APPENDICES TO FINAL REPORT

NEW JERSEY RAIL EQUIPMENT MAINTENANCE FACILITIES STUDY

PROJECT NO. IT-09-0058, TS F-212

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DRAFT

New Jersey Rail Equipment Maintenance Facility Study

TASK ONE

Existing Equipment and Facilities Inventory

June, 1977

prepared by

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Introduction

This task encompasses a detailed description of the existing state-owned passenger rail equipment and maintenance facilities in New Jersey. It is divided into four sections:

- A narrative description of the existing passenger rail services and the demand for these services throughout the State.
- An inventory of all existing state-owned rolling stock.
- An inventory of all existing active rail equipment and maintenance facilities in New Jersey.
- An inventory of non-active facilities (car storage sites).

This information will be used in later tasks to develop equipment replacement and rehabilitation schedules, maintenance service requirements, and to determine the need for rail equipment maintenance facilities for the year 2000.

I. Existing Passenger Services

Conrail operates commuter rail service on all passenger lines that were formerly operated in New Jersey by five bankrupt companies: Erie Lackawanna, Penn Central, Central Railroad of New Jersey, Pennsylvania-Reading Seashore Lines, and the Reading Railroad. These services are currently subsidized by the Urban Mass Transportation Administration (UMTA) and the State of New Jersey.

The following is a description of each passenger service as it existed in 1976, in the State of New Jersey.

Former Erie Lackawanna Service

Commuter rail service is currently provided by Conrail (Hoboken Division) along the former Erie Lackawanna Lines (EL) between communities in Somerset, Essex, Morris, Bergen and Passaic Counties and Hoboken, New Jersey. At Hoboken, passengers may make connections to downtown and midtown Manhattan via the Port Authority Trans-Hudson Corporation (PATH). Diesel service is provided to Bergen, Passaic, Essex and Morris Counties over three lines - the Pascack Valley Line (eastern Bergen County), the Mainline - Bergen County Line (western Bergen County, Passaic County), and the Boonton line (Morris, Passaic and Essex County).

Service to Newark is available from Essex, Morris and Somerset Counties over three electrified lines - the Morristown line (Morris and Essex County), the Montclair Branch (Essex County), and the Gladstone Branch (Somerset County). The latter two branch lines are connecting lines to the Morristown line. Direct access to midtown Manhattan via the Conrail (former EL) service is not available.

Table 1 below indicates the number of EL trains per weekday and the number of passengers carried on an average weekday in 1976. Ridership was obtained from the conductor counts taken in May, 1976.

Table 1: Former Erie Lackawanna

Lines	Trains per Weekday	Riders East	Riders West
Pascack Valley Line	12	3,175	2,127
Main Line - Bergen Co. Line	66	7,941	8,138
Boonton Line	25	3,143	3,104
Morristown Line	84	14,517	13,661
a) Montclair Branch	24	678	658
b) Gladstone Branch	39	3,842	3,665
TOTAL	250	33,296	32,363

ɔrmer Penn Central Service

Conrail and AMTRAK provide electrified rail commuter service from renton to New York's Penn Station via the former Penn Central Mainline (AMTRAK ainline). This commuter service is operated over a portion of the Northeast ɔrridor (Mercer, Middlesex, Union and Essex Counties) linking Boston and ashington, D.C. In New Jersey, stops are made at Trenton, Princeton Junction, ew Brunswick, Metuchen, Metropark, Edison, Rahway, Linden, North Elizabeth, lizabeth and Newark Stations.

A branch line between Princeton and Princeton Junction shuttles passengers o the AMTRAK Mainline services. Additional service to New York City via the ainline originates at the Jersey Avenue Park and Ride station in New Brunswick.

Conrail also operates the North Jersey Coast Service between Manhattan nd Ocean, Middlesex and Monmouth Counties, N. J. Prior to the Conrail akeover, this service was provided by both the former PC and CNJ Railroads.

This service uses push-pull diesel locomotives operated along the former New York and Long Branch (NYLB) trackage. This service originates at Bay Head (Ocean County) and terminates in Manhattan, N.Y. Bay Head trains switch to electric locomotives at South Amboy for the trip to Manhattan.

Electrified rail service to Manhattan also originates from South Amboy in Middlesex County, and shares a portion of the Perth Amboy and Woodbridge Branch trackage with the North Jersey Coast service. All electrified former PC services provide direct access to New York's Penn Station.

Table 2 presents the total number of weekday trains and the average daily patronage in 1976:

Table 2: Former Penn Central Service

Lines	Trains Per Weekday	Riders East	Riders West
Mainline	110	19,530	17,701
Princeton Branch	40	299	376
South Amboy	20	1,245	984
North Jersey Coast	20	5,290	4,610
TOTAL	190	26,364	23,671

Former CNJ Service

Conrail operates three diesel services formerly provided by the CNJ. Conrail passenger trains serve Warren, Hunterdon, Somerset, Middlesex and Union Counties along the former CNJ Mainline between Phillipsburg and Newark. The Bayonne Shuttle Service is operated between Bayonne, (Hudson County) and Cranford (Union County) via the Newark Bay Bridge. Passengers utilizing this service may transfer to eastbound trains at Cranford, to continue their journeys to Newark and New York City.

Finally, the North Jersey Coast service to Ocean, Monmouth, Middlesex and Union Counties is jointly operated with the former PC trains.

All former CNJ passengers bound for lower Manhattan must transfer to PATH at Newark. Passengers bound for Penn Station in midtown Manhattan must board former PC trains at Newark.

The total number of weekday trains and a conductor's count of daily 1976 passengers is listed below (Table 3):

Table 3: Former CNJ Service

Lines	Trains per Weekday	Rider East	Rider West
North Jersey Coast	14	3,295	4,327
Mainline	60	6,466	6,551
Bayonne Shuttle	41	493	561
Total	115		

Former Pennsylvania - Reading Seashore Lines (PRSL) Service

Conrail operates the former PRSL passenger service between Lindenwold, N. J. (Camden County) and communities in Atlantic and Cape May Counties. At Lindenwold, passengers can transfer to PATCO rapid transit trains for destinations in Camden and Philadelphia.

There are three branches of PRSL service. RDC cars are used on all branches.

The Ocean City branch RDC's couple with Cape May branch RDC's at Tuckahoe for the West bound trip. At Winslow Junction, they use a portion of the Atlantic City branch tracks to Lindenwold. Atlantic City bound RDC's use the entire Atlantic City branch segment.

The total number of trains per weekday, and a conductor's count of 1976 passengers on the former PRSL is listed below (Table 4):

Table 4: Former PRSL Service

Lines	Trains Per Weekday	Riders East	Riders West
Atlantic City Branch	6	123	119
Cape May Branch[1]	2	51	43
Ocean City Branch[2]	2	60	61
Total	10	234	223

[1,2]Two additional seasonal trains run between June - September

Former Joint Reading - CNJ Service

Conrail operates commuter rail service formerly jointly provided by CNJ and the Reading Company from Philadelphia and West Trenton to Newark. The service uses RDC's, and operates over former Reading trackage from its origin in Philadelphia, Pennsylvania, through Mercer and Somerset Counties to Bound Brook. At Bound Brook, former CNJ trackage is used to Cranford and thence to Penn Station, Newark. Manhattan - bound passengers must transfer to former PC trains at Newark. All passenger equipment on this service is currently owned by SEPTA.

Table 5 illustrates the 1976 daily patronage and frequency of service:

Table 5: Former Reading - CNJ Service

Line	Trains Per Weekday	Riders East	Riders West
Mainline	2	308	246

II. Inventory of Existing State-owned Rolling Stock

This section describes in detail the existing state-owned rolling stock in active service. For each passenger rail line, the following information is presented:

- type of equipment
- quantity in active service
- manufacturer
- model/series number
- year the equipment was built
- year the equipment was rehabilitated (if any)
- year the equipment is scheduled for rehabilitation (if any)
- remaining service life

The NJDOT proposes to replace or rehabilitate a considerable number of coaches, MU cars and locomotives in 1977 and 1978. In fact, the replacement process is already underway. Briefly, the following equipment will be replaced, rebuilt or purchased during this period.

- 33 Arrow I MU cars built in 1968 are scheduled for rehabilitation in 1978
- 228 former Erie Lackawanna (EL) motor and trailer cars (MU's DC) built in 1912-27 will be retired by 1980.
- 18 series 400 MU cars ("Reds") built in 1912 will be put in emergency storage by 1978
- 28 series 1500 and 4 series 3200 coaches recently acquired are scheduled for rehabilitation in 1977. These coaches will replace 29 series (1600 - 1700) coaches built in 1927 which will be retired.
- 20 series 4200 (E-8) locomotives are scheduled for rehabilitation in 1978
- 230 new Arrow III MU cars are currently being purchased. 180 of these cars will replace the 228 former EL MU's when re-electrification of the Gladstone and Morris-Essex branches are completed. 50 Arrow II cars will replace the 18 'Reds' when electrification of the North Jersey Coast Service is extended to Matawan and Red Bank.

The following tables present an inventory of all state-owned equipment as it exists in 1977.

Pascack Valley, Boonton, Bergen County and Mainline - 1977

Equipment Type	Quantity	Manufacturer	Series	Year Built	Year Rehabilitated	Scheduled Rehabilitation	Remaining Service Life (From 1977)
Cab Control Car	22	Pullman Std.	1500	1971	------	-------	24
Cab Control Car	11	Pullman Std.	1500	1973	------	-------	26
Snack Car	9	Pullman Std.	1600	1971	------	-------	24
Coach	69	Pullman Std.	1700 - 1770	1971	------	-------	24
Coach	39	Pullman Std.	1771 - 1808	1973	------	-------	26
Locomotive	23	General Electric	3300	1971	------	-------	14
Locomotive	9	General Electric	3300	1973	------	-------	16

TOTALS	Locomotives	32
	Coaches	150

Table 7: Existing Equipment - Former Erie Lackawanna Service, Conrail (Hoboken Division) Morris and Essex, Gladstone, Montclair Branches - 1977

Equipment Type	Quantity	Manufacturer	Series	Year Built	Year Rehabilitated	Scheduled Rehabilitation	Remaining Service Life (From 1977)
MU (DC)	47	Pullman Std.	3200	1925	-------	---------	0
MU (DC)	8	Beth. Steel	3400	1912-25	-------	---------	0
MU (DC)	84	Pullman Std.	3500	1930	-------	---------	0
MU (DC)	56	Pullman Std.	4300	1917-20	-------	---------	0
MU (DC)	33	Pullman Std.	4600	1929	-------	---------	0
TOTAL	228						

All cars scheduled to be replaced by 180 new MU's in 1977-78

Table 8: Existing Equipment - Former Penn Central Service, Conrail (New Jersey Division)
PC Mainline, South Amboy Branch, Princeton Branch - 1977

Equipment Type	Quantity	Manufacturer	Series	Year Built	Year Rehabilitated	Schedule Rehabilitation	Remaining Service Life (From 1977)
MU (AC)	38	St. Louis Car	Arrow I (500-533)	1968-69	-------	1978	*
MU (AC)	70	General Electric	Arrow II (534-603)	1974-75	-------	--------	*
MU (AC)	18[1]	Altoona, P.R.R.	Reds (400)	1912	-------	--------	0[2]
MU (AC)	230[3]	General Electric	Arrow III (1304-1533)	1977-78	-------	--------	*
TOTAL	351						

[1] 4 "Reds" are used daily on Princeton Branch

[2] 18 "Reds" scheduled for replacement by 1978

[3] currently being purchased at rate of 8 cars per month. 230 MU's temporarily are used on PC. 180 will be reallocated to EL lines after re-electrification.

*service life of stainless steel cars indefinite if cars have a major overhsul snf rewiring every 15 to 20 years

Table 9: Existing Equipment - North Jersey Coast Service (Former NYLB), Conrail (New Jersey Division) - 1977

Equipment Type	Quantity	Manufacturer	Series	Year Built	Year Rehabilitated	Scheduled Rehabilitation	Remaining Service Life (From 1977)
Coach	6	American Car and Foundry	100	1953	1971	------	0
Coach	28	Pullman Std.	100	1946 - 50	1973	------	1
Coach	29	Altoona P.R.R.	1684-1741	1927	-----	------	0[2]
Coach	5	American Car and Foundry	2100	1947	-----	------	0
Coach	26	Budd Co.	2400	1938	1970	------	*
Coach	16	Pullman Std.	2400	1938	1971	------	7
Coach	26	Budd Co.	3000	1938	1969	------	*
Coach	4	Budd Co.	3200	1949	1963	1977[1]	*
Coach	5	Budd Co.	4000	1947	-----	------	*
Coach	3	Pullman Std.	7000	1948	-----	------	1
Coach	28	Budd Co.	1500	1949	1963	1977[1]	*
Locomotive	8	Electro-Motive	GP-7 1500	1952	-----	------	6
Locomotive	20	Electro-Motive	E-8 4200	1947	------	1978	5
Locomotive	3	Electro-Motive	E-7 4200	1951	1972	------	0
Locomotive	13	General Electric	GG-1 4800	1935	------	------	0
TOTALS Locomotives	44						
Coaches	176						

[1] scheduled to replace (29) Series 1684-1741 coaches in 1977

[2] scheduled to be replaced by (32) series 1500, 3200 coaches in 1977

*service life is indefinite if cars have major overhaul every 15 to 20 years

Table 10: Existing Equipment - former CNJ service, Conrail (New Jersey Division) Mainline, Bayonne Shuttle - 1977

Equipment Type	Quantity	Manufacturer	Series	Year Built	Year Rehabilitated	Scheduled Rehabilitation	Remaining Service Life (From 1977)
Coach	10	Pullman Std.	270	1965	1972	------	15
Coach	20	American Car and Foundry	300	1948	1968	------	Expired
Coach	2	Budd Co.	300	1949	------	------	*
Coach	2	Budd Co.	300	1938	1968	------	*
Coach	2	Pullman Std.	300	1947	1971	-------	Expired
Coach	53	Pullman Std.	1000, 1100, 1200, 1300	1923-31	1969	-------	Expired
Locomotive	13	Lend-Leased to NJDOT	GP-40(3671-83)	1968	-------	-------	11
RDC[1]	10	Budd Co.	500	1950-53	1974-75	--------	*

[1] used on Bayonne Shuttle

*service life is indefinite if cars have major overhaul every 15 to 20 years

TOTALS Coaches 89
Locomotives 13
RDC's 10

Table 11: Existing Equipment - Former PRSL Service, Conrail (Philadelphia Division) - 1977

Equipment Type	Quantity	Manufacturer	Series	Year Built	Year Rehabilitated	Scheduled Rehabilitation	Remaining Service Life (From 1977)
Rail Diesel Car (RDC)	10	Budd Co.	402-413	1950-51	1969	-------	*
RDC (spare parts)	1	Budd Co.	554	1950-53	------	-------	Expired

*service life is indefinite if cars have major overhaul every 15 to 20 years.

III. Inventory of Existing Rail Equipment Maintenance Facilities

The State of New Jersey currently contracts with Amtrak and Conrail for all rail maintenance facilities that were formerly owned by the five bankrupt railroad companies. Although Conrail has assumed operation of all passenger services in the state, it does not own all maintenance facilities of the former companies. AMTRAK and the State of New Jersey own certain facilities.

The following is a list of the rail equipment maintenance facilities that currently service state-owned equipment on each passenger rail line in New Jersey.

1. Former CNJ Mainline (and Bayonne Shuttle)

   Handling RDC's, locomotives, push-pull coaches and coaches.

   - Elizabethport (also known as Eport)
   - Harrison
   - Raritan

2. North Jersey Coast Service (former NYLB)

   Handling locomotives and coaches

   - Sunnyside, N. Y. (AMTRAK facility)
   - South Amboy
   - Bay Head
   - Wilmington, Del. (AMTRAK facility)
   - Elizabethport

3. Former PC Mainline, Princeton Branch, South Amboy Branch

   Handling MU's, locomotives and coaches

   - Sunnyside, N. Y. (AMTRAK facility)
   - Penn Station, N. Y. (AMTRAK)
   - South Amboy
   - County Yard (New Brunswick)
   - Trenton
   - Wilmington, Del. (AMTRAK facility)
   - Paoli, Pa.

4. Former Erie Lackawanna (all lines)

Handling MU's, locomotives and push-pull coaches
- Hoboken (NJDOT facility)
- Elizabethport
- Dover
- Spring Valley, N. Y.
- Gladstone
- Suffern, N. Y.
- Morristown
- Summit
- Waldwick

5. Former PRSL Mainline

Handling RDC's

- Atlantic City
- Lindenwold

Each of these facilities was examined by the Bureau of Rail Equipment's staff in order to determine current capabilities for servicing existing rolling stock. Through on-site inspections, the following information was gathered:

- location and size of each facility
- type and present condition of maintenance equipment
- maintenance capability and type of repairs performed
- Number of personnel, areas of specialization, wage rates (note - wages are expressed in 1977 dollars)
- average repair back-log
- number of cars/locomotives that can be handled at each facility
- repair subcontractors utilized, associated frequency of use and costs
- current parts supply history, back orders, lead times
- spare parts control and cannabilization control procedures
- percentage of cannibalization per the size of fleet

The survey indicated that the rail equipment maintenance facilities available to NJDOT vary according to their maintenance capabilities. The facilities generally fit into one of three categories:

- Heavy maintenance - i.e. rebuilding of cars or locomotives
- Running maintenance and light repairs - i.e. brakes compressors, radiators
- Turnaround cleaning - i.e. fueling, car washing, charging coaches, overnight storage, replace light bulbs

The following is a list of these facilities categorized by their maintenance capabilities:

Heavy Maintenance:
Elizabethport, N.J.
Wilmington, Delaware
Hoboken, N. J.

Running Maintenance and turnaround cleaning:
South Amboy, N.J.
Raritan, N.J.
Gladstone, N.J.
Dover, N.J.
Morristown, N.J.
Hoboken, N.J. (portion of heavy facility)
Lindenwold, N.J.
Atlantic City, N.J.
Sunnyside, N.Y.
Paoli, Pa (has capability for heavy maintenance, but not currently performed on NJDOT equipment)
Trenton, N.J.
County Yard
Penn Station , N.Y.
Bay Head, N.J.

Turnaround Cleaning only:
Harrison N.J.
Waldwick, N.J.
Summit, N.J.
Phillipsburg, N.J.
Suffern, N.Y.
Spring Valley, N.Y.

A. Survey of Heavy Maintenance Facilities

1. Elizabethport - The facilities are located in Elizabeth, N.J. directly south of Newark airport and east of the New Jersey Turnpike. The facility is maintained by Conrail.

a. Size - There are separate shops for locomotives and cars, with separate entrances and exits at each of the shops. The locomotive shop is 700 feet long and is wide enough to accommodate five (5) tracks. Approximately one third of this shop is utilized for repair of NJDOT-owned locomotives.

The car shop is approximately of equal size. Two tracks are used for NJDOT-owned cars. Freight cars are given priority service.

The shop is approximately 75 years old and in generally poor condition.

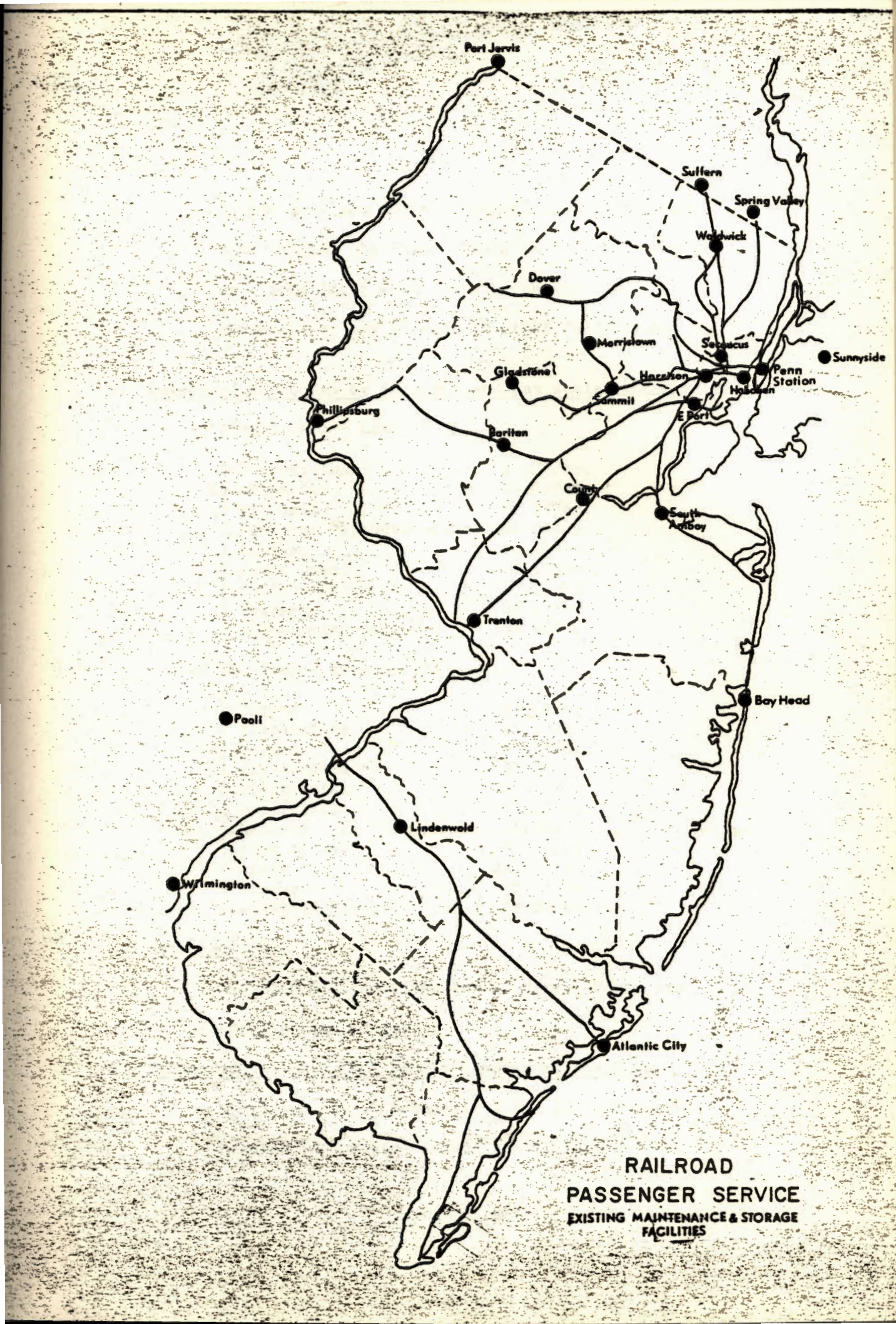
b. Type and condition of repair equipment

- In the locomotive shop there are two 75 ton cranes, one hot water engine washer, one 25 ton outdoor gantry, one 10 ton crane, three engine lathes, one locomotive load box and one large pit. In the car shop there are two 15 ton cranes, one complete wheel shop, four 50 ton drop tables, and two NJDOT-owned car jacks. There is no pit in the car shop.

All equipment is old and poorly maintained except for the wheel truing equipment.

c. Maintenance capabilities, type performed

- Heavy maintenance is performed on cars, RDC's and locomotives. Running maintenance is performed on


Port Jervis
Suffern
Spring Valley
Dover
Morristown
Secaucus
Sunnyside
Penn Station
Gladstone
Summit
E Port
Phillipsburg
Trenton
Bay Head
Paoli
Lindenwold
Wilmington
Atlantic City
RAILROAD
PASSENGER SERVICE
EXISTING MAINTENANCE & STORAGE FACILITIES

locomotives and RDC's. Limited car painting is done outside the shop. There is no paint shop per se. Some light work, such as changing air compressors, may be sent to other facilities.

d. Number of personnel by function and pay scales (1977 rates)

- Diesel Shop - Crew of 35

5 electricians	$7.17/hr.
15 mechanics	$7.17/hr.
5 plumbers	$7.17/hr.
1 assigned +1general labor	$6.00/hr.
1 hostler	$6.74/hr.
1 crane oper.	$7.17/hr.
3 boiler makers	$7.17/hr.
2 foremen	$8.14/hr.
1 electrician helper	$6.00/hr.

- Car Shop - Crew of 34

2 foremen	$8.14/hr.
2 blacksmiths	$7.17/hr.
17 carmen	$7.17/hr.
1 crane operator	$7.08/hr.
1 electrician	$7.17/hr.
3 machinists	$7.17/hr.
4 helpers	$6.00/hr.
1 pipe fitter	$7.17/hr.
1 clerk	$54.73/day
1 cleaner	$5.73/hr.
1 assigned labor	$5.83/hr.

e. Work Back Log

- Averages 8 locomotives and 12 cars. Parts are usually hard to get.

f. Number of vehicles that can be handled at one time

- Approximately 10 locomotives and 10 cars can be handled at one time inside the facility.

g. Subcontractors used, frequency and relative cost

- Parts come through Altoona stores. Air Conditioner work done thru Tomlinson Refrig. and Supply Co. Elizabeth, N.J. Vapor Corp. is used for steam generator work.

h. Parts supply history, back orders and lead times

- Lead time is long. (2 months for parts). Lead time on motors from Altoona is 1½ mo. Parts supply is traditionally the cause of back logs (up to 2 months).

i. Spare parts (stores) procedures and control of cannibalization

- In many cases, cannibalization is approved by management in order for cars to be kept in service. For example, car 561's engine was used in 560. Cannibalization occurs when material is unavailable in the store house.

j. Cannibalization percentage with each facility and size of fleet handled

- Cannabilization percentage unavailable.
- Fleet size handled here:

13 GP40 locomotives
2 E-7
20 E-8 (Heavy)
8 GP-7
10 RDC cars
155 various coaches
2 yard switchers

2. Wilmington, Delaware - There are separate engine and car shops. Both are maintained by Amtrak.

a. Location and size

- Shops are located near Amtrak Mainline in Wilmington. Exact shop dimensions were not obtained but the engine shop generally has space for 2 NJDOT locomotives.

The car shop can handle 8 cars of all types.

b. Type and condition of maintenance equipment

- The engine shop contains a wheel press, lathe, one 50 ton jack, one 30 ton jack, two 100 ton cranes, 5 drop tables, one GG-1 transformer rack.

The carshop contains one T.I.G. welder, two 35 ton jacks, one 2 ton crane, and one wheel lathe.

The equipment is old but is generally in good condition.

c Maintenance capabilities, type performed

- Heavy maintenance is performed on both electric locomotives and cars. Locomotives and components (except transformers) can be rebuilt. Repair, modification and rewiring can be performed on cars.

d. Number of personnel, type, pay scales (1977 rates)

- the total crew working on NJDOT-owned equipment consists of:

Car Shop:	5 electricians	$7.21/hr.
	4 car repairmen	$7.10/hr.

Locomotive Shop: Consist of 26 people. (No breakdown available)

e. Work back log

- Engine shop: negligible
- Car shop: one car awaiting heavy repairs

f. Number of vehicles that can be handled at one time

- Engine shop: 2 engines, but Amtrak has priority

Car Shop: 2 cars at a time

g. Subcontractors used

- Altoona Yards, Westinghouse Electric Co. for brake work. Costs and frequency unavailable.

h. Parts supply, history, backlog and lead times

- Most major parts are rebuilt, others are acquired from Sunnyside Yard. This source is very reliable.

i. Spare parts (stores) procedures and control of cannibalization

- No cannibalization

j. Cannibalization percentage with each facility and size of fleet handled

- 103 MU's
  13 GG-1's
  No Cannibalization

3. Hoboken, N.J. - These facilities are located at the terminal railroad station. The facilities are owned by the State of New Jersey, but all personnel are Conrail employees.

a. Location and size of facility

- The car shop has the capacity for 14 cars, offices and storage areas for parts, machinery and tools. The engine shop consists of offices and an open area where 3 locomotives can be worked on at a time.

b. Type and condition of equipment

- In general the equipment is old but useable. Locomotives may use car and station equipment when equipment is idle. There are several 35 ton jacks, one locomotive load box, two 25 ton cranes and one 35 ton crane.

c. Maintenance capability

- Heavy maintenance is performed on MU cars. Running maintenance is performed on both MU's and locomotives.

d. Personnel and pay scales (rates)

- The car shop consists of 79 persons:

4 foreman	$8.14/hr.
26 electricians	$7.17/hr.
6 electricians helpers	$6.00/hr.
14 machinists	$7.17/hr.
2 machinist helpers	$6.00/hr.
1 sheet metal worker	$7.17/hr.
1 crane operator	$7.08/hr.
17 laborers	$6.00/hr.
4 car cleaners	$5.73/hr.
4 painters	$7.17/hr.

The engine house employs 36:

6 foremen	$8.14/hr.
1 chief engine dispatcher	$15,800 year
9 machinists	$7.17/hr.
4 machinists helpers	$6.00/hr.
2 pipe fitters	$7.17/hr.
6 electricians	$7.17/hr.
8 laborers	$6.00/hr.

These personnel are assigned to NJDOT owned equipment.

e. Work Backlog

- 22 cars are backed up for motor work. Ninety percent of these cars will require work on all four motors.

f. Simultaneous work

- 14 cars and 3 locomotives at once.

g. Subcontractors used

- North Bergen is used for motor work. Service is good.

h. Parts supply history back orders and lead times

- Parts for EL MU cars are obsolete.

i. Spare parts (stores) procedures and control of cannibalization

- A small amount of cannibalization is done to keep a maximum number of cars in service. (Exact figures are unavailable)

j. Cannibalization percentage with each facility and size of fleet handled

- A small amount of cannibalization is done to keep a maximum number of cars in service (Exact figures are unavailable)

B. Survey of Facilities that Perform Running Maintenance

1. South Amboy - The South Amboy facilities are maintained by Conrail.

a. Location and size

- The facilities are located near NJ Route 35 just north of South Amboy. The locomotive shop contains two tracks and is capable of housing two locomotives. There is no car shop.

b. Type and condition of maintenance equipment

- There are two 50 ton hydraulic jacks in fair condition.

c. Maintenance capability and type of maintenance performed

- Running maintenance and monthly inspection work is performed. Some emergency engine, compressor and radiator work can also be done.

d. Number of personnel by type and pay scales (1977 rates)

- 4 Foremen	($65/day)
1 clerk	($1,150/mo.)
6 machinists	($7.20/hr.)
7 electricians	($7.20/hr.)
3 pipe fitters	($7.17/hr.)
2 laborers	($6.00/hr.)

e. Work Back Log

- None.

f. Number of vehicles that can be handled at one time

- One monthly inspection per day can be performed on E7 and E8 locomotives. Running maintenance can be performed on two locomotives at a time.

g. Subcontractors used, frequency and relative cost

- E'Port shop does all heavy and medium maintenance. Vapor Corp. does steam generator work.

h. Parts supply history, back orders and lead times

- Vapor Corp. - parts are very slow arriving (2½ months)

i. Spare parts procedures and control of cannibalization

- If parts are needed they are taken from locomotives requiring E'Port service for heavy maintenance. They are replaced while the unit is in E'Port.

j. Cannibalization percentage with each facility and size of fleet handled

- The fleet consists of 2-E7's and 20 E8's with occasional GG-1 for running maintenance. There are 13 GG1's. (Cannibalization rate is unavailable).

2. Raritan - The Raritan facilities are maintained by Conrail.

a. Location and size

- The facilities are located near NJ Route 202 and County Route 567 in Raritan. Offices are located in an old rail car. The maintenance building can house 2 locomotives.

b. Type and condition of maintenance equipment

- There is no special equipment. There is a good pit located in the shop for underbody repairs.

c. Maintenance capabilities, type of maintenance performed

- Running maintenance performed includes replacement of power packs and repairs to radiators and air compressors.

d. Number of personnel by type and pay scales (1977 rates)

- The car maintenance crew consists of

1 General Foreman	$8.14/hr.
3 Foremen	$7.56/hr.
2 electricians	$7.17/hr.
6 car cleaners	$5.73/hr.
12 inspectors	$7.17/hr.

The locomotive maintenance crew consists of:

2 electricians	$7.17/hr.
6 machinists	$7.17/hr.
1 pipe fitter	$7.17/hr.
2 hostlers	$6.15/hr.
5 laborers	$5.85/hr.
4 foreman	$7.56/hr.

e. Work back log

- None.

f. Number of vehicles handled at one time

- Two.

g. Subcontractors used

- E'Port is used for heavy maintenance, Air brake work is done at Reading Shop.

h. Parts supply history

- Parts can be obtained in a day or two - expendables are now becoming hard to get.

i. Spare parts procedures and control of cannibalization

- None.

j. Cannabilization rate and size of fleet handled

- Fleet size: 13 GP-40 locomotives, 8 GP-7 locomotives and 4 RDC's. No cannibalization is done.

3. Hoboken and Associated Areas - Although heavy maintenance is performed at Hoboken, separate facilities are maintained at Hoboken terminal for running maintenance. The Hoboken facility is owned by NJDOT. All other support facilities are owned by Conrail.

a. Location and size

- There is a thirteen track terminal at Hoboken, Support facilities are also maintained at Gladstone, Dover and Morristown.

b. Type and condition of maintenance equipment in place

- There is no special maintenance equipment in place. At Hoboken, there are only two fork lift trucks and a wheel truing maching.

c. Maintenance capability and type of work performed

- Running maintenance, monthly inspections and cleaning are performed at the various sites.

d. Number of personnel by type and salary scales

- Hoboken's shop consists of 92 people:

1 general foreman	$8.14/hr.
13 foremen	$7.56/hr.
1 electrician supervisor	$7.56/hr.
23 special trades	$7.17/hr.
28 electricians	$7.17/hr.
8 machinists	$7.17/hr.
5 pipe fitters	$7.17/hr.
4 brake testors	$7.17/hr.
32 car inspectors	$7.17/hr.
45 coach cleaners	$5.73/hr.
6 laborers	$5.86/hr.
2 apprentice elctricians	rates unavailable
1 chief stockkeeper	rates unavailable
1 clerk typist	rates unavailable
1 counterman	rates unavailable
1 forklift operator	rates unavailable

Gladstone Station, Gladstone, NJ	
1 car inspector	$7.17/hr.
1 electrician	$7.17/hr.
1 coach cleaner	$5.73/hr.
Dover Station, Dover, NJ	
2 car inspectors	$7.17/hr.
2 electricians	$7.17/hr.
3 coach cleaners	$5.73/hr.
Morristown Station, Morristown, NJ	
1 electrician	$7.17/hr.
1 coach cleaner	$5.73/hr.

e. Work Back log

- None

f. Number of vehicles that can be handled at one time

- Hoboken has 13 tracks in the station and yard space. Work could be done in either location. 14 cars can be worked on at a time.

g. Subcontractors used

- Altoona is used for brake, work. Vapor Corp. is used for work on compressors, door closers, etc. E'Port does heavy repair work.

h. Parts supply history

- Vapor Corp. typically takes 2 months to deliver ordered parts. Altoona delivers brake work in 1 month back orders for expendables.

i. Spare parts procedures and control of cannibalization

- Conrail procedures are used - N.J. parts are kept separate from Conrail. Car parts are also separate from locomotive parts.

j. Size of fleet and percent of cannibalization

- 33 U34CH Locomotives 227 MU Cars and trailers are at Hoboken. Cannibalization rate is negligible.

4. Former PRSL facilities: Lindenwold and Atlantic City - These facilities are owned and operated by Conrail.

a. Location and size

- The Lindenwold facility is located at the PATCO station. The Atlantic City facility is at Bacharach Blvd. near the passenger station. Each location has enough track to park six RDC's used in normal service.

b. Type and condition of equipment

- Lindenwold - No special equipment

Atlantic City - There is an engine test stand, a lift truck for engine removal, and a lathe. All equipment is old but useable.

c. Maintenance capability and type of maintenance being done

- Only running maintenance can be performed at Lindenwold. At Atlantic City, monthly inspections, running maintenance and limited heavy maintenance can be performed. This includes removal and replacement of major items on cars, electric welding, sheet metal work, and engine repairs.

d. Personnel and pay scales ((1977 rates)

- At Lindenwold the crew consists of:

1 electrician	$7.17/hr.
1 machinist	$7.17/hr.
2 laborers	$5.65/hr.
1 car repairman	$7.17/hr.

At Atlantic City the crew consists of:

4 machinists	$7.17/hr.
3 electricians	$7.17/hr.
3 car inspectors	$7.17/hr.
1 car repairman	$7.17/hr.

e. Work Back Log

- No back log.

f. Number of vehicles that can be handled at one time

- Two RDC's can be handled at a time. Work is limited by available man power at each location.

g. Subcontractors used

- Reading shops are used for heavy repair and wheel work. Altoona does some brake work.

h. Parts supply history

- There is good service on parts from E'port but fair service from Altoona. Much of the engine work depends on parts scrounging.

i. Spare parts control of cannibalization

- Parts may be cannibalized from cars sent to Reading to get another car in service. They can afford to have a few cars out of service without seriously affecting operations.

j. Fleet size

- Fleet size: 11 RDC cars. The cannibalization rate is 10% (one car is scrapped, 10 cars are active).

5. Sunnyside Yard, N.Y. - This facility is operated by Amtrak. However, like Wilmington, it performs work on NJDOT owned equipment.

a. Location and size

- The facility is located in the Long Island City/ Sunnyside sections of Queens Borough in New York City. It is a large terminal point for many Amtrak trains and New Jersey owned electric locomotives, coaches and MU cars.

b. Type and condition of maintenance equipment

- The facility contains one monthly inspection shed with raised track for six cars, one toilet dump truck, a small crane, two 35 ton jacks, and one drop table.

c. Maintenance capability and type of maintenance performed

- Running maintenance is performed on MU cars. The facility also assembles and disassembles trucks, but motors are sent out for rebuilding or repair.

d. Number of Personnel by type and pay scales (1977 rates)

- The entire crew consists of 159 persons:

8	foremen $8.14/hr.	33	electricians $7.17/hr.
12	pipe fitters $7.17/hr.	3	machinists $7.17/hr,
24	car inspectors $7.17/hr.	2	electricans helpers $6.00/hr.
20	car repairmen $7.17/hr.	57	coach cleaners $5.73/hr.

e. Work Back Log

- There generally is a repair backlog of six cars.

f. Number of vehicles that can be handled at one time

- Generally, one New Jersey owned car at a time can be scheduled for major repairs (such as transformer replacement, etc.)

g. Subcontractors used, frequency, and relative cost

- Heavy maintenance work is done at Wilmington on GG-1's. Altoona does brake work. Hillside shops repair Westinghouse gear units. Marine Electric repairs motors and generators.

h. Parts supply history back orders and lead times

- The facility has had some trouble (unresolved) accounting for brake parts sent to Altoona. Altoona probably lost them. Parts have 2 month lead times.

i. Spare parts (stores) procedures and control of cannibalization

- Stores try to economize by not buying as many parts as they could. The maintenanceepeople automatically cannibalize parts from other cars beeause there is little attempt to control it. Management encourages cannibalization.

j. Cannibalization percentage with each facility and size of fleet handled

- Approximately 2-3 cars have been held out of service for some time during last six months. Car 115 has been out

a year. Equipment maintained includes 103 MU's, 81 coaches, and 13 GG-1's. Cannabalization occurs when parts cannot be obtained from stores.

6. Paoli, Pa. - The Paoli shop is associated with Conrail.

a. Location and size

- The facility is located on Route 252 in the center of town. The shop has an engine house with four tracks. Three tracks are used for heavy repairs. Each track is capable of handling four cars.

b. Type and condition of equipment in place

- Presently in use are the following pieces of equipment; 1 drop pit, 1 drop jack, 1 austin western crane car, and 2 overhead cranes.

c. Maintenance capability and type of maintenance being done

- The type of maintenance performed on NJDOT equipment are running maintenance and mileage checks. The capabilities would be dependent upon the priorities of how many of each type of cars are shopped.

d. Number personnel by type and pay scales (1977 rates)

- The type of personnel is as follows. All are paid standard Conrail rates.

58	Electricians	$7.17/hr.
49	Repairmen	$7.17/hr.
11	Machinist	$7.17/hr.
11	Pipefitter	$7.17/hr.
4	electrical helpers	$6.00/hr.

1	blacksmith	$7.17/hr.
1	boilermakers	$7.17/hr.

Note: NJDOT does not have any personnel specifically assigned for state owned cars only.

e. Work Back Log

- There are 18 cars which are serviced in Paoli of which four are presently out of service. Two cars are generally backlogged at a time.

f. Number of vehicles that can be handled at one time

- The maximum amount of cars that could be worked on is approximately 16.

g. Subcontractors used, frequency and relative cost

- The subcontractors used for the NJDOT cars are Altoona Pa. for motor overhauls and Wilmington Del. for work on electrical components.

h. Parts supply history back orders and lead times

- Due to the cars being so old there is a minimum time of 90 days to acquire parts for repairs.

i. Spare parts procedures and control of cannibalization

- There is a building used for storing spare parts.

j. Cannibalization percentage with each facility and size of fleet

- There are 243 cars worked on at Paoli. Eighteen of the cars are owned by NJDOT. The percent of NJDOT owned cars cannibalized is 22.2%.

7. Trenton Station - This facility, also known as Barracks Yard, is maintained by Conrail.

a. Location and size of facility

- Trenton Station is located on Clinton and Fairview Avenue in Trenton, N.J. and can be reached easily from I-95. The station has 8 tracks, 4 of which are used for storage and maintenance.

b. Type and condition of equipment

- There are no pieces of equipment available for maintenance.

c. Maintenance capability

- The work done in Trenton is classified as light repairs and running maintenance. Compressor oil levels are maintained, brake shoes are replaced and pantograph work is also done. At Trenton Station there is room for 40-50 cars. This includes S.E.P.T.A. cars.

d. Personnel by type and pay scales (1977 rates)

- Personnel -	1 - foreman	$7.78/hr.
	8 - coach cleaner	$5.73/hr.
	8 - car inspector	$7.17/hr.

e. Work Back Log

- No Back log.

f. Simultaneous work

- None.

g. Subcontractors used

- No subcontractors

h. Parts supply history back orders and lead times

- No parts are stored. Any parts needed are obtained. Philadelphia shops.

i. Spare Parts (stores) procedures and control of cannibalization

- Spare parts come from Sunnyside, NY or Philadelphia

j. Cannibalization percentage with each facility and size of fleet handled

- No cannibalization is done. 40 cars are handled. Some of which are SEPTA-owned cars.

8. County Yard - This facility is maintained by Conrail.

a. Location and size

- County Yard is located about 2 miles from Route 1 just south of New Brunswick. The yard is accessible from Jersey Ave. There are three tracks, which are available for storage and/or maintenance.

b. Type and condition of Equipment

- There are no pieces of heavy equipment in the yard that are used for maintenance.

c. Maintenance capability and type of maintenance performed

- The type of work done in County would be classified as light repairs or running maintenance. The cars come into the yard for layover and are inspected for any faults. The cars also receive an interior/exterior cleaning.

d. Number of personnel by type and pay scales (1977 rates)

- The personnel on hand at county by titles are:

1 - mechanical foreman	$7.78/hr.
1 - cleaner foreman	$7.78/hr.
10 - cleaners	$5.73/hr.
5 - car inspectors	$7.17/hr.

e. Work Back Log

- There very rarely is any work back log.

f. Number of vehicles that can be handled at one time

- Maximum capability of maintenance is 30-35 cars per night.

g. Subcontractors used, frequency and relative cost

- Subcontractor utilized is the "A-1 Hauling Co." in Secaucus, N.J. which is responsible for the cleaning of the toilets. Approximate cost is $2,100 per month

h. Parts supply history,back orders and lead times

- The few parts that are needed in County are ordered from Sunnyside, New York. There are no major tie ups with receiving ordered parts.

i. Spare parts (stores) procedures and control of cannibalization

- The only spare parts kept in the yard are brake equipment and door parts.

j. Cannibalization percentage with each facility and size of fleet handled

- Since the cars do not lay over at county for any long period there is absolutely no cannibalization.

9. Penn Station, New York - This facility is maintained by Amtrak.

a. Location and size

- The facility is located on 8th Avenue in New York City. There are two yards" Erie Yard has 6 tracks capable of handling 4 to 8 cars per track. "A" Yard also has 6 tracks.

b. Type and condition of equipment in place

- No special equipment is used for maintenance

c. Maintenance capability and type of maintenance being done

- Running maintenance repairs are made on MU's, coaches and electric locomotives. Turn around cleaning of cars is also performed.

d. Personnel and pay scales (1977 rates)

- The crew consists of 59 persons:

3 foremen	$7.78/hr.
4 electricians,	$7.17/hr.
2 pipe fitters	$7.17/hr.
30 carmen,	$6.15/hr.
1 car repairman	$7/17/hr.
19 cleaners	$5.73/hr.

(80 cleaners are shared with Amtrak)

e. Work Back Log

- There is no work back log.

f. Number of vehicles that can be handled at one time

- 70 cars can be handled with the manpower available.

g. Subcontractors used

- Subcontractors are used.

h. Parts supply history

- A small supply of parts for running, maintenance (bulbs, fuses etc). is obtained from Sunnyside stores.

i. Spare parts control of cannibalization

- Cannibalization is performed. Exact percentages were not available.

j. Fleet size

- The fleet consists of 121 MU's, 13 GG1 electric Locomotives and 81 coaches.

10. Bay Head - This facility is maintained by Conrail

a. Location and size -

- The facility is located at the southern terminus of the former New York and Long Branch Railroad. It's main purpose is to provide layover siding for locomotives and coaches.

b. Type and condition of equipment

- Approximately 30,000 gal of fuel, sand and parts such as hoses, battery water and clamps are stored here.

c. Maintenance capability and type of maintenance performed

- Only running maintenance is performed. Work is done at night. A general foreman and car cleaner work the day shift.

d. Number personnel by type and pay scales (1977 rates)

The crew consists of:

1 general foremen	$8.14/hr.
5 foreman	$7.78/hr.

The locomotive crew includes:

1 electrician	$7.17/hr.
1 machinist	$7.17/hr.
3 hostlers	$6.15/hr.
3 hostlers helpers	$5.81/hr.

The passenger car crew includes:

4 car inspectors	$7.17/hr.
3 electricians	$7.17/hr.
17 car cleaners	$5.73/hr.

e. Work Back Log

- None.

f. Number of vehicles that can be handled at one time

- 130 cars and 20 locomotives can be stored. May have to move some to fuel or sand. Six cars can be worked on at a time.

g. Subcontractors used frequency and relative cost

- Parts are ordered through E'Port. They arrive through Altoona central stores. There is bad delivery of parts; 2 months or more.

h. Parts supply history back orders and lead time

- There are 5 or 6 requisitions (Form 154) full of material ordered as far back as February 11, 1977 not received as yet. Most of these requests are for expendables.

i. Spare parts (stores) procedures and control of cannibalization

- A computer run off is kept as a parts list. Orders are placed by Form 154. They are neatly kept in a notebook and notations are clearly made of status. No orders are made for stock.

j. Cannibalization percentage with each facility and size of fleet handled

- No cannibalization is performed. The fleet consists of 130 cars and 20 locomotives.

C. Survey of Facilities that Perform Turnaround Cleaning Only

1. Harrison Yard - This facility is maintained by Conrail

a. Location and Size

- The facility is located in Harrison, New Jersey just north of Newark's Penn Station. There are eight through tracks and one stub track.

b. Type and Condition of equipment in place

- The facility has standby receptacles for charging coaches and car washing equipment.

c. Maintenance capability and type of maintenance being done

- Turnaround cleaning of coaches, exterior washing of locomotives and coaches, and minor repairs to locomotives and coaches are performed here.

d. Number of personnel by type and pay scales (1977 rates)

- The crew consists of:

1 general foreman	$8.14/hr.	10 electricians	$7.17/hr.
1 assistant foreman	$7.78/hr.	3 pipe fitters	$7.17/hr.
1 painter	$7.17/hr.	3 machinists	$7.17/hr.
1 carpenter	$7.17/hr.	2 car men	$6.15/hr.
1 welder	$7.17/hr.	2 laborers	$6.00/hr.
6 car repairmen	$7.17/hr.	1 hostler	$6.15/hr.
8 car inspectors	$7.17/hr.	26 coach cleaners	$5.73/hr.

e. Work Back log

- None.

f. Number of vehicles that can be handled at one time

- 11 Locomotives; 107 coaches can be maintained

g. Subcontractors used, frequency, and relative cost

- None.

h. Parts supply history back orders and lead times

- None.

i. Spare parts (stores) procedures and control of cannibalization

- None.

j. Cannibalization percentage with each facility and size of fleet handled

- There is no cannibalization. The fleet consists of 11 locomotives and 107 coaches.

2. Waldwick - This facility is maintained by Conrail

a. Location and size

- The facility is located in Waldwick, New Jersey, north of the EL railroad station on the Bergen County line. There are six tracks for storage,

b. Type and condition of equipment in place

- Standby receptacles are used for heating locomotives and coaches

c. Maintenance capability and type of maintenance being done

- Turnaround cleaning of coaches and shutdown and startup of locomotives is performed. Minor repairs are done to both locomotives and coaches.

d. Number of personnel by type and salary scales

- The crew consists of:

1 gang foreman	$7.56/hr.
2 coach cleaners	$5.73/hr.
1 engine preparer	$7.17/hr.

e. Work Back Log

- None.

f. Number of vehicles that can be handled at one time

- Six locomotives and 28 coaches can be handled.

g. Subcontractors used, frequency, and relative cost

- None.

h. Parts supply history back orders and lead times

- None.

i. Spare parts (stores) procedures and control of cannibalization

- None.

j. Cannibalization percentage with each facility and size of fleet handled

- There is no cannibalization. The fleet consists of 6 locomotives and 28 coaches.

3. Summit - This facility is maintained by Conrail.

a. Location and size

- The facility is located in Summit, New Jersey, near Route 512. The facility is an overnight storage yard. There are three tracks.

b. Type and condition of equipment in place

- None.

c. Maintenance capability and type of maintenance being done

- Turnaround cleaning and minor repairs to MU cars is performed.

d. Number of personnel by type and pay scales (1977)

- One car inspector $7.17/hr.

e. Work Back Log

- None.

f. Number of vehicles that can be handled at one time

- 22 Electric MU's can be handled.

g. Subcontractors used, frequency and relative cost

- None.

h. Parts supply history back orders and lead times

- None.

i. Spare parts (stores) procedures and control of cannibalization

- None.

j. Cannibalization percentage with each facility and size of fleet handled

- There is no cannibalization. 22 Electric MU's are handled.

4. Phillipsburg - The facility is maintained by Conrail.

a. Location and size

- The facility is located in Phillipsburg, New Jersey, near Route 22. There are two tracks for overnight storage.

b. Type and condition of equipment in place

- None.

c. Maintenance capability and type of maintenance being done

- Turnaround cleaning of coaches, and minor repairs to locomotives and coaches is performed.

d. Number personnel by type and pay scales (1977 rates)

- One car inspector $7.17/hr.

e. Work Back Log

- None

f. Number of vehicles that can be handled at one time

- Two trains (2 locomotives - 14 coaches).

g. Subcontractors used, frequency, and relative cost

- None.

h. Parts supply history back orders and lead times

- None.

i. Spare parts (stores) procedures and control of cannibalization

- None.

j. Cannibalization percentage with each facility and size of fleet handled

- There is no cannibalization. The fleet consists of: 2 locomotives and 14 coaches.

5. Suffern, N. Y. - This facility is maintained by Conrail

a. Location and size

- The facility is located near Rt. 17 in Suffern. There are 4 tracks available to handle 6 locomotives and 35 coaches.

b. Type and condition of equipment in place

- The equipment is for cleaning coaches only. There are stand by receptacles for shutting down locomotives and charging cars.

c. Maintenance capability and type of maintenance performed

- Turn around cleaning of coaches is the only work performed. Shut down and start up of locomotives is also handed. No other maintenance is done.

d. Number of personnel by type and pay scales (1977 rates)

- The crew consists of:

1 engine foreman	$7.78/hr.
1 engine preparer	$7.17/hr.
1 coach cleaner	$5.73/hr.

e. Work Back Log

- None.

f. Number of vehicles that can be handled at one time

- 6 locomotives and 35 coaches can be handled for storage only.

g. Subcontractors used, frequency and relative cost

- None.

h. Parts supply history back orders and lead times

- The only parts stored are cleaning materials and light bulbs.

i. Spare parts (stores) procedures and control of cannibalization

- All parts are obtained from Hoboken

j. Cannibalization percentage with each facility and size of fleet handled

- There is no cannibalization - 6 locomotives, and 35 coaches are handled.

6. Spring Valley - This facility is maintained by Conrail.

a. Location and size

- The Spring Valley facility is near Rt. 59. There are 3 tracks available to handle 5 trains.

b. Type and condition of equipment in place

- There is equipment available only for cleaning coaches Standby receptacles are available for shutting down locomotives and charging cars.

c. Maintenance capability and type of maintenance being done

- Turnaround cleaning of coaches is the only work performed. Shut down and start up of locomotives is also handled. No other maintenance is done.

d. Number of personnel by type and pay scale (1977 rates)

- The crew consists of: 1 Engine foreman, 1 engine preparer, 1 coach cleaner, 1 combination coach cleaner, enginer preparer. All personnel are paid standard Conrail rates.

e. Work Back Log

- None.

f. Number of vehicles that can be handled at one time

- 5 locomotives and 21 coaches can be handled.

g. Subcontractors used, frequency and relative cost

- None.

h. Parts supply history back orders and lead times

- The only parts stored are cleaning materials and light bulbs.

i. Spare parts (stores) procedures and control of cannibalization

- All parts are obtained from Hoboken.

j. Cannibalization percentage with each facility and size of fleet handled

- There is no cannibalization - 5 locomotives and 21 coaches handled.

IV. Inventory of Non-Active Facilities

In addition to those facilities performing maintenance and car storage functions, there are two other sites that do not currently service equipment owned by NJDOT.

At Secaucus, New Jersey, major repairs are made on Conrail owned freight locomotives. Prior to commencement of Conrail operations, this facility service NJDOT owned passenger equipment. However, this work is now performed at Conrail's Elizabethport facilities. NJDOT-owned parts are stored at Secaucus in 1/3 of two 60 by 40 foot building. There are seven people employed in the parts storage section, all are paid standard Conrail rates but exact figures are unavailable: 1 chief stockkeeper, 2 stockkeepers, 1 clerk typist, 1 leading stockkeeper, 1 counterman and 1 fork lift operator.

At Port Jervis, New York, overnight storage facilities are used by NJDOT-owned trains serving the EL Mainline and Bergen County lines. Although running maintenance is performed at this facility, all NJDOT-owned equipment is serviced at Hoboken.

APPENDIX B

APPENDIX B
EQUIPMENT LAYOVERS - DETAILS

1. INTRODUCTION

Included in this section of the Appendix are the details of the layovers of equipment by type, at the various terminals which are summarized in Exhibit I-10 of Chapter I.

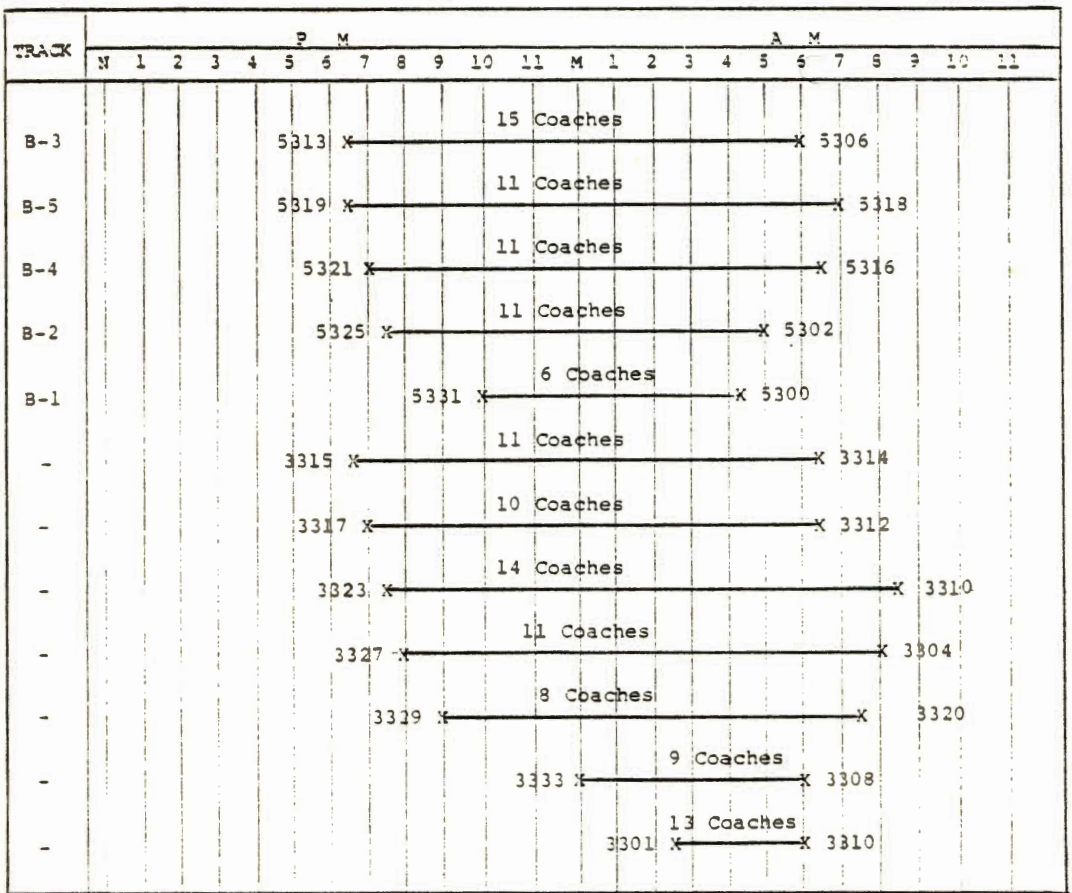
Arrival and departure times in the following exhibits are given to the nearest half-hour.

The layovers at the following facilities are presented:

Bay Head - between 6:00 p.m. and 9 00 a.m.
County Yard - between 5:00 p.m. and 8 00 a.m.
Dover - between 6:00 p.m. and 9:00 a.m.
Gladstone - between 4 00 p.m. and 8 00 a.m.
Hoboken - between 8:00 p.m. and 7:00 a.m.
Hoboken - between 8:00 a.m. and 7:00 p.m.
Morristown - between 5:00 p.m. and 8:00 a.m.
Phillipsburg - between 7:00 p.m. and 7:00 a.m.
Raritan - between 7:00 p.m. and 8 00 a.m.
South Amboy - between 5:00 p.m. and 8 00 a.m.
Spring Valley - between 6:00 p.m. and 8:00 a.m.
Suffern - between 6 00 p.m. and 8 00 a.m.
Summit - between 6:00 p.m. and 8 00 a.m.
Trenton - between 6:00 p.m. and 8 00 a.m.
Waldwick - between 6:00 p.m. and 8:00 a.m.

EXHIBIT B-1
EQUIPMENT LAYOVERS
BAY HEAD - COUNTY YARD

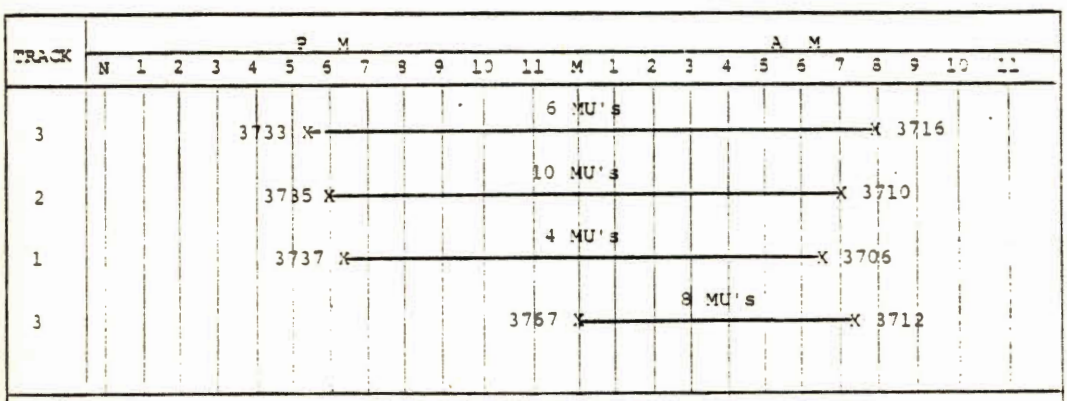
BAY HEAD



Total Overnight Layovers

21 Diesel Locomotives
130 Coaches

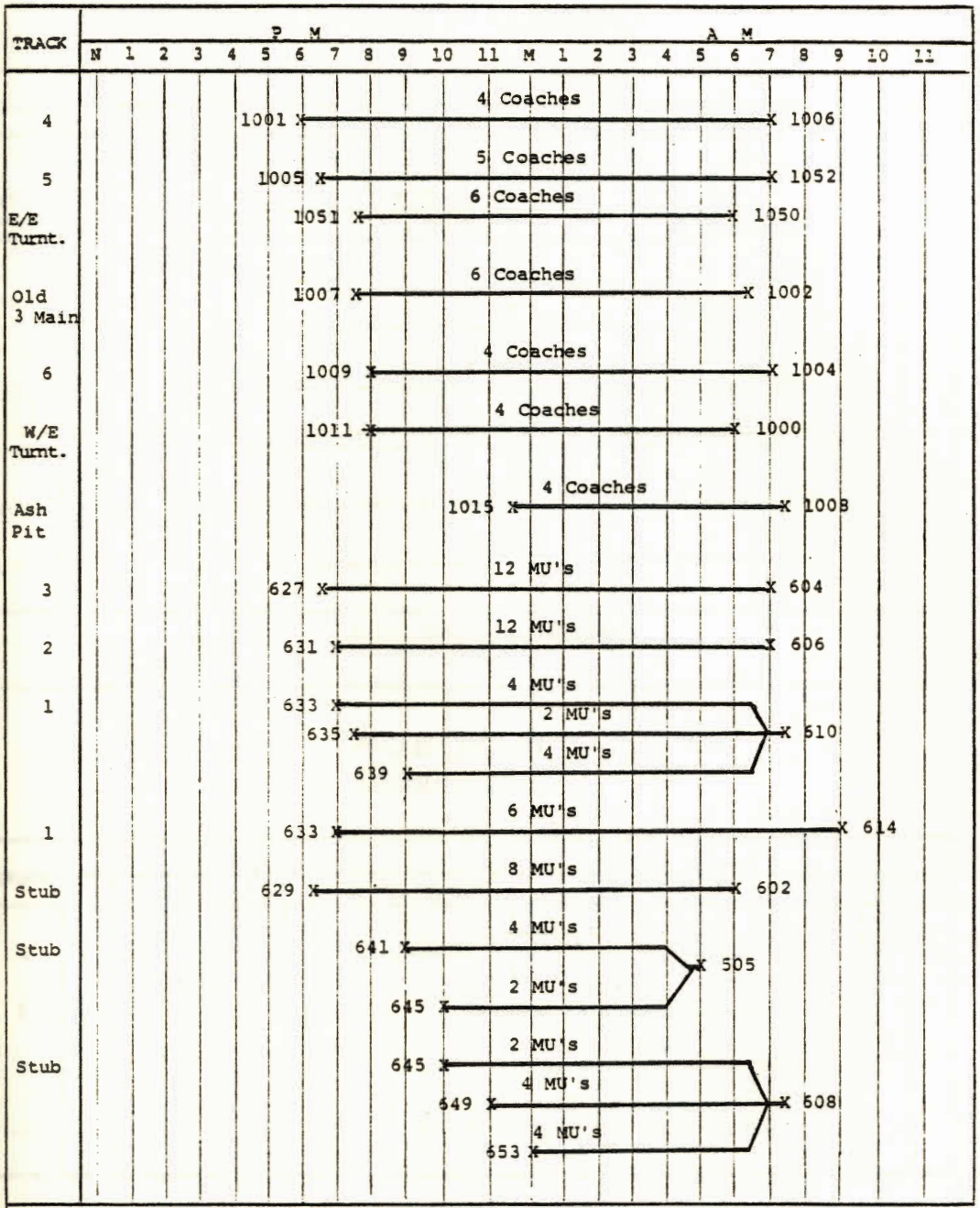
COUNTY YARD



Total Overnight Layovers
28 MU's

EXHIBIT B-2
EQUIPMENT LAYOVERS
DOVER

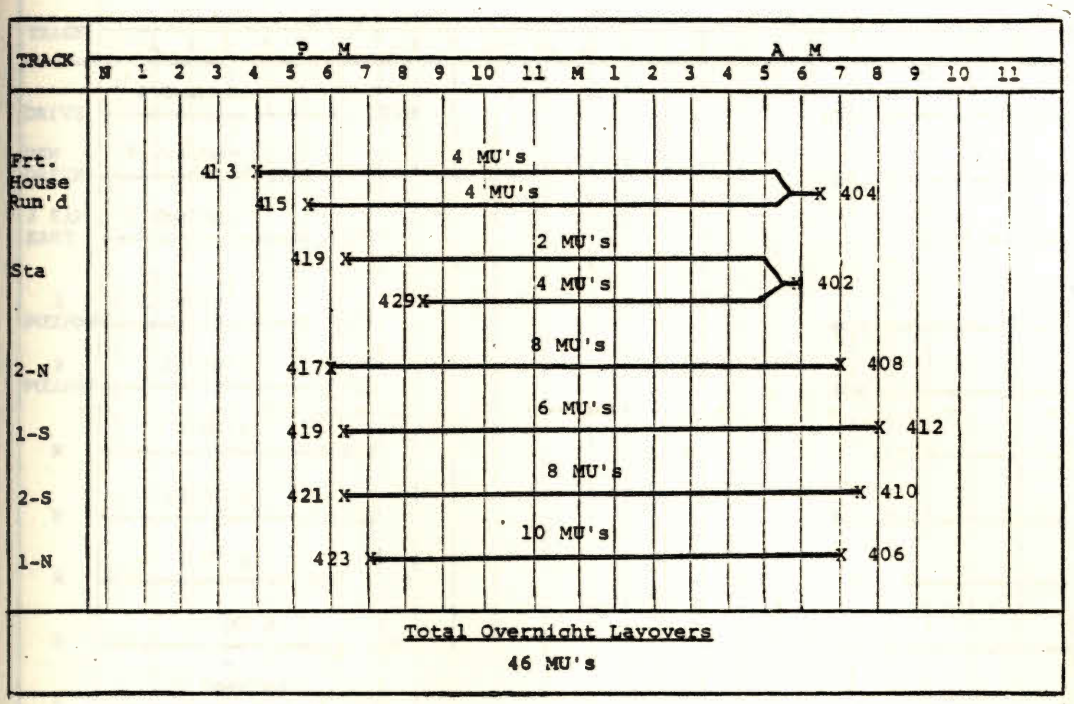
DOVER



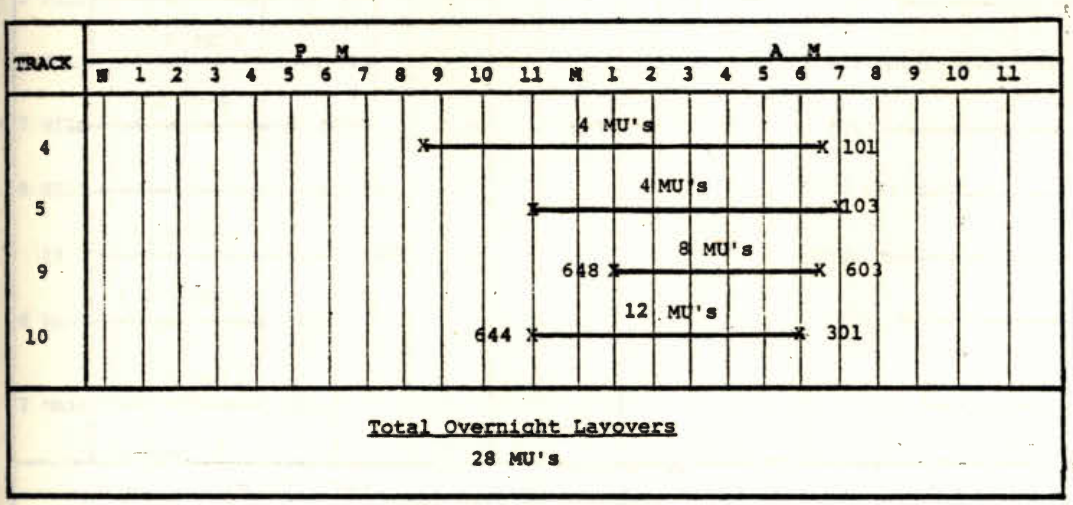
Total Overnight Layovers
7 Diesel Locomotives
33 Coaches
64 MU's

EXHIBIT B-3
EQUIPMENT LAYOVERS
GLADSTONE- HOBOKEN

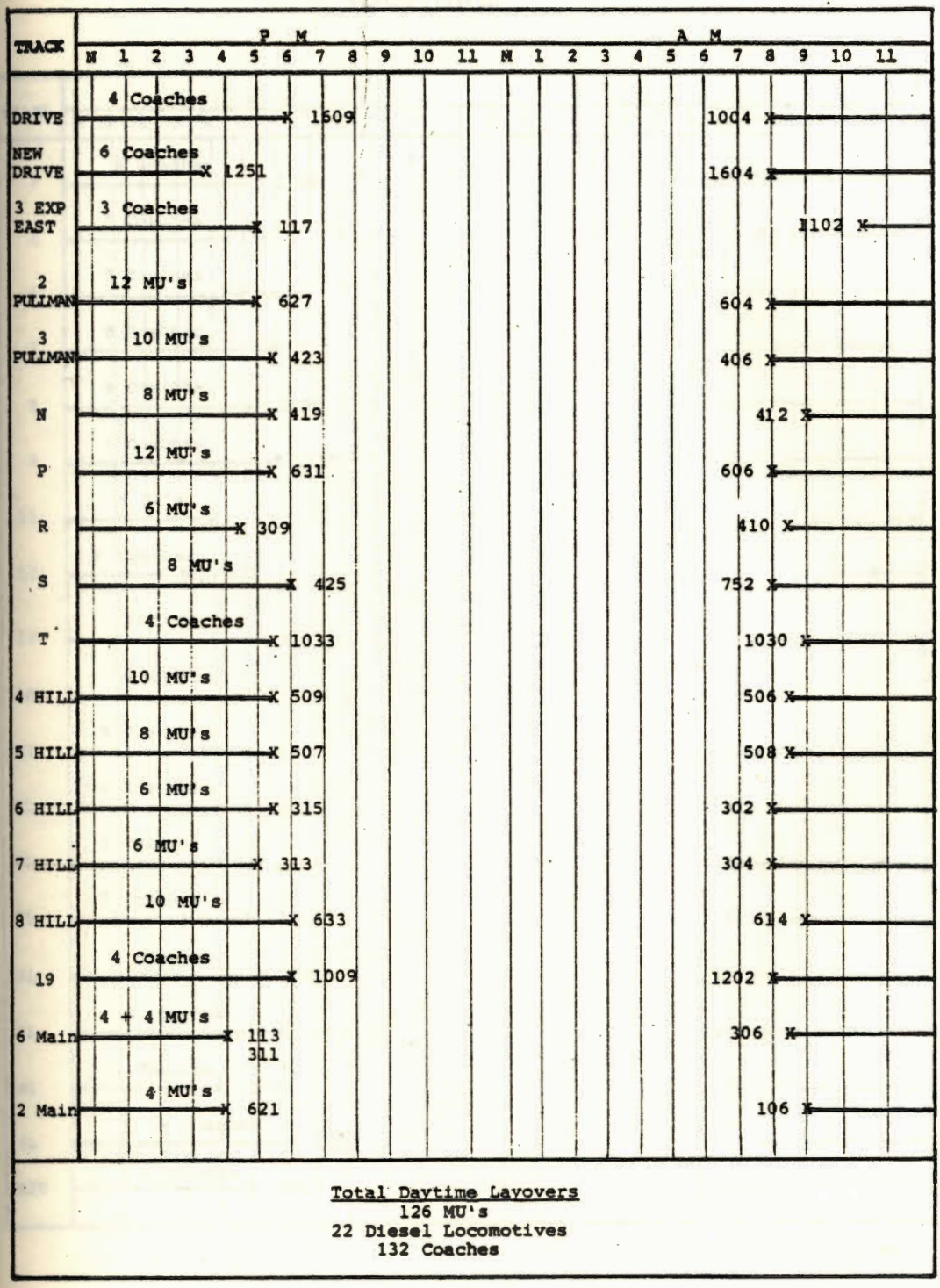
GLADSTONE



HOBOKEN
(Overnight)



HOBOKEN
(Daytime)



Total Daytime Layovers
126 MU's
22 Diesel Locomotives
132 Coaches

EXHIBIT B-3 (CONT'D)
EQUIPMENT LAYOVERS
HOBOKEN (CONT'D)

HOBOKEN
(Daytime)

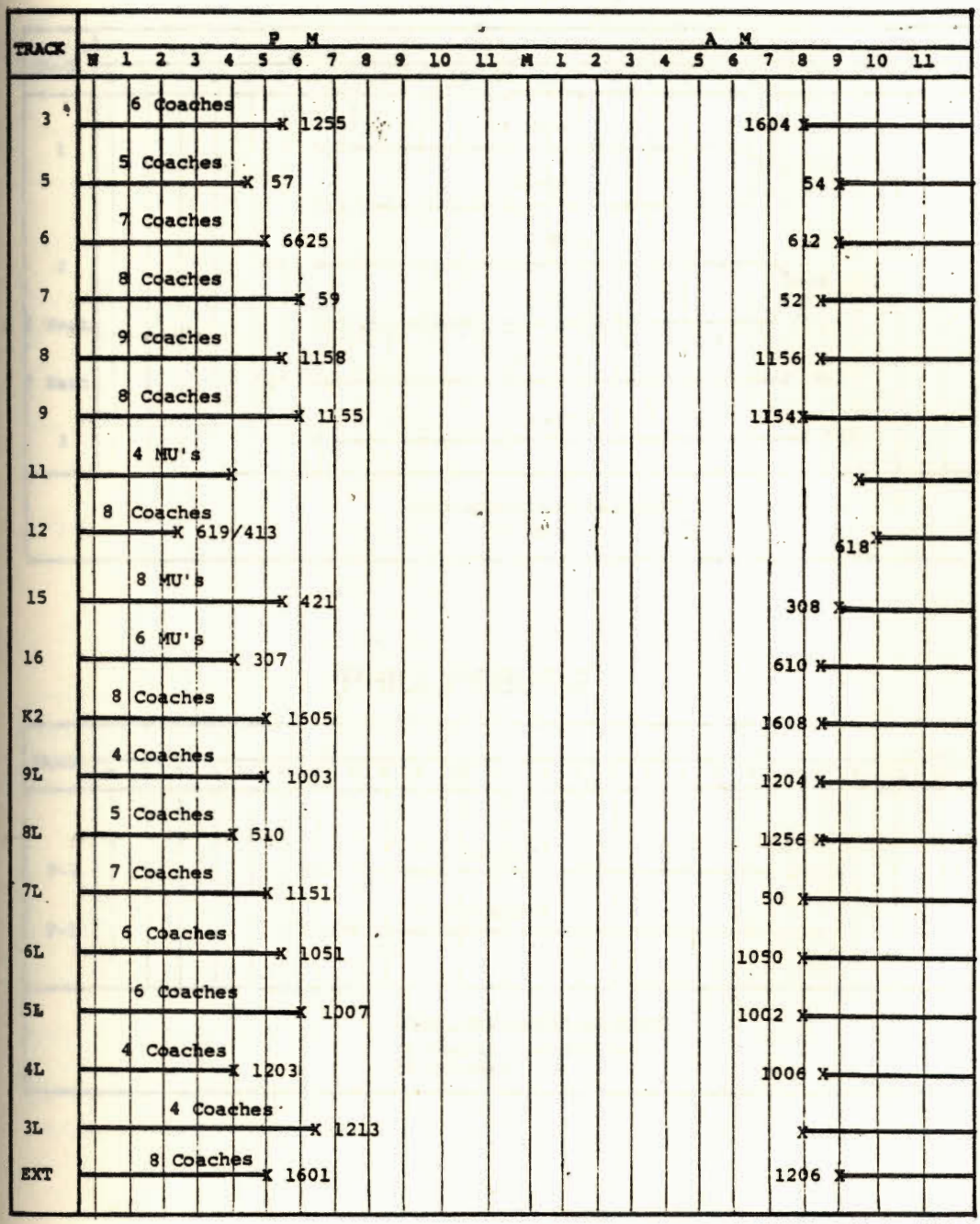
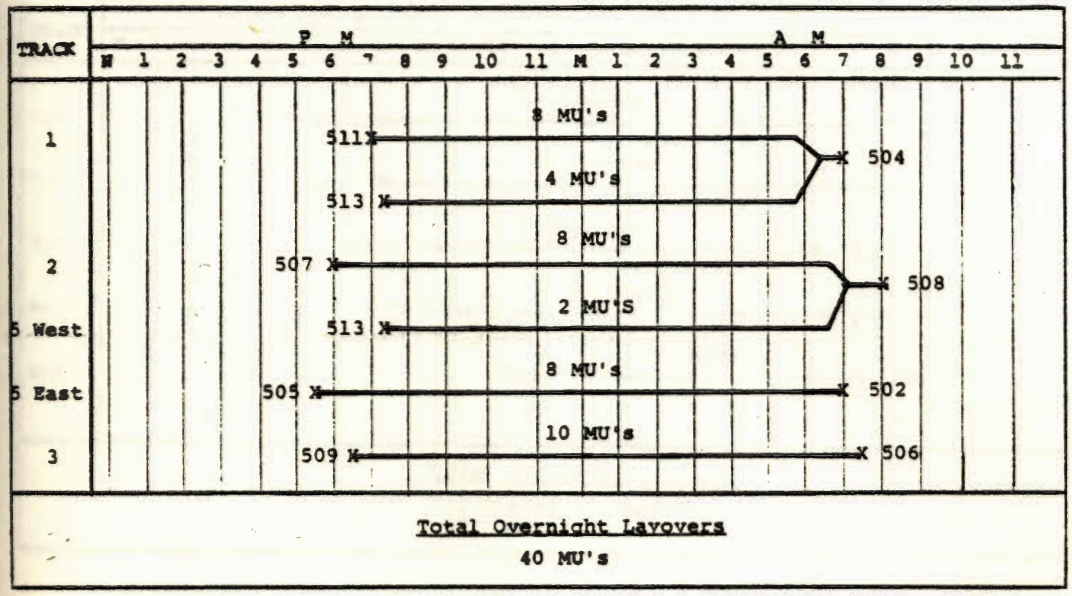


EXHIBIT B-4
EQUIPMENT LAYOVERS
MORRISTOWN - PHILLIPSBURG

MORRISTOWN



PHILLIPSBURG

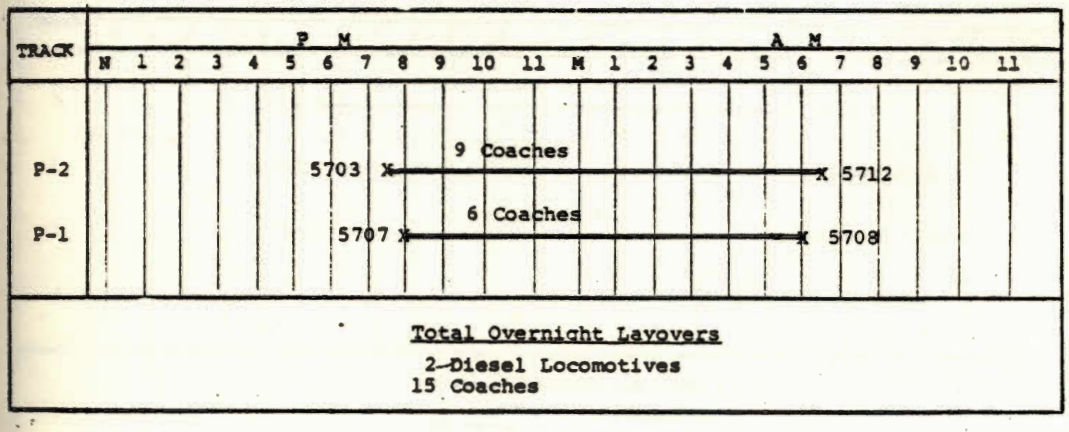
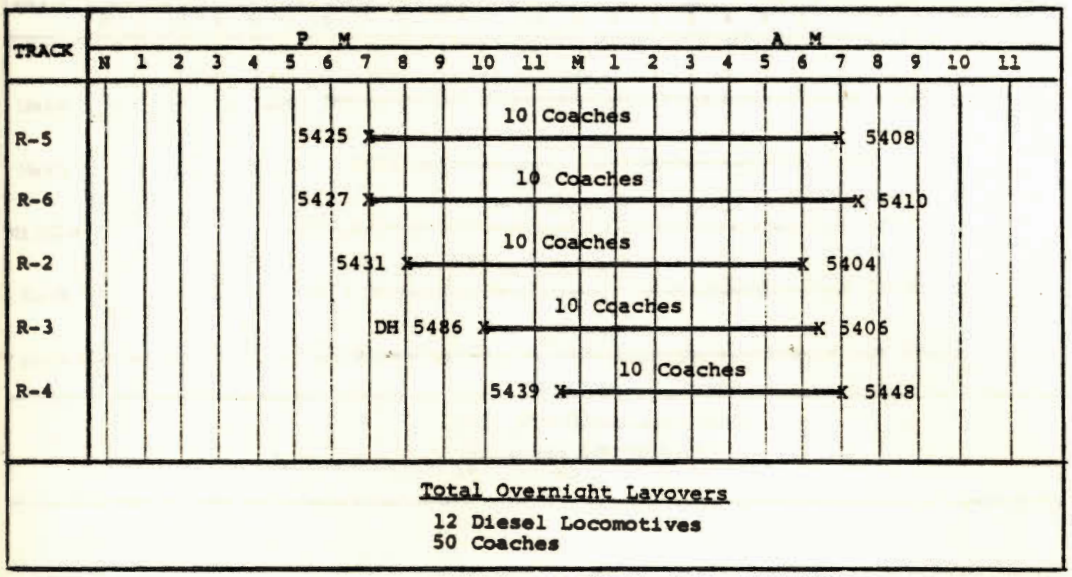


EXHIBIT B-5
EQUIPMENT LAYOVERS
RARITAN - SOUTH AMBOY

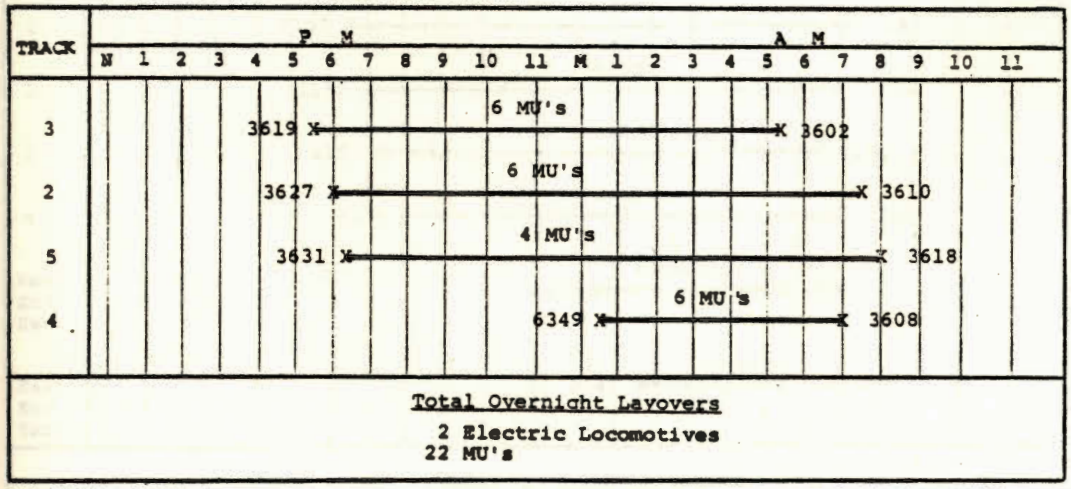
RARITAN



Total Overnight Layovers

12 Diesel Locomotives
50 Coaches

SOUTH AMBOY



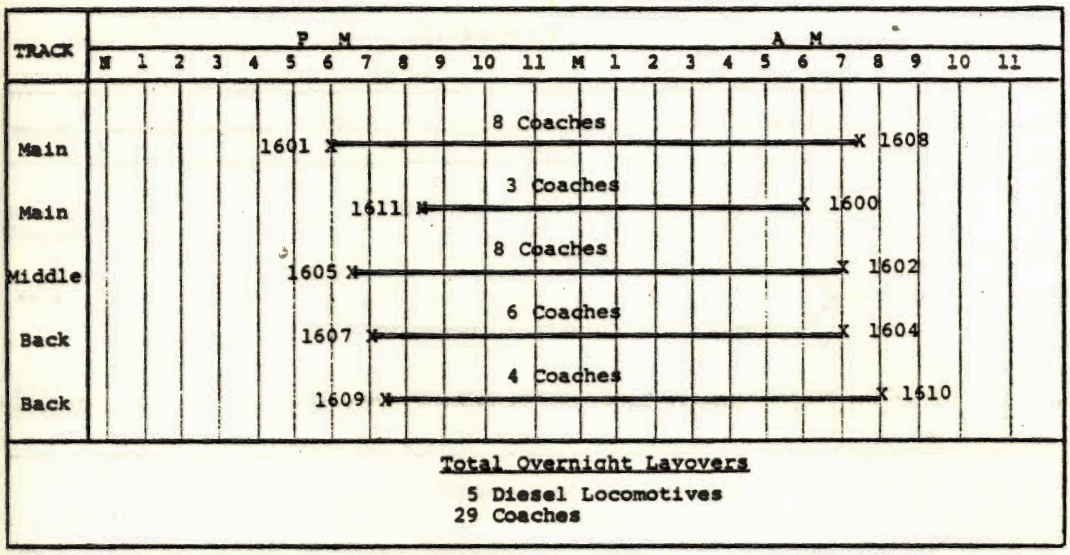
Total Overnight Layovers

2 Electric Locomotives
22 MU's

EXHIBIT B-6

EQUIPMENT LAYOVERS
SPRING VALLEY - SUFFERN

SPRING VALLEY



SUFFERN

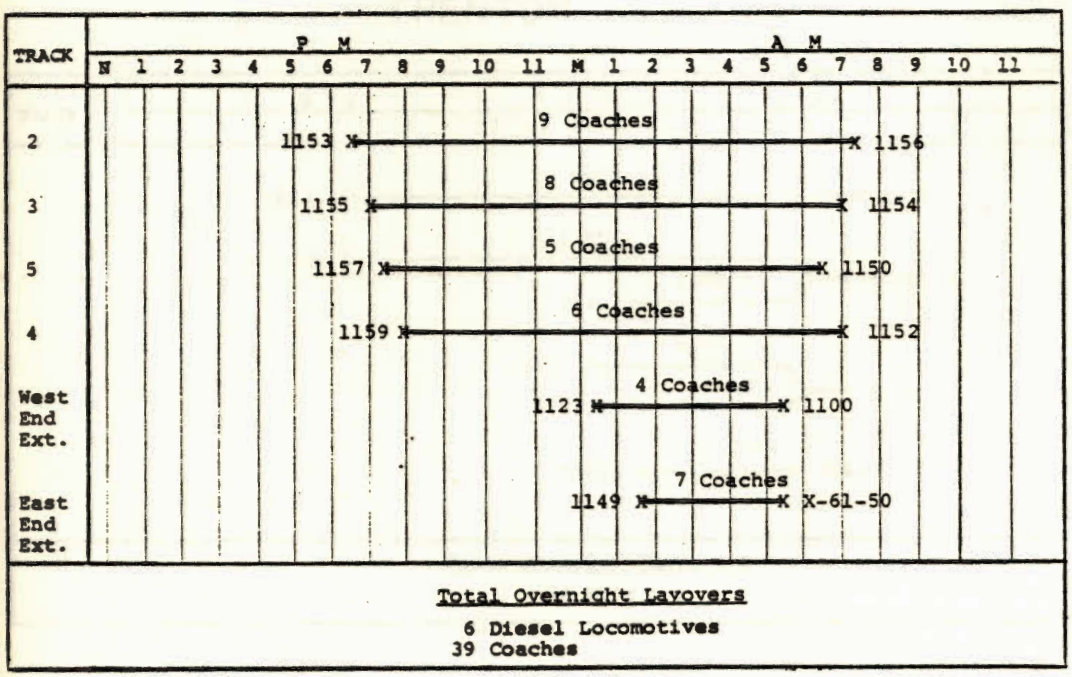
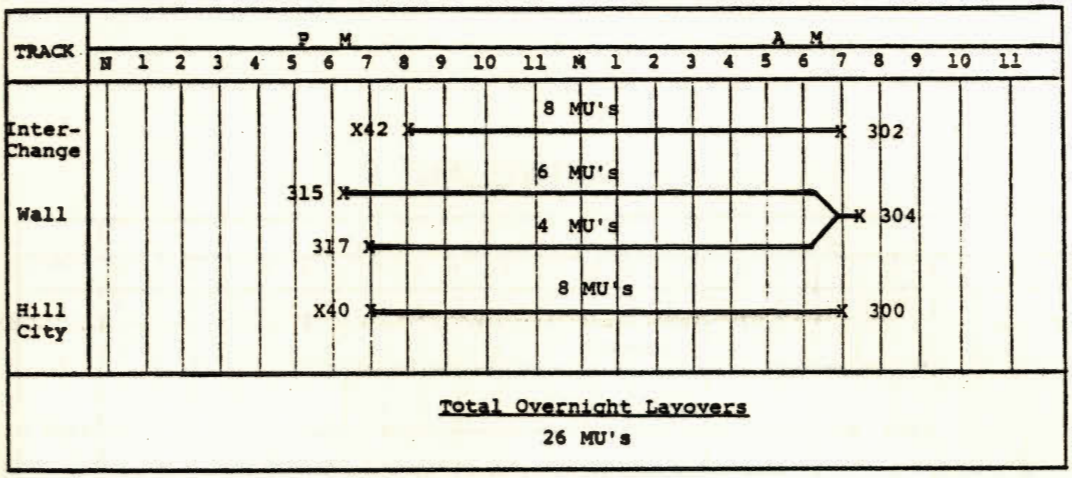


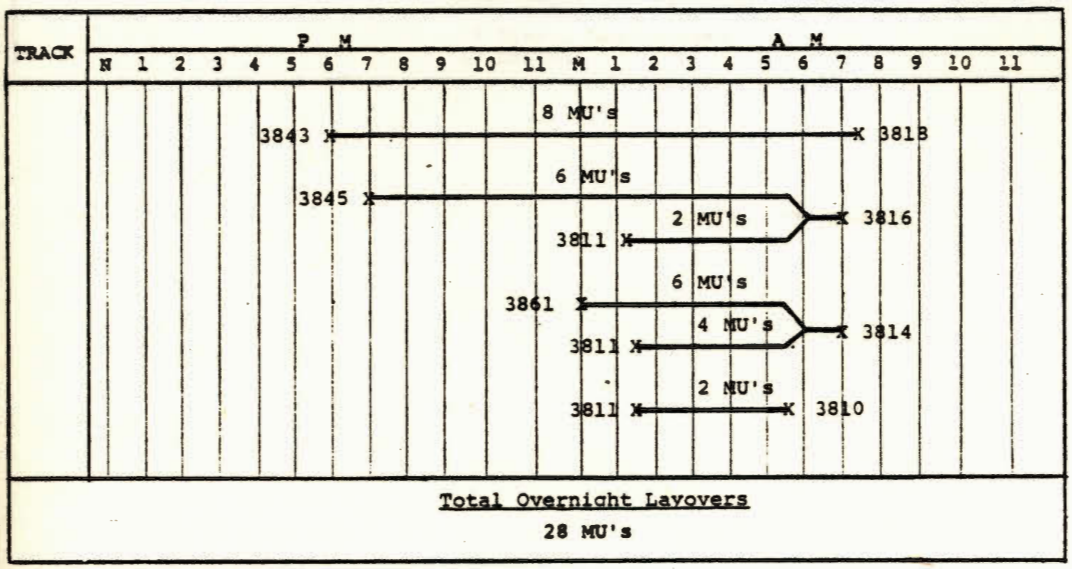
EXHIBIT B-7

EQUIPMENT LAYOVERS
SUMMIT - TRENTON

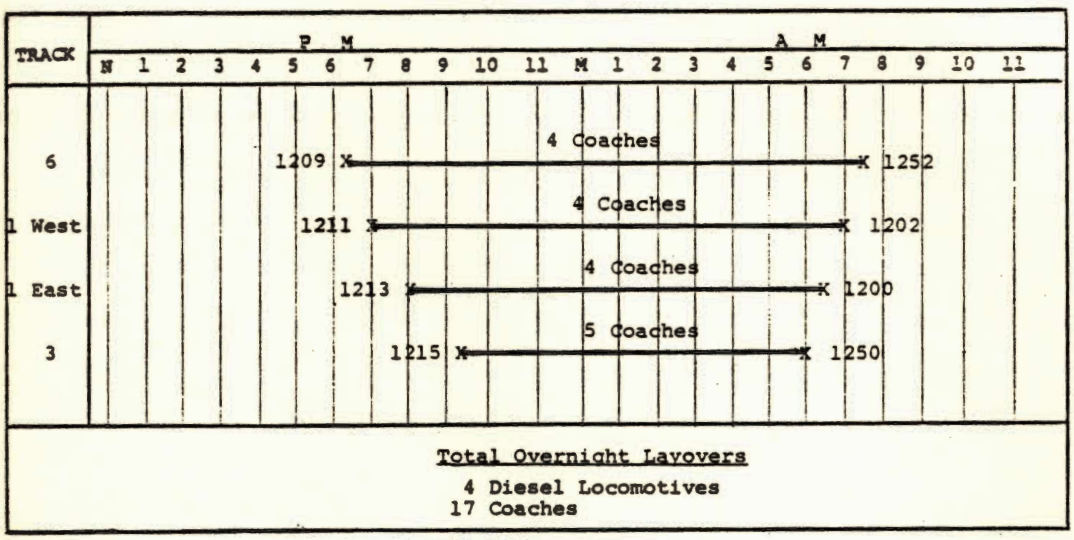
SUMMIT



TRENTON



WALDWICK


TRACK
P M
A M
N 1 2 3 4 5 6 7 8 9 10 11 M 1 2 3 4 5 6 7 8 9 10 11
6
4 Coaches
1209
1252
1 West
4 Coaches
1211
1202
1 East
4 Coaches
1213
1200
3
5 Coaches
1215
1250
Total Overnight Layovers
4 Diesel Locomotives
17 Coaches

APPENDIX C

STAFF REPORT

FINAL DRAFT

New Jersey Rail Equipment Maintenance Facilities Study

TASK TWO

PROJECTED SERVICES AND ASSOCIATED EQUIPMENT NEEDS

March, 1978

prepared by

New Jersey Department of Transportation
Bureau of Common Carrier Planning
Bureau of Rail Equipment

"Preparation of this report has been financed in part through a grant from the U. S. Department of Transportation, Urban Mass Transportation Administration, under the Urban Mass Transportation Act of 1964, as amended. This document is disseminated under the sponsorship of the U. S. Department of Transportation in the interest of information exchange. The United States Government assumes, no liability for its contents or use thereof."

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I. Introduction

This task focuses primarily on determining the size of New Jersey's rail passenger equipment fleet during the period 1980-2000. It is divided into four sections:

- A discussion of New Jersey's rail services that will exist in the years 1980 and 2000. (This includes both reviews of proposed improvement projects and of services likely to be terminated).
- Demand projections for each anticipated passenger service through the year 2000 and recommended fleet sizes for each passenger line.
- Future passenger fleet requirements, including equipment rehabilitation and replacement schedules for all rolling stock in existence by 1980.
- Detailed recommendations for equipment purchases to the year 2000; including capital costs, interchangeability of equipment and purchasing schedules.

This information will be used in later tasks to determine the need for improved rail maintenance facilities, and to develop a design for such facilities.

During the course of this study, several assumptions were made (concerning the continuation of certain rail services in the State of New Jersey) that are not based on current NJDOT policy. In addition, some conclusions were drawn (concerning the commencement of new rail services) that are not based on the results of a completed NJDOT Study, although in some cases feasibility studies are currently underway (see p. 10).

These subjective assessments are not intended to bias future NJDOT policy, nor to compromise the findings of any feasibility study currently in progress or anticipated for the future. They are included merely to ensure that a rail equipment maintenance facility(s) is designed that

will have sufficient excess capacity to handle non-programmed increases in New Jersey's passenger rail fleet.

Figure 1 illustrates New Jersey's Commuter Rail Network as it exists in 1978.

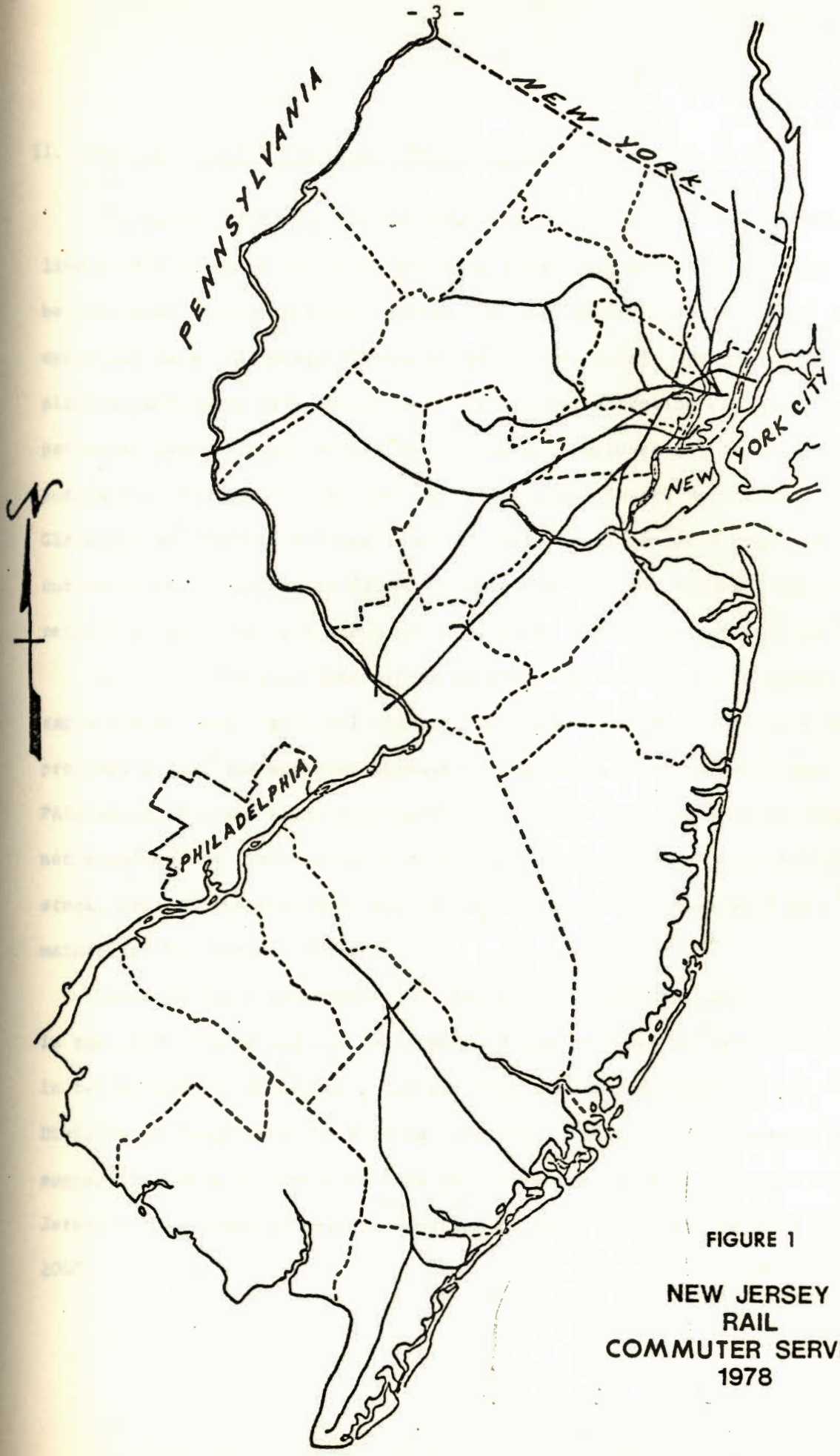


FIGURE 1

NEW JERSEY
RAIL
COMMUTER SERVICE
1978

II. New Jersey's Rail Passenger Network 1980-2000

The Bureau of Common Carrier Planning studied each passenger rail line in the state to determine the likelihood that each service will be continued and/or improved between 1980 and 2000. Past ridership and operating data, patronage forecasts, and state, local, and regional planning documents were researched. Particular attention was given to passenger lines already scheduled for service improvements (such as the purchase of 230 new MU cars for the North Jersey Coast, Morristown, Gladstone and Montclair lines), and to improvement projects that are currently being studied by NJDOT but have not yet been funded (such as reinstitution of service along the West Shore line in Bergen County).

For the purpose of determining maintenance facility requirements, rapid transit and light rail transit improvement projects that have been proposed by various agencies throughout the State (such as PATCO and PATH extensions and light rail service to Jersey City and Bayonne) were not examined. Although these services may use some state-owned rolling stock, most of the equipment and all maintenance facilities will be maintained by separate entities.

Based on these assessments, a list of rail services likely to exist in the 1980-2000 period was developed and was reviewed by key personnel in two of NJDOT's divisions - the Division of Commuter Services and the Division of Transportation Systems Planning. The resulting comments and suggestions were incorporated into the following pages to describe New Jersey's rail commuter network expected to be in operation between 1980 and 2000.

1. Conrail Hoboken Division (Mainline, Bergen County Line, Pascack Boonton Lines)-

The Pascack Valley, Boonton, Mainline, and Bergen County Lines received a major equipment refurbishment by NJDOT between 1971 and 1974. As Task I indicated, 32 new diesel locomotives and 155 new passenger cars were purchased during this period.

Ridership has remained high--to the point where in 1977, all these passenger cars were used daily with no operational spares. Moreover, population (particularly along the Boonton Corridor) is expected to increase appreciably.

The NJDOT is about to commence a study entitled E-L Main, Bergen, Pascack Corridor Study, (IT-09-0058/69), which will develop a low-cost short range improvement plan for all Hoboken Division diesel services except the Boonton Line. For the purposes of this study, however, it will be assumed that: 1) Normal replacement and refurbishing of rolling stock will be made on these lines as the service life of existing equipment expires; 2) The fleet will be expanded as the patronage increases beyond the capabilities of the present fleet; 3) Minor station and track improvements will be made; and 4) Direct rail access to Manhattan will be unavailable.

2. Conrail Hoboken Division (Morristown, Gladstone and Montclair lines)-

The Gladstone, Morristown and Montclair lines will be rehabilitated and converted from 3 kv DC to 25 kv AC by 1980. As mentioned in Task I, 227 old MU cars will be retired and will be replaced with 180 new Arrow III MU cars by 1980.

Accompanying the purchase of new equipment will be a complete conversion of the electrified lines to commercially available current. The re-electrification has reached the final design stage, and the ordering of long-lead construction items has begun. Total project cost is expected to be 178.7 million dollars, of which 80 percent will be funded by UMTA grant No. NJ-03-0014.

Related to the foregoing is the Direct Rail Access Project (DRAP), Study No. IT-09-0023, for which NJDOT has made preliminary application to UMTA for federal funding. Phase I of DRAP will establish a rail connection between the electrified Conrail-Morristown Line and the AMTRAK Northeast Corridor Line, at Kearny, to permit direct operation to Penn Station, New York, of trains originating in the electrified suburban territory of the former Erie-Lackawanna. Including necessary signal, switch, and station improvements, the improvement total project cost for DRAP will be approximately 40 million dollars.

3. Conrail New Jersey Division (Raritan Valley Line)-

In 1977, NJDOT and the Port Authority of New York and New Jersey (PANYNJ) participated in a federally funded study to examine public transportation alternatives west of Plainfield, NJ, in anticipation that PATH rapid transit service would be extended from its present terminus at Newark, NJ to Plainfield. The study, entitled Public Transportation Beyond Plainfield (IT-09-0034/37), suggested that commuter rail service on the Raritan Valley Line should only be provided between Raritan, NJ and Plainfield - provided PATH is extended to Plainfield.

Subsequent to the study's completion, PANYNJ experienced certain legal complications regarding the financing of the PATH project. These difficulties have hampered PANYNJ's plans to extend PATH to Plainfield.

Although no official decision has been made yet to cancel the PATH extension, it is safe to speculate that the Raritan Valley Line will be refurbished if the PATH project is dropped.

As Task 1 indicated, most of the rolling stock on the Raritan Valley Line is over 25 years old, and more than half of the passenger cars are more than 40 years old. However, the service is used by a considerable number of Newark and NYC bound commuters and ridership is expected to increase as the population increases. Thus, although a major improvement program has not yet been funded, this study assumes that the Raritan Valley Line will undergo extensive rehabilitation-encompassing repair and replacement and rehabilitation of existing rolling stock--during the 1980-2000 period. It is also assumed that, unless ridership from Warren County increases appreciably, service to Phillipsburg may be curtailed, making Hampton the western terminus of Raritan Valley operations.

4. Conrail/AMTRAK Northeast Corridor (NEC)-

As Task 1 indicated, between 1966 and 1974 the State of New Jersey purchased a total of 105 MU cars for use on what was then called the PC Mainline and South Amboy Branch (103 MU's are still in use). These cars have been complemented by a portion of the new Arrow III fleet on a temporary basis. (The Arrow III MU Cars will be transferred to the Morristown, Gladstone, Montclair and North

Jersey Coast Lines when electrification/re-electrification is completed.

Major federal investments have been proposed for the NEC to rehabilitate three stations (Trenton, Metropark and Newark), to upgrade trackage, and improve signal and communication systems. While these improvements are geared mainly to longhaul AMTRAK service, Conrail's commuter services will benefit appreciably.

An extensive modernization of the Metuchen station which will include high level boarding platforms, is also in the design phase. This project which is partially funded by UMTA under grant number NJ-03-008, is expected to cost $2,065,000.

The NJDOT is also investigating the feasibility of a new park-and-ride station facility, which could be located on the Northeast Corridor Line east of Trenton, near the intersection with Interstate 295. This study, entitled I-295-Penn Central Park/Ride Study (IT-09-0050), has also been partially funded by UMTA, at an approximate cost of $63,000.

Ridership is expected to continue increasing along the Northeast Corridor in the future. Normal replacement/refurbishing of existing rolling stock will be made as the service life expires and/or patronage increases beyond the capabilities of the existing MU fleet.

5. Conrail New Jersey Division (Princeton Branch)-

The Princeton branch currently uses two Arrow I MU cars (1 in service, 1 spare) to shuttle passengers between Princeton and the AMTRAK NEC Mainline at Princeton Junction. In order to ensure continuation of passenger service, the entire line was purchased by the State of New Jersey in 1976 for $65,406. However, long term

operating subsidies for this service by NJDOT will probably be discontinued.

Support for this service may be continued by local groups.

6. Conrail New Jersey Division (North Jersey Coast Line or NJCL)

The North Jersey Coast Line (former New York and Long Branch Railroad) has been allocated funds for a major improvement. Electrification will be extended from its present terminus at South Amboy (on the former PC South Amboy Branch) to the Red Bank/ Long Branch area in the early 1980's.

As Task I indicated, 50 new Arrow III cars are currently being purchased for eventual use between Penn Station, NY and the southern end of the electrified territory.

Diesel service from Bay Head will be continued, and diesel trains will continue to stop at selected stations in the electrified corridor. However, it is not yet certain whether diesel hauled consists will change to electric locomotives at the southern terminus of electrification, or if diesel locomotives will eventually be replaced by dual-mode locomotives.

NJDOT has already begun replacing 29 of the older diesel coaches on a limited basis (see pg. 11m Task I). However, a major refurbishing/ replacement program will be necessary--for the service life of much of rolling stock has already expired.

7. Conrail New Jersey Division (Bayonne Line)

The Bayonne Line currently uses 10 rail diesel cars (RDC's) to transport passengers between Bayonne and Cranford.. This service generally accommodates people travelling to Elizabeth and Bayonne from points along the Raritan Valley Line.

The service operates over the Newark Bay Bridge - a lift bridge which spans the mouth of Newark Bay. The double lift spans and causeways are more than fifty years old and are difficult and expensive to maintain. Two of the four tracks are out of service, because one of the lift spans was severely damaged through a collision with a ship. The US Coast Guard is expected to issue an order to condemn the bridge in the near future because of its effect on marine traffic.

This service is subsidized under Section 17 of the Urban Mass Transportation Act, as amended, which provides Federal funding under a formula which decreases the Federal share on an annual basis. This funding program is due to expire in 1980. With expiration of UMTA Section 17 funding, it is doubtful that this service will continue.

Several service alternatives are currently being studied by NJDOT for implementation as part of a federally funded UMTA project entitled: Rail Transit Service - Bayonne to Jersey City, NJ (IT-09-0037). The Consultant firm under contract to NJDOT for this study has recommended a light rail transit service, which would utilize the right of way of the former CNJ mainline as part of a route between Bayonne and Journal Square (Jersey City).

8. Conrail Philadelphia Division (Reading Line)-

With the expiration of UMTA Section 17 funding, which is provided through the Southeastern Pennsylvania Transportation Authority (SEPTA), it is doubtful that service from Philadelphia to Newark will be continued on the Reading line. Since the RDC cars in this service are owned by SEPTA, no equipment will be reallocated to other New

Jersey services.

It is possible that Pennsylvania Department of Transportation (PENN DOT) or SEPTA may elect to retain this service. However, it is unlikely that the NJDOT would contribute toward continued operation.

9. Conrail Philadelphia Division (Atlantic City Line)-

Casino gambling and the subsequent projected population and employment growth in the ACUATS region could severely strain Atlantic City's existing parking and mass transit facilities. If federal funds can be obtained subsequent to expiration of UMTA Section 17 funding, RDC service will continue. Ridership will have to significantly increase with a minimum of capital investment to justify extending service beyond 1985.

It is anticipated that weekend service (3 daily round trips per weekend), and eight daily round trips per weekday will be made. The Atlantic City station will be improved. Service will be comparable to the System II service proposed in a Study conducted by the Delaware Valley Regional Planning Commission entitled: Report on the Economic Feasibility of Improved Rail Commuter Service Between Philadelphia and Atlantic City, (see page 27).

10. Conrail Philadelphia Division (Cape May Line, Ocean City Branch)-

With the expiration of UMTA Section 17 funding, it is doubtful that this service will continue. Ridership is comparatively low and is steadily decreasing. Major capital investments and increased service would be required to attract ridership sufficient to approach the break even point. Upon termination of service, RDC's will be

reallocated to the Atlantic City service.

11. Proposed New Services

a. West Shore Line - NJDOT is currently participating in an UMTA funded study entitled West Shore Corridor Alternatives Study (IT-09-0058E). The study is being conducted to determine the feasibility of reinstituting passenger service along the former PC West Shore Line in eastern Bergen County. Several major problems must be resolved regarding coordination of existing freight service with the proposed passenger service. If sufficient diesel rolling stock can be transferred from other rail services planned for improvements (or elimination), this service can be implemented by 1990. It is possible that minimal diesel service designed for commuters could probably be implemented at the outset.

b. Lakewood Service - NJDOT is currently studying the feasibility of instituting passenger service to Lakewood in Ocean County, which will be referred to here as the "Lakewood Service." This new service is being considered in an UMTA-funded technical feasibility study entitled: Improvement and Extension of Commuter Transportation Service In Monmouth and Ocean Counties (IT-09-0034/37).

NJDOT is evaluating two route alternatives as an addition to existing service on the NJCL. One route would originate in Lakewood on the Southern Division Main Line (M-L) and pass through Red Bank on the North Jersey Coast Line. The other route would follow the Southern Division

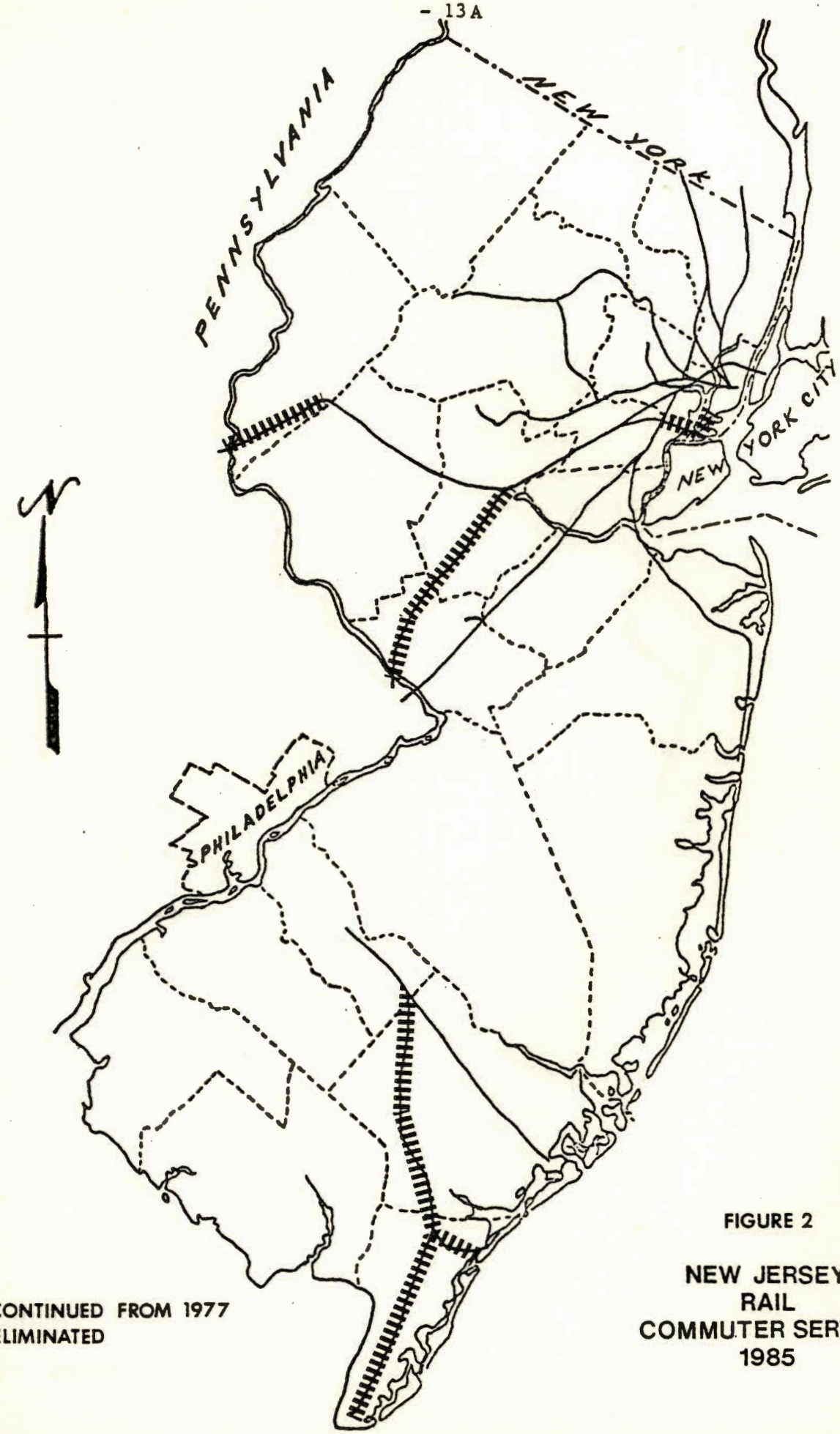
M-L to Farmingdale, then utilize the Freehold Secondary track to Freehold and the Freehold Branch through Matawan to the North Jersey Coast Line. Service would extend to Newark and New York City via the North Jersey Coast Line.

The State of New Jersey has already purchased a portion of the Freehold Secondary Track and the entire Freehold Branch to ensure that passenger service can be implemented--provided it is considered feasible.

Should this project prove feasible and receive funds for implementation, major rehabilitation of trackage, purchases of new rolling stock and constructing of stations and facilities will be required.

It is possible that this new service could be introduced between 1990 and 2000.

New Jersey's rail commuter network for the years 1985 and 2000, as projected for the purposes of this report, is presented in Figures 2 and 3, respectively.



CONTINUED FROM 1977
ELIMINATED

FIGURE 2

NEW JERSEY
RAIL
COMMUTER SERVICE
1985

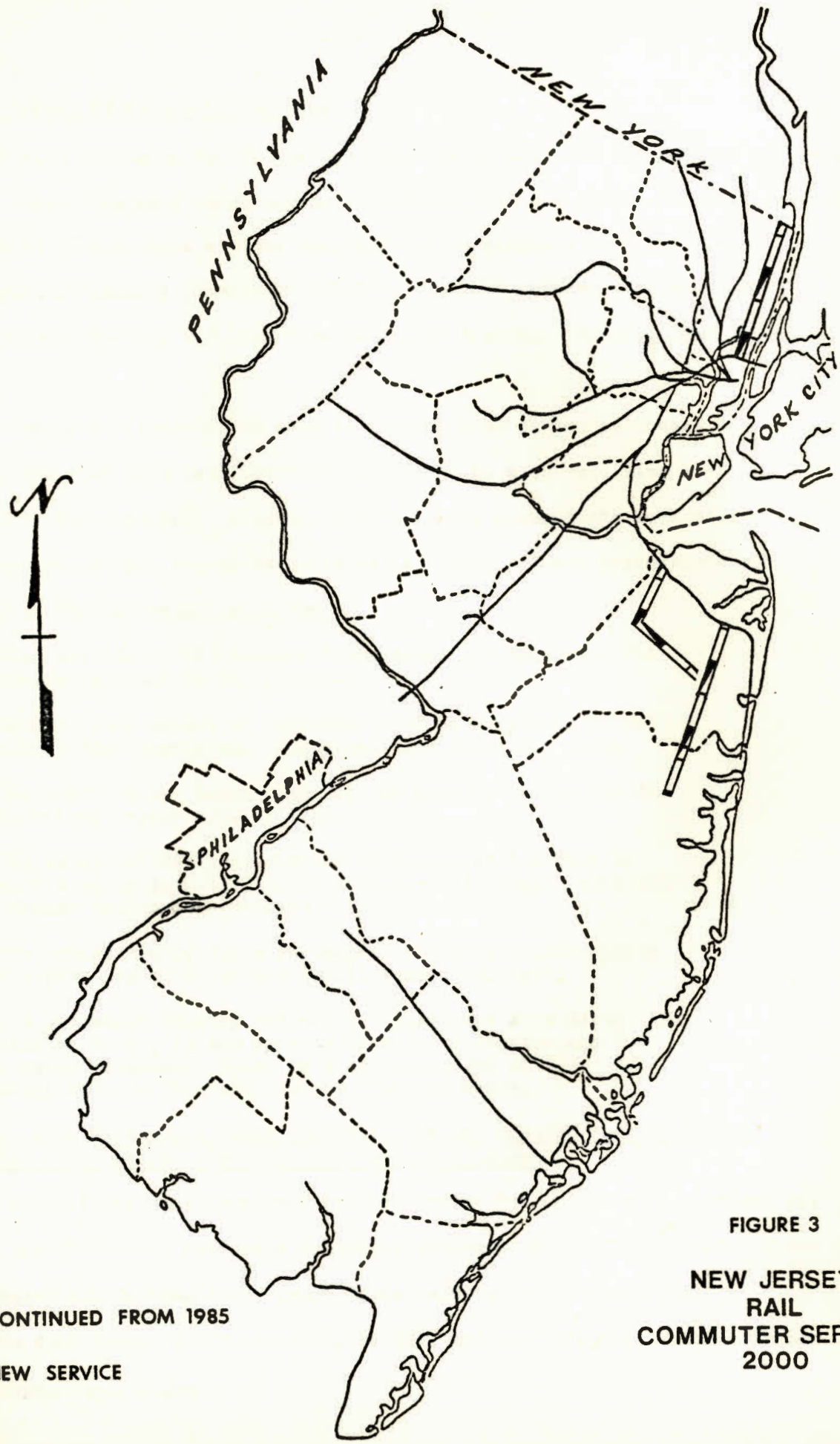


FIGURE 3

NEW JERSEY
RAIL
COMMUTER SERVICE
2000

III. Peak Period Patronage Projections

Patronage estimates by station groupings were developed for each of the existing rail lines that will be in operation between 1980 and 2000. These estimates were adapted from various studies completed or in progress by NJDOT, Tri-State Regional Planning Commission (TSRPC), the Port Authority of New York and New Jersey (PANYNJ), and the Delaware Valley Regional Planning Commission (DVRPC).

The specific methodologies used to project peak period patronage demand to the year 2000 (and intermediate years) on each rail line are discussed in the appendix. However, the following assumptions were made concerning the service characteristics on each line. These assumptions are reflected in the patronage estimates.

- The existing (1978) service frequencies and routings will remain constant on all services.
- Direct rail access to Manhattan will be available to the electrified Morristown, Gladstone, and Montclair Lines.
- The North Jersey Coast Line will be electrified to the Red Bank/Long Branch area by 1985.
- The existing (1977) proportion of passenger loadings at each station in a particular corridor will remain constant (unless indicated otherwise).
- The proportion of daily passengers boarding trains during the peak period (7-10 a.m.) will remain constant.
- All patronage figures reflect net patronage at a particular station (i.e., if 400 patrons board at a station and 300 patrons disembark, there is a net patronage of 100. 100 seats will be required, rather than 400 seats).

1. Former Erie Lackawanna Lines (Mainline, Bergen County, Pascack Valley, Boonton, Morristown, Gladstone and Montclair Lines)

Projections were developed for the former Erie-Lackawanna services for 1980 and 1986 using patronage estimates completed by PANYNJ in 1977. These estimates are derived from projections made in 1972 by an Inter-Agency Task Force (IATF) of NJDOT, PANYNJ, and New York Mass Transportation Authority (MTA) staff.

Tables 1 through 6 depict the net eastbound peak period passenger loadings that can be expected on all former EL lines between 1980-2000. Table 7 presents a summary of the projected increases for all EL lines.

1990 and 2000 patronage was derived from population estimates developed by the Bureau of Common Carrier Planning, based on population and work force projections made by TSRPC.

Table 1

Boonton Line - Peak Period Patronage Projections
(Net Patronage)

Station Groupings	1976*	1980	1986	1990	2000
Netcong - Dover	391	528	733	751	792
Denville - Mt. View	1137	1539	2133	2183	2309
Little Falls - Arlington	1458	1963	2734	2797	2958
Net Eastbound Patronage	2986	4030	5600	5731	6059

NJDOT - Dec. 1977

Table 2

Pascack Valley Line - Peak Period Patronage Projections
(Net Patronage)

Station Groupings	1976*	1980	1986	1990	2000
NY Stations - Westwood	1506	1742	2096	2145	2268
Emerson - N. Hackensack	1037	1198	1444	1478	1563
Hackensack - Woodbridge	329	383	460	471	499
Net Eastbound Patronage	2872	3323	4000	4094	4330

NJDOT - Dec. 1977

*actual conductor's passenger counts, typical weekday.

Table 3

Mainline/Bergen County Line - Peak Period Patronage Projections
(Net Patronage)

Station Groupings	1976 *	1980	1986	1990	2000
NY State - Ridgewood	3750	4503	5636	5770	6098
Glen Rock - Rutherford	2307	2770	3466	3547	3752
Hawthorne - Kingsland	1120	1353	1698	1736	1836
Net Eastbound Patronage	7177	8626	10,800	11,053	11,686

NJDOT - Dec. 1977

Table 4

Gladstone Branch - Peak Period Patronage Projections
(Net Patronage)

Station Groupings	1976 *	1980	1986	1990	2000
Gladstone - Far Hills	488	554	652	676	733
Bernardsville - New Prov.	2482	2816	3316	3432	3731
Summit - Harrison**	-737	-837	-985	-1018	-1108
Net Eastbound Patronage	2233	2533	2983	3090	3356

** Negative number indicates more persons disembarked than boarded
*Actual conductors' passenger counts, typical weekday.

NJDOT - Dec. 1977

Table 5

Morristown Line - Peak Period Patronage Projections
(Net Patronage)

Station Groupings	1976*	1980	1986	1990	2000
Dover - Morris Plains	1102	1250	1473	1526	1657
Morristown - Chatham	3884	4408	5192	5379	5841
Summit - S. Orange	4227	4797	5650	5852	6358
Orange - Harrison**	-1659	-1883	-2217	-2298	-2496
Net Eastbound Patronage	7554	8572	10,098	10,459	11,360

NJDOT - Dec. 1977

Table 6

Montclair Branch - Peak Period Patronage Projections
(Net Patronage)

Station Groupings	1976*	1980	1986	1990	2000
Montclair - Roseville Ave.	527	595	697	722	785
Newark - Harrison**	-210	-237	-278	-288	-314
Net Eastbound Patronage	317	358	419	434	471

**Negative number indicates more persons disembarked than boarded
*Actual comductors' passenger counts, typical weekday

NJDOT - Dec. 1977

TABLE 7

Ridership Trends 1976-2000, Former Erie Lackawanna Lines, Peak Period
(Net Patronage)

Line	1976*	1980	1986	1990	2000
Boonton	2,986	4,030	5,600	5,731	6,059
Pascack Valley	2,872	3,323	4,000	4,094	4,330
Mainline/Bergen Co.	7,177	8,626	10,800	11,053	11,686
Gladstone	2,233	2,533	2,983	3,090	3,356
Morristown	7,554	8,572	10,098	10,459	11,360
Montclair	317	358	419	434	471
Grand Total					
Diesel	13,035	15,979	20,400	20,878	22,075
Electric	10,104	11,463	13,500	13,983	15,187

Projected Patronage Increases

	1976-1986		1976-2000	
	#	%	#	%
Boonton	2,614	87.5	3,073	102.9
Pascack Valley	1,128	39.3	1,458	50.8
Mainline/Bergen Co. Line	3,623	50.5	4,509	62.8
Gladstone	750	33.6	1,123	50.3
Morristown	2,544	33.7	3,806	50.4
Montclair	102	32.2	154	48.6

NJDOT - Dec. 1977

*Actual conductors' passenger counts, typical weekday.

It is apparent that the greatest numerical increases in patronage are anticipated in western Bergen and Passaic Counties. These areas are served by the Mainline/Bergen County Line and Boonton Line. These projections are supported by various planning reports, predicting that the Passaic-Bergen region is expected to experience significant population and employment increases in the next 20 years.[1]

The electrified services (Morristown, Montclair, Gladstone) will experience overall patronage increases of approximately 33% by 1986 and between 48-51% by the year 2000. While the population of Morris, western Essex, and northern Somerset Counties is expected to increase, growth is not expected to be as rapid as in the Passaic-Bergen region.[2]

The Pascack Valley Corridor projections were developed without consideration of trip diversions to the West Shore Line. Although it is unlikely that the West Shore service will be in operation until the late 1980's, Pascack Valley ridership may eventually be affected by reinstitution of West Shore service.

Refined West Shore projections were not developed for this study. Pascack Valley line patronage projections, which might be affected by institution of service on the West Shore route, will be further developed by the Main/Bergen/Pascack Valley lines study mentioned earlier in this report.

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[1] Selected Population, Employment, and Travel Data from Transit Corridors within the Tri-State Region, TSRPC, January, 1977, p. 6.

[2] IBID. . . . . p. 6.

2. Raritan Valley Line

Raritan Valley Line projections were developed for 1980, 1985 1990 and 2000 using selected population, employment and travel projections developed by Tri-State Regional Planning Commission (TSRPC).

Table 8 presents the peak period eastbound patronage:

Table 8

Raritan Valley Line - Peak Period Patronage Projections
(Net Patronage)

Station Groupings	1976*	1980	1985	1990	2000
Phillipsburg - Somerville	802	886	995	1100	1306
Manville - Dunellen	719	795	892	985	1171
Plainfield - Roselle Park	3744	4139	4627	5116	6097
Net Eastbound Patronage	5265	5820	6514	7201	8574

NJDOT - Dec. 1977

*Actual conductors' passenger counts, typical weekday

Project Patronage Increases	#	%
1976-1985	1,249	23.7
1976-2000	3,309	62.8

By comparison, a joint PATH-NJDOT task force projected 1985 all day ridership along the Raritan Valley Line at 8,500.[1] The PATH-NJDOT figure converts into approximately 7,100 peak period riders - roughly 9 percent greater than the figure used in this report.

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[1] NJDOT-PATH Joint Task Force Report, CNJ Corridor Commuter Transportation Alternatives, January 15, 1975, Table 1.

However, the PATH-NJDOT figure assumes that complete track upgrading and station rehabilitation (including construction of high-level platforms), purchase of an entirely new passenger fleet and track improvements at Aldene will be accomplished.[2]

3. Northeast Corridor Line

Northeast Corridor patronage projections were developed for 1980, 1985, 1990, and 2000 using selected population, employment and travel projections developed by TSRPC. Comparable trends were used to project patronage for that portion of the Corridor located in the Tri-State region.

Table 9

Northeast Corridor - Peak Period Patronage Projections
(Net Patronage)

Station Groupings	1976*	1980	1985	1990	2000
Trenton - Princeton Jct.	2040	2084	2140	2194	2305
Jersey Ave. - Metropark	4474	4572	4692	4813	5055
Rahway - N. Elizabeth**	2438	2490	2558	2623	2754
Net Eastbound Patronage	8952	9146	9390	9630	10,114

*Actual conductors' passenger counts, typical weekday

**Trains originating in South Amboy not included

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[2] IBID,...p. 4-5.

As Table 10 indicates, ridership on this line has been steadily increasing since 1970.

Table 10

Ridership Trends - Northeast Corridor

Year	Peak Period Patronage	Percent Increase Over 1970	Over 1974	Over 1976
1970	7,437*	-	-	-
1974	8,557*	15.0	-	-
1976	8,952*	20.3	4.6	-
1985	9,390	26.2	9.7	4.9
2000	10,114	36.0	18.2	13.0

NJDOT - Dec. 1977

*Actual conductors' passenger counts, typical weekday.

Tri-State projections indicate that the population in the Northeast Corridor is expected to increase by 37% from 1970-2000. This figure correlates with the projected increase in eastbound transit trips of 36%.[2]

4. North Jersey Coast Line

North Jersey Coast patronage projections for 1985 were obtained from a report entitled Proposed Operations Plan for the Modernization of the New York and Long Branch Railroad (June 1977) by Edwards and Kelcey, Inc. and Wyer Dick and Co. Projections were developed for 1990 and 2000 using the Tri-State Report entitled Selected Population, Employment and Travel Data from Transit Corridors within the Tri-State Region.

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[2] IBID,...p. 6.

Substantial service improvements have been suggested by Edwards and Kelcey (et. al.) for both the electrified and diesel portions of this line. Briefly, these improvements include:

- Increase of maximum track speed to 80 mph between Red Bank and South Amboy.
- Relocation of the engine change from South Amboy to Red Bank and substitution of MU trains for five of the diesel trains. Travel time of passengers who currently ride the diesel trains from Red Bank, Matawan and Middletown Station (the three stations with highest ridership) and Hazlet would be reduced by six minutes.
- Implementation of a modified skip-stop arrangement during peak periods. Less than thirty minute headways would be provided during the peak period.
- Trains originating in Bay Head would make only one or two stops east of the Red Bank en route to Newark or New York.
- Provision of high-level platforms at the major stations of Red Bank, Middletown and Matawan to reduce station dwell time for trains at those stations.

Table 11

North Jersey Coast Service - Peak Period Patronage Projections
(Net Patronage)

Station Groupings	1976*	1980	1985	1990	2000
Bay Head - Elberon	2288	2357	2444	2712	3248
Long Branch - Matawan	5126	6697	8661	9610	11,508
South Amboy - Avenel	1387	1801	2318	2572	3080
Rahway - N. Elizabeth**	1859	1947	2058	2168	2388
Net Eastbound Patronage	10,660	12,802	15,481	17,062	20,224

*Actual conductors' passenger counts, typical weekday.
**Limited to trains originating in South Amboy (origin will change to Red Bank or Long Branch when electrification is complete)

NJDOT - Dec. 1977

Recent ridership trends on the North Jersey Coast Line indicate that patronage has been decreasing since 1970. Tables 11 and 12 suggest that electrification, station improvements and the purchase of new MU cars will reverse this downward trend. Ridership in the year 2000 is expected to be 77.0% higher than 1970 ridership and 89.7% higher than the 1976 figure.

Table 12

Ridership Trends North Jersey Coast Line

Year	Peak Period Patronage	Percent Increase Over 1970	Over 1974	Over 1976
1970	11426	X	X	X
1974	10770	-5.7	X	X
1976	10660	-6.7	-1.0	X
1980	12802	12.0	18.9	20.1
1985	15481	35.5	43.7	45.2
1990	17062	49.3	58.4	60.1
2000	20224	77.0	87.8	89.7

5. Seashore Lines (Atlantic City Line)

It is not yet apparent whether the Seashore Lines will remain as a service oriented toward westbound commuting. Casino gambling is expected to severely strain Atlantic City's existing transit services, road network and parking facilities thus yielding a potential increase in demand for rail transportation. However, neither NJDOT nor Atlantic County developed an estimate of future eastbound rail ridership or modal splits which would be generated by casino oriented travel.

NJDOT and Atlantic County officials are currently studying cost-effective methods to improve the rail terminal in Atlantic

City to attract more ridership. However, NJDOT has predicted that at least for the short term, rail service from Atlantic City will remain commuter-oriented.[1] Eastbound travelers to Atlantic City are expected to rely primarily on automobiles, express buses and air transportation.[2]

The current schedules on the Seashore line make it very difficult for travelers from the greater Philadelphia region to commute to Atlantic City on a regular basis. Weekend service is not provided during the winter.

As mentioned in Section II of this report, it is doubtful that this service will be continued beyond 1985-unless ridership increases appreciably.

The 1985 patronage projections used in this report, were developed by the Delaware Valley Regional Planning Commission (DVRPC). These projections do not consider the effects of casino gambling. The 1990 and 2000 ridership was projected using population estimates developed by the Bureau of Common Carrier Planning.

Table 13 presents 1980, 1985, 1990, and 2000 patronage estimates for a commuter oriented service under two different service levels. System 1 assumes that the existing service frequency (3 weekday round trips, no weekend service) will remain in effect. System 2 assumes that 8 weekday round trips and 4 weekend round trips will be provided.

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[1] Interim Transportation Analysis Relating to Casino Operation in Atlantic City, p. 29.

[2] IBID, pp. 34, 44, 45.

Table 13

Seashore Lines (Atlantic City Line) - Patronage Projections

		System 1				System 2			
Stations	1976	1980	1985[1]	1990	2000	1980	1985[1]	1990	2000
lantic City	40	115	208	227	239	141	268	293	308
econ	39	47	56	61	64	53	70	76	80
g Harbor	16	22	30	33	34	27	40	44	46
mmonton	24	36	52	57	60	43	66	72	76
t Eastbound tronage	119	220	346	378	397	264	444	485	510

RSL Ridership and Revenue Study, DVRPC, September, 1975, p. 35, NJDOT, Dec. 1977

DVRPC's projections indicate that if service were increased by 1985 from the present peak period trains per weekday to 4 peak /4 offpeak trains per weekday, only 98 additional passengers can be expected to ride--assuming casino gambling has no effect on service.

Table 14 presents a comparison of past ridership and anticipated ridership for both service levels:

Table 14

Ridership Trends - Seashore Lines

Year	Ridership
1971	98
1974	161
1976	119
1985 (System 1)	346
1985 (System 2)	444
2000 (System 1)	397
2000 (System 2)	510

It is recommended that these patronage estimates be reviewed and revised (as necessary) after the effects of casino gambling on passenger rail service actually observed.

IV. Future Passenger Equipment Needs

Task 1 presented a description of New Jersey's passenger rail fleet as it existed in 1977. This inventory was used to determine which portions of the 1977 passenger fleet can be expected to continue operating in the 1980-2000 period.

Rehabilitation and replacement schedules were developed based on the remaining service life of this equipment and on current NJDOT rehabilitation and replacement plans as outlined in Task 1. A review of these plans indicated that the service life of a considerable portion of the fleet expires before 1980, but that this equipment has not yet been scheduled for replacement. This equipment should be replaced between 1980 and 1985.

Table 15 presents a description of the obsolete equipment:

Table 15

Passenger Rail Equipment with Service Life Expiring Before 1980 Not Yet Scheduled for Replacement or Rehabilitation

quipment	Rail Line	Quantity	Manufacturer	Series	Year Built	Year Rehabilitated
Coach	NJ Coast	6	A.C.F.[1]	100	1953	1971
Coach	NJ Coast	28	Pullman Std.	100	1946-50	1973
Coach	NJ Coast	5	A.C.F.	2100	1947	----
Coach	NJ Coast	3	Pullman Std.	7000	1948	----
Coach	Raritan Valley	20	A.C.F.	300	1948	1968
ocomotive	NJ Coast	3	Electro Motive	4200(E-8)	1951	1972
Coach	Raritan Valley	2	Pullman Std.	300	1947	1971
Coach	Raritan Valley	53	Pullman Std.	1000-1300	1923-31	1969

.C.F. = American Car and Foundry Co.

OTAL = 42 coaches North Jersey Coast Line
75 coaches CNJ Mainline
3 locomotives North Jersey Coast Line

In addition to this equipment, locomotives and passenger cars on several other rail lines have remaining service lives that will expire in the 1980-2000 period. The Bureau of Rail Equipment has recommended that all of this equipment also be replaced. Table 16 presents a description:

Table 16

Passenger Rail Equipment Recommended for Replacement: 1980-2000

uipment	Rail Line	Quantity	Manufacturer	Series	Year Built	Recommended Replacement Year
comotive	NJ Coast	8	Electro-Motive	GP-7	1952	1983[1]
comotive	NJ Coast	20	Electro-Motive	E-8	1947	1981[2]
comotive	NJ Coast	13	General Elec.	4800-(GG-1)	1935	1982[3]
comotive	MBPB[7]	32	General Elec.	3300-(U-34CH)	1971-73	1991[4]
ach	Raritan Valley	10	Pullman Std.	270	1965	1995[5]
ach	NJ Coast	16	Pullman Std.	2400	1938	1995[6]

TALS - 31 Locomotives NJ Coast Service

16 Coaches NJ Coast Service

32 Locomotives Former EL Lines

10 Coaches Former CNJ Mainline

eplace with new locomotives

eplace with remanufactured locomotives

eplace with 12 new dual-mode locomotives

eplace with new passenger coaches

lainline, Bergen Co. Line, Pascack Valley, Boonton Line

Table 17 is a rehabilitation and replacement schedule for existing state-owned rolling stock which will continue to operate after 1980. This schedule was developed based on the following assumptions:

Table 17

STATE OF NEW JERSEY EXISTING PASSENGER RAIL EQUIPMENT
REHABILITATION AND REPLACEMENT SCHEDULE
1980-2000

MAKE	1980	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	2000
MU ARROW III												43	48	48	38	48					
MU ARROW II									22	24	24										
MU ARROW I																			9	24	
LOCO GP-7	RETIRE (8) →			NEW LOCO (GP-40)												8					
LOCO E-8	RETIRE (20) →		REPLACE BY REMANUFACTURED LOCO (GP-40)											12	8						REPLACE
LOCO (#4800)	RETIRE (13) →		REPLACED BY REMANUFACTURED LOCO														12				
LOCO (#3300)				8	12	12				RETIRE (32) →		NEW	LOCO (GP-40)								
CAB CAR (#1500)							11	11	11												REPLACE
SNACK CAR (#1600)							5	4													REPLACE
PP COACH (1700)						12	12	18	30	18	18										REPLACE
COACH (#270)						10							RETIRE →			NEW					
COACH (#2400)					14	14	14						16 RETIRE → CAR			NEW					
COACH (#3000)				20	5														20	5	
COACH (#3200)			4															4			
COACH (#4000)	5															5					
COACH (#500)													24	4							
COACH (#300)				4																4	
RDC (#400, #500)					10						10									10	
COACH	5		4	24	19	36	42	33	63	42	42	48	72	52	38	53		4	29	33	
LOCO AND RDC				8	22	12				10				12	8	8	12			10	

- Aluminum passenger coaches have a maximum service life of 30 years--provided they undergo rehabilitation after 15 years.

- Stainless-steel passenger coaches (and MU cars) have an indefinite service life, if they undergo major rehabilitation every 15 to 20 years.

- Diesel locomotives have a maximum service life of 20 years--provided they undergo rehabilitation after 10 years.

- Electric locomotives have a maximum service life of 25 years--provided they undergo rehabilitation after 15 years.

As discussed earlier, Tables 15, 16, and 17 illustrate recommended rehabilitation and replacement schedules for equipment (1977). Although these tables are useful to determine when existing equipment should be retired or rehabilitated; patronage projections, turnaround capabilities, vehicle capacities and vehicle downtime must also be considered to more accurately project future fleet sizes.

A formula was developed to estimate the future fleet requirements of each rail line for a particular year.

$$X = \frac{P}{V - DV + T(V - DV)}$$

Where:

P = projected net peak period patronage

V = average vehicle capacity for the particular fleet

D = average portion of fleet out of service ("downtime" - expressed as a decimal.

T = percentage of fleet capable of making more than one eastbound trip during the 7-10 a.m. peak period (expressed as a decimal).

X = number of vehicles needed for eastbound peak period service (Vehicle fleet sizes were determined using peak period needs since 80 - 90% of demand occurs then).

To determine (T) the percentage of train consists that are capable of making two eastbound trips during the 7 to 10 a.m. peak period, the existing layover, switching and turnaround procedures on each rail line were reviewed. The percentage of each fleet that currently completes more than one peak period round trip was calculated. For future years it was assumed that these percentages would remain constant. In other words, since it had been previously assumed that the existing routes and schedules would remain constant on each rail line, the turnaround and switching procedures were also expected to remain unchanged.

The formula yields the number of passenger cars (X) having the average seating capacity of the existing (1980) fleet that will be needed in a future year. In certain cases, 'X' was adjusted to reflect changes in the seating capacity made by the vehicle manufacturer (i.e. Existing Arrow II cars have a seating capacity of 105, but new Arrow III cars will seat an average of 117 persons).

Finally the existing passenger fleet was compared with "X" to project future equipment needs based on incremental patronage increases.

The following is a description by railroad of the projected equipment needs on each rail line, using the formula described above.

1. Mainline, Bergen County Line, Pascack Valley, Boonton Lines (MBPB)

The 150 Pullman Std. coaches currently used on the MBPB Lines were originally provided with '3-2' seating (129 seats) by the manufacturer. NJDOT modified these coaches to provide '2-2'

seating (108 seats). It is unlikely that NJDOT will make similar modifications in the future. Therefore, all new coaches will probably have 129 seats.

The passenger fleet that will be needed to handle the projected peak period patronage between 1980 and 2000 on the MBPB lines is as follows:

Year	New Locomotives[1]	Pre-1980 Locomotives	New Coaches (post- 1980)	Pre-1980 Coaches	Total
1980	--	32	8	150	158
1985	--	32	44	150	194
1990	34	--	47	150	197
2000	40	--	58	150	208

[1]new locomotive needs based on 1 locomotive per 6 coaches (20% downtime included)

2. Morristown, Gladstone, Montclair, Lines

The passenger fleet that will be needed to handle the projected peak period patronage between 1980 and 2000 on the Morristown, Gladstone and Montclair lines is as follows:

Year	Existing MU's[1] (Needed for Peak Period)	New MU's (post 1980)	Available MU's
1980	123	----	180
1985	144	----	180
1990	149	----	180
2000	161	----	180

[1]number of Arrow III MU's needed for peak period service

As Task 1 indicated, 180 new Arrow III MU cars are currently being purchased to replace 227 obsolete MU Cars on the Morristown, Gladstone and Montclair lines. The new Arrow III cars have an average seating capacity for 117 persons. (The obsolete MU's can only accommodate 82 persons).

It is apparent that the 180 new Arrow III MU's should be able to accommodate the projected patronage increases through the year 2000. Moreover, many of these cars should be available for additional peak service or offpeak service.

3. Raritan Valley Line

The passenger fleet that will be needed to handle the projected peak period patronage between 1980 and 2000 on the Raritan Valley Line is as follows:

Year	New Locomotives[1]	Pre-1980 Locomotives[2]	New Coaches (post 1980)	Pre-1980 Coaches	Total Coaches
1980	---	13	---	68	68
1985	---	13	39	14	53
1990	13	---	45	14	59
2000	13	---	62	4	66

[1]locomotive needs based on 1 locomotive per 6 coaches (20% downtime included).

[2]not owned by NJDOT, leased from Conrail

As Table 15 indicated, 75 of the existing 89 passenger coaches used on the Raritan Valley line should be replaced by 1985. These coaches have an average seating capacity for 82 persons. (New diesel coaches can accommodate 129 persons). It should be noted that only 68 existing coaches should be needed to service peak period needs in 1980.

While the total number of passenger coaches on the Raritan Valley Line will decrease between 1980 and 2000, the number of available seats will increase as new equipment is put into service.

4. Northeast Corridor Line

The passenger fleet that will be needed to handle the projected peak period patronage increases between 1980 and 2000 on the Northeast Corridor Line (NEC) is as follows:

Year	New MU's (post-1980)	Existing MU's (pre-1980)	Total Fleet
1980	6	81	87
1985	9	81	90
1990	11	81	92
2000	15	81	96

As Task 1 indicated, 103 existing Arrow I and Arrow II MU's are expected to continue in service through the year 2000. (81 MU's on the NEC, 22 MU's on the NJ Coast Line) These cars have an average seating capacity of 108. New equipment purchased after 1980 would have 117 seats (Arrow III's).

5. North Jersey Coast Line

The passenger fleet that will be needed to handle the projected peak period increases between 1980 and 2000 on the North Jersey Coast Line is as follows:

ear	New Locomotives	Pre-1980 Locomotives	New Coaches (post-1980)	Pre-1980 Coaches	New MU's (post-1980)	Pre-1980 MU's	Total MU's/coaches
80	---	41[1]	--	117	--	72	189
85	27[2]	--	--	105	14	72	191
90	27[2]	--	8	105	25	72	210
00	31[3]	--	42	89	37	72	240

[1] 28 diesel-locomotives, 13 electric locomotives

[2] 15 diesel locomotives, 12 dual-mode locomotives

[3] 19 diesel locomotives, 12 dual-mode locomotives

The report completed for NJDOT by Edwards and Kelcey, Inc. (et. al.) included fleet size projections to the year 1985.[1] Fleet Sizes were estimated for the 1986-2000 period using the previously discussed formula.

As mentioned earlier in this report, trains originating in Bay Head would make fewer stops in the electrified portion of the North Jersey Coast Line - provided the Edwards and Kelcey scheduling scheme is implemented. Thus, fewer locomotives and fewer diesel-hauled coaches would be required for the Bay Head service.

For example, there are 147 diesel-hauled coaches currently used on the North Jersey Coast Service. Only 105 of these coaches would be needed in 1985. In addition, the 28 diesel locomotives currently in use need only be replaced by 15 units in the 1980-85 period.

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[1] Proposed Operations Plan for the Modernization of the New York and Long Branch Railroad, Edwards and Kelcey, Inc. - Wyer Dick and (01) June, 1977.

[2] Ibid, p. 10.

The Edwards and Kelcey report indicates that 72 MU cars would be required to service patrons by 1985.[1] As discussed earlier, 50 Arrow III MU's are being purchased by NJDOT to supplement 22 Arrow II MU's currently used on the South Amboy service. However, the MU fleet must be expanded from 72 MU's to 86 MU's by 1986 to allow for downtime.

6. Seashore Lines - Atlantic City Line

The RDC fleet that will be needed to handle the projected peak period patronage between 1980 and 2000 on the Seashore Lines is as follows:

	System 1		System 2	
ear	Pre-1980 RDC's	New RDC's (post-1980)	Pre-1980 RDC's	New RDC's (post 1980)
80	5	---	5	---
985	5	---	6	---
990	5	---	7	---
000	6	---	7	---

As discussed in Section II of this report, the fleet size of the Atlantic City Line can be increased from 5 to 10 RDC's if service on the Cape May/Ocean City Branches is terminated.

Under the System 1 alternative (existing schedules) the existing fleet would be sufficient to meet demand until the 1980-2000 period.

Using the System 2 alternative (4 peak/4 offpeak trips) one additional RDC would be needed by 1985, and another RDC would be needed between 1985 and 2000.

Since casino gambling ridership was not considered in

these forecasts, it is recommended that the entire fleet of 10 RDC's be maintained to handle unanticipated demand.

7. Proposed West Shore Service

Since the federally funded study of the West Shore Corridor is not complete, there are no patronage projections or preliminary schedules with which to develop train consist requirements.

Preliminary indications suggest that a minimal diesel service could be implemented at the outset. Two round trips could be made on such a service during the peak period.

Since commencement of passenger rail service in this corridor is still to be determined, it is concluded, for the purposes of this study, that the NJDOT will reallocate existing diesel rolling stock to the West Shore line rather than purchase new equipment. The 10 Rail Diesel Cars currently used on the Bayonne Service would be adequate for this service.

8. Proposed Lakewood Service

Preliminary indications call for a fleet of 10 locomotives and 60 push-pull coaches to be used on the proposed Lakewood service.

As discussed in Section II of this report, rail service from Lakewood would be offered over one of two possible routes; but either route would link with the North Jersey Coast Line at Matawan or Red Bank. If a diesel service is offered south of the North Jersey Coast Line to Lakewood, it would be necessary to switch to electric locomotives at Matawan or Red Bank--unless dual-mode locomotives are utilized. Thus, it is recommended that dual-mode locomotives be considered. This suggestion would make

the service compatible with the Bay Head service.

It is recommended, that these estimates be reviewed upon completion of the federally funded study currently underway (see p. 12).

V. Equipment Flexibility, Future Fleet Sizes, Projected Costs

1. Equipment Interchangeability

As Task 1 indicated, NJDOT is gradually phasing out obsolete rail equipment and replacing it with rolling stock that can be used on several different lines. This report suggests that the equipment replacement program be continued vigorously during the 1980-2000 period.

By 1985, all equipment on the electrified commuter rail lines will be fully interchangeable. The North Jersey Coast Line, Northeast Corridor Line, Morristown, Gladstone, and Montclair Lines will all use 25Kv60 HZ electric power. NJDOT will have completed the rehabilitation of Arrow I and Arrow II MU cars currently underway (1977-78). Thus, MU cars can be reallocated to lines experiencing unanticipated high patronage, on a temporary basis.

By the year 2000, it is anticipated that at least 52 additional Arrow III MU's will be needed for New Jersey service. Since the equipment will be needed on lines having 333 fully interchangeable MU cars, it is logical to purchase equipment that can easily be added to the existing fleet.

On the other hand, NJDOT has recently had difficulty purchasing MU cars in smaller 'lots.' MU manufacturers are reluctant to bid for contracts requiring construction of less than 100 units.

Thus, as a second choice, it may become necessary for NJDOT to purchase electric or dual mode locomotives and push-pull coaches, if MU cars are unavailable. Existing diesel coaches would then be useable on electrified lines.

The Pullman Std. Series 1500, 1600, 1700 diesel coaches, or equivalent, are recommended by the Bureau of Rail Equipment for use on all diesel services in the future. The cars can easily be added to the current MBPB diesel fleet and can be reallocated to electrified services, if dual-mode locomotives are purchased. By the year 2000, it is estimated that the diesel fleet (Pullman Standard cars) will increase from 150 to 380 coaches (provided service is initiated on to Lakewood).

At the outset, some difficulty may be experienced in interchanging these cars on lines other than the MBPB lines. The majority of the obsolete coaches currently used on the North Jersey Coast Line and Raritan Valley Line are steamheated, whereas the Pullman Std. coaches use electric heat. This means that train consists must use either all Pullman coaches or all obsolete coaches. As the older coaches are gradually phased out, this problem will be minimized. However, by 2000 it is estimated that 57 steam heated coaches will still be in use on the North Jersey Coast Line.

The Rail Diesel Cars (RDC's) currently used on the Bayonne Branch and Seashore Lines theoretically can be used on both diesel and electric lines (although they are diesel powered). They can be reallocated to any service in the State on a temporary basis. However, RDC's cannot be used for direct service into Manhattan because units

powered by internal combustion are not permitted in the North River tunnel. For commuting purposes, their use should be limited to the Raritan Valley Line; MBPB lines; the West Shore service (if initiated); the Seashore Lines; and for eastbound trips on other lines that do not terminate in Manhattan.

RDC's of the type currently used on the Seashore Lines and Bayonne Line are no longer manufactured in this country. A substantial market does exist for remanufactured units. The average purchase price of a remanufactured unit is approximately $300,000.[1] It should be noted that the Budd Company has recently introduced the SPV-2000, a self-propelled diesel MU car based on the Amfleet cars used by AMTRAK in intercity service. The SPV-2000 is being promoted as the present-day equivalent of the RDC. As such, it is being considered as an equipment alternative by the NJDOT technical study entitled, "Improvement and Extension of Commuter Transportation Service in Monmouth and Ocean Counties"(IT-09-0034/37).

As Table 17 indicated, the Bureau of Rail Equipment proposes to replace 13 obsolete series 4800 locomotives (GG-1's) with 12 new dual-mode locomotives (diesel/electric powered). New dual mode prototypes cost approximately $1,000,000 a piece. Dual-mode locomotives would eliminate the ten minute delays that North Jersey Coast Line schedules must now incorporate, to accommodate engine changes at the end of electrified territory between diesel and electric locomotives. New diesel services could be offered to Lakewood without requiring similar changeovers. Finally, diesel powered consists could be substituted on electrified lines if the need arose.

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[1] Report on Economic Feasibility of Improved Rail Services between Philadelphia and Atlantic City, DRPA, June, 1976, p.22.

2. Future Passenger Fleet Size - 1980-2000

Table 18 illustrates the 1980 passenger fleet requirements. New equipment purchases include:

- 8 Pullman Std. Series #1500-1700 coaches for the MPBP lines
- 6 Arrow III MU's for the Northeast Corridor Line

On a temporary basis, the 10 RDC's used on the Bayonne Branch can be reallocated to the Raritan Valley Line - until a decision is made on the disposition of the West Shore Corridor.

Note: temporary allocation of RDC's to the Raritan Valley Line was not taken into account during fleet size computations. This substitution is merely suggested if delays are encountered procuring new rolling stock or if patronage increases exceed the capacities of the existing fleet.

TABLE 18

1980 Passenger Fleet Requirements - State of New Jersey

	Locomotives		Arrow I	Arrow II	Arrow III		Other Diesel	
	Diesel	Electric	MU	MU	MU	Diesel Coaches	Coaches Available	RDC
MBPB Lines	32	--	--	--	--	158	--	--
Morristown, Gladstone, Montclair Line	--	--	--	--	180	---	--	--
Raritan Valley Line	13	--	--	--	--	--	75 obsolete coaches (see Table 15) 14 (series 270-300)	10[1]
Northeast Corridor Line	--	--	33	48	6	--	--	--
North Jersey Coast Line	28	13	--	22	50	--	42 obsolete coaches (see Table 15) 105 (series 1500, 2400, 3000, 3200, 4000)	--
Seashore Lines	--	--	--	--	--	--	--	10
TOTALS	73	13	33	70	236	158	236	20

[1] temporary use after termination of Bayonne Service

NJDOT - Dec. 1977

Table 19 illustrates the 1985-86 passenger fleet requirements. Equipment purchases between 1980-85 include:

- 36 series 1500, 1600, and 1700 coaches for MBPB Lines
- 39 series 1500, 1600 and 1700 coaches for the Raritan Valley Line
- 3 Arrow III MU cars for the Northeast Corridor Line
- 14 Arrow III MU Cars for the North Jersey Coast Line
- 12 Dual-Mode locomotives for the NJ Coast Line
- 12 GP-40 locomotives for the NJ Coast Line
- 3 remanufactured E-8 locomotives for the NJ Coast Line

TABLE 19

1985/86 Passenger Fleet Requirements

	Locomotives		Passenger Coaches					
	Diesel	Dual Mode	Arrow I MU	Arrow II MU	Arrow III MU	Diesel Coaches (Series 1500-1700)	Other Diesel Coaches (pre-1980)	RDC
MBPB Lines	32	--	--	--	--	194	--	--
Morristown, Gladstone, Montclair Lines	--	--	--	--	180	--	--	--
Raritan Valley Lines	13	--	--	--	--	39	14 (series 270-300)	10[1]
Northeast Corridor Lines	--	--	33	48	9	[illegible]	--	--
North Jersey Coast Lines	15	12	--	22	64	20	105 (series, 1500, 2400, 3400, 3000, 3200 4000)	--
Seashore Lines	--	--	-	--	--	---	--	10
Totals	60	12	33	70	253	233	119	20

[1] temporary use

Table 20 illustrates the 1990 passenger fleet requirements. Equipment purchases during the 1985-1990 period include:

- 13 series 3300 (GP-40) locomotives for the Raritan Valley Line to replace 13 units currently lend-leased from Conrail.
- 6 series 1500, 1600, 1700 coaches for the former Raritan Valley Line.
- 8 series 1500, 1600, 1700 coaches for the NJ Coast Line
- 3 series 1500, 1600, 1700 coaches for the MBPB Lines
- 34 series 3300 (GP-40) locomotives for the MBPB lines (Two of these locomotives are needed to accommodate additional coaches that will be purchased between 1980-2000)
- 2 Arrow III MU's for the Northeast Corridor Line
- 11 Arrow III MU's for the North Jersey Coast Line

TABLE 20

1990 Passenger Fleet

	Diesel	Dual-Mode	Arrow I	Arrow II	Arrow III	Diesel Coaches (#1500-1700)	Other Diesel Coaches (pre 1980)	RDC
MBPB Lines	34	--	--	--	--	197	--	--
Morristown, Gladstone, Montclair Lines	--	--	--	-	180	--	--	--
Raritan Valley Line	13	--	--	--	--	45	14 (#270-300)	--
Northeast Corridor Line	-	--	33	48	11	--	--	--
North Jersey Coast Line	15	12	--	22	75	28	105 (#1500,2400 3000, 3200, 4000)	--
Seashore Line	--	--	--	--	--	--		10
West Shore	--	--	--	--	--	--	--	10
TOTALS	62	12	33	70	266	267	119	20

TABLE 21

2000 Passenger Fleet

	Locomotive		Arrow I	Arrow II	Arrow III			
	Diesel	Dual-Mode	MU	MU	MU	Diesel Coaches (#1500-1700)	Other Diesel Coaches (pre-1980)	RDC
MBPB Lines	40	--	--	--	--	208	--	--
Morristown, Gladstone, Montclair Lines	--	--	--	--	180	--	--	--
Raritan Valley Line	13	--	--	--	--	62	4 (#300)	--
Northeast Corridor Line	--	--	33	48	15	--	--	--
NJ Coast Line	19	12	--	22	87	50	89 (#1500, 2400 3000, 3200, 4000)	--
Seashore Line	--	--	--	--	--	--	--	10[1]
West Shore	--	--	--	--	--	--	--	10
NJ Coast - Lakewood	--	10	--	--	--	60	--	--
Totals	72	22	33	70		380	93	20

3. Costs: New Purchases and Rehabilitation

To implement the equipment purchasing program suggested in this report, the State of New Jersey will be required to make a substantial long term commitment to the improvement of rail services. Table 22 indicates that the cost of replacing obsolete rolling stock and expanding the size of the 1980 fleet will exceed $231 million during the 1980-2000 period.

In addition more than $107 million will be needed during this period to rehabilitate the rail passenger fleet. Table 23 presents an annual breakdown of these rehabilitation costs based on the schedules developed in Section IV of this report.

Finally, the combined cost estimates for rehabilitation, replacement and additions to New Jersey's rail passenger fleet for the 1980-2000 period will exceed $339 million. Table 24 presents these figures in five year segments.

TABLE 22

Recommended Purchasing Schedule - New Passenger Rail Equipment
State of New Jersey, 1980-2000
(1977 Dollars)

Rail Line	Equipment	Quantity	Unit Price($)[1]	Total Cost ($)	Need Date
MBPB LINES	Coach (Series 1500, 1600, 1700)	8	$500,000	$ 4,000,000	1980
		36		$ 18,000,000	1986
		3		$ 1,500,000	1990
		11		$ 5,500,000	2000
		34		$ 27,200,000	1990
	Locomotive(Series 3300)	6	$800,000	$ 4,800,000	2000
Morristown etc.	NONE				
Raritan Valley Line	Coach (Series 1500, 1600, 1700)	39	$500,000	$ 19,500,000	1985
		6		$ 3,000,000	1990
		17		$ 8,500,000	2000
	Locomotives (Series #3300)	13	$800,000	$ 10,400,000	1988
Northeast Corridor Line	Arrow III MU	6	$800,000	$ 14,800,000	1980
		3		$ 2,400,000	1985
		2		$ 1,600,000	1990
		4		$ 3,200,000	2000
North Jersey Coast Line	Coach (Series 1500, 1600, 1700)				
		8	$500,000	$ 4,000,000	1990
		34		$ 17,000,000	2000
	Arrow III MU	14		$ 11,200,000	1985
		11	$800,000	$ 8,800,000	1990
		12		$ 9,600,000	2000
	Locomotive (Dual-Mode)	12	$1,000,000	$ 12,000,000	1982
	Locomotive (GP-7)	16	$ 800,000	$ 12,800,000	1983, 1995
	Locomotive (E-8)	3	$ 480,000	$ 1,440,000	1981
Lakewood Branch	Locomotive (Dual-Mode)	10	$1,000,000	$ 10,000,000	1995
	Coach (Series #1500, 1600, 1700)	60	$ 500,000	$ 30,000,000	1995
TOTAL				$231,240,000	

[1]Bureau of Rail Equipment

TABLE 23

Projected Rehabilitation Costs by Year
New Jersey Rail Passenger Fleet: 1980-2000
(1977 dollars)

Year	Equipment	Cost/Unit[1]	Quantity	Total/Category	Annual Cost
1980	Coach (#4000)	$ 45,000	5	$ 225,000	$225,000
1981	None	---	---	---	---
1982	Coach (#3200)	$ 45,000	4	$ 180,000	$180,000
1983	Locomotive (#3300)	$250,000	8	$2,000,000	
	Coach (#3000)	$ 45,000	20	$ 900 000	
	Coach (#300)	$ 45,000	4	$ 180,000	$3,080,000
1984	Locomotive (#3300)	$250,000	12	$3,000,000	
	Coach (#2400)	$ 45,000	14	$ 630,000	
	Coach (#3000)	$ 45,000	5	$ 225,000	
	RDC	$200,000	10	$2,000,000	$5,855,000
1985	Coach (#2400)	$ 45,000	14	$ 630,000	
	Coach (#270)	$ 45,000	10	$ 450,000	
	Coach (#1700)	$ 50,000	12	$ 600,000	
	Locomotive (#3300)	$ 50,000	12	$3,000,000	$4,680,000
1986	Coach (#1700)	$ 50,000	11	$ 550,000	
	Coach (#1700)	$ 50,000	5	$ 250,000	
	Coach (#1700)	$ 50,000	12	$ 600,000	
	Coach (#2400)	$ 45,000	14	$ 630,000	$2,030,000
1987	Coach (#1700)	$ 50,000	11	$ 550,000	
	Coach (#1700)	$ 50,000	4	$ 200,000	
	Coach (#1700)	$ 50,000	18	$ 900,000	$1,650,000
1988	MU-Arrow II	$250,000	22	$5,500,000	
	Coach (#1700)	$ 50,000	11	$ 550,000	
	Coach (#1700)	$ 50,000	30	$1,500,000	$7,500,000
1989	MU-Arrow II	$250,000	24	$6,000,000	
	Coach (#1700)	$ 50,000	18	$ 900,000	$6,900,000
1990	MU-Arrow III	$250,000	24	$6,000,000	
		$ 50,000	18	$ 900,000	
		$200,000	10	$2,000,000	$8,900,000
1991	MU-Arrow III	$250,000	48	$12,000,000	$12,000,000
1992	MU-Arrow III	$250,000	48	$12,000,000	
	Coach (#1700)	$ 45,000	24	$ 1 080,000	$13,080,000

[1]Bureau of Rail Equipment

TABLE 23
(continued)

1993	MU-Arrow III	$ 250,000	48	$12,000,000	
	Locomotive (E-8)	$ 250,000	12	$ 3,000,000	
	Coach (#1700)	$ 450,000	4	$ 180,000	$15,180,000
1994	MU-Arrow III	$ 250,000	38	$ 9,500,000	
	Locomotive (E-8)	$ 250,000	8	$ 2,000,000	$11,500,000
1995	MU-Arrow III	$ 250,000	48	$ 1,200,000	
	Locomotive (GP-7)	$ 250,000	8	$ 2,000,000	
	Coach (#4000)	$ 45,000	5	$ 225,000	$ 3,425,000
1996	Locomotive (Dual-Mode)	NA	12	NA	
1997	Coach (#3000)	$ 45,000	4	$ 180,000	$ 180,000
1998	MU-Arrow I	$ 250,000	9	$ 2,240,000	
	Coach (#3000)	$ 45,000	20	$ 900,000	$ 3,150,000
1999	MU-Arrow I	$ 250,000	24	$ 6,000,000	
	Coach (#3000)	$ 45,000	5	$ 225,000	
	Coach (#300)	$ 45,000	4	$ 180,000	
	RDC	$ 200,000	10	$ 2,000,000	$ 8,405,000

TOTAL REHABILITATION
COST: 1980-2000 $107,970,000

TABLE 24

Combined Costs - Rehabilitation, Replacement, Additional Equipment, New Jersey Passenger Rail Fleet
(1977 dollars)

Period	Equipment Purchases	Equipment Rehabilitation
1980-85	$ 64,940,000	$ 14,020,000
1986-1990	$ 74,500,000	$ 27,030,000
1991-1995	$ 43,200,000	$ 55,185,000
1996-2000	$ 48,600,000	$ 11,735,000
Totals	$231,240,000	$107,970,000

Grand Total: $339,210,000

APPENDIX

I. Rehabilitation Costs per Unit: NJ Rail Equipment

Item	1977 Dollars
RDC	$200,000
Diesel Locomotive	$250,000
Arrow I MU	$250,000
Arrow II MU	$250,000
Arrow III MU	$250,000
Series 1500-1700 Coaches	$ 50,000
Other Diesel Coaches	$ 45,000

II. Purchase Price per Unit

Item	1977 Dollars
Diesel Locomotive	$ 800,000
E-8 Locomotive (remanufacture)	$ 450,000
Dual-mode (EMD) Locomotive	$1,000,000
Arrow III, MU	$ 800,000
Series 1500-1700 coaches	$ 500,000

Source: Bureau of Rail Equipment

Peak Period Factors - Commuter Rail Lines in N.J.

	Peak (7-10 A.M.) as Share of 24 Hour Service
MBPB	.95
Morristown, Gladstone, Montclair Lines	.80
Raritan Valley Line	.85
Northeast Corridor Line	.80
North Jersey Coast Line	.90

Source: PANYNJ, verified by 1976 Conductor Counts

Peak Period Patronage Estimation
Former Erie Lackawanna Lines (MBPB, Morristown, Gladston, Montclair Lines)

Patronage was estimated in two steps for both diesel and electric services. 1980 and 1986 forecasts were derived from revised Inter-Agency Task Force projections, then they were adjusted to reflect station loadings. Station loadings for all years (1980, 1986, 1990, 2000) were developed on the assumption that 1976 passenger loadings would remain in effect. (i.e., if 5 % of the patronage in 1976 originated at a given station, that station would generate 5% of the patronage throughout the 1980-2000 period).

Patronage increases for the years 1990 and 2000 were based on population projections by the Bureau of Common Carrier Planning.

Raritan Valley and Northeast Corridor Lines

Patronage was estimated for the Raritan Valley and Northeast Corridor Lines using similar techniques.

Tri-State developed transit travel projections to Manhattan for the year 2000. These projections were based on 1970 census data, and population and employment projections.

NJDOT adjusted the transit travel projections to reflect eastbound rail patronage for the year 2000.

1980, 1985, and 1990 projections were developed by plotting ridership trends for the period 1970 - 1976 on a graph and estimating the incremental increases in the years 1980, 1985, and 1990 using slopes.

All patronage projections were adjusted to reflect net station loadings using 1976 data. (1976 data was used instead of 1970 data because in certain instances, stations operating in 1970 no longer exist, and new

stations (i.e., Metropark) have been constructed since 1970).

Patronage estimates were further adjusted to reflect peak period patronage, using PANYNJ peak period factors.

North Jersey Coast Line

1985 patronage projections were obtained from the NJDOT report entitled Proposed Operations for the Modernization of the New York and Long Branch Railroad. NJDOT developed 1985 projections estimating the incremental patronage increases between 1980 and 1990 using slopes.

All patronage figures (1980, 1985, 1990, 2000) were adjusted to reflect peak period patronage using factors developed by PANYNJ.

Sea Shore Lines

1980 and 1985 patronage projections were derived from patronage estimated by DVRPC. These figures were not altered for the purposes of this study.

1990 and 2000 projections were based on population projections developed by the Bureau of Common Carrier Planning.

Station loadings for the years 1990 and 20000 were based on the projected 1985 loadings developed by DVRPC.

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APPENDIX D

APPENDIX D
PROJECTED ROLLING STOCK REQUIREMENTS BY PASSENGER LINE

1. INTRODUCTION

Included in this section of the Appendix are the details of the projected rolling stock requirements for each passenger line through the year 2000. Using the data provided by N.J.DOT in Tasks One and Two, a summary of these requirements was contained in Exhibit II-8 of Chapter II.

A. Mainline, Bergen County Line, Pascack Valley and Boonton Lines (MBPB)

The 150 Pullman Standard coaches currently used on the MBPB Lines were originally provided with '3-2' seating (129 seats) by the manufacturer. NJDOT modified these coaches to provide '2-2' seating (108 seats). It is unlikely that NJDOT will make similar modifications in the future. Therefore, all new coaches will probably have 129 seats.

The passenger fleet that will be needed to handle the projected peak period patronage between 1980 and 2000 on the MBPB lines is shown in Exhibit D-1.

B. Morristown, Gladstone and Montclair Lines

The passenger fleet that will be needed to handle the projected peak period patronage between 1980 and 2000 on the Morristown, Gladstone and Montclair lines is also given in Exhibit D-1.

As Chapter I indicated 180 new Arrow III MU cars are being purchased to replace 227 obsolete MU Cars on the Morris-

EXHIBIT D-1
PROJECTED FLEET REQUIREMENTS
MBPM AND MGM LINES

MAINLINE, BERGEN COUNTY LINE, PASCACK VALLEY AND BOONTON LINES

Diesel Locomotives			Cab Control Cars			Coaches		
Existing (Pre-1980)	New[1] (Post 1980)	Total	Existing (Pre-1980)	New (Post 1980)	Total	Existing (Pre-1980)	New (Post 1980)	Total
32	-	32	33	-	33	117	8	125
32	-	32	33	9	42	117	35	152
32	2	34	33	9	42	117	38	155
32	8	40	33	12	45	117	46	163
GE 3300-(U34CH)	3300 (GP-40)		Pullman Std. 1500			Pullman Std. 1600-1800	Pullman Std. 1600-1700	

[1]New locomotive needs based on one locomotive per six coaches including 20% downtime.

MORRISTOWN, GLADSTONE AND MONTCLAIR LINES

Year	Multiple Unit Cars (MU's)		
	Existing (Pre-1980)	Required	Available
1980	-	123	180
1985	-	144	180
1990	-	149	180
2000	-	161	180
Type	MU (DC)[1]	Arrow III[2]	Arrow III[2]

[1]Seating Capacity: 82

[2]Seating Capacity: 117

town, Gladstone and Montclair lines. The new Arrow III cars have an average seating capacity for 117 persons. (The obsolete MU's can only accomodate 82 persons).

It is apparent that the 180 new Arrow III MU's should be able to accommodate the projected patronage increases through the year 2000. Moreover, many of these cars should be available for additional peak service or off-peak service.

C. Raritan Valley Line

The passenger fleet that will be needed to handle the projected peak period patronage between 1980 and 2000 on the Raritan Valley Line is given in Exhibit D-2.

Seventy-five(75) of the existing 89 passenger coaches used on the Raritan Valley Line should be replaced by 1985. These coaches have an average seating capacity of 82 persons. (New diesel coaches can accommodate 129 persons). It should be noted that only 68 existing coaches should be needed to service peak period needs in 1980.

While the total number of passenger coaches on the Raritan Valley Line will decrease between 1980 and 2000, the number of available seats will increase as new equipment is put into service. New coaches seat 129 versus 82 on existing.

D. Northeast Corridor Line

The passenger fleet that will be needed to handle the projected peak period patronage increases between 1980 and 2000 on the Northeast Corridor Line (NEC) is given in Exhibit D-2.

EXHIBIT D-2
PROJECTED FLEET REQUIREMENT
RARITAN VALLEY AND NEC LINES

RARITAN VALLEY LINE

Year	Diesel Locomotives			Coaches		
	Existing (Pre-1980)	New (Post 1980)	Total	Existing (Pre-1980)	New (Post 1980)	Total
1980	13	-	13	89	-	89
1985	-	10	10	-	65	65
1990	-	10	10	-	65	65
2000	-	10	10	-	65	65
Type	Lend-Leased GP-40	3300(GP-40)		Pullman, ACF & Budd Co.[1]	Pullman Std 1500-1700[2]	

[1]Seating Capacity: 82
[2]Seating Capacity: 129

NORTHEAST CORRIDOR LINE

Year	Multiple Unit Cars (MU's)		
	Existing (Pre-1980)	New (Post-1980)	Total
1980	81	6	87
1985	81	9	90
1990	81	11	92
2000	81	15	96
Year	Arrow I[1] Arrow II	Arrow III[2]	

[1]Seating Capacity: 108
[2]Seating Capacity: 117

As Chapter I indicated 103 existing Arrow I and Arrow II MU's are expected to continue in service through the year 2000. (81 MU's on the NEC 22 MU's on the NJ Coast Line). These cars have an average seating capacity of 108. New equipment purchased after 1980 would have 117 seats (Arrow III's)

E. North Jersey Coast Line

The passenger fleet that will be needed to handle the projected peak period increases between 1980 and 2000 on the North Jersey Coast Line is given in Exhibit D-3. Trains originating in Bay Head would make fewer stops on the electrified portion of the North Jersey Coast Line. Thus, fewer locomotives and fewer diesel-hauled coaches would be required for the Bay Head service.

For example there are 147 diesel-hauled coaches currently used on the North Jersey Coast service. Only 105 of these coaches would be needed in 1985. In addition, the 28 diesel locomotives currently in use need only be replaced by 15 units in the 1980-85 period.

Seventy-two(72) MU cars would be required to service patrons by 1985. As discussed earlier, 50 Arrow III MU's are being purchased by N.J.DOT to supplement 22 Arrow II MU's currently used on the South Amboy service. However, the MU fleet must be expanded from 72 MU's by 1986 to allow for downtime.

F. Seashore Lines - Atlantic City Line

The RDC fleet that will be needed to handle the projected peak period patronage between 1980 and 2000 on the Seashore Lines is given in Exhibit D-3.

EXHIBIT D-3
PROJECTED FLEET REQUIREMENTS
NJCL AND SEASHORE LINES

NORTH JERSEY COAST LINE (NJCL)

Locomotives			Diesel Coaches			Multiple Unit Cars (MU's)		
Existing (Pre-1980)	New (Post 1980)	Total	Existing (Pre-1980)	New (Post 1980)	Total	Existing (Pre 1980)	New (Post 1980)	Total
41[1]	-	41[1]	139	-	139	22	50	72
14[2]	19[3]	33	149[6]	-	149[6]	22	50	72
-	27[4]	27[4]	107	8	115	22	50	72
-	31[5]	31[5]	89	42	131	22	50	72
GP-7 1500 E-8 4200 E-7 4200 GG-1 4800	GP-40 Diesels		Pullman, ACF, Altoona, Budd Co.	Pullman Std 1500 - 1700		Arrow I Arrow II	Arrow III	

els and 13 Electric

ls and 10 Electric

els and 12 Electric

els and 12 Electric

es 10 coaches from Raritan Valley Service

SEASHORE LINES

Year	Existing RDC's Available	RDC's Required
1980	10	5
1985	10	6
1990	10	7
2000	10	7
Type	Budd Co. 402-413	

The fleet size of the Atlantic City Line can be increased from five(5) to ten(10) RDC's if service on the Cape May/Ocean City Branches is terminated.

Under the System 1 alternative (existing schedules), the existing fleet would be sufficient to meet demand during the 1980-2000 period.

Using the System 2 alternative four(4) peak trips and four (4) offpeak trips) one additonal RDC would be needed by 1985, and another RDC would be required between 1985-2000.

Since casino gambling ridership was not considered in these forecasts, it is recommended that the entire fleet of 10 (10) RDC's be maintainced should unanticipated demand develop.

G. Proposed West Shore Service

Since the federally funded study of the West Shore Corridor is not complete, there are no patronage projections or preliminary schedules with which to develop train consist requirements.

Preliminary indications suggest that a minimal diesel service could be implemented at the outset. Two round trips could be made on such a service during the peak period.

Since commencement of passenger rail service in this corridor is still to be determined, it is concluded that the N.J.DOT will reallocate existing diesel rolling stock to the West Shore Line rather than purchase new equipment. The ten(10) rail diesel cars formerly used on the Bayonne Service would be adequate for this service.

H. Proposed Lakewood Service

Preliminary proposals call for a fleet of ten(10) locomotives and sixty(60) push-pull coaches to be used on the proposed Lakewood service.

Rail service from Lakewood would be offered over one of two possible routes. Either route would link with the North Jersey Coast Line at Matawan or Red Bank. If a diesel service is offered south of the North Jersey Coast Line to Lakewood, it would be necessary to switch to electric locomotives at Matawan or Red Bank-- unless dual-mode locomotives are utilized. Thus, dual-mode locomotives should be considered. This would make the service compatible with the Bay Head service. These estimates should be reviewed upon completion of the study currently underway.

APPENDIX E

APPENDIX E
SITE SELECTION MATRICES

1. INTRODUCTION

Included in this appendix are the matrices used in the site selection evaluation process. Each of the fifteen sites were reviewed in terms of adequacy of land, land availability, suitability for improvements/construction, and system accessibility. Within each of these four major criteria groups were three sub-groups, each of which had a maximum point value of five. Thus, the maximum point value that a site could earn was sixty. As indicated on the matrices included in this appendix, the actual point values assigned in the evaluation process to potential consolidated MR/R and S&I (BOTH) facility sites ranged between zero and fifty-two.

SITE SELECTION MATRIX

SITE	Adequacy of Land			Land Availability			Suitability for Construction/ Improvement			System Accessibility			TOTAL		
	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH
CROXTON (Existing Yard)	10			9			9			9			37		
		10			9			9			9			37	
			10			9			9			9			37
ELIZABETHPORT	15			11			12			8			46		
		15			11			12			8			46	
			15			11			12			8			46
HOBOKEN - Upgrade Exist.	5			12			12			11			40		
		5			12			12			11			40	
			A			A			A			A			A
HOBOKEN/JERSEY CITY SOUTH OF CANAL	15			12			12			13			52		
		15			12			12			13			52	
			15			12			12			13			52
JERSEY CITY West of Croxton	15			11			11			11			48		
		15			11			11			11			48	
			13			11			11			11			48
JERSEY CITY Monmouth St.	B			—			—			—			B		
		B			—			—			—			B	
			B			—			—			—			B
Jersey City Pavonia	15			12			11			10			48		
		15			12			11			10			48	
			13			12			11			10			46
HARRISON YARD	10			13			13			11			47		
		9			13			13			11			46	
			A			—			—			—			A

NOTES:

M R/R Major Repair/ Rebuild Facility

S & I Service and Inspection Facility

Both M R/R & S & I

A) Property size is inadequate, Removed from further consideration in this category.

B) Inadequate height clearance

C) Evaluated for Penn Station trains only; diesels can not use tunnels.

SITE SELECTION MATRIX

SITE	Adequacy of Land			Land Availability			Suitability for Construction Improvement			System Accessibility			TOTAL		
	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH
ARNY/HARRISON RTE 280 & SJ Tpke	12			11			7			5			35		
		12			11			7			5			35	
			8			9			7			5			29
ARNY - Koppers Coke	15			13			12			10			50		
		15			13			12			10			50	
			15			13			12			10			50
ADOW SHOP (Kearny)	10			10			10			10			40		
		8			10			10			9			37	
			A			—			—			—			A
ORTH BERGEN (West Shore)	12			12			10			6			40		
		12			12			10			6			40	
			4			12			10			6			32
CAUCUS	10			12			10			9			41		
		10			12			10			9			41	
			8			12			10			9			39
NNYSIDE N.Y.	C			—			—			—			C		
		15			12			14			13			54	
			C			—			—			—			C
EHAWKEN	13			11			9			5			38		
		13			11			9			5			38	
			11			11			9			5			36

NOTES: Same as Page 1

SITE	SHOP AREA (S)			STORAGE TRUCKS, ETC.			SUPPORT FACILITIES			TOTALS		
	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH
KTON (Existing Yard)	4			3			3			10		
		4			3			3			10	
			4			3			3			10
ZABETHPORT	5			5			5			15		
		5			5			5			15	
			5			5			5			15
OKEN - Upgrade Exist.	2A			1			2			5		
		2A			1			2			5	
			0			0			0			0
OKEN/JERSEY CITY SOUTH OF CANAL	5			5			5			15		
		5			5			5			15	
			5			5			5			15
SEY CITY West of Croxton	5			5			5			15		
		5			5			5			15	
			5			4			4			13
SEY CITY Monmouth St.	0			INADEQUATE						0		
		0									0	
			0	HEIGHT: REMOVE								0
ey City Pavonia	5			5			5			15		
		5			5			5			15	
			5			4			4			13
RRISON YARD	4			3			3			10		
		3			3			3			9	
			0	EITHER SHOP: NOT BOTH								0

SPACE INADEQUATE
Storage trucks; test trucks, ready trucks, run-a-round.

Completely Adequate .

Support; power plant, treatment plant, road ways for access & delivery, parking.

Fairly Adequate minimum acres and/or awkward shape

A: requires demolition of existing work areas, hampers yard operations not ideal.

Constrained

Croxton existing - conflicts with existing yard op. Shops would not have common wall; Harrison - space constrained.

Inadequate: remove from consideration

Hoboken (existing) - space constrained.

SITE	SHOP AREA (S)			STORAGE TRUCKS, ETC.			SUPPORT FACILITIES			TOTALS		
	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH
NY/HARRISON E 280 & Tpke	4			4			4			12		
		4			4			4			12	
			3			3			2			8
NY - pers Coke	5			5			5			15		
		5			5			5			15	
			5			5			5			15
OW SHOP arny)	4			3			3			10		
		4			2			2			8	
			0	INSUFFICIENT SPACE								0
H BERGEN st Shore)	4			4			4			12		
		4			4			4			12	
			2			1			1			4
CUS	4			3			3			10		
		4			3			3			10	
			4			1			3			8
YSIDE FOR S&I Y. ONLY	0			0			0			0		
		5			5			5			15	
			0			0			0			0
AWKEN	5			4			4			13		
		5			4			4			13	
			4			3			4			11

AME Meadow Shop - odd shape, constrained

No. Bergen - constrained space for both with support, storage, etc.

Sunnyside - diesels cannot use tunnels ∴ no MR/R

SITE	VACANT / DEVELOPED			OWNERSHIP POTENTIAL			ZONING LAND USE			TOTALS		
	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH
OXTON (Existing Yard)	2			2			5			9		
		2			2			5			9	
			2			2			5			9
IZABETHPORT	3			3			5			11		
		3			3			5			11	
			3			3			5			11
BOKEN - Upgrade Exist.	2			5			5			12		
		2			5			5			12	
	ZERO RATING UNDER ADEQUACY OF LAND											0
BOKEN/JERSEY CITY SOUTH OF CANAL	5			4			3			12		
		5			4			3			12	
			5			4			3			12
SEY CITY West of Croxton	5			1			5			11		
		5			1			5			11	
			5			1			5			11
SEY CITY Monmouth St.	NOT EVALUATED BECAUSE OF ZERO RATING UNDER ADEQUACY OF LAND									0		
											0	
												0
sey City Pavonia	4			3			5			12		
		4			3			5			12	
			4			3			5			12
RRISON YARD	3			5			5			13		
		3			5			5			13	
	ZERO RATING UNDER ADEQUACY OF LAND											0

	OWN	ZONE LAND USE
Vacant/ no demo	Very likely	conforming ~~compatable~~
Partially/ developed/ some demo	Possible	
Fully developed/ heavy demo	Questionable	non conforming ~~not compatable~~

Croxton (existing): Owned by Conrail, active freight operation, future plans by Conrail E'port - existing Maint. fac., Conrail owned, req. some demo some relocation of existing, Hoboken (existing) - hampers existing op. relocates existing, disrupts present M. operation. H/JC - for sale, rezoned but has existing freight op. Croxton West - recently purchased by PSE & G Pavional strong developer interest, but for sale. Harrison - existing M. operation displaced.

LAND AVAILABILITY 2 OF 2

SITE	VACANT / DEVELOPED			OWNERSHIP POTENTIAL			ZONING LAND USE			TOTALS		
	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH
RNY/HARRISON TE 280 & J Tpke	5			3			3			11		
		5			3			3			11	
			3			3			3			9
RNY - oppers Coke	4			4			5			13		
		4			4			5			13	
			4			4			5			13
DOW SHOP Kearny)	3			2			5			10		
		3			2			5			10	
	INADEQUATE SIZE											0
TH BERGEN Jest Shore)	4			3			5			12		
		4			3			5			12	
			4			3			5			12
AUCUS	4			4			4			12		
		4			4			4			12	
			4			4			4			12
NYSIDE .Y.	-			-			-			-		
		4			3			5		12		
			-			-			-			-
HAWKEN	3			3			5			11		
		3			3			5			11	
			3			3			5			11

SAME K/H: garbage fill, + 80' above existing rail line, municipality owned,

Kearny-Koppers: Industrial zoned, mostly vacant, for sale

Meadows - deteriorated rail M. fac., used for freight storage & TOFC

No. Bergen - existing yard

Weehauken - existing yard, some activity & storage, developers interested.

SITE	SITE CONDITIONS			LIKLIHOOD OF FOUNDATION PROBLEMS			AVAILABILITY OF UTILITY SERVICES			TOTALS		
	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH
OXTON (Existing Yard)	3			2			4			9		
		3			2			4			9	
			3			2			4			9
IZABETHPORT	4			4			4			12		
		4			4			4			12	
			4			4			4			12
BOKEN - Upgrade Exist.	4			3			5			12		
		4			3			5			12	
	INADEQUATE SIZE								-			-
BOKEN/JERSEY CITY SOUTH OF CANAL	4			4			4			12		
		4			4			4			12	
			4			4			4			12
RSEY CITY West of Croxton	3			3			5			11		
		3			3			5			11	
			3			3			5			11
RSEY CITY Monmouth St.										-		
	INADEQUATE HEIGHT										-	
												-
sey City Pavonia	4			4			3			11		
		4			4			3			11	
			4			4			3			11
RRISON YARD	4			4			5			13		
		4			4			5			13	
	INADEQUATE SIZE								-			-

very good	Croxton (existing) - flood problems, former marsh, fill
good	Croxton West - fill, varying elevations, Marsh
fair	
poor	
very poor	
oding, Marsh,	
evation, grades	

SITE	SITE CONDITIONS			LIKLIHOOD OF FOUNDATION PROBLEMS			AVAILABILITY OF UTILITY SERVICES			TOTALS		
	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH
RNY/HARRISON TE 280 & J Tpke	2			3			2			7		
		2			3			2			7	
			2			3			2			7
RNY - oppers Coke	4			4			4			12		
		4			4			4			12	
			4			4			4			12
DOW SHOP Kearny)	3			3			4			10		
		3			3			4			10	
	INADEQUATE SIZE											-
TH BERGEN Vest Shore)	3			4			3			10		
		3			4			3			10	
			3			4			3			10
AUCUS	3			3			4			10		
		3			3			4			10	
			3			3			4			10
YSIDE .Y.	-			-			-			-		
		5			4			5			14	
			-			-			-			-
HAWKEN	3			3			3			9		
		3			3			3			9	
			3			3			3			9

Same

K/H - Garbage dump, fill, + 80' above surrounding area

Koppers - Heavy industrial site

Meadow Shop - flooding problems,

No. Bergen - Marsh, flooding

Secaucus - Marsh, fill, flooding

SYSTEM ACCESSIBILITY 1 OF 2 PAGE E-10

SITE	Access/ Proximity to Commuter Lines & Terminals			Operational Feasibility & Constraints			Vehicular Access, Parking roadway etc			TOTALS		
	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH
XTON (Existing Yard)	4			2			3			9		
		4			2			3			9	
			4			2			3			9
ZABETH PORT	2			2			4			8		
		2			2			4			8	
			2			2			4			8
OKEN - Upgrade Exist.	4			3			4			11		
		4			3			4			11	
			-	INSUFFICIENT SIZE								-
OKEN/JERSEY CITY SOUTH OF CANAL	4			4			5			13		
		4			4			5			13	
			4			4			5			13
	4			4			3			11		
RSEY CITY West of Croxton		4			4			3			11	
			4			4			3			11
										-		
SEY CITY Monmouth St.	INSUFFICIENT HEIGHT										-	
												-
	3			2			5			10		
rsey City Pavonia		3			2			5			10	
			3			2			5			10
	4			3			4			11		
RRISON YARD		4			3			4			11	
	INSUFFICIENT SIZE											-

5 Very good	Croxton (existing) active/freight yard numerous conflicts, parking minimal, road work required, busy
4 good	E'port - requires DH, no electrification, major upgrade
3 fair	of existing req.
2 poor	Hoboken (existing) - would hamper existing yard operations,
1 very poor	diminish storage trucks
	H/JC - some DH for Newark op., adjacent to term/orig. terminal
existing access,	Croxton West - no roadway access, DH. for all op. access
modification req., no elec	to power & elec.
DH req.	Pavonia - DH for all, no electrification, numerous reverse moves from Hoboken
	Harrison - DH for all, elec. req., conflicts with ML

SYSTEM ACCESSIBILITY 2 OF 2 PAGE E-11

SITE	Access Proximity to Commuter Lines & Terminals			Operational Feasibility & Constraints			Vehicular Access Parking Roadways etc			TOTALS		
	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH	M R/R	S & I	BOTH
RNY/HARRISON TE 280 & J Tpke	1			2			2			5		
		1			2			2			5	
			1			2			2			5
RNY - ppers Coke	2			4			4			10		
		2			4			4			10	
			2			4			4			10
DOW SHOP Kearny)	3			4			3			10		
		3			3			3			9	
	INSUFFICIENT SPACE											-
TH BERGEN est Shore)	1			2			3			6		
		1			2			3			6	
			1			2			3			6
AUCUS	4			3			2			9		
		4			3			2			9	
			4			3			2			9
YSIDE .Y.	-			-			-			-		
		4			5			4			13	
			-			-			-			-
HAWKEN	1			1			3			5		
		1			1			3			5	
			1			1			3			5

SAME K/H - Grade problem, DH required, off beaten path

Koppers - requires embankment for access, DH for all op., has veh. access,

Meadow Shop - DH req. no elec.

No. Bergen - isolated from existing op., no elec.

Secaucus - some conflict with M.L. , poor roadway access.

Weehawken - isolated from existing, DH required