HORSHAM	22	2	24
	LANSDALE	1	0	1
	LOWER GWYNEDD	3	0	3
	MONTGOMERY	3	0	3
	SPRINGFIELD	4	0	4
	UPPER DUBLIN	87	7	94
	UPPER GWYNEDD	1	0	1
	WHITEMARSH	8	1	9
	WHITPAIN	4	0	4
	DOYLESTOWN	1	0	1
	NEW BRITAIN BORO	2	0	2
	NEW BRITAIN	1	0	1
	WARRINGTON	3	0	3
	TOTALS	140	10	150
FELLWICK				
ORELAND				
	MONTGOMERY	1		1
	NORTH WALES	1		1
	SPRINGFIELD	33		33
	UPPER DUBLIN	15		15
	WHITPAIN	1		1
	TOTALS	51		51
NORTH HILLS				
	UPPER DUBLIN	20		20
	HORSHAM	2		2
	SPRINGFIELD	2		2
	TOTALS	24		24
GRAND TOTALS		1025	54	1079

* PARKING EXPANSION ASSUMED

EXHIBIT C

EXHIBIT D

ASSIGNED STATION RIDERSHIP
PER "TREND" GROWTH SCENARIO

STATIONS	MUNICIPALITY	1996 ASSIGNED STATION RIDERSHIP WTIH LATENT DEMAND PER SEPTA'S IMPROVEMENT PROGRAM	CHANGE IN RIDERSHIP (1990–2005) PERCENT CHANGE IN JTW RAIL RIDERSHIP (1990–2005) TREND	CHANGE IN RIDERSHIP (1990–2005) 2005 ASSIGNED STATION RIDERSHIP TREND	CHANGE IN RIDERSHIP (1990–2020) PERCENT CHANGE IN JTW RAIL RIDERSHIP (1990–2020) TREND	CHANGE IN RIDERSHIP (1990–2020) 2020 ASSIGNED STATION RIDERSHIP TREND
DOYLESTOWN *						
	DOYLES TWP.	30	53.9	46	137.1	71
	DOYLES BORO.	17	10.6	19	23.4	21
	BUCKINGHAM	10	22.2	12	44.4	14
	TOTALS	57	35.4	77	86.9	107
DEL. VAL. COLLEGE			34		82	
NEW BRITAIN			93		81	
CHALFONT						
	NEW BRITAIN TWP	11	36.6	15	92.9	21
	BEDMINSTER	1	21.1	1	47.4	1
	DUBLIN	1	0	1	0	1
	CHALFONT	5	22.2	6	44.4	7
	DOYLES TWP.	2	53.9	3	137.1	5
	DOYLES BORO.	1	10.6	1	23.4	1
	PERKASIE	2	11.1	2	22.2	2
	E. ROCKHILL	1	75	2	200	3
	HILLTOWN	1	71.4	2	185.7	3
	HORSHAM	1	5	1	10.6	1
	NEW BRITAIN BORO	2	25	3	62.5	3
	TOTALS	28	32.1	37	77.0	50
LINK BELT			35		86	
COLMAR *						
	HILLTOWN	18	71.4	31	185.7	51
	HORSHAM	1	5	1	10.6	1
	SILVERDALE	1	50	2	100	2
	DUBLIN	2	0	2	0	2
	CHALFONT	1	22.2	1	44.4	1
	HATFIELD TWP	5	8.7	5	17.4	6
	MONTGOMERY	6	39.8	8	95.1	12
	NEW BRITAIN TWP	11	36.6	15	92.9	21
	W. ROCKHILL	3	0	3	0	3
	SELLERSVILLE	2	0	2	0	2
	SOUDERTON	5	6.3	5	12.5	6
	TOTALS	55	36.2	76	95.3	107
FORTUNA						
	HATFIELD TWP.	11	8.7	12	17.4	13
	HATFIELD BORO.	2	0	2	0	2
	SOUDERTON	1	6.3	1	12.5	1
	MONTGOMERY	2	39.8	3	95.1	4
	FRANCONIA	2	0	2	0	2
	TELFORD (MONT)	2	0	2	0	2
	TOTALS	20	9.1	22	19.7	24
LANSDALE *						
	FRANCONIA	8	0	8	0	8
	HATFIELD	7	8.7	8	17.4	8
	HATFIELD BORO	24	0	24	0	24
	HORSHAM	1	5	1	10.6	1
	LANSDALE	21	0	21	0	21
	LOWER SALFORD	2	29.7	3	67.6	3
	MONTGOMERY	3	39.8	4	95.1	6
	SOUDERTON	3	6.3	3	12.5	3
	TELFORD (MONT)	4	0	4	0	4
	TOWAMENCIN	23	6.3	24	12.5	26
	UPPER DUBLIN	1	2.1	1	4	1
	UPPER GWYNEDD	6	8.3	6	17.4	7
	CHALFONT	3	22.2	4	44.4	4
	DOYLESTOWN BORO	2	10.6	2	29.4	2
	DOYLESTOWN	1	53.9	2	137.1	2
	HILLTOWN	3	71.4	5	185.7	9
	NEW BRITAIN	7	36.6	10	92.9	14
	PERKASIE	5	11.1	6	22.2	6
	SELLERSVILLE	2	0	2	0	2
	SILVERDALE	1	50	2	100	2
	TELFORD (BUCKS)	1	12.5	1	25	1
	EAST ROCKHILL	2	75	4	200	6
	TOTALS	130	10.4	144	24.2	161
PENNBROOK						
	U. GWYNEDD	3	8.3	3	17.4	4
	LANSDALE	5	0	5	0	5
	TOWAMENCIN	3	6.3	3	12.5	3
	WARRINGTON	1	22.6	1	50	2
	HATFIELD	2	8.7	2	17.4	2
	MONTGOMERY	1	39.8	1	95.1	2
	HATFIELD BORO	1	0	1	0	1
	TOTALS	16	7.7	17	16.8	19
NORTH WALES *						
	FRANCONIA	1	0	1	0	1
	HATFIELD	3	8.7	3	17.4	4
	HORSHAM	1	5	1	10.6	1
	LANSDALE	25	0	25	0	25
	LOWER GWYNEDD	3	3.8	3	8.3	3
	LOWER SALFORD	4	29.7	5	67.6	7
	MONTGOMERY	40	39.8	56	95.1	78
	NORTH WALES	9	2.9	9	5.7	10
	TOWAMENCIN	37	6.3	39	12.5	42
	UPPER GWYNEDD	49	8.3	53	17.4	58
	WHITPAIN	3	0	3	0	3
	WORCESTER	5	6.3	5	12.5	6
	BUCKINGHAM	1	22.2	1	44.4	1
	HILLTOWN	1	71.4	2	185.7	3
	NEW BRITAIN	6	36.6	8	92.9	12
	TOTALS	188	14.8	216	33.9	252
GWYNEDD VALLEY						
	AMBLER	1	5.5	1	9.9	1
	L. GWYNEDD	20	3.8	21	8.3	22
	MONTGOMERY	4	39.8	6	95.1	8
	NORTH WALES	1	2.9	1	5.7	1
	TOWAMENCIN	2	6.3	2	12.5	2
	UPPER DUBLIN	2	2.1	2	4	2
	U. GWYNEDD	7	8.3	8	17.4	8
	WHITPAIN	19	0	19	0	19
	NEW BRITAIN TWP	3	36.6	4	92.9	6
	TOTALS	59	7.4	63	16.9	69
PENLLYN						
	DOYLESTOWN	2	53.9	3	137.1	5
	L. GWYNEDD	10	3.8	10	8.3	11
	MONTGOMERY	4	39.8	6	95.1	8
	NORTH WALES	1	2.9	1	5.7	1
	UPPER DUBLIN	2	2.1	2	4	2
	U. GWYNEDD	4	8.3	4	17.4	5
	WARRINGTON	1	22.6	1	50	2
	WHITPAIN	11	0	11	0	11
	TOTALS	35	10.5	39	24.9	44
AMBLER						
	AMBLER	24	5.5	25	9.9	26
	HATFIELD	2	8.7	2	17.4	2
	HORSHAM	27	5	28	10.6	30
	LANSDALE	4	0	4	0	4
	LOWER GWYNEDD	34	3.8	35	8.3	37
	MONTGOMERY	8	39.8	11	95.1	16
	NORTH WALES	1	2.9	1	5.7	1
	TOWAMENCIN	3	6.3	3	12.5	3
	UPPER DUBLIN	54	2.1	55	4	56
	UPPER GWYNEDD	2	8.3	2	17.4	2
	WHITEMARSH	4	9.1	4	19.7	5
	WHITPAIN	88	0	88	0	88
	WORCESTER	1	6.3	1	12.5	1
	DOYLESTOWN BORO	4	10.6	4	23.4	5
	DOYLESTOWN	1	53.9	2	137.1	2
	NEW BRITAIN	5	36.6	7	92.9	10
	PLUMSTEAD	1	23.5	1	58.8	2
	WARRINGTON	3	22.6	4	50	5
	TOTALS	266	4.9	279	10.9	295
FT. WASHINGTON *						
	HORSHAM	24	5	25	10.6	27
	LANSDALE	1	0	1	0	1
	LOWER GWYNEDD	3	3.8	3	8.3	3
	MONTGOMERY	3	39.8	4	95.1	6
	SPRINGFIELD	4	3.2	4	6.3	4
	UPPER DUBLIN	94	2.1	96	4	98
	UPPER GWYNEDD	1	8.3	1	17.4	1
	WHITEMARSH	9	9.1	10	19.7	11
	WHITPAIN	4	0	4	0	4
	DOYLESTOWN	1	53.9	2	137.1	2
	NEW BRITAIN BORO	2	25	3	62.5	3
	NEW BRITAIN	1	36.6	1	92.9	2
	WARRINGTON	3	22.6	4	50	5
	TOTALS	150	5.1	158	11.1	167
FELLWICK			4		9	
ORELAND						
	MONTGOMERY	1	39.8	1	95.1	2
	NORTH WALES	1	2.9	1	5.7	1
	SPRINGFIELD	33	3.2	34	6.3	35
	UPPER DUBLIN	15	2.1	15	4	16
	WHITPAIN	1	0	1	0	1
	TOTALS	51	3.5	53	7.2	55
NORTH HILLS						
	UPPER DUBLIN	20	2.1	20	4	21
	HORSHAM	2	5	2	10.6	2
	SPRINGFIELD	2	3.2	2	6.3	2
	TOTALS	24	2.4	25	4.7	25
GRAND TOTALS		1079		1205		1373

* PARKING EXPANSION ASSUMED

EXHIBIT D

EXHIBIT E

ASSIGNED STATION RIDERSHIP
PER "HIGH" GROWTH SCENARIO

STATIONS	MUNICIPALITY	1996 ASSIGNED STATION RIDERSHIP WTIH LATENT DEMAND PER SEPTA'S (1994–1996) IMPROVEMENT PROGRAM	CHANGE IN RIDERSHIP (1990–2005) PERCENT CHANGE IN JTW RAIL RIDERSHIP (1990–2005) HIGH	2005 ASSIGNED STATION RIDERSHIP HIGH	CHANGE IN RIDERSHIP (1990–2020) PERCENT CHANGE IN JTW RAIL RIDERSHIP (1990–2020) HIGH	2020 ASSIGNED STATION RIDERSHIP HIGH
DOYLESTOWN *						
	DOYLES TWP.	30	107.8	62	274.2	112
	DOYLES BORO.	17	21.2	21	46.8	25
	BUCKINGHAM	10	44.4	14	88.8	19
	TOTALS	57	70.8	97	173.9	156
DEL. VAL. COLLEGE			68		164	
NEW BRITAIN			66		162	
CHALFONT						
	NEW BRITAIN TWP	11	77.2	19	185.8	31
	BEDMINSTER	1	42.2	1	94.8	2
	DUBLIN	1	0	1	0	1
	CHALFONT	5	44.4	7	88.8	9
	DOYLES TWP.	2	107.8	4	274.2	7
	DOYLES BORO.	1	21.2	1	46.8	1
	PERKASIE	2	22.2	2	44.4	3
	E. ROCKHILL	1	150	3	400	5
	HILLTOWN	1	142.8	2	371.4	5
	HORSHAM	1	10	1	21.2	1
	NEW BRITAIN BORO	2	50	3	125	5
	TOTALS	28	64.2	46	153.9	71
LINK BELT			70		172	
COLMAR *						
	HILLTOWN	18	142.8	44	371.4	85
	HORSHAM	1	10	1	21.2	1
	SILVERDALE	1	100	2	200	3
	DUBLIN	2	0	2	0	2
	CHALFONT	1	44.4	1	88.8	2
	HATFIELD TWP	5	17.4	6	34.8	7
	MONTGOMERY	6	79.6	11	190.2	17
	NEW BRITAIN TWP	11	77.2	19	185.8	31
	W. ROCKHILL	3	0	3	0	3
	SELLERSVILLE	2	0	2	0	2
	SOUDERTON	5	12.6	6	25	6
	TOTALS	55	76.4	97	190.5	160
FORTUNA						
	HATFIELD TWP.	11	17.4	13	34.8	15
	HATFIELD BORO.	2	0	2	0	2
	SOUDERTON	1	12.6	1	25	1
	MONTGOMERY	2	79.6	4	190.2	6
	FRANCONIA	2	0	2	0	2
	TELFORD (MONT)	2	0	2	0	2
	TOTALS	20	0	24	39.4	28
LANSDALE *			0			
	FRANCONIA	8	0	8	0	8
	HATFIELD	7	17.4	8	34.8	9
	HATFIELD BORO	24	0	24	0	24
	HORSHAM	1	10	1	21.2	1
	LANSDALE	21	0	21	0	21
	LOWER SALFORD	2	59.4	3	135.2	5
	MONTGOMERY	3	79.6	5	190.2	9
	SOUDERTON	3	12.6	3	25	4
	TELFORD (MONT)	4	0	4	0	4
	TOWAMENCIN	23	12.6	26	25	29
	UPPER DUBLIN	1	4.2	1	8	1
	UPPER GWYNEDD	6	16.6	7	34.8	8
	CHALFONT	3	44.4	4	88.8	6
	DOYLESTOWN BORO	2	21.2	2	46.8	3
	DOYLESTOWN	1	107.8	2	274.2	4
	HILLTOWN	3	142.8	7	371.4	14
	NEW BRITAIN	7	77.2	12	185.8	20
	PERKASIE	5	22.2	6	44.4	7
	SELLERSVILLE	2	0	2	0	2
	SILVERDALE	1	100	2	200	3
	TELFORD (BUCKS)	1	25	1	50	2
	EAST ROCKHILL	2	150	5	400	10
	TOTALS	130	20.8	157	48.4	193
PENNBROOK						
	U. GWYNEDD	3	16.6	3	34.8	4
	LANSDALE	5	0	5	0	5
	TOWAMENCIN	3	12.6	3	25	4
	WARRINGTON	1	45.2	1	100	2
	HATFIELD	2	17.4	2	34.8	3
	MONTGOMERY	1	79.6	2	190.2	3
	HATFIELD BORO	1	0	1	0	1
	TOTALS	16	15.4	18	33.7	21
NORTH WALES *						
	FRANCONIA	1	0	1	0	1
	HATFIELD	3	17.4	4	34.8	4
	HORSHAM	1	10	1	21.2	1
	LANSDALE	25	0	25	0	25
	LOWER GWYNEDD	3	7.6	3	16.6	3
	LOWER SALFORD	4	59.4	6	135.2	9
	MONTGOMERY	40	79.6	72	190.2	116
	NORTH WALES	9	5.8	10	11.4	10
	TOWAMENCIN	37	12.6	42	25	46
	UPPER GWYNEDD	49	16.6	57	34.8	66
	WHITPAIN	3	0	3	0	3
	WORCESTER	5	12.6	6	25	6
	BUCKINGHAM	1	44.4	1	88.8	2
	HILLTOWN	1	142.8	2	371.4	5
	NEW BRITAIN	6	77.2	11	185.8	17
	TOTALS	188	29.5	244	67.9	316
GWYNEDD VALLEY						
	AMBLER	1	11	1	19.8	1
	L. GWYNEDD	20	7.6	22	16.6	23
	MONTGOMERY	4	79.6	7	190.2	12
	NORTH WALES	1	5.8	1	11.4	1
	TOWAMENCIN	2	12.6	2	25	3
	UPPER DUBLIN	2	4.2	2	8	2
	U. GWYNEDD	7	16.6	8	34.8	9
	WHITPAIN	19	0	19	0	19
	NEW BRITAIN TWP	3	77.2	5	185.8	9
	TOTALS	59	14.7	68	33.7	79
PENLLYN						
	DOYLESTOWN	2	107.8	4	274.2	7
	L. GWYNEDD	10	7.6	11	16.6	12
	MONTGOMERY	4	79.6	7	190.2	12
	NORTH WALES	1	5.8	1	11.4	1
	UPPER DUBLIN	2	4.2	2	8	2
	U. GWYNEDD	4	16.6	5	34.8	5
	WARRINGTON	1	45.2	1	100	2
	WHITPAIN	11	0	11	0	11
	TOTALS	35	21.0	42	49.8	52
AMBLER						
	AMBLER	24	11	27	19.8	29
	HATFIELD	2	17.4	2	34.8	3
	HORSHAM	27	10	30	21.2	33
	LANSDALE	4	0	4	0	4
	LOWER GWYNEDD	34	7.6	37	16.6	40
	MONTGOMERY	8	79.6	14	190.2	23
	NORTH WALES	1	5.8	1	11.4	1
	TOWAMENCIN	3	12.6	3	25	4
	UPPER DUBLIN	54	4.2	56	8	58
	UPPER GWYNEDD	2	16.6	2	34.8	3
	WHITEMARSH	4	18.2	5	39.4	6
	WHITPAIN	88	0	88	0	88
	WORCESTER	1	12.6	1	25	1
	DOYLESTOWN BORO	4	21.2	5	46.8	6
	DOYLESTOWN	1	107.8	2	274.2	4
	NEW BRITAIN	5	77.2	9	185.8	14
	PLUMSTEAD	1	47	1	117.6	2
	WARRINGTON	3	45.2	4	100	6
	TOTALS	266	9.8	292	21.7	324
FT. WASHINGTON *						
	HORSHAM	24	10	26	21.2	29
	LANSDALE	1	0	1	0	1
	LOWER GWYNEDD	3	7.6	3	16.6	3
	MONTGOMERY	3	79.6	5	190.2	9
	SPRINGFIELD	4	6.4	4	12.6	5
	UPPER DUBLIN	94	4.2	98	8	102
	UPPER GWYNEDD	1	16.6	1	34.8	1
	WHITEMARSH	9	18.2	11	39.4	13
	WHITPAIN	4	0	4	0	4
	DOYLESTOWN	1	107.8	2	274.2	4
	NEW BRITAIN BORO	2	50	3	125	5
	NEW BRITAIN	1	77.2	2	185.8	3
	WARRINGTON	3	45.2	4	100	6
	TOTALS	150	10.2	165	22.2	183
FELLWICK			8		18	
ORELAND						
	MONTGOMERY	1	79.6	2	190.2	3
	NORTH WALES	1	5.8	1	11.4	1
	SPRINGFIELD	33	6.4	35	12.6	37
	UPPER DUBLIN	15	4.2	16	8	16
	WHITPAIN	1	0	1	0	1
	TOTALS	51	7.1	55	14.5	58
NORTH HILLS						
	UPPER DUBLIN	20	4.2	21	8	22
	HORSHAM	2	10	2	21.2	2
	SPRINGFIELD	2	6.4	2	12.6	2
	TOTALS	24	4.9	25	9.5	26
GRAND TOTALS		1079		1330		1668

* PARKING EXPANSION ASSUMED

EXHIBIT E