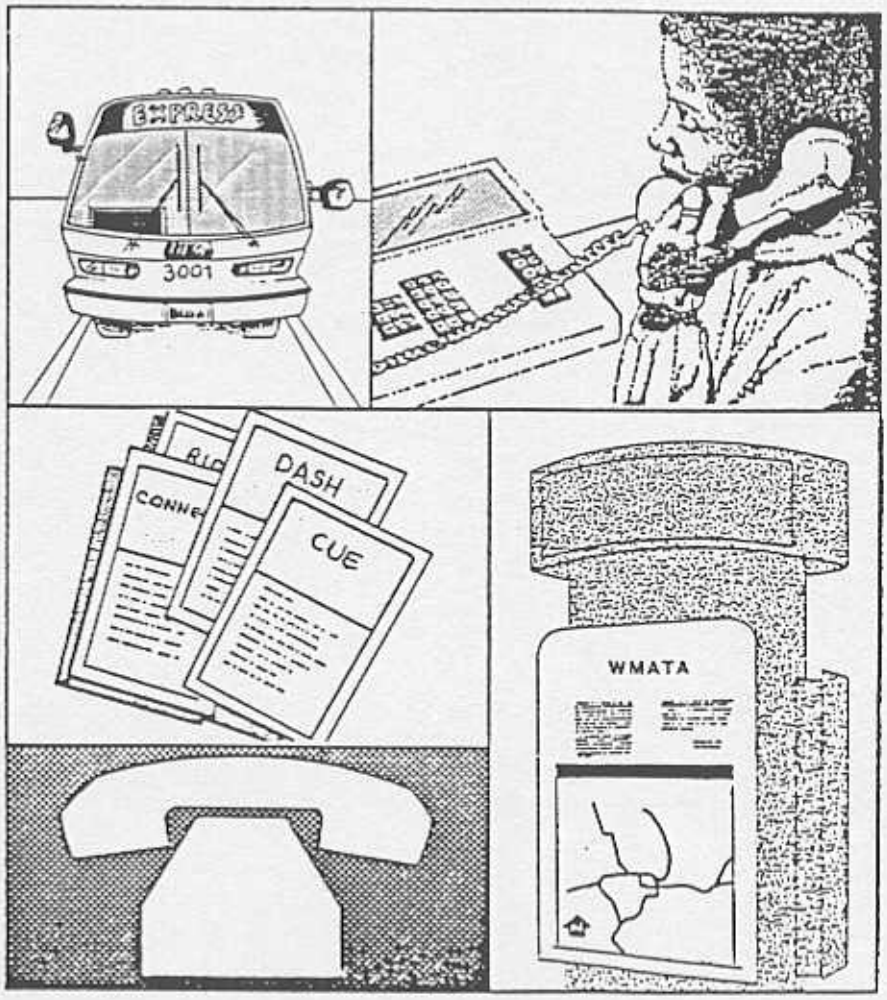
Coordinated Transit Information Services Project

Prepared for
Northern Virginia
Transportation Commission

N.D. Lea & Associates, Inc.
Washington, D.C.

November 1987



Northern Virginia
Transportation Commission

Arlington Executive Building • 2009 North 14th Street • Suite 300 • Arlington, Virginia 22201 • (703) 524-3322

February 17, 1988

MEMORANDUM:

TO: Coordinated Transit Information Services Working Group

SUBJECT: Transmittal of Final Report and Update on Project

FROM: Michelle Rogers MR

Enclosed please find a copy of the consultant's final report entitled "Coordinated Transit Information Services Project." WMATA and the local systems in Virginia are proceeding with encoding the routes and schedule information for a six month trial period. During the trial period, WMATA staff will monitor the number of calls to determine the call volume fluctuation, if any, attributable to the new information. At the end of the six month trial period, WMATA will provide the local jurisdictions with an operating cost estimate based on the number of calls received that are non-Metro related. At that time, the Virginia bus systems will have the opportunity to decide whether their system's information will remain in WMATA's database.

Northern Virginia
Transportation Commission

Arlington Executive Building • 2009 North 14th Street • Suite 300 • Arlington, Virginia 22201 • (703) 524-3322

COORDINATED TRANSIT INFORMATION SERVICES PROJECT FOR THE WASHINGTON, D.C. METROPOLITAN AREA (DC-08-0016-149)

The Washington, D.C. Metropolitan region is served by several public and private transit operators. Major transit providers include: the Washington Metropolitan Area Transit Authority (WMATA), the Fairfax Connector (Fairfax County, Virginia), DASH (Alexandria, Virginia), CUE (Fairfax City, Virginia), and Ride-On (Montgomery County, Maryland). Although many of the bus service and fare policies have been coordinated between the different operators, there is no unified source of information for potential patrons who may wish to use more than one system. Consumers must have a prior knowledge of the different bus systems to determine which operators to contact regarding trips that cross jurisdictional boundaries. The study describes the current conditions for consumer assistance by transit operators in the Washington, D.C. area, and analyzes and recommends alternatives for coordinating transit information in the region.

This study was prepared in cooperation with the Metropolitan Washington Council of Governments, the Virginia Department of Transportation, the governments of Montgomery County and Prince Georges County in Maryland, Fairfax County and the cities of Fairfax and Alexandria in Virginia, and the Washington Metropolitan Area Transit Authority.

A consultant, Lea and Elliott, Inc., prepared the study for the Northern Virginia Transportation Commission (NVTC). NVTC obtained financial assistance through FY 1987 grants of the Urban Mass Transit Administration of the U.S. Department of Transportation under the Urban Mass Transportation Act of 1964, as amended, and the Virginia Department of Transportation.

This study reflects the views of the consultant, who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Urban Mass Transportation Administration, the Washington Metropolitan Council of Governments, the Virginia Department of Transportation, or the Northern Virginia Transportation Commission. This report does not constitute a standard, specification, or regulation.

Lea+Elliott transportation engineers

COORDINATED TRANSIT INFORMATION SERVICES PROJECT FOR NORTHERN VIRGINIA TRANSPORTATION COMMISSION

N.D. Lea & Associates, Inc. a partner of Lea+Elliott
14325 Willard Road, Suite 200, Chantilly, Virginia 22021 • (703) 968-7883 • FAX: (703) 968-7888 • TLX: 6501286937

CONTENTS

EXHIBITS

INTRODUCTION

The following report discusses alternatives to coordinating the information systems of the transit providers in the Washington, D.C. metropolitan area. Currently, a rider/potential rider when seeking information must first decide which system(s) to call. Should the rider make the wrong choice or should he or she not get sufficient information he or she may have to make another phone call. He or she may even get misinformation. Much of this could be overcome and a good deal of rider anxiety removed if all systems use one number (a transit hot line) or if their call is forwarded to the correct location to obtain the needed information. A consolidated and coordinated system could provide the entire District area, including Northern Virginia and Maryland, with better customer information service and provide participating transit operators with the benefit of satisfied riders and probably increased ridership.

The study describes the current individual systems as they presently operate and defines the technological aspects related to integrating them. System technology, integration impacts, and costs are addressed. A plan including an implementation schedule is presented. The study recommends initially implementing a call forwarding system and as the need develops write an automated system specification, draw up a contract for its implementation, and then procure the system.

1.0 TRANSIT INFORMATION SYSTEMS CURRENTLY IN THE WASHINGTON AREA

Significant transit systems in the Washington Metropolitan area that should be considered for integrated information services include WMATA (Washington Metropolitan Area Transit Authority), CUE (City of Fairfax), Fairfax Connector (County of Fairfax), DASH (City of Alexandria) and Ride-On (Montgomery County).

The Washington Metropolitan Area Transit Authority Transit Information System, which is semi-automated, is the most comprehensive system of this type in the country. It extends beyond the District and interfaces with, and in some cases parallels, local information transit services in Virginia and Maryland. The local information transit service operators, whose systems are small in comparison with

WMATA's, provide information on their transit services using telephones, maps and printed schedules. The basic need for the Washington D.C. area transit rider is an integrated information system where only one phone call will provide the rider with the needed help to make a trip in outlying areas and the District.

1.1 WMATA TRANSIT INFORMATION SYSTEM

The WMATA transit system operates four (4) rapid rail lines and 1,567 buses, all of which are included in the WMATA Transit Information System along with 12,200 bus stops and 52,000 streets. The information service receives about 200,000 telephone inquiries per month. Thirty-three (33) telephone agents, each supported by a computer-aided display, may be on-line at one time. An average WMATA inquiry call takes one minute and twenty seconds. It takes 18 seconds on the average for computer data retrieval. The average waiting time to contact an agent is 80 seconds.

Additional information on the WMATA Transit Information Service is provided in Appendix 1.

Systems Operations

Metro number calls are answered as they come in. If all agents are busy, the calls are put on hold automatically with the message: "All agents are busy, please hold, call will be answered in turn, etc." The queue is released on a first in, first out basis.

In answering 55 percent of inquiries, the agent utilizes the automated information display system. This system provides agents with a prompting method of data entry. The system displays on the display terminal a series of statements and blanks to be filled in by the agent. When all entries are completed, the system evaluates the entries to determine the type of query and selection ranking. It then performs the calculations and displays a reply.

The system includes automatic correction of misspellings entered by information agents. If the system is unable to find a misspelled entry in the data base, it

defaults to a spelling corrector routine, which generates alternative entries for the misspelled name. The routine displays:

(1) An indication that the name entered is misspelled,
(2) Display of the misspelled entry, and
(3) A list of logical alternative names from the data base.

The system permits the agent to select one of the displayed alternatives or a name not on the list as the correct entry.

At any point during the entry and processing of a query, the agent may correct or alter any entry already made. The automatic information display system recognizes erroneous entries and displays a prompting message so the agent can re-enter the data. Once the entry has been made properly, the system continues handling the transaction normally.

The information display system has a specific set of calculations and a display for each type of query, as follows:

(1) Type I Query - Trip Itinerary.

In processing this type of query, the system identifies all reasonable trip itineraries between the caller's origin and destination, ranking them according to the following criteria:

(a) Proximity of the origin and destination stops to the caller's specified origin and destination,

(b) Required walking distance,

(c) Number of transfers,

(d) Proximity of actual departure or arrival time to those specified by the caller, and

(e) Trip duration.

The weighting of the factors used in determining these rankings is variable in the program. The weighted factors were determined by trial and error when the system was implemented. During implementation the

programmers and information agents worked together to adjust the weight assignments so the program would give the highest ranking to the "best" routing alternative. The information agent can choose the selection criteria based upon caller preference. All undisplayed trips are held in the system in rank order, pending an alternative trip request from an information agent.

In response to the Type I Query, the system displays the following information concerning the trip itinerary: route number, boarding time, fare (with conditions), stop locations, walking time estimates and direction of travel.

(2) Type II Query - Boarding Time.

The system identifies and displays a series of scheduled stop times covering the time specified by the information agent: showing route number, stop location, boarding time and direction of travel.

(3) Type III Query - Bus/Rail Stop Location.

The system will search the data base to locate stops and stations within reasonable proximity of the caller's entry. Caller origin locations need not be bus stops. Valid inputs to the system include the following location descriptions: street intersections, major street addresses, suburban communities, and prominent local landmarks, such as large buildings (commercial, government, apartments), transportation terminals, monuments and shopping centers.

The system will automatically estimate walking distances from the location designated to the nearest transit stops, displaying information for the agent on route number, stop location, walking time estimate and direction of travel.

(4) Type IV Query - Service Information.

Routes that service a specific location or bus stop are determined by:

- o Origin location,
- o Destination location,
- o Route,
- o Day and time of travel, and
- o Special fare category.

When this information is entered, the system refers to the fare structure and displays:

- o Fare and
- o Conditions.

(5) Follow-on Queries.

In answer to any of the other four types of queries, the system retains all information so that a follow-on query can be handled efficiently. Information from the original query is retained for use in producing the information for the subsequent query.

The caller can use the telephone information system with very little initial information. He enters the system with basic geographic information about his own location. Prominent landmarks, buildings, shopping centers, or monuments are adequate, as are street addresses or intersections. He needs to indicate where he wants to go and the time he wishes to travel.

The information display system accepts all these geographic data for route calculation. It will calculate the route on the basis of bus only or rail only travel, for a particular day of the week, for arrival or departure times, and for current information or for information that will be correct after an upcoming schedule change.

System Equipment

The system equipment required to efficiently accomplish the objectives includes the following:

Telephone

- Telephone Distributor - ROLM 9000, ACD System
- Fifty (50) Telephone Lines
- Forty-three (43) Receivers

Computers and Displays (See Exhibit 1)

- Three (3) Computers, HP 3000 Series III
- Three (3) Digital Tape Units, 7970 B
- Three (3) Disk Drives, 102 Megabyte
- One (1) Switching Device, T-Bar
- Sixty-seven (67) Color CRT Displays, ESPRIT, thirty-three (33) on-line at one time

The present Computer Unit Capacity is as follows:

T-Bar:

- Device will handle 48 terminals
- Forty-one terminals are being used
- Capacity = 85% used

HP 3000 Series II Computer:

- Forty-three (43) ports/computer ports are available for displays
- Forty (40) ports/computer ports are being used
- Port Capacity = 93% used
- System node capability is 500
- Four hundred are currently being used
- Node Capability = 80% used
- Current response time for display is 18 seconds average. The response time is a function of the number of nodes.

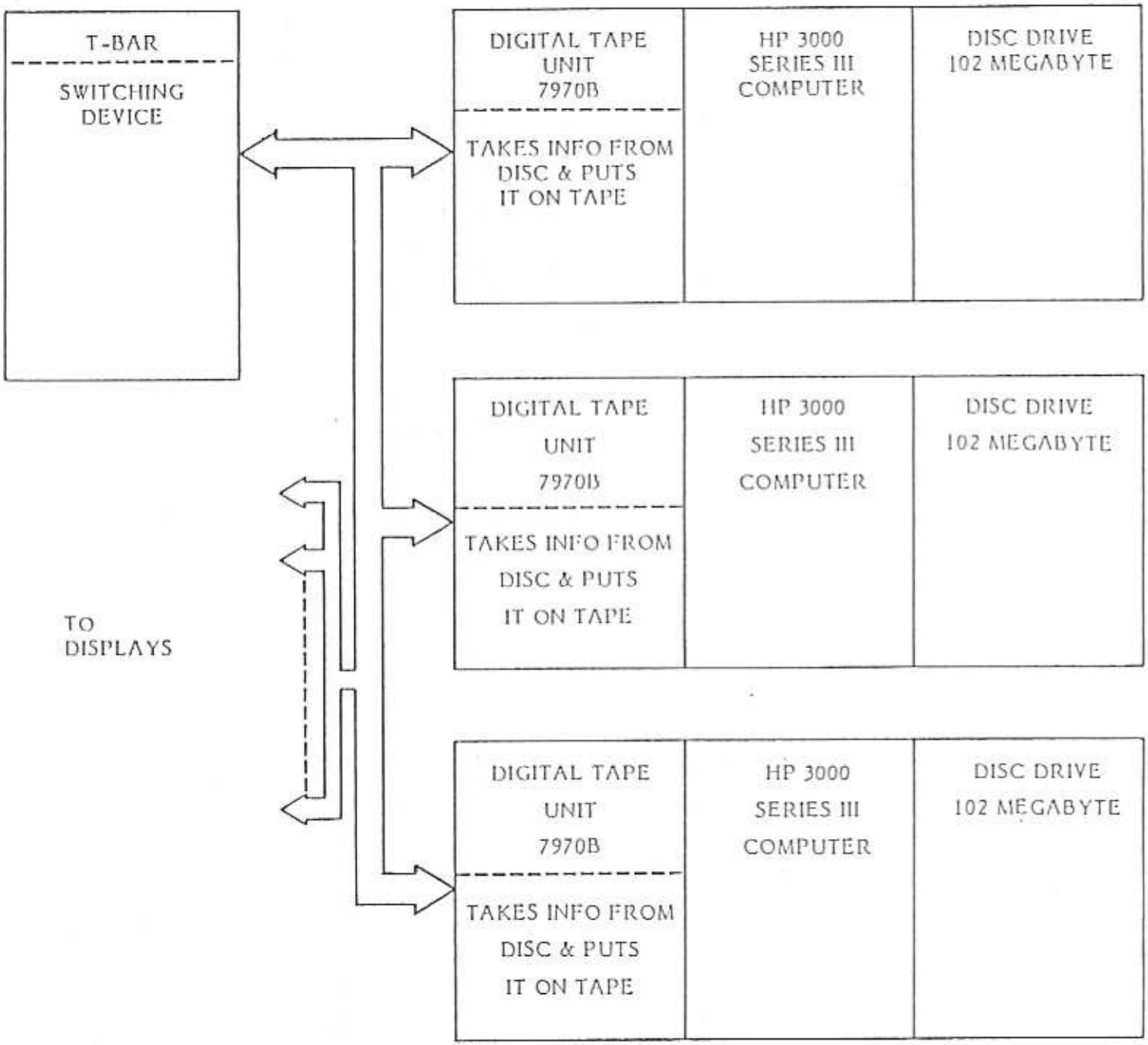


EXHIBIT 1: WMATA TELEPHONE INFORMATION SYSTEM COMPUTER UNIT

1.2 LOCAL OPERATORS' INFORMATION SYSTEMS

To readily understand the Washington Area telephone inquiry picture, the following comparison is provided:

Transit System	Calls/Month	% of WMATA System
WMATA	200,000	100
Ride-On, Montgomery County	13,000	6.5
All others combined (CUE, DASH, CONNECTOR, Etc.)	3,700	1.85

The above comparisons show that telephone inquiries to local systems are very small compared to that for WMATA. This is reflected in the current information equipment utilized by the local transit operators where agents/part-time agents are provided with hard copy maps, schedules, etc. to answer customer telephone inquiries.

WMATA has 41 agents on its staff answering phone calls, DASH has two, CUE has one, Fairfax Connector has one and Ride-On has six.

1.3 SUMMARY OF PARAMETERS OF WASHINGTON AREA TRANSIT SYSTEMS

Exhibit 2 is a matrix showing parameters which are significant to this study.

EXHIBIT 2

TRANSIT SYSTEM	NO. BUSES OPERATING	NO. BUS ROUTES	ANNUAL RIDER-SHIP	NO. CALLS/MO.: OWN	NO. CALLS/MO.: OTHERS	NO. CALLS/ PEAK DAY	NO. CALLS/ PEAK HOUR	NO. AGENTS ON DUTY AVERAGE	NO. AGENTS ON STAFF	NO. TELEPHONES
WMATA	1,567	439	216,237,137(1)	200,000	-	-	-	23 1st/ 18 2nd	51	43
Virginia:										
Dash; Alexandria Transit Authority	19	4	1,200,000	1,050	200	15 est.	1 est.	2	2	3
City of Alexandria	0	0	0	200	40	8 est.	1 est.	2(2)		4(3)
Arlington Shuttle Service, Taxi	1	1	3,250	8	2	-	-	-	0	1
Cue; City of Fairfax	9	7	500,000	513	60	52		4	1	4
Connector; County of Fairfax	33	10	1,020,000	1,520	124	148	50	1	1(4)	1
Maryland:										
Call-A-Bus; Prince Georges County	1	1	11,818	120	-	-	-	1	(5)	1
Upper Marlboro Shuttle, Prince Geo. County	8	Demand Response	10,364	1,320	20	80	20	1	1	2
Ride-On; Montgomery County	216	67	8,000,000	11,700	1,300	650	100	4	6	6
Totals: Virginia	62	22	2,720,000	3,291	426					17
Totals: Virginia and Maryland(6)	278	89	10,720,000	14,991	1,726					23

(1) Bus and Rail; Bus only = 136,852,480
(2) Staff members handling calls (no info. agents per se)
(3) Have Ridesharing CRT & Modem to COG.
(4) Non-Business hours, dispatcher, etc., answer
(5) Each staff member can respond
(6) Montgomery County Ride-On Only

2.0 TRANSIT INFORMATION SYSTEM INTEGRATION

System integration can be accomplished in a non-automated or an automated configuration.

2.1 NON-AUTOMATED TRANSIT INFORMATION SYSTEM INTEGRATION

Call Referral

WMATA telephone agents are supplied with official local operator phone numbers. The WMATA agent supplies as much information as possible and supplies a referral telephone number for additional local operator information. Local operator agents do likewise for WMATA.

There is no increase in operator cost over the current operation of systems.

The benefit for local operators in this system alternative is that they maintain autonomy over their system.

The public callers may have to pay for two telephone calls, will get uncoordinated information, and may be left confused and discouraged.

Call Forwarding

The system operation is much as above except instead of referring the rider to another number for additional information the call is forwarded by the agent to the appropriate source for the additional information. "Call Forwarding" and "Speed Calling"must be added to the local operator's systems. The first-time cost for this is quite nominal, $300. The annual operating cost is about $500 in addition to the cost for local calls (See Appendix 2).

Local operators still retain autonomy over their systems. The system is very affordable. There may be a reluctance on the Union's* part to operate in this type operation. While the public callers will now be charged for only one call, they will still have to get into two telephone queues. In addition they will still get uncoordinated information.

---

* Local 689 Amalgamated Transit Workers Union

2.2 AUTOMATED TRANSIT INFORMATION SYSTEM INTEGRATION

An efficient and perhaps affordable approach to achieve an integrated transit information system is to utilize the present WMATA computer system which has the appropriate hardware and even more important the basic data base. The question remains, does the WMATA system, as currently configured, have sufficient computer capacity to handle the expansion requirements imposed by an integrated Washington area information system?

The WMATA computer can accommodate 2000 Trip Routes as a total system. The current WMATA system uses 1665 Trip Routes. WMATA carried out a review of the Northern Virginia routes. The largest local system in Virginia, the Fairfax Connector basically covers the same territory as the old Metro bus routes and their information is already in the computer. This is also largely true for CUE and DASH. In essence, it would not be necessary to introduce substantial new information into the computer's data base.

WMATA concluded that assimilating the Northern Virginia routes into the computer system can readily be done. Also Ride-On could be assimilated but the system would then be approaching maximum capacity.

Basic Cost Elements*

To develop estimates for capital costs and operations & maintenance (O&M) costs between alternative system configurations, unit costs were estimated for hardware, data analysis and entry, training and operations.

Unit Hardware Costs

		Each
o	Color Terminal	$ 900
o	RS 232 Cable	$ 100
o	Modem (2 per display) when required	$ 200
o	Installation Cost 2 hr. x $20/hr.	$ 40

* Developed in conjunction with WMATA

Data Analysis and Entry

- First Time:

100 m-hrs[(a)] @ $20[(b)] per hour	$ 2,000
300 m-hrs[(a)] @ $20[(b)] per hour Ride-On	$ 6,000

- Updating:

5 m-hrs per route change @ 20/hr	$ 100/route change
Annual Computer Service Fee[(c)]	
$75,000 Annual WMATA Cost / 439 WMATA Bus lines	$ 170/bus line/per year

Training

o Cost to train the trainer (1 man-month)	$ 2,500
o Cost to train Outside Information Agent:	
Agent $22,000/yr, $87/day; $87 x 90 days	$ 7,830 /agent
Trainer $30,000/yr, $119/day; $119 x 90 x 25% of time	$ 2,678 trainer/agent
o Cost to Train Outside Coordinator:	
Coordinator $87/day; $87 x 120 days	$10,400 coordinator
Trainer $119/day x 120 x 25% of time	$ 3,570 trainer for coordinator

Operations

o Information Agent	$22,000[(b)]/per year
o Coordinator	$22,000[(b)]/year

(a) Data presented in WMATA format (see Appendix 4)

(b) Includes fringe benefits & overhead

(c) Annual costs related to computers and displays

2.3 ALTERNATIVES; AUTOMATED INTEGRATED TRANSIT INFORMATION SYSTEM

Alternative Configurations

From one perspective two basic system configuration alternatives may be considered. See Exhibit 3.

1. WMATA Computer Unit with remote display terminals located in one of the local transit operators' facility, or in the NVTC office, or in a private office such as a travel agency.

2. WMATA Computer Unit with WMATA display terminals located in the WMATA Facility in the vicinity of the Computer Unit.

Fare Collection Alternatives

In addition to the system configuration alternatives, there are fare collection alternatives. One of the major problems to be resolved is how to handle fares. Currently, the following fare policies are in effect:

Metro Fare	-	By Zones
Connector Fare	-	25¢ per Ride
CUE Fare	-	25¢ per Ride
DASH Fare	-	60¢ regular, 90¢ Pentagon
Ride-On	-	60¢ per Ride

The following fare collection alternatives should be considered:

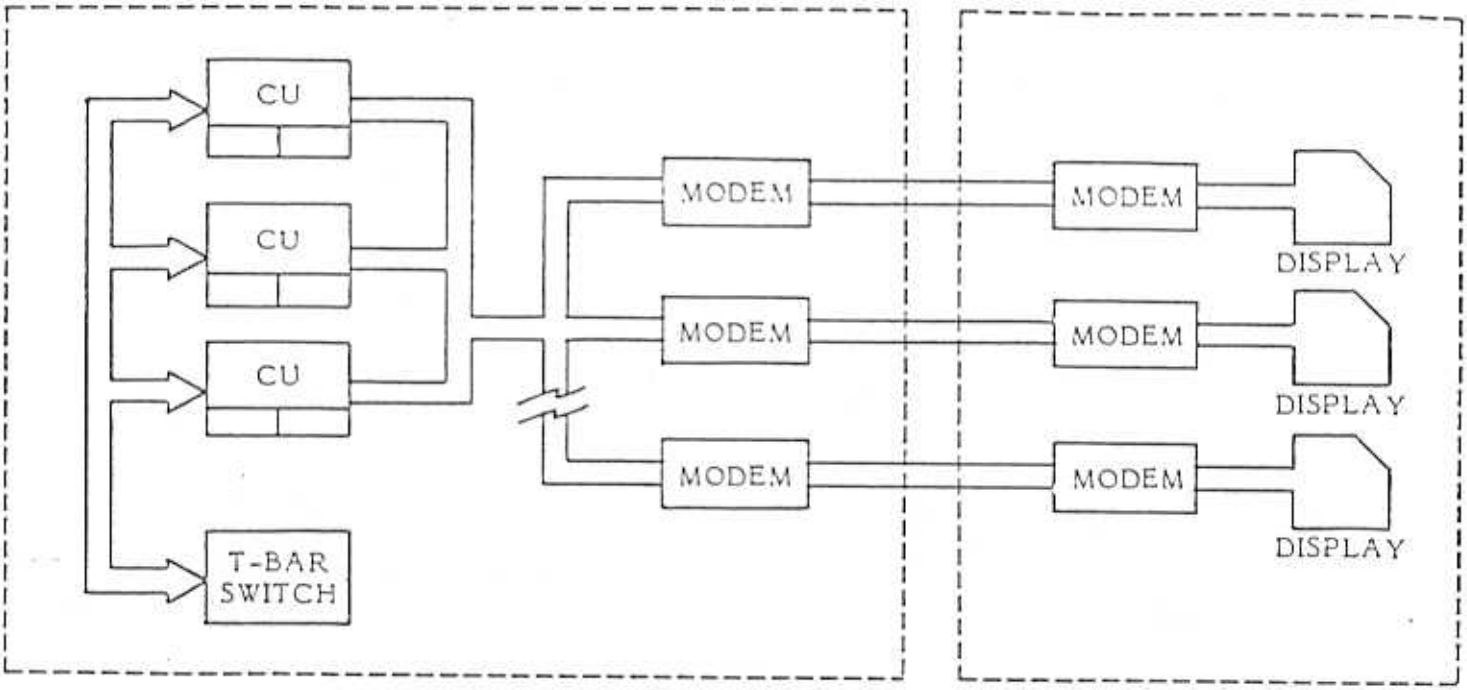
1. If fare policies are to remain, new fare tables must be programmed into the computer for total fare to be calculated by the computer. Cost estimate* -- $70,000.

---

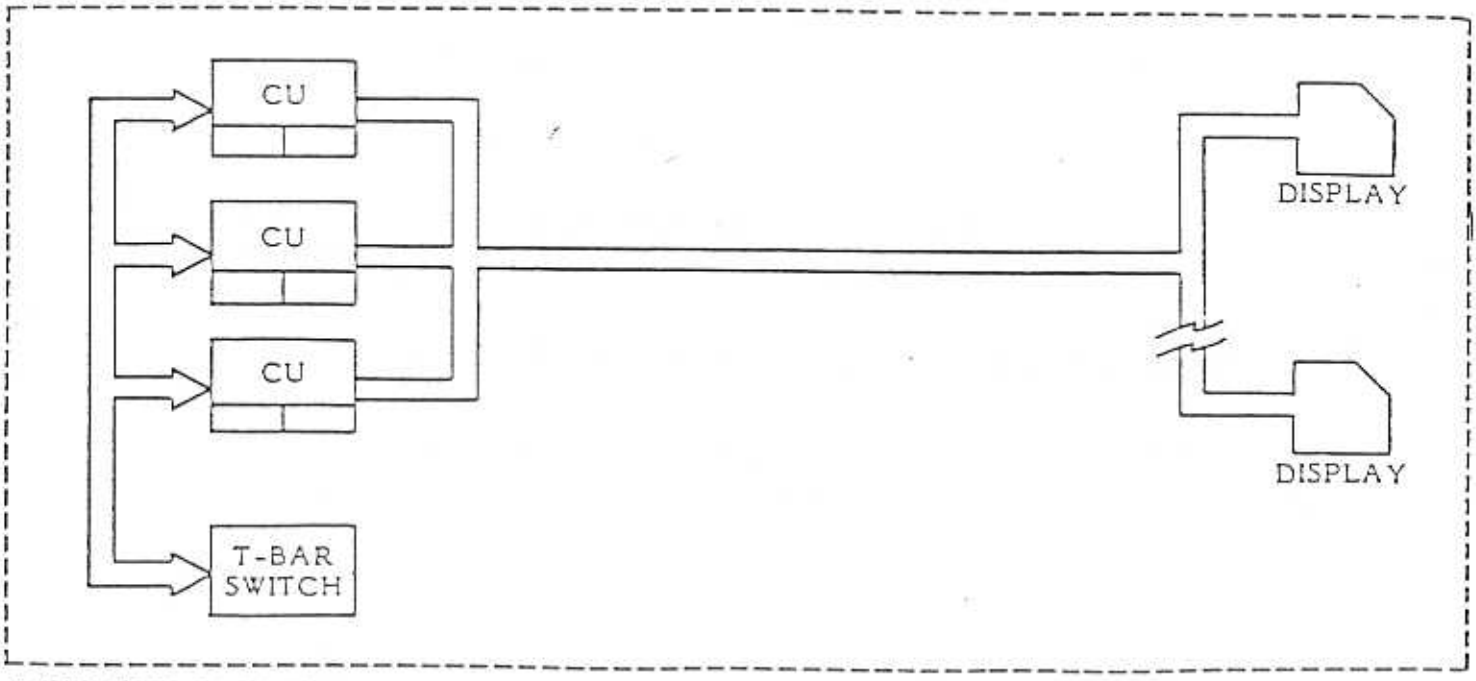
* Estimate made in conjuction with WMATA.

EXHIBIT 3: ALTERNATIVE SYSTEM CONFIGURATIONS

ALTERNATIVE 1 - Remote Terminals Located in Local Transit Operators', NVTC or Private Facility



ALTERNATIVE 2



2. If fare policies are to remain, inquiries can be answered by supplying WMATA fare obtained from the display terminal and separately local transit fare supplied from that obtained from hard copy. The total fare would not be given.

3. Local transit operators may modify their fare policy (not fares) to be consistent with WMATA, i.e., pay total trip fare upon entry and obtain necessary transfers for additional legs. Some additional programming will be required. Cost estimate* 2 man-months -- $5,000.

System Cost Estimates

Alternative system configurations are estimated as follows.

ALTERNATIVE	FIRST TIME COST	ANNUAL OPERATING COST
1, Display Terminals Remote, Northern Virginia	$ 61,790	$114,340
1, Display Terminals Remote, Northern Virginia, Montgomery County	84,890	171,700
2, Display Terminals at WMATA, Northern Virginia	34,940	70,340
2, Display Terminals at WMATA Northern Virginia, Montgomery County	58,480	127,700

Details for these estimates are provided in Exhibits 4, 5, 6 and 7.

2.4 EVALUATION OF ALTERNATIVES; AUTOMATED, INTEGRATED TRANSIT INFORMATION SYSTEMS

The first alternative configuration has the following major disadvantages:

- Either two telephone numbers are required or one telephone number with call forwarding is required. In either case the caller may end up in two queues.

---

* Estimate made in conjuction with WMATA.

EXHIBIT 4: ALTERNATIVE CONFIGURATION ESTIMATED COSTS*

ALTERNATIVE 1, Northern Virginia

First Time Costs:

Hardware:	
3 Color Terminals	$ 2,700
3 RS 232 Cable	300
6 Modems	1,200
3 Installation	120
Data Analysis and Entries:	
100 man-hours	2,000
Reprogram for Fares	5,000
Training:	
Train Trainer	2,500
Train 4 Agents	31,320
Agent Trainer Costs	2,680
Train 1 Coordinator	10,400
Coordinator Training Cost	3,570
TOTAL FIRST TIME COST	$ 61,790

Recurring Costs:

Operations:	
4 Agents	88,000
1 Coordinator	22,000
Data Analysis and Entry for 6 Route Changes/year	600
Computer Services Fee, $170 x 22	3,740
ANNUAL OPERATING COST	$114,340

* Based on Unit Costs, See Section 2.2

EXHIBIT 5: ALTERNATIVE CONFIGURATION ESTIMATED COSTS*

ALTERNATIVE 1, Northern Virginia, Montgomery County

First Time Costs:

Hardware:	
4 Color Terminals	$ 3,600
4 RS 232 Cable	400
8 Modems	1,200
4 Installation	160
Data Analysis and Entries:	
400 man-hours	8,000
Reprogram for Fares	5,000
Training:	
Train Trainer	2,500
Train 6 Agents	46,980
Agent Trainer Costs	2,680
Train 1 Coordinator	10,400
Coordinator Training Cost	3,570
TOTAL FIRST TIME COST	$ 84,890

Recurring Costs:

Operations:	
6 Agents	132,000
1 Coordinator	22,000
Data Analysis and Entry for 24 Route Changes/year	2,400
Computer Services Fee, $170 x 90	15,300
ANNUAL OPERATING COST	$171,700

* Based on Unit Costs, See Section 2.2

EXHIBIT 6: ALTERNATIVE CONFIGURATION ESTIMATED COSTS

ALTERNATIVE 2, Northern Virginia

First Time Costs:

Hardware:	
2 Color Terminals	$ 1,800
0 RS 232 Cable	0
0 Modems	0
2 Installation	80
Data Analysis and Entries:	
100 man-hours	2,000
Reprogram for Fares	5,000
Training:	
Train Trainer	0
Train 2 Agents	15,660
Agent Trainer Costs	0
Train one Coordinator	10,400
Coordinator Training Cost	0
TOTAL FIRST TIME COST	$ 34,940

Recurring Costs:

Operations:	
2 Agents	44,000
1 Coordinator	22,000
Data Analysis and Entry for 6 Route Changes/year	600
Computer Services Fee, $170 x 22	3,740
ANNUAL OPERATING COST	$ 70,340

* Based on Unit Costs, See Section 2.2

EXHIBIT 7: ALTERNATIVE CONFIGURATION ESTIMATED COST*

ALTERNATIVE 2, Northern Virginia, Montgomery County

First Time Costs:

Hardware:	
4 Color Terminals	$ 3,600
0 RS 232 Cable	0
0 Modems	0
4 Installation	160
Data Analysis and Entries:	
400 man-hours	8,000
Reprogram for Fares	5,000
Training:	
Train Trainer	0
Train 4 Agents	31,320
Agent Trainer Costs	0
Train 1 Coordinator	10,400
Coordinator Training Cost	0
TOTAL FIRST TIME COST	$ 58,480

Recurring Costs:

Operations:	
4 Agents	88,000
1 Coordinator	22,000
Data Analysis and Entry for 24 Route Changes/year	2,400
Computer Services Fee, $170 x 90	15,300
ANNUAL OPERATING COST	$127,700

* Based on Unit Costs, See Section 2.2

- The cost is greater than Alternative 2.
  - Additional equipment such as modems is required.
  - Must train local operators' agents to use WMATA system.
  - Additional telephone agents are required.
- Telephone agents are isolated from the WMATA telephone display agents and may suffer from the lack of support by the nucleus group.
- WMATA telephone agents must learn local system hard copy.

The second alternative has advantages such as:

- Eliminates rider confusion as to where to obtain trip information.
- Computer data related to number and location of calls will be available for management and marketing study.
- Union will get two more jobs and is likely to accept the plan.
- Provides fully coordinated information to its riders.
- All agents would be trained to cover the entire Washington area. The agents would all be part of the same agent group and thus are supported by each other.
- No call forwarding is necessary.
- Local system personnel now answering calls may be utilized elsewhere or their jobs can be eliminated.
- It is more economical than Alternative 1.

The main disadvantage of the second alternative is an apparent loss of local operator control. This may be mitigated through contractual agreement whereby periodic assessment of the information system performance will expose any serious mishandling of telephone inquiries.

The fare collection issue must be resolved. It is presently proposed that the fare policies remain "as is", that WMATA fares would be supplied by the WMATA system and local fares supplied by agents utilizing hard copy. The fare collection issue is beyond the scope of this report. It should be studied further as there is probably a much better solution.

The Union issue must be addressed. It is pointed out that system configuration Alternative 2, wherein all the terminals are in the WMATA operations area, would add job positions to the information agent group and would also add an additional coordinator.

2.5 SYSTEM ALTERNATIVES IMPLEMENTATION

Cost Sharing, Automated System

To enable discussion with local operators, a test formula was developed to apportion costs between them so that each might have a picture of the general magnitude of costs facing them.

The following are the First Time Costs and the Annual Operating Costs of Alternative 2 wherein the display terminals are located in the WMATA facility and are operated by WMATA agents. The cases examined are (1) expansion into Northern Virginia only; (2) expansion into both Northern Virginia and Montgomery County.

1. First Time Cost, Northern Virginia Expansion by Itself

The local transit operators' cost of expanding the WMATA system into Northern Virginia Operators' Area is proposed to be apportioned between Fairfax Connector (County of Fairfax), DASH (Alexandria Transit Company), and CUE (City

of Fairfax). The Arlington Shuttle Service Taxi does not provide a fixed schedule service and is not considered.

SYSTEM	COST SHARING FACTOR*	ESTIMATED FIRST TIME COST SHARE**
Connector	.47	$16,422
Dash	.32	11,181
CUE	.21	7,337
	TOTAL	$34,940**

2. First Time Cost, Northern Virginia and Montgomery County Expansion

The local transit operators' cost of expanding the WMATA system into both Northern Virginia and Montgomery County operations area is proposed to be apportioned between Fairfax Connector (County of Fairfax), DASH (Alexandria Transit Company), and CUE (City of Fairfax) and Ride-On (Montgomery County).

* See Appendix 3, Cost Sharing Ratios

** Does not include project overview costs.

SYSTEM	COST SHARING FACTOR*	ESTIMATED FIRST TIME COST SHARE**
Connector	.103	$ 6,023
Dash	.072	4,211
CUE	.044	2,573
Ride-On	.781	45,673
	TOTAL	$58,480 **

3. Annual Operating Cost, Northern Virginia Expansion by Itself

SYSTEM	COST SHARING FACTOR*	ESTIMATED ANNUAL OPERATING COST SHARE
Connector	.47	$33,060
Dash	.35	24,619
CUE	.18	12,661
	TOTAL	$70,340 **

4. Annual Operating Cost, Northern Virginia and Montgomery County

SYSTEM	COST SHARING FACTOR*	ESTIMATED ANNUAL OPERATING COST SHARE
Connector	.10	$ 12,770
Dash	.08	10,216
CUE	.03	3,831
Ride-On	.79	100,883
	TOTAL	$127,700**

* See Appendix 3, Cost Sharing Ratios.
** Does not include project overview costs.

2.6 BENEFITS OF PROVIDING BETTER INFORMATION TO RIDERS

Other Properties

Discussion was recently held with properties having automated systems. Ottawa-Carleton (OCTranspo) of Canada, Minneapolis-St. Paul (Metropolitan Transit Commission) Minnesota and Columbus (Central Ohio Transit Authority-COTA), Ohio, all have over five years experience with automated systems.

Discussion with Mary Whelan [1][2] of OCTranspo revealed that their telerider system is eight years old, is still in use and was upgraded with added vocabulary. In the past six years, the number of telephone calls has increased five hundred percent. OCTranspo was unable to quantify data relating the increase in number of calls to increase in ridership; however, they felt that the benefits to themselves were great in that they were achieving customer satisfaction. Mr. Shesh Chandra[3] is completing a study for the Province of Ontario evaluating automated systems. He is currently finishing a draft report with presumably very favorable results.

Bob Lashomb, Metropolitan Transit Commission, Minneapolis-St. Paul stated that their automated transit information system is successful and in the near future they will connect a digitized voice capability into the main line system. MTC states that their automated system is more cost effective than when they were employing operators using manuals.

Discussion with Bill Bowmas of Central Ohio Transit Authority (COTA) states that if their telerider system is out of service even for a short period of time, the public complains loudly. When asked for quantified results of calls vs. ridership, COTA could not supply that type information in that they couldn't isolate the variables.

Community Savings

In Great Britain, the Transport and Road Research Laboratory in a study[4] assesses the potential benefits (measured by savings in community costs and increased public transport patronage) of an integrated transit information system in a set of 50 randomly selected towns.

The study estimates the potential savings to the community are made up as follows:

- o A reduction of 16-39 percent in pre-journey waiting time due to an effective increase in service frequency.
- o A saving in walking and waiting time at interchanges of 8-18 percent.
- o A reduction of up to almost 9 percent in the mean number of interchanges per trip.
- o A reduction of up to 2 percent in riding time.

These savings also contribute to a reduction of 8-22 percent in overall trip time (i.e., in the time from the desired departure time to the arrival at the destination, including pre-journey waiting time).

Value Of A Call

In Hamburg, Germany, surveys of users of the AFI telephone information system indicate that one-third of the test population made transit trips for which private autos would have otherwise been used. Moreover, most of the trips resulting from the use of the information system were nonwork or occasional trips; such trips are not normally transit trips. This indicates that callers were attracted to transit and revenues increased.

One of the more difficult aspects of assessing a Telephone Information System (TIS) is estimating the value of a call into the system. It is generally assumed that a telephone call into the TIS is initiated by a prospective transit user and that by providing the appropriate information the TIS will enable the caller to become a revenue passenger. Since it is quite likely that some calls actually result in a revenue passenger trip being made, it is useful to examine what the value may be. The value of a call might be separated into two components, near term and long term. The near term or immediate value results from the caller making a trip as a

new transit user, making a new trip as a regular transit user, or becoming a regular transit user. The long term value may result from a greater frequency of trip use by all callers and callers making additional trips within the system that were not considered previously.

The value of a telephone call to a TIS was discussed at an UMTA-sponsored workshop[5]. In an informal survey attendees suggested that one call can generate from one-third to one-half an average fare (see Exhibit 8). No studies have been conducted which substantiate this estimated range.

Benefits to Northern Virginia

Data shows that as much as thirty-three percent (33%) of WMATA telephone calls request information involving Northern Virginia. These calls are broken down as follows*:

Northern Virginia alone	19%
Northern Virginia and Maryland	7%
Northern Virginia and D.C.	7%
	33%

An example of computing cost benefits can be made. Assume twenty-five percent (25%) of the calls are wrong number, then:

Automated System

($34,940 ÷ 10**) + $70,340 = $73,834 per year cost for an Automated System
$73,834 ÷ 33% (2,400,000 x 25%) = 37 cents cost per call

Call Forwarding System

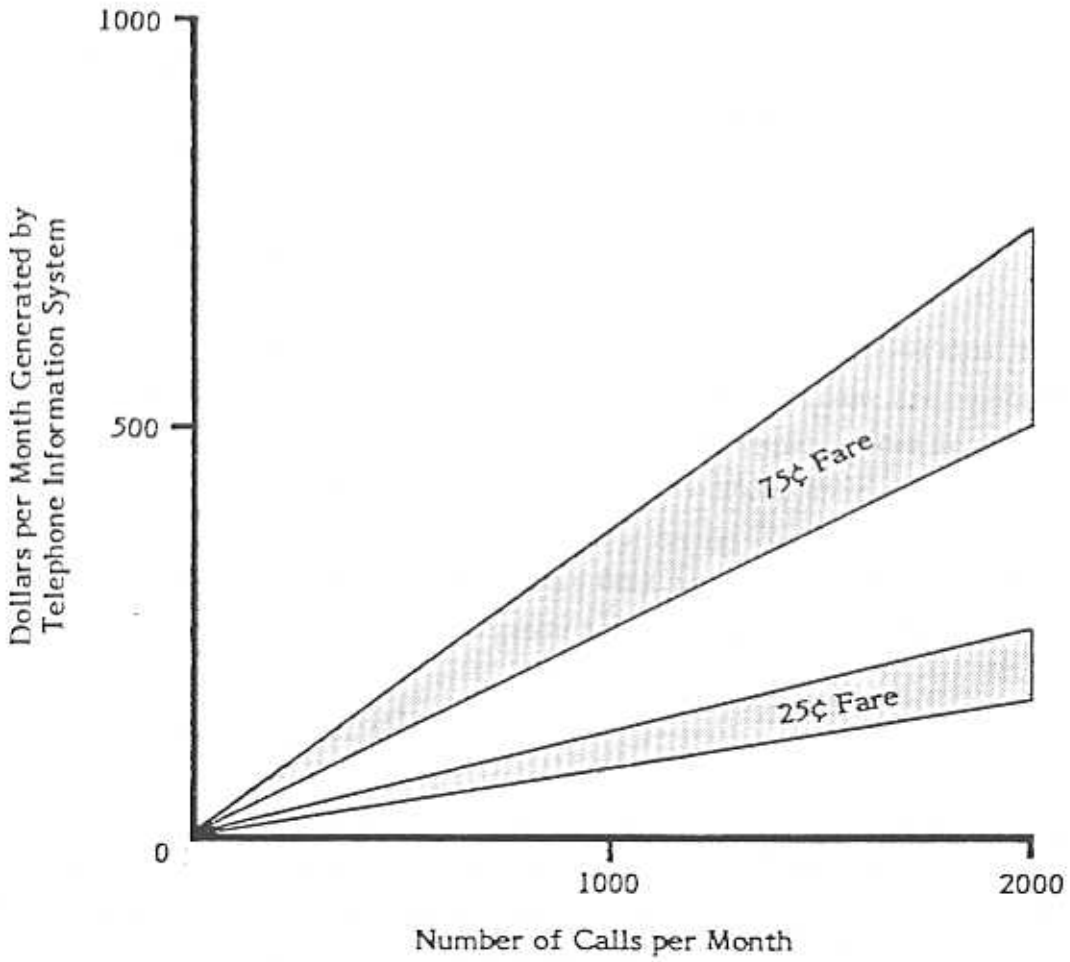
Cost = $1,000 per year
$1,000 ÷ 33% (2,400,000 x 25%) = 0.5 cents cost per call

---

* Data sample is 3rd weekend in November 1987.

** First time cost prorated over 10 years.

EXHIBIT 8: VALUE OF TELEPHONE CALL*



* Based on UMTA workshop suggested fare generation

2.7 DISCUSSIONS WITH OPERATORS

CUE (City of Fairfax)

CUE has some studies in process for a small expansion, perhaps to the Fair Oaks Mall, but no major expansion is anticipated. In regard to their telephone information system, they utilize part time operators for 5 hours a day and feel that they supply superior local service. After reviewing the previous developed alternatives and costs, CUE feels that in their case automated transit information systems are not cost effective. CUE has no objection to participating in a call forwarding system.

DASH (Alexandria)

DASH has no major expansion plans. They feel that something must be done to integrate the information systems in the Washington Area. They are reluctant to go to a centralized automated system unless system performances can be spelled out in a contract. DASH discussed the period of time when an automated system is initially introduced and suggested that a call forwarding system would work well during this interim. DASH concluded that they would like to study the situation a bit more, get everyone together as a group and work something out.

Fairfax Connector (County of Fairfax)

Fairfax Connector is anticipating some growth with 17 Buses replacing Metro bus plus some additional growth in early 1990. Fairfax Connector points out that a 37% turnover in residences results in a constant new-people market and feels that they will eventually want to adopt an automated system. The present budget will not be able to support acquiring the system now and they will need some time to plan for it. It was suggested that call-forwarding was a good initial step while working out a program for a centralized automated system. In reviewing the suggested cost sharing plan, Fairfax Connector thinks that it may not be equitable.

WMATA

Most of the discussion with WMATA centered around the capability of their system to absorb the data of the local operators and operate the integrated centralized system without significantly degrading their own service or penalizing local operators. The WMATA staff would like to upgrade their information system with the purchase of new computers; however, they stated that this is not imminent.

2.8 RECOMMENDED IMPLEMENTATION PLAN

There appears to be considerable accord from WMATA and some local operators that an integrated telephone information system is desirable, if not necessary. Such a system can be achieved by incrementally adding to the WMATA system. There is also a reluctance to immediately become part of an automated system without some additional study/planning. With this in mind, the following plan is suggested.

1. Implement a call forwarding telephone system whereby, if the wrong operator is called or additional information is needed, the caller will have his call forwarded to the most appropriate operator. While this does not achieve a one-number hot line, it does provide the caller with the benefit of being forwarded if necessary to obtain the best source of information without the caller having to make another phone call. It also provides a good interim system prior to any expansion into an automated integrated system.

2. With NVTC as the leader, establish a stable working group consisting of one representative from each interested transit operator. This group may utilize this report as a basis for initiating work on an automated system.

3. Write an Automated System Specification that will identify the participating local transit operators, establish costs, and describe the technical and schedule details of the system implementation related to both the local transit operators and WMATA. This specification should include

hardware and software modifications, data entry, system performance, training, and operating and maintenance. It should include operating data collected and summarized by the computer. It should also include the method of handling fares.

4. Prepare a Contract Document that will document the agreements between all parties involved. It will enumerate and describe the responsibilities related to performance, schedule, monitoring, measurements, and costs including cost sharing and payments.

5. Schedule and implement selected automated system.

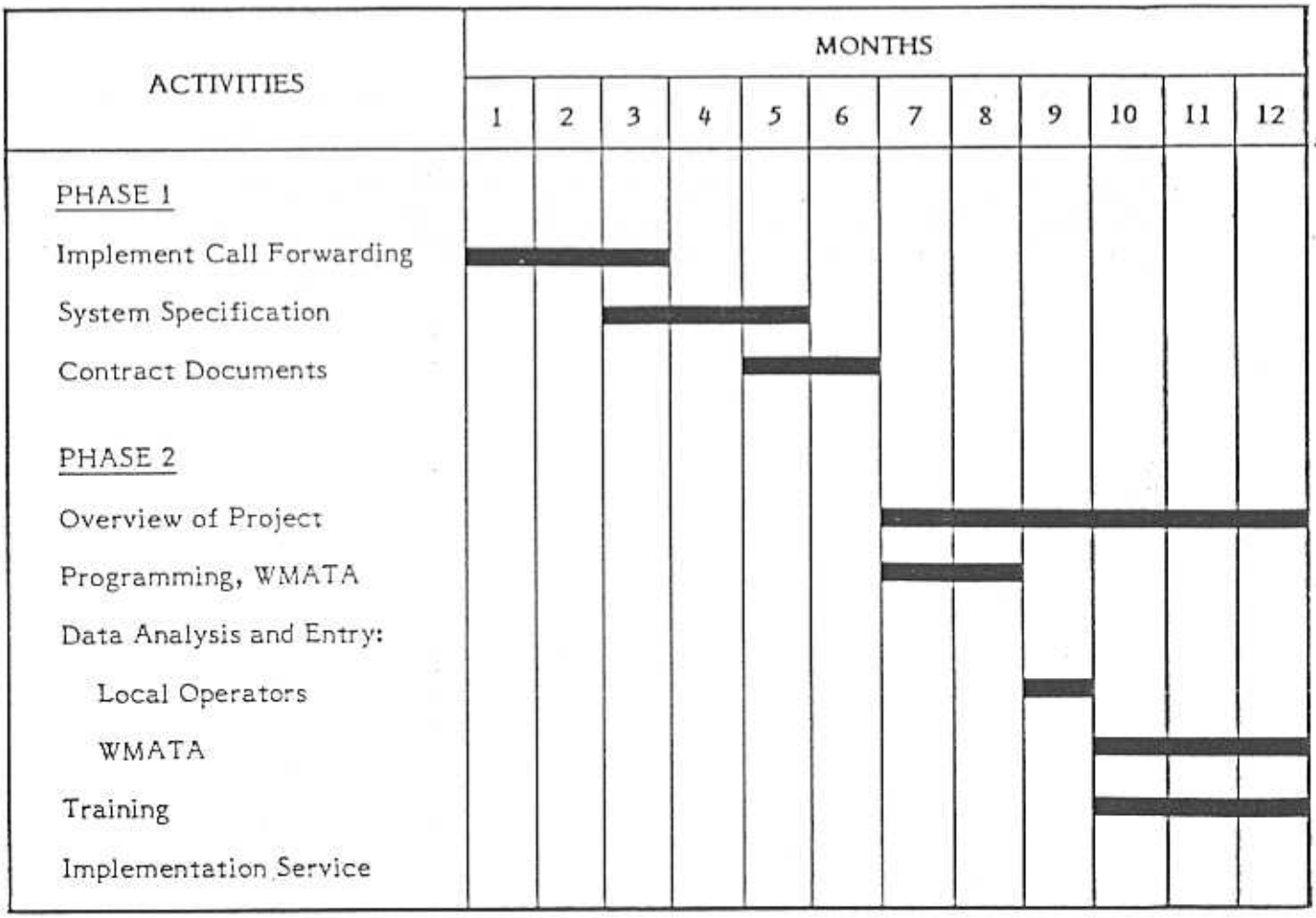
The Alternative 2 system requires no major hardware additions in that the WMATA computer, displays and facility could be used. However, it will be necessary for WMATA personnel to perform additional programming for fare information.

Data Analysis and Entry will require the local operators to format their routes and schedules in WMATA form (see Appendix 4) so that WMATA can correctly enter data into the system computer.

Training will involve updating a trainer on the expanded systems, training agents currently working and training new agents.

The Implementation Schedule recommended is shown in Exhibit 9.

EXHIBIT 9: IMPLEMENTATION PLAN SCHEDULE



REFERENCES

(1) Mary Whelan and John Bonsall "Better Information Equals More Riders", Presentation at Canadian Urban Transportation Association Annual Meeting, Quebec City, 1981.

(2) Whelan, Mary, "Automated Passenger Information: Implementation and Early Results", Presentation at APTA Conference, Sacramento, California 1981.

(3) Shesh Chandra, Transit Office OCTranspo, 1201 Wilson Avenue, West Tower, Downsview, Ontario, Canada M3M, 1J8, (416) 235-4021.

(4) Some Benefits of an Integrated Public Transport Travel Information System, Digest LR 830, 1978.

(5) Summary of the Telephone Transit Information Workshop, Denis O'Sullivan, ed., U.S. Department of Transportation, Urban Mass Transportation Administration, UMTA-VA-06-0052-81-1, Feb. 1981.

APPENDIX 1

QUESTIONNAIRES

WMATA

April 16, 1987

QUESTIONNAIRE - TRANSIT INFORMATION SYSTEM (TIS)

WMATA Transit Information System

GENERAL:

No. of Buses Operating	1,567
No. of Bus Routes	439
No. of Bus Lines	159
No. of Rail Lines	4
Annual System Ridership Bus/Rail	Bus-136,852,480 / Rail-115,933,806 } FY'86 (Total - 216,237,137)
Map of the System	Rail-Yes Bus-Not Current

TIS OPERATION:

Weekday, Hours of Operation 6AM to 11:30PM

Saturday, Hours of Operation 6AM to 11:30PM

Sunday, Hours of Operation 6AM to 11:30PM

Peak Day of Week; No. of Calls MONDAY ; 8,500

Peak Hour of Day; No. of Calls 9AM a.m. to NOON a.m.; 580 per hr.

_____ p.m. to _____ p.m.; _____

Average No. of Calls per Week Metro 46,000

Average No. of Calls per Week Others _____

Average No. of Calls per Week Lost 2,200

No. of Agents: 1st Shift 23 ; *2nd Shift* 18 ; *3rd Shift* _____

No. of Supervisors: 1st Shift _____ ; *2nd Shift* _____ ; *3rd Shift* _____

No. of Others: 1st Shift 7

2nd Shift 3

3rd Shift _____

When Answering a Call, Where Do Agents Get Their Information?

Memory	20 %
Hard Copy Data (Schedules & Maps)	25 %
Automated Display System	55 %

TELEPHONE EQUIPMENT & SYSTEM:

- *Type Distributor (Equipment & Manufacturer)* ROLM 9000 - ACD SYSTEM

- *Capacity:*
  - *Trunks* 50
  - *Lines* 50
  - *Receivers* 43

- *Automation:*
  - *Are Calls Put on Hold Automatically? (yes/no)* YES
  - *How Is Queue Released* (ex. first in, first out)? FIRST IN - FIRST OUT
  - *Does System Have Provisions for Recorded Announcements?* YES
    If So, Descript Basic Recordings ALL AGENTS ARE BUSY -- PLEASE HOLD, CALL WI
    BE ANSWERED IN TURN, ETC.
  - *Does System Count the Calls Received?* YES
  - *Does System Count the Calls Answered?* YES
  - *Does System Count the No. of Calls Handled at Each Work Station?* YES

- *Other Significant Information*

COMPUTERS AND DISPLAYS:

- *How Many Computers Are Used?* 3 (REDUNDENT SYSTEMS)
- *Name and Type of Computer(s):*
  HEWLETT PACKARD 3000, SERIES III

- *What Is Basis of Route Calculations?*
  (Bus Only, Rail Only, Bus and Rail, Day of Week, Arrival or Departure Time)
  BUS/RAIL/BUS-RAIL/BUS-RAIL-BUS AT TIME OF DAY

TRAINING:

- *What Type of Information-Agent Training Is Provided?*
  NEW EMPLOYEES TRAIN FOR 90 DAY PERIOD. MANUAL UNDERSTANDING OF ROUTE/SCHEDULE SYSTEM: THEN TRAINING OPERATION FOR COMPUTERIZED SYSTEM.

SYSTEM DESCRIPTION AND COST:

- *Block Diagram of Telephone and Data-Display System Showing Equipment and Functional Descriptions.*

- *Capital Costs:*
  ~~See~~ ATTACHED FOR DATA SYSTEM.

- *O&M Cost:*
  MAINTENANCE — $35,000/YR
  SALARIES — $43,000/YR

COST OF ARTS DEVELOPMENT

	TOTAL COSTS	Allocated Funding Paid By: Research & Devel Grants	UMTA Funds (2/3)	WMATA/Local Funds (1/3)
Physical Site Devel.	190,000	-0-	128,600	62,000
Data Collection	80,000	40,000	28,000	12,000
Data Base Struc	25,000	12,500	8,300	4,200
Application Stware	155,000	77,500	51,600	25,385
Education/Training	50,000	25,000	16,600	8,400
Eval/Sys Maintenance	38,000	19,000	12,600	6,400
Software Development	348,000	174,000	117,200	56,800
Hardware, Communication Equipment & Project Mgmt.	520,000	-0-	346,700	173,300
Initial Subtotals	1,058,000	174,000	592,000	290,500
10 yr Operation/Maint. Costs & Staff	700,000	-0-	-0-	700,000
Application Sftware Modifications	69,000	-0-	-0-	69,000
TOTAL PROJECT COSTS	1,827,000	174,000	592,000	1,061,000

WMATA

DASH
ALEXANDRIA TRANSIT CO.

April 16, 1987

QUESTIONNAIRE - TRANSIT INFORMATION SYSTEM (TIS)

JURISDICTION:

SYSTEM NAME: DASH

GENERAL:

No. of Buses Operating 19

No. of Bus Routes 4

Annual System Ridership 1.2 million

System Map Attached

TIS OPERATION:

Weekday, Hours of Operation ~~5:45~~ 8:00 a.m. to ~~11:30~~ 5:00 p.m.

Saturday, Hours of Operation ~~6:15~~ a.m. to ~~11:30~~ p.m.

Sunday, Hours of Operation ~~8:05~~ a.m. to ~~4:50~~ p.m.

No. of Calls per Month for Own Jurisdiction: ~~150~~ 1050

No. of Calls per Month for Other Jurisdictions: ~~25~~ 200

Calls During Peak Day of Month: No. Calls N/A, Day _____

Calls During Peak Hour of Month: Est. No. Calls N/A, Hour _____, Day _____

No. of Information Agents on Duty: Average 2, Peak 2

No. of Information Agents on Staff: 2

Information Aids Used by Agents: Use public timetables and city wide street map

New Info. (corrected Nov. 1987

Percentage of Lost Calls: +5% 1-2 %

TIS EQUIPMENT:

No. of Telephones: 3

No. of Lines: 2

Degree of Telephone Automation: Use Digital Voice Announcements during non office hours.

Other Equipment:

TIS SYSTEM COST:

Capital Cost (Yr) $ N/A

O&M Cost $ N/A

COMMENTS:

CITY OF ALEXANDRIA

April 16, 1987

QUESTIONNAIRE - TRANSIT INFORMATION SYSTEM (TIS)

JURISDICTION: CITY OF ALEXANDRIA

SYSTEM NAME: OFFICE OF TRANSIT SERVICES + PROGRAMS

GENERAL:

No. of Buses Operating ~~0~~

No. of Bus Routes ~~0~~

Annual System Ridership ~~0~~

System Map

TIS OPERATION:

Weekday, Hours of Operation 8 a.m. to 5 p.m.

Saturday, Hours of Operation ~~0~~ a.m. to ~~0~~ p.m.

Sunday, Hours of Operation ~~0~~ a.m. to ~~0~~ p.m.

No. of Calls per Month for Own Jurisdiction: 200

No. of Calls per Month for Other Jurisdictions: 40

Calls During Peak Day of Month: No. Calls _____, Day N/A

Calls During Peak Hour of Month: Est. No. Calls _____, Hour N/A, Day _____

No. of ~~Information Agents~~ Staff handling Calls on Duty: Average 2, Peak 3

No. of Information Agents on Staff: do not have an information agent per say.

Information Aids Used by Agents: Route + Schedule Brochures, Directories of Transportation Providers + Agencies

Percentage of Lost Calls: 0%

CITY OF ALEXANDRIA

TIS EQUIPMENT:

No. of Telephones: 4

No. of Lines: 4

Degree of Telephone Automation: 0

Other Equipment: Ridesharing CRT + modem to COG

TIS SYSTEM COST:

Capital Cost (Yr) $_____

O&M Cost $_____

COMMENTS:

The Office of Transit Services + Programs provides assistance to the public + business community regarding the mix of transit services, paratransit + ridesharing available in Alexandria + throughout the region. If we can provide the information, we do. If we can't we refer them to the appropriate agency.

Feel free to contact me for details at 838-3800

ARLINGTON COUNTY
DEPARTMENT OF PUBLIC WORKS

April 16, 1987

QUESTIONNAIRE - TRANSIT INFORMATION SYSTEM (TIS)

JURISDICTION: Arlington County Va

SYSTEM NAME: Arlington Shuttle Service Taxi

GENERAL:

No. of Buses Operating 1

No. of Bus Routes 1

Annual System Ridership 3,250

System Map see folder attached

TIS OPERATION:

Weekday, Hours of Operation 9:30 p.m. to 12:27 a.m.

Saturday, Hours of Operation 7 a.m. to 12:27 a.m.

Sunday, Hours of Operation 0 a.m. to 0 p.m.

No. of Calls per Month for Own Jurisdiction: 8

No. of Calls per Month for Other Jurisdictions: 2

Calls During Peak Day of Month: No. Calls 2, Day Random

Calls During Peak Hour of Month: Est. No. Calls 1, Hour Random, Day ____

No. of Information Agents on Duty: Average 0, Peak 0

No. of Information Agents on Staff: 0 calls handled by coordinator

Information Aids Used by Agents: Public time tables, METRO maps, headway sheet reports

Percentage of Lost Calls: 2%

33% are delayed by call-back.

TIS EQUIPMENT:

No. of Telephones: 1

No. of Lines: 1

Degree of Telephone Automation: Rerouted to secretary after three rings.

Other Equipment:

TIS SYSTEM COST:

Capital Cost (Yr) $ Incrementally Zero

O&M Cost $

COMMENTS:

For the number of calls, our arrangement is fine. We sometimes get requests that WMATA did not answer correctly.

CUE
CITY OF FAIRFAX

April 16, 1987

QUESTIONNAIRE - TRANSIT INFORMATION SYSTEM (TIS)

JURISDICTION: CITY OF FAIRFAX

SYSTEM NAME: CUE BUS

GENERAL:

No. of Buses Operating 9

No. of Bus Routes 7

Annual System Ridership 500,000

System Map

TIS OPERATION:

Weekday, Hours of Operation 5:45 a.m. to 11:30 p.m.

Saturday, Hours of Operation 8:45 a.m. to 8:15 p.m.

Sunday, Hours of Operation 10:00 a.m. to 6:40 p.m.

No. of Calls per Month for Own Jurisdiction: 513

No. of Calls per Month for Other Jurisdictions: 60

Calls During Peak Day of Month: No. Calls 52, *Day* Thursday

Calls During Peak Hour of Month: Est. No. Calls *, *Hour* _____, *Day* _____

No. of Information Agents on Duty: Average 4, *Peak* 4

No. of Information Agents on Staff: 1

Information Aids Used by Agents: SCHEDULE & SYSTEM MAP

Percentage of Lost Calls: 0

* This information not logged

TIS EQUIPMENT:

No. of Telephones: 4

No. of Lines: 1

Degree of Telephone Automation: NONE

Other Equipment:

TIS SYSTEM COST:

Capital Cost (Yr) $?

O&M Cost $?

COMMENTS:

ALL PERSONNEL IN OFFICE ANSWER TRANSIT CALLS, AND WATER AND SEWER CALLS. ONE PART TIME PERSON IS GENERALLY ASSIGNED TO ANSWER TRANSIT RELATED CALLS.

CONNECTOR
COUNTY OF FAIRFAX

April 16, 1987

QUESTIONNAIRE - TRANSIT INFORMATION SYSTEM (TIS)

JURISDICTION: County of Fairfax

SYSTEM NAME: Connector

GENERAL:

No. of Buses Operating: Fleet of 33, Peak requirement of 27

No. of Bus Routes: 10

Annual System Ridership: 3/86 - 3/87 1,020,000 Note: Ridership before reduced fare promotion

System Map: Enclosed

TIS OPERATION:

Weekday, Hours of Operation: 6:00 a.m. to 11:00 p.m.

Saturday, Hours of Operation: 6:00 a.m. to 10:00 p.m.

Sunday, Hours of Operation: -- a.m. to -- p.m. No TIS coverage

No. of Calls per Month for Own Jurisdiction: 1520 for 26 operating days

No. of Calls per Month for Other Jurisdictions: 124 for same period for Metro, DASH, FASTRAN and CUE

Calls During Peak Day of Month: No. Calls 148, Day 11/11/86, Veteran's Day

Calls During Peak Hour of Month: Est. No. Calls 50, Hour 9-10 AM, Day 11/11/86

No. of Information Agents on Duty: Average 1, Peak 1

No. of Information Agents on Staff: 1 Note: Non-business hours dispatcher etc answer route and schedule calls.

Information Aids Used by Agents: Large system map poster with bus stops pinpointed along each route.

Percentage of Lost Calls: Unknown

TIS EQUIPMENT:

No. of Telephones: 1 phone for route and schedule information

No. of Lines: 1 line not entirely dedicated for TIS purposes

Degree of Telephone Automation: None

Other Equipment: N/A

TIS SYSTEM COST:

Capital Cost (Yr) $ N/A

O&M Cost $ 5,000 for annual telephone expense

COMMENTS:

RIDE-ON
MONTGOMERY COUNTY

April 16, 1987

QUESTIONNAIRE - TRANSIT INFORMATION SYSTEM (TIS)

JURISDICTION: Montgomery County

SYSTEM NAME: Ride-On

GENERAL:

No. of Buses Operating	216
No. of Bus Routes	67
Annual System Ridership	8,000,000
System Map:	Enclosed

TIS OPERATION:

Weekday, Hours of Operation: 6:30 a.m. to 7 p.m.

Saturday, Hours of Operation: 8:30 a.m. to 4 p.m.

Sunday, Hours of Operation: 8:30 a.m. to 4 p.m.

No. of Calls per Month for Own Jurisdiction: 11,700

No. of Calls per Month for Other Jurisdictions: 1,300

Calls During Peak Day of Month: No. Calls 650, Day Monday

Calls During Peak Hour of Month: Est. No. Calls 100, Hour 9-10, Day Monday

No. of Information Agents on Duty: Average 4, Peak 6

No. of Information Agents on Staff: 6

Information Aids Used by Agents: (1) Ride-On Time Tables (2) System Map (3) ADC Atlases (Montgomery County, P.G. County, D.C., Northern Virginia) (4) Metrobus Timetables (5) All About Metro (6) MARC Timetables (7) Miscellaneous Brochures and Information Pieces

Percentage of Lost Calls: 3%

TIS EQUIPMENT:

No. of Telephones: 6

No. of Lines: 8

Degree of Telephone Automation: Call Holding Equipment, TTY Phone

Other Equipment: Typewriters

TIS SYSTEM COST:

Capital Cost (Yr) $ -

O&M Cost $170,000

COMMENTS:

1) We mail timetables and other information about 700 mailouts per month

2) About one fourth of our calls are referrals from WMATA. About 80% are for Multi-mode trips, often ending or beginning in other jurisdiction

3) We occasionally augment staff with light duty bus operators.

0152F

April 16, 1987

QUESTIONNAIRE - TRANSIT INFORMATION SYSTEM (TIS)

JURISDICTION: Prince George's County

SYSTEM NAME: Upper Marlboro Shuttle Service

GENERAL:

No. of Buses Operating 1

No. of Bus Routes 1

Annual System Ridership 11,913

System Map ATTACHED

TIS OPERATION:

Weekday, Hours of Operation 8:00 a.m. to 7:00 p.m.

Saturday, Hours of Operation N/A - a.m. to - p.m.

Sunday, Hours of Operation N/A - a.m. to - p.m.

No. of Calls per Month for Own Jurisdiction: 120

No. of Calls per Month for Other Jurisdictions: -

Calls During Peak Day of Month: No. Calls _____, Day _____

Calls During Peak Hour of Month: Est. No. Calls _____, Hour _____, Day _____

No. of Information Agents on Duty: Average 1, Peak 1

No. of Information Agents on Staff: Each member of staff can respond

Information Aids Used by Agents: Brochures

Percentage of Lost Calls: Not tracked

TIS EQUIPMENT:

No. of Telephones: 8 (Each staff member of staff can respond to request)

No. of Lines: 1 (952-3636)

Degree of Telephone Automation: AT&T System 85

Other Equipment: N/A

TIS SYSTEM COST:

Capital Cost (Yr) $ N/A -line is used for all Division of Transit business.

O&M Cost $

COMMENTS:

CALL-A-BUS
PRINCE GEORGE'S COUNTY

April 16, 1987

QUESTIONNAIRE - TRANSIT INFORMATION SYSTEM (TIS)

JURISDICTION: Prince George's County

SYSTEM NAME: Call-A-Bus

GENERAL:

No. of Buses Operating 8

No. of Bus Routes N/A demand-response

Annual System Ridership 10,364

System Map attached

TIS OPERATION:

Weekday, Hours of Operation 8:30 *a.m. to* 3:30 *p.m.*

Saturday, Hours of Operation N/A - *a.m. to* - *p.m.*

Sunday, Hours of Operation N/A - *a.m. to* - *p.m.*

No. of Calls per Month for Own Jurisdiction: 1,320

No. of Calls per Month for Other Jurisdictions: 20

Calls During Peak Day of Month: No. Calls 80, *Day* Thursday

Calls During Peak Hour of Month: Est. No. Calls 20, *Hour* 8 A.M. *Day* Thursday

No. of Information Agents on Duty: Average 1, *Peak* 1

No. of Information Agents on Staff: 1

Information Aids Used by Agents: Brochures, Wall Maps

Percentage of Lost Calls: 1%

CALL-A-BUS

TIS EQUIPMENT:

No. of Telephones: two

No. of Lines: two

Degree of Telephone Automation: Dial-type (C.A.B) ATT

Other Equipment:

TIS SYSTEM COST:

Capital Cost (Yr) $ 121,105 (FY87)

O&M Cost $ 120,000

COMMENTS:

COUNTY CALL-A-BUS SERVICE

Services are available to:

- All residents of Prince George's County within the service area.
- Handicapped individuals
- Senior citizens

Fares	One Way
Regular fare	$1.00
Senior citizens (age 55 and over)	$ .50
Handicapped Individuals	$ .50

To schedule a ride call:

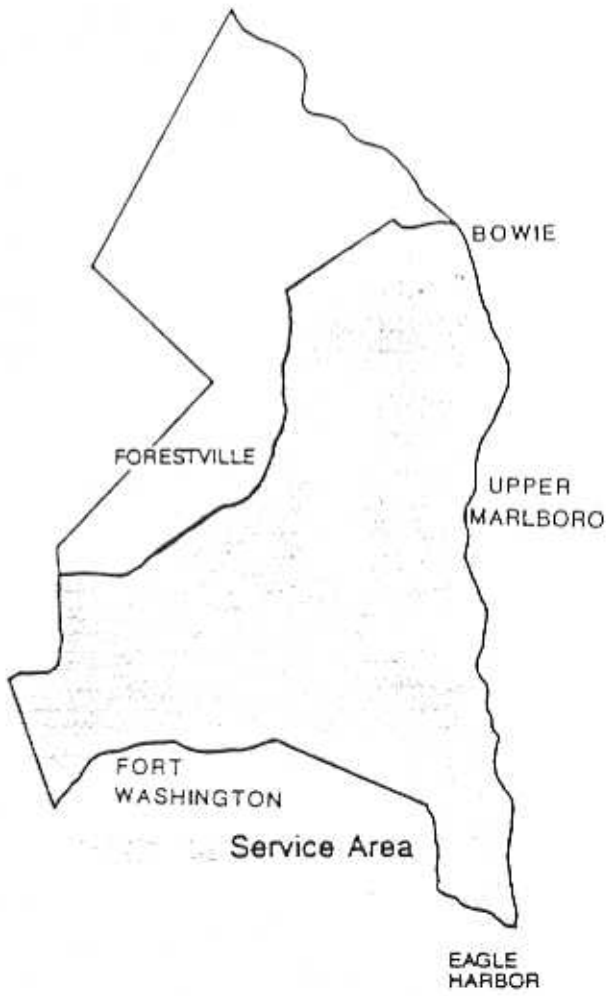
372-1255

lift equipped bus available for the non-ambulatory

Hours of Operation
8:30 AM – 3:30 PM
Monday thru Friday
excluding holidays.

(24 hour advance notice preferred)

PRINCE GEORGE'S COUNTY



Department of Public Works
and Transportation
CALL-A-BUS
12911 Cherry Tree Crossing Road
Brandywine, Maryland 20613

MARC

April 16, 1987

QUESTIONNAIRE - TRANSIT INFORMATION SYSTEM (TIS)

~~WMATA~~ Transit Information System

GENERAL:

No. of ~~Buses~~ Trains Operating 32 per weekday

No. of Bus Routes _____

No. of Bus Lines _____

No. of Rail Lines 3

Annual System Ridership Bus/Rail _____

Map of the System enclosed

TIS OPERATION:

Weekday, Hours of Operation 9:00 A.M. to 4:00 P.M.

Saturday, Hours of Operation _____ to _____

Sunday, Hours of Operation _____ to _____

Peak Day of Week; No. of Calls _____; _____

Peak Hour of Day; No. of Calls _____a.m. to _____a.m.; _____

_____p.m. to _____p.m.; _____

Average No. of Calls per Week Metro _____

Average No. of Calls per Week Others _____

Average No. of Calls per Week Lost _____

No. of Agents: 1st Shift _____; 2nd Shift _____; 3rd Shift _____

No. of Supervisors: 1st Shift _____; 2nd Shift _____; 3rd Shift _____

No. of Others: 1st Shift _____

2nd Shift _____

3rd Shift _____

When Answering a Call, Where Do Agents Get Their Information?

Memory 10 %

Hard Copy Data (Schedules & Maps) 90 %

Automated Display System _____ %

TELEPHONE EQUIPMENT & SYSTEM:

- *Type Distributor (Equipment & Manufacturer)* Siemens 1r - Dyad units serviced by Contel-Executone
- *Capacity:* *Trunks* 4
  Lines 24
  Receivers 26
- *Automation:*
  - *Are Calls Put on Hold Automatically? (yes/no)* No
  - *How Is Queue Released" (ex. first in, first out)?* N/A
  - *Does System Have Provisions for Recorded Announcements?* Yes
    If So, Descript Basic Recordings Usually, message tells them to call back during office hours; occasionally gives emergency service info.
  - *Does System Count the Calls Received?*
  - *Does System Count the Calls Answered?* > Yes - on phone bill.
  - *Does System Count the No. of Calls Handled at Each Work Station?* No
- *Other Significant Information*

COMPUTERS AND DISPLAYS:

- *How Many Computers Are Used?*
- *Name and Type of Computer(s):*
  N/A

- Is/Are Computer(s) Dedicated to the Telephone Information System? No

  If Not, What Other Fuanctions Are Performed?

  Word processing, accounting, specifications

- How Many Video Display Terminals Are Owned? 4

  How Many On-Line at One Time? 4

- Type Displays and Manufacturers.

  Unisys

APPLICATIONS PROGRAM: (Data Base Search, Retrieval, Handling)

- Who Wrote the Program? n/a
- How Is Data Base Constructed (ex. Grid System)?
  - No. of Bus Stops
  - No. of Routes
  - No. of Streets
  - No. of Intersections
  - Special Landmarks
  - Other
- Types of Basic Queries for Data Retrieval System (Answer Yes or No) n/a
  - Trip Itinerary
  - Boarding Time
  - Bus/Rail Stop Location
  - Service Information
  - Other

- *What Is Basis of Route Calculations?* N/A
  (Bus Only, Rail Only, Bus and Rail, Day of Week, Arrival or Departure Time)

TRAINING:

- *What Type of Information-Agent Training Is Provided?*
  OJT

SYSTEM DESCRIPTION AND COST:

- *Block Diagram of Telephone and Data-Display System Showing Equipment and Functional Descriptions.*

- *Capital Costs:*

- *O&M Cost:*

WMATA SYSTEM EXPANDABILITY:

- *How many display terminals does the present system handle?* 4

  What is the maximum number it can handle and still provide the equivalent display information? ∞

- *What are the present limitations of the current system? (Include: telephone equipment, computers, displays, interfacing equipment and software)*

  Lack of equipment and manpower

DISTRICT

April 16, 1987

QUESTIONNAIRE - TRANSIT INFORMATION SYSTEM (TIS)

JURISDICTION: District of Columbia

SYSTEM NAME: Not Applicable

GENERAL:

No. of Buses Operating _____

No. of Bus Routes _____

Annual System Ridership _____

System Map

TIS OPERATION:

Weekday, Hours of Operation _____a.m. to _____p.m.

Saturday, Hours of Operation _____a.m. to _____p.m.

Sunday, Hours of Operation _____a.m. to _____p.m.

No. of Calls per Month for Own Jurisdiction: _____

No. of Calls per Month for Other Jurisdictions: _____

Calls During Peak Day of Month: No. Calls _____, *Day* _____

Calls During Peak Hour of Month: Est. No. Calls _____, *Hour* _____, *Day* _____

No. of Information Agents on Duty: Average _____, *Peak* _____

No. of Information Agents on Staff: _____

Information Aids Used by Agents: _____

_____

_____

_____

_____

_____

_____

_____

Percentage of Lost Calls: _____

APPENDIX 2

CALL FORWARDING


Betty Goldsberry
Service Representative
C&P Telephone
A Bell Atlantic Company
P.O. Box 7530
Falls Church, Virginia 22046
Telephone (703) 241-6902

*NORVA
Effective 5-1-87

MESSAGE BUSINESS SERVICE

Lines	Monthly	Installation
1	$ 15.50	$ 64.00
2	37.62	90.80
3	56.43	117.60
4	75.24	144.40
5	94.05	171.20
6	112.86	198.00
7	131.67	224.80
8	150.48	251.60
9	169.29	278.40
10	188.10	305.20
11	206.91	332.00
12	225.72	358.80

AVAILABLE FEATURES

Call Forwarding	$4.00 per line
3 Way Calling	4.00 per line
Call Waiting	4.00 per line
Speed Calling	
-8 Codes	2.00 per line
-30 Codes	4.50 per line
Hunting	.88 per line

- 100 % OF ALL monthly rates ARE SUBJECT to Local + Federal TAXES

- ALL LOCAL CALL 10.3 ¢

CENTREX MVP 6 & 30

Lines	Monthly	Installation
1	N/A	$ 64.00 + 200.00 Service Establishment Charge
2	36.98	290.80
3	55.47	317.60
4	73.96	344.40
5	92.45	371.20
6	110.94	398.00
7	128.31	$224.80 + 500.00 S.E.C.
8	146.64	751.60
9	164.97	778.40
10	183.30	805.20
11	201.63	832.00
12	219.96	858.80

50 % OF ALL monthly rates ARE SUBJE TO LOCAL + Federal taxes

AVAILABLE FEATURES

Call Forwarding - Variable	FREE
Call Forwarding - Busy line	FREE
Call Forwarding - Don't Answer	FREE
3 Way Calling	FREE
Call Waiting	FREE
Speed Calling	
-6 Codes	FREE
-30 Codes	FREE
Hunting	FREE
Call Pick-up and Hold	FREE
Call Transfer	FREE
Consultation Hold	FREE
Touchtone	FREE
Line to Line Intercom	FREE

APPENDIX 3

COST SHARING

COST SHARING

First Time Cost Sharing Analysis, Alternative 2, Northern Virginia Only (See P. 18)

Hardware	$ 1,880	5% of total
Data Analysis & Entry	7,000	20% of total
Training	26,060	75% of total
	$34,940	100% Total

Hardware and Data Analysis and Entry consitute 25% of first time costs and Training consitutes 75% of first time costs (see above).

Hardware and Data Entry costs are much more sensitive to the number of bus routes as opposed to the number of buses, the annual ridership and the number of calls per month. Hence, the cost of hardware and data entry (25% of total cost) is portioned out to the operators according to the number of routes that they operate.

Training costs depend on the number of people to be trained. The number of people to be trained depends on the number of telephone calls to be handled. Hence, the cost of training (75% of total cost) is portioned out to the operators according to the number of calls each handles.

The total first-time cost sharing ratio for each operator:

25% x Operator's number of routes ÷ Total Routes of all Virginia operators + 75% x Operator's number of calls ÷ number of calls of all Virginia operators = Operators first time cost sharing ratio.

Annual Operating Cost Sharing Analysis, Alternative 2, Northern Virginia Only (See P. 18)

Computer Services	$ 3,740	5% of total
Data Entry	600	1% of total
Agent & Coord. Labor	66,000	94% of total
	$70,340	100% Total

Hardware and Data Entry consitute 6% of the total annual operating cost while agent and coordinating labor constitute 94% of the total annual operating cost.

Hardware and Data Entry costs are sensitive to the number of bus routes. Hence, the cost of labor (94% of total cost) is portioned out to the operators according to the number of calls each handles.

The total annual operating cost sharing ratio for each operator:

6% x Operator's number of routes ÷ Total Routes of all Virginia operators + 94% x Operator's number of calls ÷ Total number of calls of all Virginia operators = Operator's Annual Operating Cost Sharing Ratio.

First Time Cost Sharing Analysis, Alternative 2,
Northern Virginia and Montgomery County

	Northern Virginia & Montgomery County
Hardware Cost	6% of total cost
Data Entry Cost	22% of total cost
Training Cost	72% of total cost
	100%

∴ Formula for each operating sharing ratio, Northern Virginia and Montgomery County.

Total Sharing Ratio = 28% x Route Ratio + 72% Calls Ratio

Annual Operations Cost Sharing Analysis, Alternative 2,
Northern Virginia and Montgomery County

	Northern Virginia & Montgomery County
Computer Services	12% of total cost
Data Entry Cost	2% of total cost
Labor	86% of total cost
	100%

∴ Formula for each operator

Northern Virginia and Montgomery County:

Total Sharing Ratio = 14% x Route Ratio + 86% Calls Ratio

COST SHARING RATIOS

VIRGINIA ONLY

	NO. BUSES	NO. ROUTES	ANNUAL RIDERSHIP	CALLS PER MO.	ANNUAL OPERATIONS COST SHARING	FIRST-TIME COST SHARING SHARING
CONNECTOR	0.54	0.48	0.38	.47	(.06)(.48) + (.94)(.47)= .47	(.25)(.48) + (.75) (.47)=.47
DASH	0.31	0.19	0.44	.36	(.06)(.19) + (.94)(.36)= .35	(.25)(.19) + (.75) (.36)=.32
CUE	0.15	0.33	0.18	.17	(.06)(.33) + (.94)(.17)= .18	(.25)(.33) + (.75) (.17)=.21

VIRGINIA & MONTGOMERY COUNTY

	NO. BUSES	NO. ROUTES	ANNUAL RIDERSHIP	CALLS PER MO.	ANNUAL OPERATIONS COST SHARING	FIRST-TIME COST SHARING SHARING
CONNECTOR	0.12	0.11	0.10	.10	(.14)(.11) + (.86)(.10)= .10	(.28)(.11) + (.72)(.10)= .103
DASH	0.07	0.05	0.11	.08	(.14)(.05) + (.86)(.08)= .08	(.28)(.05) + (.72)(.08)= .072
CUE	0.03	0.08	0.04	.03	(.14)(.08) + (.86)(.03) = .04	(.28)(.08) + (.72)(.03) = .044
RIDE-ON	0.78	0.76	0.75	.79	(.14)(.76) + (.86)(.79)= .79	(.28)(.76) + (.72)(.79)= .781

↓ Sharing Factor

APPENDIX 4

WMATA ROUTE FORMAT

BUS STOP		DIRECTION	STOP			ZONE		ROUTES	FARE ZONE	SHELTER	TYPE SIGN	CATALOG	COMMENTS
ON STREET	AT STREET		LOCATION	AUTHORITY	DATE ESTAB.	CAPACITY	AUTHORITY						
US Route 1	S. 20TH ST	S	N	77-30	7-26-77			9A 9E 13A 13B 13F 13G P13	G	ARL	F	01	
(Sch. Pass. Hwy-Automobile Co.)	" "	N	N					9A 9E 13A 13B 13F 13G 23A 23T P13	G	ARL	F	01	
	S. 23RD ST.	S	N					9A 9E 13A 13B 13F 13G P13	G	ARL	F	01	
	" "	N	F					9A 9E 13A 13B 13F 13G 23A 23T P13	G	ARL	F	01	
	S. 26TH ST.	N	F					"9A 9E End Zone 1 - Begin Zone G"	1/G		F	12	BENCH - UNDER RT 233 OVERPASS
	" " (EXTD)	S	N	77-65	12-7-77			"9A 9E End Zone G - Begin Zone 1"	G/1		F	12	" " " "
5486 3553	FORT SCOTT DR	S	F					9A 9E	1		F	01	
	BUDGET RENT-A-CAR	N	N	82-17	5-21-82			9A 9E	1		F	01	S. OF DRWY. TO - S. OF FT. SCOTT DR.
	DOLLAR RENT-A-CAR	S	M					9A 9E	1		F	01	(EXT) N. END OF FOUR DIV. BUS LOT
5487 3816	" "	N	M					9A 9E	1		F	01	(OPP) " " " " "
70	S. GLEBE RD	S	N					9A 9E	1		F	01	
(ARLINGTON) Co.	" " (EXTD)	N	N					9A 9E	1		F	01	
(ALEXANDRIA)	PREM. # 3800	S	F	86-16	6-30-86			9A 9E	1		F	01	ENTR. TO HERTZ RENT-A-CAR
	" " (EXTD)	N	N	86-4	4-22-86			9A 9E	1		F	01	" " " (@ CATCH BASIN)
	E. REED AVE.	N	F					9A 9E	1		F	01	BUS BAY
3305	E. LYNN HAVEN DR (EXTD)	S	N					9A 9E	1		F	01	INTERSECTION CUT OFF
	EVANS LA.	S	N					9A 9E	1		F	01	
	" " (EXTD)	N	N					9A 9E	1		F	01	BUS BAY
	WESMOND DR (EXTD)	S	N					9A 9E	1		F	01	
	E. GLEBE RD.	S	N					9A 9E	1		F	01	
	" " (EXTD)	N	N					9A 9E	1		F	01	BUS BAY
	E. SWANN AVE	S	N					9A 9E	1		F	01	
	" " (EXTD)	N	F					9A 9E	1		F	01	BUS BAY
	E. CUSTIS AVE	S	N					9A 9E	1		F	01	" " - N. OF OLD TUNNEL
	" " (EXTD)	N	N					9A 9E	1		F	01	" "
	E. HOWELL AVE (EXTD)	N	N					9A 9E	1		F	01	" "
	E. BELLEFONTE AVE	S	N					9A 9E	1		F	01	" "
3163	E. MONROE AVE	S	N					9A 9E	1		F	01	APPROX. 120' N. OF -

Page 1-9A

Total 28

Nearside	20	Midblock	2
Farside	6		