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16. Abstract The Virginia Transit Performance Evaluation Package (VATPEP), a computer software package, is documented. This is the computerized version of the methodology used by the Virginia Department of Transportation to evaluate the performance of public transportation systems supported by public funds in the Commonwealth of Virginia. The technical steps in the process are entering, printing, and editing data; validating data; evaluating performance; and printing annual report data and graphs. A Pascal program supplemented by graphics from Lotus 1-2-3 comprises the package.					
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FINAL REPORT

VIRGINIA TRANSIT PERFORMANCE
EVALUATION PACKAGE
(VATPEP)

by

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and

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(The opinions, findings, and conclusions expressed in this report are those of the author and not necessarily those of the sponsoring agencies.)

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ABSTRACT

The Virginia Transit Performance Evaluation Package (VATPEP), a computer software package, is documented. This is the computerized version of the methodology used by the Virginia Department of Transportation to evaluate the performance of public transportation systems supported by public funds in the Commonwealth of Virginia. The technical steps in the process are entering, printing, and editing data; validating data; evaluating performance; and printing annual report data and graphs. A Pascal program supplemented by graphics from Lotus 1-2-3 comprises the package.

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INTRODUCTION

The Virginia Transit Performance Evaluation Package (VATPEP) provides an automated version of the Virginia Department of Transportation (VDOT) Performance Evaluation System (PES). This evaluation method was developed for the VDOT by MacDorman and Associates and is documented in Guidelines and Procedures for the Performance Evaluation of Public Transportation System in the Commonwealth of Virginia, November 1985 (1).

The purpose of the PES is to examine the efficiency and effectiveness of public transportation systems, to report findings, and to assist in the improvement of public transportation performance (2). The implementation of this PES has evolved into a three-phase process: collecting and validating the data, evaluating performance, and reporting the results.

Each of the technical steps in VATPEP (data reporting, data validation, performance evaluation, and performance reporting) is briefly discussed here to summarize the tasks performed in each of them. The following is an overview of the process that is computerized.

Data Reporting

Virginia's public transportation systems are required to provide specific data as prescribed by the state Rail and Public Transportation Division. These data are structured like Urban Mass Transportation Administration's Section-15 reporting system, but in a condensed form. Virginia public transportation organizations are divided into four tiers (A-D); the amount of data reported in each tier is determined primarily by the proportion of state assistance received. All transit operators report data separately for each mode operated (motorbus, demand responsive, rapid rail, and ferryboat). Systemwide data are not

reported, although they can be determined by combining appropriate transit property modal data.

Annual data from transit operators is input into VATPEP for each mode per property according to a specified tier as defined above. The program prompts the user for each item. If an error is made, the data item can be corrected later, prior to validation.

Data Validation

Once a complete set of data is input into VATPEP, validation procedures are used to screen the data to identify those items that are questionable and incorrect. The internal data-validation procedures developed for VATPEP include, in addition to a completeness check performed by the user:

1. Internal-consistency checks that note errors in addition or relative order of magnitude of the data.
2. Data-reasonable checks that determine whether the data are within an expected range of values based on national transit data.

The validation of reported transit data and information has two phases. Phase I is a validation of key reported data items and is used to provide an orderly foundation for the validation of other data and information. Phase II of the validation procedures is intended to screen all other remaining reported data. There is a maximum of 40 checks consisting of 17 internal consistency checks and 23 range checks. Since the validation procedures attempt to minimize redundancy while cross-checking all data, some items are checked only once. These single-checked items are considered less important to the PES than other items. Any data that are corrected must be re-entered via the data-change component of the VATPEP.

Performance Evaluation

The performance evaluation framework provides more than 50 different performance indicators and data ratios. Some indicators and ratios are not used in evaluating performance at all levels. The data requirements (in Virginia) change at the different levels. The financial data used in computing the indicator are indexed to constant 1983 dollars. Performance measures are generally ratios of two reported data items. These measures are interpreted by Z scores, which are computed as follows:

$$Z = \frac{\text{Computed Ratio} - \text{Peer Group Ratio Mean}}{\text{Peer Group Ratio Standard Deviation}}$$

The resulting Z score is converted to a standardized score referred to as a PES score in the methodology.

Annual Report

The VATPEP prepares interpretations of the transit data and performance measures for direct input into the VDOT Annual Report on Public Transportation. The tasks accomplished here include:

1. Preparation of a file (after the performance evaluation) of selected descriptive measures and performance indices for presentation in the annual report.
2. Preparation of a summary of descriptive measures for each property as required for the annual report.
3. Development of graphs for the statewide data summary.
4. Development of selected graphs that illustrate the performance of each transit property.

This information is suitable for insertion into the Annual Report on Public Transportation in the Commonwealth of Virginia as illustrated by prior reports (2).

Methodology

The procedures that are automated in the VATPEP are documented in reference 1. The annual report information follows the format illustrated in the 1985 annual report (2).

Summary of the Manual

The following sections of this manual guide the reader through the VATPEP program. It is recommended that the manual be used while initially working through the program. The documentation is focused on the following information and tasks:

- System Requirements
- Starting up
- Write, Print, or Edit Data
- Editing the CPI File
- Validate Data
- Evaluate Performance
- Write Annual Report Files
- Develop PIC Files with Lotus
- Print Graphs

RUNNING THE PROGRAM

System Requirements

VATPEP is written in Turbo Pascal using the MS DOS 2.11 operating system supplemented by LOTUS 1-2-3 to develop graphic displays of certain data. In order to run this computer package, the user needs:

1. An IBM compatible microcomputer (with one or more floppy disk drives or a hard disk plus a floppy).
2. 640K or more of random access memory.
3. Video monitor.
4. Printer.
5. LOTUS 1-2-3 system (version 2 or greater).

Starting Up

The default drive should be the drive with the VATPEP programs. To start the system, the user types "VATPEP." The user is then prompted for the location of the VATPEP program files and data files. Various combinations of disks can be used, e.g., 2 floppys, 1 hard disk, and 1 floppy, etc.

After the user provides the file location information the menu is shown:

```

* * * * *
(1) Write, Print, or Edit Data
(2) Edit the CPI file
(3) Validate Data
(4) Evaluate Performance
(5) Write Annual Report Files
(6) Exit

Choice Number:
* * * * *

```

The user may now choose to perform one of the five tasks or exit the program. Any option may be selected but experience will show where dependencies on previous options exist. Each of the menu items is described in sequence.

(1) Write, Print, or Edit Data

If (1) is entered, the following appears:

Please choose:

- (1) Enter Data
- (2) Print Data
- (3) Change Data

Choice:

Writing a New Data File

When Sub option (1) is selected the user is prompted to give a file name (e.g., zebra).

Give name for new file: zebra
(Any file with this name will be destroyed.)

The user is then asked to provide descriptive data items:

Name of Property: *zebra trans

*

level? (must be A,B,C or D):b

Size? (Type letter) : m

- (L) Large
- (M) Medium
- (S) Small

year?: 1986

Property ID? (5 digits): 00095

After the property ID (a five digit number that is later used to access a property's file) is provided, a summary of the descriptive data is given and the user is prompted to begin inputting the operation and performance data at item 1000.

zebra trans
Id: 00095
Size: Mid-size Urban
Year: 1986
Level: B
Mode: Motorbus

1000 Total Operating Revenue

The user then is prompted to input each data item that is required for the class of property specified. The last entry is indexed as 9100.

After a value is entered for item 9100, the user is returned to the main menu. The file can be viewed with the print-data option.

Printing Data Files

This is suboption (2) of menu item 1. Instructions are provided to print up to four files for a selected property.

Data files will be printed:

- (1) Showing percent of increase from file to file.
- (2) Not showing percent of increase.

Please type choice:

You may print up to four data files.
(Press RETURN when finished listing.)

disk file name # 1: tidew.85

Exhibit 1 is an example of a complete modal data file that has been entered into the PES. In the next option, it will be shown how to modify the file.

Exhibit 1. Printed File Data

-1535

File #1: 00001 - Tidewater Transportation District Commission
 level: B
 mode: Motorbus
 year: 1985

 file # 1

1000	Total Operating Revenue	7,432,778.00
1100	Total Passenger Revenue	6,958,596.00
1110	E&H Passenger Revenue	737,611.00
1200	Total Operating Assistance	8,585,878.00
1210	Federal Operating Assistance	3,168,262.00
1220	State Assistance	2,436,540.00
1230	Local Operating Assistance	2,981,076.00
1240	Other Operating Assistance	0.00
1510	Base Adult Boarding Fare (minimum)	0.70
1520	Additional Zone Charge	0.30
1530	Transfer Charge	0.10
1540	Elderly & Handicapped Fare	0.35
1550	Student Fare	0.00
2010	Total Vehicle Operations Exp.	9,368,128.00
2020	Total Vehicle Maintenance Exp.	3,400,797.00
2030	Total Non-Veh. Maint. Exp.	423,558.00
2040	Total General Administration Exp.	2,724,776.00
2050	Total Other (reconciling) Exp.	0.00
2100	Total Labor Exp.	11,165,948.00
2110	Veh. Operations Labor Exp.	7,472,437.00
2120	Veh. Maintenance Labor Exp.	2,163,693.00
2130	Non-Veh. Maint. Labor Exp.	233,023.00
2140	General Administration Labor Exp.	1,296,794.00
2300	Total Materials Exp.	3,135,701.00
2311	Total Fuel & Lubricants Exp.	NA
2314	Total Energy Exp.	NA
2400	Total Services & Other Exp.	1,615,629.00
2441	Total Casualty & Liability Exp.	NA
2500	Total System Exp.	15,917,238.00
2111	Revenue Veh. Operator Wages	4,472,222.00
2122	Veh. Inspection & Maint. Labor Exp	NA
2123	Veh. Servicing Labor Exp.	NA
2134	Maint. of Fare Col & Equip Lab Exp	NA
2135	Maint.of Rdwy,Track,... Labor Exp	NA
2136	Maint. Veh. Mvmt.Systems Labor Exp	NA
2147	Ticket & Fare Collection Labor Exp	NA
2148	System Security Labor Exp.	NA
3100	Total Employees	356.00
3110	Veh. Operations Employees	319.00
3111	Revenue Veh. Operators	278.00
3140	General Administration Employees	37.00
3147	Ticket & Fare Collection Employees	NA
3148	System Security Employees	NA
4111.0	Rev. Veh. Operator Total Pay Hours	496,202.00
4111.1	Rev.Veh.Operator Operating Pay Hrs	579,085.00
5100	Total Active Vehicles	187.00
5200	Total Stations	NA
5301	Total Fuel Consumed (gallons)	NA
5304	Total Power Consumed (KWH)	NA
6100	Vehicle Hours	441,725.00
6200	Vehicle Miles	5,702,342.00
6300	Vehicle Service Hours	416,793.00
6400	Vehicle Service Miles	5,314,008.00
6500	Scheduled Veh. Service Miles	5,321,725.00
6600	Peak Vehicles	132.00
6700	Base Vehicles	85.00
7110	Weekday Morning Service Begins	4.33
7115	Weekday Morning Service Ends	12.00
7120	Weekday Afternoon Service Begins	12.00
7125	Weekday Afternoon Service Ends	26.83
7130	Saturday Service Begins	4.75
7140	Saturday Service Ends	26.67
7150	Sunday Service Begins	5.42
7160	Sunday Service Ends	26.67
7200	Directional Route Miles	501.00
7300	Average Weekday Headway	25.00
7400	Roadcalls	4,471.00
7500	Vehicle Accidents	309.00
8100	Total Revenue Passenger Boardings	12,754,000.00
8110	E&H Passenger Boardings	0.00
8200	Total Revenue Passenger Trips	11,002,000.00
8300	Passenger Injuries / Fatalities	63.00
9000	Population	748,241.00
9100	Service Area	679.00

Changing Data File Entries

To change a data file entry that has been entered incorrectly or has been changed after the validation process, enter option (1), then enter 3 from the sub-menu.

The user is then prompted to give the name of the file to be corrected.

```
* * * * *
Give name of file to be changed: tidew.85
* * * * *
```

The user is then asked if he wishes to change any of the property designation parameters in the following sequence:

```
* * * * *
Tidewater Transportation District Commission
Id: 00001
Size: Mid-size Urban                      Level: B
Year: 1985                                Mode: Motorbus
```

Do you wish to change the name? (Y/N):

Do you wish to change the level? (Y/N):

Do you wish to change the mode? (Y/N):

Do you wish to change the size? (Y/N):

Do you wish to change the ID? (Y/N):
* * * * *

Next, the user gives the item number to be corrected and inserts the new values. All corrections must be input in increasing item number order. Numbers should be entered without commas.

```
* * * * *
Tidewater Transportation District Commission
Id: 00001
Size: Mid-size Urban                      Level: B
Year: 1985                                Mode: Motorbus
```

Give next item to be changed: 6100
((Return) if there are no more.)

```
Item 6100
Old value was                      441,725.00
Press RETURN to keep this value, or give new value: 448000
* * * * *
```

(2) Editing the CPI File

The second item on the main menu is the editor for the CPI (consumer price index) file. This step is usually only necessary when the processing of a new annual set of data files is initiated. A cumulative record is kept for all years on file.

EDITING THE CPI FILE

Currently on file:

year	CPI
1982	277.00
1983	293.47
1984	302.31
1985	313.43

Do you wish to change or add to these? (y/n)

(3) Validate Data

The computer requests a file to be named for validation. After a file name is given (e.g. TIDEW.85), the validation is automatically performed. The methodology used is documented in Guidelines and Procedures, 1985. If the user wishes to process a data set that has been correctly input, this step is skipped.

Type name of file to be validated: tidew.85

After the file name is entered the computer prints out the validation results. For interpretation of the results, reference to the source document is recommended.

(4) Evaluate Performance

Enter (4) on the main menu to obtain a performance evaluation for a transit property data file. The program automatically provides the measures required, based on the level of the property (see Guidelines and Procedures, 1985).

Give name of file for evaluation : tidew.85

After the property name is entered, a performance evaluation report like that shown in Exhibit 2 is provided.

Exhibit 2. Performance Evaluation Report

PERFORMANCE EVALUATION

property : Tidewater Transportation District Commission
 level : B
 mode : Motorbus
 size : Mid-size Urban
 year : 1985
 ID : 00001

COST EFFECTIVENESS		value	z-score	PES score
check # 1	Local Rev/Sys Exp	65.43	0.52	70
check # 2	Local Rev/Oper Rev	1.40	0.09	54
check # 3	Oper Rev/Sys Exp	46.70	0.46	68
check # 4	Pass Rev/Sys Exp	43.72	0.40	66
check # 5	Boardings/Sys Exp	801.27	-0.66	25

SERVICE EFFECTIVENESS		value	z-score	PES score
check # 6	Pass Rev/VSH	16.70	0.52	70
check # 7	Boardings/VSH	30.60	-0.49	31
check # 8	Pass Rev/Boardings	0.55	1.10	86
check # 9	Boardings/Pass Inj	202.44	1.94	97
check # 10	VM/Roadcall	1,275.41	-0.75	23
check # 11	60 min/Headway	2.40	standard dev. is zero.	
check # 12	Route Miles/Area	0.74	standard dev. is zero.	
check # 13	Avg Serv Hrs/Day	22.24	standard dev. is zero.	
check # 14	VSH/Population	0.56	standard dev. is zero.	
check # 15	Trips/Boarding	86.26	standard dev. is zero.	
check # 16	Base Fare	0.70	standard dev. is zero.	
check # 17	E&H Fare	0.35	standard dev. is zero.	
check # 18	E&H Boards/Boards	0.00	standard dev. is zero.	

RESOURCE EFFICIENCY		value	z-score	PES score
check # 19	VSH/Sys Exp	26.19	-0.78	22
check # 20	VSH/Veh Opns Exp	44.49	-0.39	35
check # 21	VM/Veh Maint Exp	1,676.77	-0.85	20
check # 22	VSH/N-Veh Maint Exp	984.03	-0.79	21
check # 23	VSH/Gen'l Admin Exp	152.96	-0.82	21
check # 24	VSH/Employee	1,170.77	1.07	86
check # 25	VSH/Labor Exp	37.33	-0.83	20
check # 26	VM/Materials Exp	1,818.52	-0.29	39
check # 27	VSH/Serv & Oth Exp	257.98	-0.53	30
check # 28	VSH/Veh Opns Empl	1,306.56	-0.69	25
check # 29	VSH/VOpns Lab Exp	55.78	-0.59	28
check # 30	Driver Hrs/Accid	1,429.53	0.42	66
check # 31	VSH/Operator PHR	71.97	-0.57	28
check # 32	VSH/Operator Wage	93.20	0.05	52
check # 33	VM/VMain Lab Exp	2,635.47	-0.83	20
check # 36	VSH/NVMaint Lab Exp	1,788.63	-0.71	24
check # 40	VSH/Admin. Emp	11,264.68	-0.62	27
check # 41	VSH/Admin Lab Exp	321.40	-1.19	12
check # 46	VM/Peak Veh	43,199.56	1.11	87

DESCRIPTIVE INFORMATION

property : Tidewater Transportation District Commission
 level : B
 mode : Motorbus
 year : 1985

1	Population/Area	1101.97
2	Act Veh/Peak Veh	1.42
3	VSM/Sched VSM	99.85
4	VSM/VSH	12.75
5	Peak Veh/Base Veh	1.55
6	Pass Rev/Trip	0.63
7	Trips/VSH	26.40
8	Trips/Population	14.70
9	Op Wages/Op Phrs	9.01

(5) Write Annual Report Files

Option (5) provides the tables and figures that are represented in the Annual Report (2). This option performs three separate functions as defined on the computer monitor. Directions are given on the computer to guide the user through this option.

ANNUAL REPORT SECTION

- (1) Print Descriptive Pages
- (2) Write Statewide Summary Page
- (3) Write file for LOTUS

Choice:

Print Descriptive Pages

When function (1) is entered, the user may print out the descriptive pages for all properties for which performance evaluations have been conducted or he may select a report for a single property only. If a single property report is desired, that property is requested using the property ID number that was input into the file.

Which do you wish to print?

- (A) All property reports for the year
- (S) A single property report

Choice : s

Please type the five digit id : 00001

Exhibit 3 is a sample descriptive report.

Print Statewide Summary Measures

Option (2) under menu item 5 provides a summary report of selected financial and operating statistics of the transit systems that have been evaluated in step 4 for a certain year. This report follows the format used in the Annual Report on Public Transportation in the Commonwealth of Virginia for Exhibit III.11. An example is shown in Exhibit 4.

Exhibit 3. Property Description

Tidewater Transportation District Commission
Id: 00001 1985 level B Motorbus

Service Characteristics: 1985

Service Hours	
Monday-Friday	4.20 - 26.50
Saturday	4.45 - 26.40
Sunday	5.25 - 26.40

Fare Structure	
Base Adult Fare	\$0.70
Additional Zone Charge	\$0.30
Transfer Charge	\$0.10
Elderly & Handicapped Fare	\$0.35
Student Fare	\$0.00

Fleet Size	
Number of Active Vehicles	187
Peak Service Vehicle Requirement	132

Financial & Operating Statistics: 1985

Service Inputs	
Total Operating Expenditures	\$15,917,240.

Service Outputs	
Vehicle Service Hours	416,793.
Vehicle Service Miles	5,314,008.

Service Consumption	
Passenger Trips	11,002,000.
Operating Revenue	\$7,432,778.
Passenger Revevue	\$6,958,596.

Public Operating Assistance	
Federal Government	\$3,168,262.
State Government	\$2,436,540.
Local Government	\$2,981,076.

Exhibit 4. Annual Statewide Statistics Summary

STATEWIDE FINANCIAL AND OPERATING STATISTICS
FISCAL 1985EXHIBIT III.11
VIRGINIA PUBLIC TRANSPORTATION SYSTEMS
FINANCIAL AND OPERATING STATISTICS

	Large Urban Areas		Mid-Size Urban	Small Urban/ Rural	Statewide
	Rail	Bus			
SERVICE INPUTS					
Operating Exp.	153,204.55	0.00	31,215.33	0.00	184,419.88
SERVICE OUTPUTS					
Veh.Serv.Hrs.	1,093.03	0.00	824.14	0.00	1,917.17
Veh.Serv.Mi.	24,202.14	0.00	9,823.55	0.00	34,025.68
SERVICE CONSUMPTION					
Pass. Trips	100,546.98	0.00	25,484.88	0.00	126,031.86
Operating Rev.	112,251.42	0.00	16,288.63	0.00	128,540.05
Passenger Rev.	102,880.05	0.00	15,572.08	0.00	118,452.12
PUBLIC OPERATING ASSISTANCE					
Federal Govt.	131.68	0.00	6,501.07	0.00	6,632.75
State Govt.	0.00	0.00	5,048.99	0.00	5,048.99
Local Govt.	3,496.29	0.00	3,141.77	0.00	6,638.06

Write File For Lotus

This function prepares a file that is later read into LOTUS 1-2-3 for the purpose of printing the graphs used in the annual report. The computer prompts for the year for which the file is to be created. It further asks whether preceding years should be included. The maximum number of years is five. If included, preceding years' graphs appear for comparative purposes. The file summarizes data for all properties for which a performance evaluation (main menu #4) has been conducted. After the file is written, the main menu reappears.

```
*****
Report for year 1985
Include preceding year in report? (Y/N) n
*****
```

In order to print the graphs, the user must exit VATPEP (using main menu #6) and run LOTUS. For the LOTUS program to work, the files called AUTO123.WK1 and ANNUAL_*.PRN (with the appropriate year in place of _) must be on the drive specified as the default data drive for LOTUS. After typing 123, the user is asked to enter the year of the report. The file ANNUAL_*.PRN will be automatically loaded, and the following menu will appear:

```
*****
SummaryGraphs OneProperty AllProperties Quit          Menu
Create Graphs III3 to III10
*****
```

This LOTUS menu provides three options (other than QUIT), all of which create .PIC files on the default data drive. After any of the options is run, the menu will reappear.

Summary Graphs

If RETURN is entered while the curser is on this option, files are created for the printing of the 11 state summary graphs labelled Exhibit III.3 through III.10 in the Annual Report on Public Transportation in the Commonwealth of Virginia.

One Property

This option generates four files for the four graphs summarizing the efficiency of a property. After selecting this option, the user is asked for the ID of the property.

```
*****
Type ID wanted (0 for menu):
*****
```

Next, the question appears:

 Do you wish to use the PES standard scaling? (yes/no)

This refers to the y-axis scale on the four graphs. PES standard scaling is that used in the Annual Report. If "no" is given as the answer, the user is asked for the four upper limits on y-axis values:

 Enter Upper Limit: 0 1st

The "1st" on the right indicates that the user should enter the upper limit for the 1st graph. Next, whether a "yes" or "no" answer was given, the user must (again) enter the property ID when so requested. This sequence is repeated for each of the four graphs.

All Properties

This option generates all four graph files for all the properties. PES standard scaling is always used. The user must enter the property ID four times for each property when so prompted. (The screen will show what number should be entered.)

In order to print any of the graphs whose files were generated, the user must select QUIT from the menu, which will bring back the system prompts, and insert the LOTUS PrintGraph disk. After typing PGRAPH, the user will see the following menu:

```

Copyright 1986 Lotus Development Corp. All Rights Reserved. Release 2.01  MENU
DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD
Select graphs for printing
Image-Select Settings Go Align Page Exit
MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMM
  GRAPH          IMAGE OPTIONS                        HARDWARE SETUP
  IMAGES          Size                Range Colors        Graphs Directory:
  SELECTED        Top                 .395 X               A:\
                  Left                 .750 A               Fonts Directory:
                  Width                6.500 B             A:\
                  Height               4.691 C             Interface:
                  Rotate               .000 D               Parallel 1
                                          E                   Printer Type:
  Font            F
    1 BLOCK1
    2 BLOCK1

                                          Paper Size
                                          Width        8.500
                                          Length       11.000

                                          ACTION OPTIONS
                                          Pause: No   Eject: No
    
```

For specific directions on this program consult the LOTUS user's manual. The command "Image Select" will provide a listing of the files

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that lotus previously created for the graphs. An example is shown in Exhibit 5. In this case ID1_1 through ID1_4 are files for the property with ID1, whereas files prefixed with III are statewide summary graphs.

An example of a property graph on file at ID1_1 is shown in Exhibit 6. An example of a statewide summary graph (III6) is shown in Exhibit 7.

Exhibit 5. Files Created for Graphs

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Select graphs for output

PICTURE	DATE	TIME	SIZE
ID1_1	12-28-86	12:27	832
ID1_2	12-28-86	12:27	832
ID1_3	12-28-86	12:27	710
ID1_4	12-28-86	12:27	706
III10	12-28-86	12:28	1812
III3L	12-28-86	12:28	1898
III3R	12-28-86	12:28	1905
III4L	12-28-86	12:28	1933
III4R	12-28-86	12:28	1685
III5L	12-28-86	12:28	2201
III5R	12-28-86	12:28	1761
III6	12-28-86	12:28	1719
III7	12-28-86	12:28	797
III8	12-28-86	12:28	726
III9	12-28-86	12:28	1724

[SPACE] turns mark on and off
[RETURN] selects marked pictures
[ESCAPE] exits, ignoring changes
[HOME] goes to beginning of list
[END] goes to end of list
[UP] and [DOWN] move cursor
List will scroll if cursor
moved beyond top or bottom
[GRAPH] displays selected picture

Exhibit 6. Example Property Graph

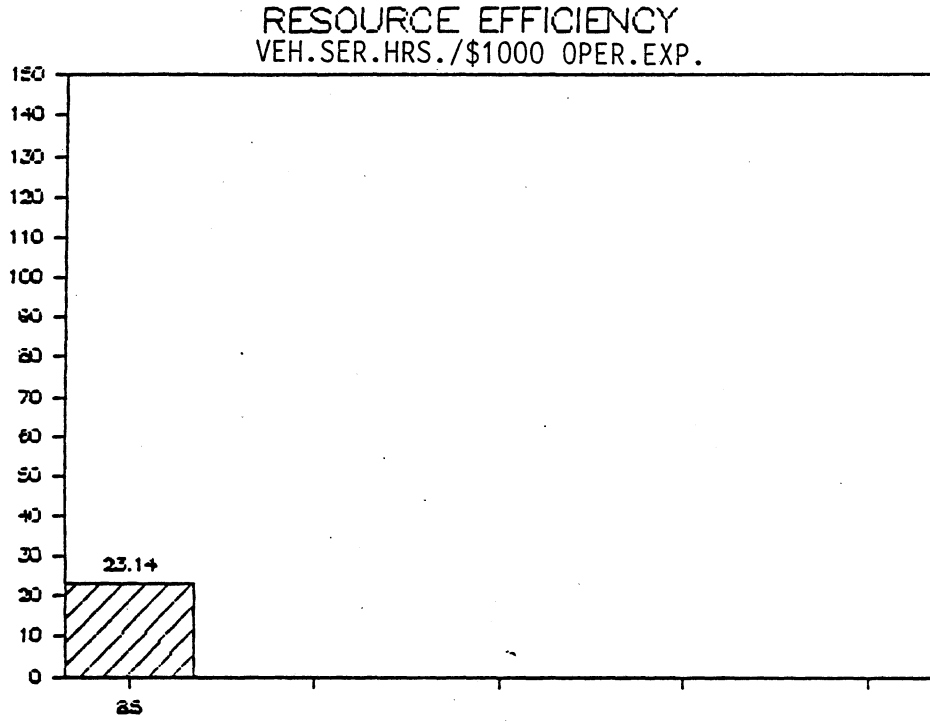
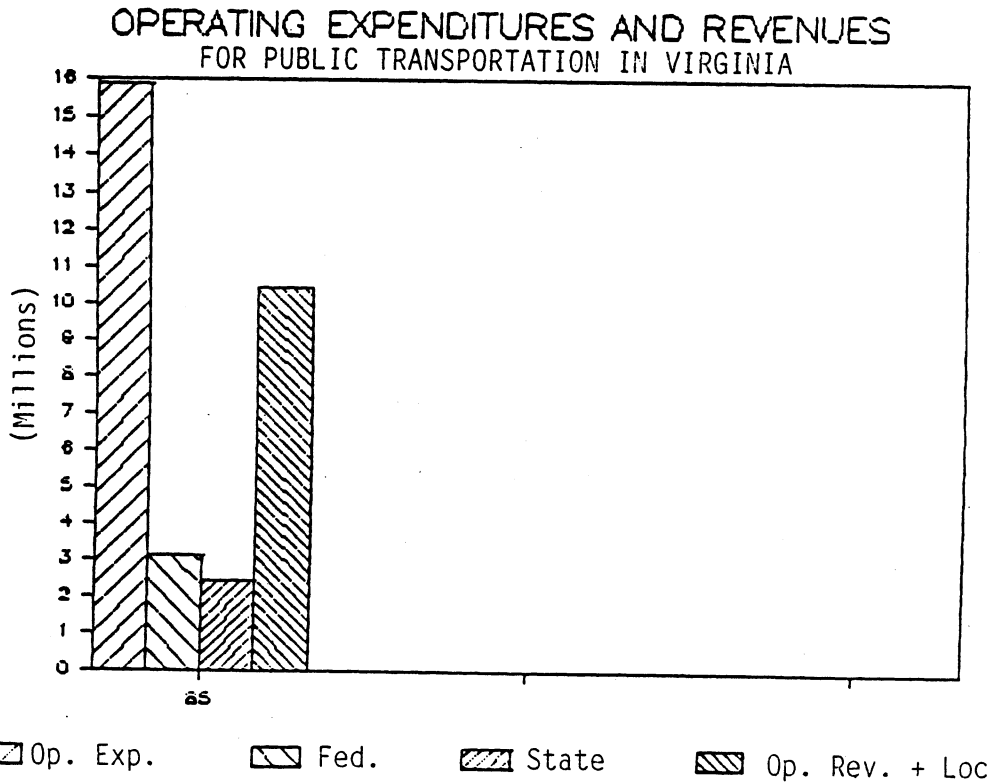


Exhibit 7. Example Statewide Summary Graph



REFERENCES

1. Rail and Public Transportation Division, Virginia Department of Highways and Transportation. 1985. Guidelines and procedures for the performance evaluation of public transportation systems in the Commonwealth of Virginia. By MacDorman and Associates. Richmond
2. Rail and Public Transportation Division, Virginia Department of Highways and Transportation. 1983, 1984, 1985. Annual report of public transportation in the Commonwealth of Virginia. Richmond.

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