

Report On

**PROPOSED WASHINGTON-ALEXANDRIA-FRANCONIA
COMMUTER TRAIN SERVICE**

Prepared For

Northern Virginia Transportation Commission
Room 211, Citizen Resources Building
1430 North Uhle Street
Arlington, Virginia 22201

By

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March 1967

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March 2, 1967

Mr. Gordon J. Thompson
Executive Director
Northern Virginia Transportation Commission
1430 North Uhle Street
Arlington, Virginia 22201

Dear Mr. Thompson,

As requested in your letter of February tenth, I have reviewed plans submitted to me for the provision of commuter railroad service between Washington, District of Columbia and Franconia, Virginia, over the Richmond, Fredericksburg & Potomac Railroad via Alexandria, Virginia.

It appears that inherent highway congestion, inadequate parking space, overall economy of urban resources, and public convenience all call for fast, reliable, comfortable service such as proposed. A demonstration proving its value would be most productive.

The Alexandria, Barcroft & Washington Transit Company is one of the best operated suburban bus services in the nation, but it is hampered by traffic congestion and very sharp peaks of traffic which work against efficient utilization of buses and men. In cooperation with rail commuter service, AB&W should retain 97 1/2% of its present riders, gain 1/2% of new riders, and be able to retire ten (4%) of its oldest buses, leaving the operation in a stronger financial position, while the public enjoys a wider variety of improved transportation facilities. The rail commuter service will not impair the financial position of any of AB&W's employees.

Appended hereto are my more detailed estimates of your situation, with suggestions for possible reductions in cost.

It has been a distinct pleasure to have had the opportunity to participate in this interesting project.

Respectfully Submitted,



E. L. Tennyson, P.E.

Report on the Proposed NVTC
WASHINGTON-ALEXANDRIA-FRANCONIA COMMUTER TRAIN SERVICE
E. L. Tennyson, P. E.

Before engaging in engineering detail, it must be determined if there is any basic need for a railroad commuter service such as being studied by the staff of NVTC.

All indicators are positive. The National Capital's suburbs are among the highest density anywhere,⁽¹⁾ with resultant highway congestion in Northern Virginia and in Washington. Transit use is relatively low in the suburban area of Washington, being only half as acceptable as commuter rail service in Chicago, Boston, Philadelphia or Pittsburgh.⁽²⁾ Many extensive and intensive reports have been published to document the need for better commuting facilities to and from Washington.⁽³⁾

With specific reference to the RF&P corridor, Shirley Highway is and will continue to be congested, as this type of facility inherently attracts more peak hour traffic than it can handle. Every major expressway has the same problem in suburban areas. The construction of the HUD and Forrestal Buildings in Southwest Mall has removed large parking areas and will introduce thousands of new employees in this area. Virginia transit service does not reach Southwest Mall as a general rule. Commuter service will answer both of these problems.

Suburban bus service is as good as can be operated in this area, but circuitous routings to new developments and congested streets and highways reduce speed to a level too low to compete effectively with the private automobile. Commuter rail service should improve bus service by relieving highway congestion, eliminating some of the most inefficient and costly bus runs (Route 18, etc.) and introducing new flexibility of trip making in combination with commuter trains as well as by bus alone.

Granted that congestion is a problem. will commuters ride trains in 1967? The answer is strongly suggestive of yes, very much so. In Chicago, the major commuter railroad exceeded 80,000 riders a day last year for a 6% gain over 1965.⁽⁴⁾ In Philadelphia, commuter volumes continue upward. Across the nation, while bus traffic has fallen off about 60% over the past two decades,⁽⁵⁾ rail commuter volumes have fallen only where service has been discontinued for financial reasons, and most lines now carry far more at rush hours than they did in prior years. A detailed study in Philadelphia has revealed that when rail and auto time is equal,

(1) NCTA report to Congress

(2) Census report January 30, 1963 pc(51)-41

(3) DeLeuw, Cather, NCTA, National Capital Planning, etc.

(4) Wall Street Journal

(5) Moody's Transportation Manual

two-car families commute to downtown by rail 65% and auto 35%.⁽⁶⁾ The rail percentage is now even higher, as rail service has been gaining riders at a rapid pace. In Chicago, a higher percentage of commuters use trains than even in Philadelphia. New York will not be considered because of its peculiar and unique conditions.

Rail service is often faster than highway travel to work in the center of a city. As a result, 72% of the commuters use transit and 28% use automobiles.⁽⁷⁾ In Northern Virginia, 60% use automobiles, hence the problem. There is now no faster way to travel. There is need for a better, faster, safer, more efficient way.

PROPOSAL

The staff of the Northern Virginia Transportation Commission has proposed that a modern rail commuter service be activated on the main line of the Richmond, Fredericksburg & Potomac Railroad from Southwest Mall (7th Street) in Washington to Powhatan Street near Monroe Avenue and Union Station between Duke and King Streets in Alexandria, Van Dorn Street beyond Cameron Station, and Franconia Road near Springfield. Auto parking would be provided for commuters to leave their cars and ride the train. This has become the accepted way to travel in other major cities. Feeder buses would also be provided as part of the general bus system serving the public at large. Not many suburbanites will use feeder buses.

As soon as construction permits, additional stations would be added at Crystal Plaza for the Pentagon, and at Telegraph Road for that part of Fairfax County, again with parking. Stations would be simple, clean, heated shelters. Tickets would be bought at Alexandria Union Station, Southwest Mall, or Washington Union Station, where a few of the rush hour trains would tie up. Tracks would be resigalled for flexible operation and 99% on-time performance can be expected.

RECOMMENDED BUS SERVICE ADJUSTMENT TO COORDINATE FEEDER BUSES WITH RAIL COMMUTER SERVICE.

AB&W Transit Company serves 10,000,000 annual or 36,000 week-day interstate passengers and 6,000,000 or 21,600 intrastate riders. The route pattern gives excellent coverage throughout the area, but to do so, an overcomplicated and intricately varied route pattern has evolved which is beyond general comprehension, even for regular riders at different than usual travel times.

Rail transit is obviously the opposite, with a simple direct spine. Because of the wide difference, rail transit will not

⁽⁶⁾ Penn-Jersey Transportation Study, Volume 1, page 83, chart 14.

⁽⁷⁾ Penn-Jersey Transportation Study, Volume 1, page 81.

greatly alter the bus system, but should complement it and make possible some simplification of bus schedules.

About 2½% of the bus riders will find rail service better for them and will shift. Most of the new riders will come from automobiles, as with Chicago's "Skokie Swift", serving the same population as found along the RF&P. Without correlation, these estimates duplicate Skokie Swift travel volume. While "Swift" had more than a 2½% effect on the adjacent parallel bus line, the effect was small. The effect of Skokie Swift was higher because of 100% parallel and adjacent bus service whereas most of AB&W's lines are not parallel to the RF&P, or they stop conveniently between stations where they are parallel.

Feeder bus service to rail stations will restore to AB&W little of the 2½% that they lost, but feeder passengers can be handled without additional buses, so that nine old buses and one spare can be retired, saving \$205,000 per year. The revenue loss can be expected to be \$175,000 and the new feeder revenue \$96,000, leaving AB&W \$126,000 ahead.

One exception to the minor overall impact on AB&W will be in the Springfield area where travel time will be cut from nearly an hour to 37 minutes by feeder bus and train, including transfer time, to Southwest Mall. Even to Federal Triangle, the rail route will be 10 minutes faster after using a D. C. Transit system bus in Washington. With a ten minute saving, 64% will prefer the rail and bus to direct bus.

Obviously then, rail service will impact heavily on bus route 18, which has only two trips each way each day to Washington. The four morning and five evening buses required on this line can be converted to feeder buses, saving one in the evening peak. This will permit much greater coverage of the area, give faster trips to work, and permit a greater frequency of service over a greater time span at less cost.

For example, pending more detailed study, it is recommended that Route 18, and like it, Route 1, be abolished in favor of a new Route 1 which would begin at the Franconia Station, then proceed west to Keene Mill Rd., Hanover Ave., Floyd Ave., Backlick Rd., Braddock Rd., Duke St., Lincolnia Rd., and South Van Dorn St., to Van Dorn Station. Buses would meet all rush-hour trains and some mid-day trains. Even from Lincolnia, time to S.W. Mall via bus and rail would be but 36 minutes compared to 45 minutes via Shirley Highway express bus and one hour local in the rush hour on Route 7F. The diversion of motorists to trains will relieve Shirley Highway traffic, accelerating the speed of those buses which continue to operate.

Route 18 would be reinstated from Van Dorn Station via Edsall Road through Bren Mar Park to Backlick Rd., then Leesville Blvd., Glen Allen St., Chatham St., Garner St., Elgar St., Heming Ave., Braddock Rd., Queensbury Ave., Heming Ave., Chatham St., and

return to Van Dorn Station. Route 16 would be cut back to Braddock, offering a 55 minute ride to S.W. Mall via the new 18 instead of 60 minutes via 16 from Queensbury and Heming. From Bren Mar Park the advantage is more startling, with a saving of eight minutes and three times as much service.

Bus Route 4 becomes largely superfluous with rail service also. It has only two buses an hour apart and few passengers. The new route 18 would replace the western end. Routes 11 and 16 can replace the Duke Street extended portion, while 7 and 8 cover the Brookville portion. Route 4 would become a King Street service at alternate half hours from Route 3 looping via Braddock Rd., Howard St., Seminary Rd., and Quaker Lane to King Street. With Route 4 on King, Route 6 should concentrate on Janneys Lane off peak to simplify the service pattern, with Route 6P trips augmenting Route 4 on King.

Route 7A would be extended from Edsall to Van Dorn Station with originating and terminating garage trips going into service at Franconia and Van Dorn each time there is a train.

Route 8 should be restored in non-rush hours, and garage trips extended via Duke Street and Pickett Street to Van Dorn. This will give Shirley Duke a 38 minute run to S. W. Mall as compared to 41 by Shirley Highway express bus. Only 25% of this group would prefer rail to bus, but Cameron Station is along the way.

Route 9 should be shifted to Kings Highway and Telegraph Road to feed trains, then operate via National Airport. Time from Jefferson Manor and beyond would be cut from 44 minutes to 26 minutes. A branch would serve more of Telegraph Road and Virginia Hills and Rose Hill Farms.

Route 10 might be diverted to Crystal Plaza and tied in with Route 22 to save a bus. Transfers would be carefully scheduled for Alexandria. Many opportunities abound for convenient transfers.

Routes 11A and 11D should be rerouted via Powhatan and Jefferson Davis to replace Route 9. This will also give Bucknell Manor a 53 minute bus and rail ride instead of an hour by bus alone. The off-peak Hunting Towers trips would be discontinued as a few passengers shift to the train. Route 11R would continue via National Airport, with a few trips extended to Annandale in lieu of Route 4 which is less direct, and proposed for truncation.

Route 12 should be shifted from West St. to Russell Rd. to give access to Alexandria Station. From Braddock and Cameron Mills it will become only 24 minutes via bus-rail to S. W. Mall, opposed to 31 by bus direct.

Route 14 would then be shifted from Russell Rd. to West St., Braddock Rd. and Commonwealth Ave., to Monroe Ave. to replace Route 12.

Center and Judiciary Square in four minutes (Routes D2 and D4), the Senate Office Buildings in two minutes and the Supreme Court, Capitol and Library of Congress in four minutes (Route 90), and a variety of other points in northeast and northwest Washington within ten minutes, or 40 minutes from Franconia, or 30 minutes from Alexandria. The standard WMATC joint ticket would be used to permit the equivalent of a 10¢ ride.

RAIL BUS CONNECTIONS POSSIBLE

<u>STATION</u>	<u>BUS ROUTE</u>	<u>TO</u>
S. W. Mall	72-74-R-3-Minibus	Downtown Washington
Portal	50- V4-V6	Downtown Washington and Navy Yard
Crystal Plaza	10-22	Shirlington, Pentagon, T-7, National Airport
Powhatan	11-15	Old Alexandria, Bucknell, Fort Hunt, Monroe Ave.
Alexandria	3-4-6-9-11R-12-13	King, Braddock, Russell, Duke, Janneys
Telegraph	9	Ft. Belvoir, Virginia Hills
Van Dorn	1-7-8-18	Landmark, Lincolnia, Braddock Acres, Oakwood, Pickett, Shirley Duke, Edsall, Bren Mar Park, North Springfield
Franconia	1-15	Springfield, Backlick, Keene Mill

SCHEDULES

The NVTC staff has confirmed the importance of arrivals in Washington at Southwest Mall at 8:20 am and 8:45 am. Because of the round trip running time of the trains, earlier arrivals would be at 7:10 am and 7:45 am. During the mid-day, service would be less often, but extended by alternate trips to Union Station for "North-east Corridor" train connections and transfers to Northeast Wash- ington bus routes. Returning, the key times are 4:40 pm and 5:10 pm, with following trips as soon as possible at 5:45 pm and 6:20 pm. Two later trips should also be operated for overtime workers and late store hours. Since mid-day service is low volume, only as many trips would be operated as fit within a trainman's basic day.

On the other hand, when the Forrestal Building is completed in 1968, a demand will be created for travel between it and the Pentagon during daily office hours. The commuter service could provide a frequent shuttle operation between the two buildings by

using otherwise idle equipment. The railroad runs past the rear of the Forrestal Building and the track could be relaid to the Pentagon. Such a shuttle would require the support of the Department of Defense, and could not be permitted to interfere with existing train movements.

In order for 15 cars to service the calculated potential, only two trains can be operated at one time, each of seven cars (1000 riders) and a spare car. These two trains will move the equivalent of two four-lane arterial highways during rush hours. The railroad might prefer three trains with more layover time for insurance, but this is too expensive to be justified. The 65 minute cycles recommended are standard practice in Philadelphia operations.

With buses, a 30-minute frequency is not considered good rush hour service, but with trains it is quite acceptable because of the higher speed, more seating and punctual performance. Passengers know and trust the schedule and allow only 4 or 5 minutes to wait. Park and riders allow even less. It is the fastest way to reach the office.

PATRONAGE

There are three realistic methods for estimating patronage. Surveys have developed gravity models which predict the number of rides each person will take, based upon the distance from downtown. Close in, people take 100 rides a year, but farther out it drops to 30, and at Woodbridge to as few as ten. This is a standard phenomenon across the nation from Boston to San Francisco.

Another method is to count the present trips being made in the area, and compare the relative travel time of the new service with present times. Using experience tables, the percentage expected to use the new line can be determined, but this makes no allowance for people relocating to take advantage of better service.

A third method is to study the census reports on means of travel to work. This discloses that suburban areas with rail service see 35% (except New York) using it, not just to downtown but to the entire city. Cities without rail service, like Washington, experience only 18% or less using buses.⁽⁸⁾ It is remarkable that suburban rail transit takes more men to their jobs in five cities than all of the suburban buses in the entire nation.⁽⁸⁾ The reason is speed and reliability.

All three methods suggest well over 2,000,000 annual rides or 9000 weekday rides on a Franconia commuter line. Assuming that service begins in 1968, this level of riding would be reached during 1970.

(8) Census report January 30, 1963 pc(51)-41

FARES

Fares are based on proposed AB&W fares plus 10¢ for a bus-to-train transfer. These fares are not low and do not appear changeable. With sharing on joint rides with the buses, they will produce just over \$1,000,000 per year. The first year, only 67% of that amount should be expected. The second year, 90% of it. The fourth year should gross 105%, and the fifth year 110%.

Operating costs are in two categories: direct actual cash costs, and pro rata payments for use of joint facilities shared with other trains. Direct costs are readily computed, and approximate \$900,000 per year. Other costs are larger because of the Washington Union Terminal law and subsidizing agreements. If the law could be changed as it relates to local intra-area commuter service, great savings would be possible in assessments required for service not performed. This does not refer to the employees, but to overhead charges.

It is only fair to pay RF&P for the occupancy of their tracks and valuable property, and the attention of their executives. It is recommended that \$136,000 be paid annually for indirect expenses of RF&P, which company will also benefit from a unit reduction in Union Station costs as NVTC picks up some of it. Should the railroad find its effort more costly than \$136,000, it would not be unreasonable to negotiate a figure more realistic to them.

ALTERNATIVES

The staff has proposed the use of stainless steel rail diesel cars which seem ideal for this type of service. However, with seven-car trains, it appears less costly to use locomotives and trailing coaches, still air conditioned, electrically heated, and of stainless steel to prevent corrosion, retain light weight, and avoid painting expense.

In past years, locomotives were impossibly inefficient for commuter service, but in recent years the Chicago & North Western, Milwaukee Road, Reading, Canadian National, and possibly other railroads have inaugurated "push-pull" trains which permit the crew to operate from either end of the train without changing the locomotive. The train can be readily shortened by having a special cab car in the center of the train. This type of equipment should save \$204,000 on the Franconia run, each year.

Another major saving appears possible by constructing a cross-over and pair of sidings at Woodbridge, with a locomotive shed for overnight storage of both trains. One man would be on duty overnight from 9:15 pm to 6:15 am to provide security and make minor adjustments. A cleaner would also work here. By avoiding 28 car

moves at Union Station, this will save \$150,000 per year but will add \$230,000 to capital investment. The rate of return is rapid. All trains would not operate to Woodbridge -- only those trips on which crews sign on or off. The train would be ten minutes faster than Greyhound, but would attract only \$8,000 in annual revenue.

Electrification is also a possibility if rapid transit on separate tracks is not planned for Alexandria. While rapid transit would have many advantages, it would require tens of millions of investment that might better be employed on other areas with more population and no existing railroad. Electrification will give faster, less costly service and would permit through service from Bowie and Landover, Maryland, to Virginia. The diesel equipment would continue as additional rush-hour-only trains. Electric trains could not use Union Station, but can reach Virginia via the Pennsylvania Railroad's electrified Benning route. Electrification might extend only to the Pentagon, with diesel trains being extended north from Union Station to College Park, Maryland, and on some trips to Laurel, Maryland, where Columbia travel may develop. This would give Maryland service, at less cost than separately. The point here is to make investments that will fit future alternatives.

One final possibility with respect to this service is that of service between Washington and Richmond on weekends, when travel is usually heavier. One set of commuter equipment might leave Washington at 5 pm Sunday evening ahead of RF&P train number 1 to avoid putting short rides on long trains, returning at 7:30 pm from Richmond at a popular time when there is no train. For this operation the locomotive would change ends. The third, or spare, locomotive if push pull design is used, would be available for main line service, anytime provided it was back when needed. This suggestion is made to save NVTC up to \$20,000 per year by sharing costs with RF&P. Just 100 passengers each way to and from Richmond each Sunday would net RF&P \$10,000 incremental profit as well as reducing NVTC expense.

The following Exhibits are attached to substantiate the explanation preceding:

1. Map of Proposed Washington-Alexandria-Franconia Commuter Train Service.
2. Recommended Schedule; Railroad Commuter Trains.
3. Map of Feeder Bus Routes in Suburban Area.
4. Map of Feeder Bus Routes in Downtown Area.
5. Recommended Schedule; Proposed Feeder Bus Route 1 (to show how greatly expanded service can be provided in the Springfield area at less cost than present infrequent service).

6. Recommended Schedule; Proposed Feeder Bus Route 18 (same purpose as Exhibit 5).

7. Station Access.

8. Travel Time Improvement With Rail Service.

9. Estimated Annual Revenue.

10. Estimated Annual Costs.

11. Economic Advantages of Rail Commuter Service.

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PROPOSED WASHINGTON-ALEXANDRIA-FRANCONIA COMMUTER TRAIN SERVICE

EXHIBIT 1

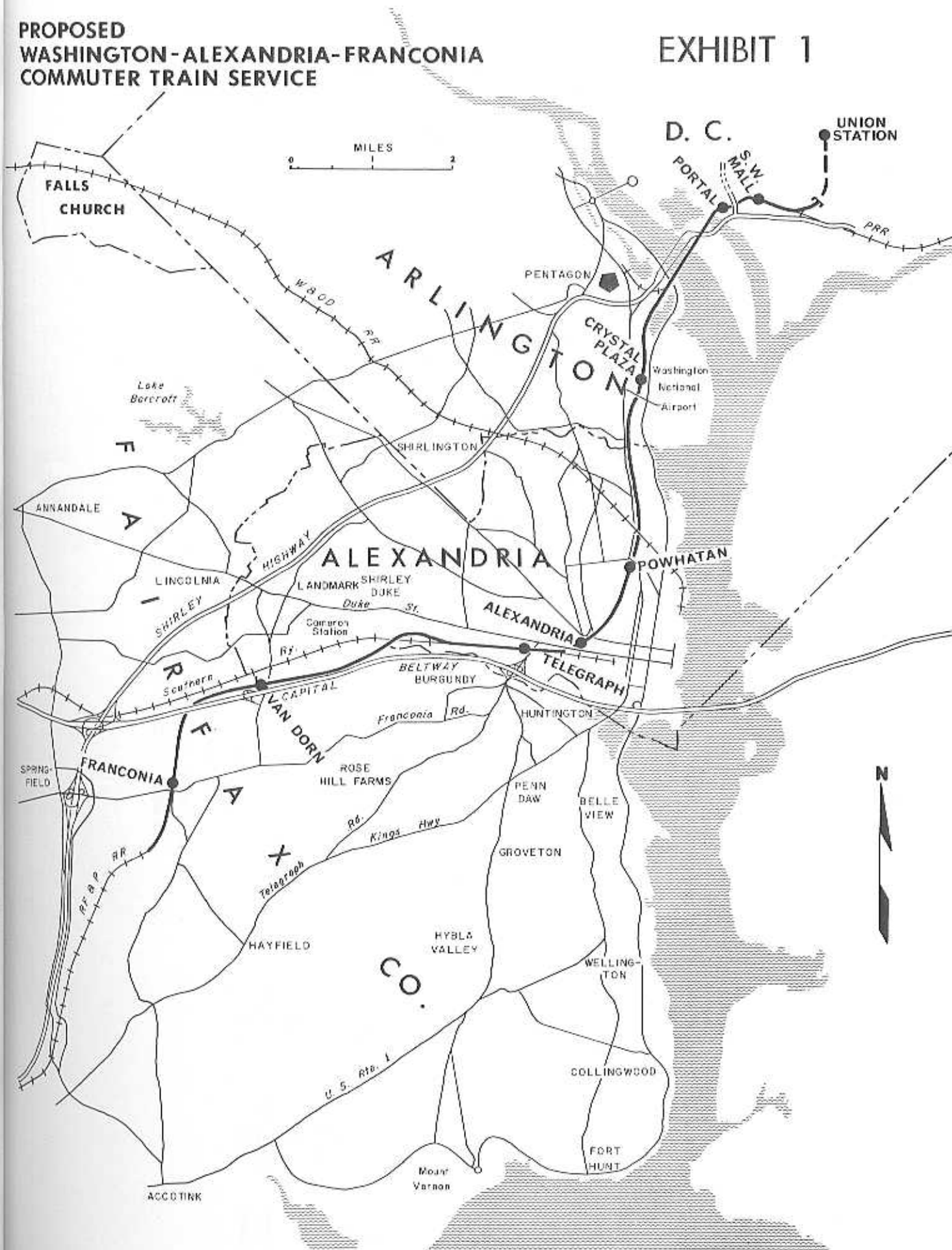
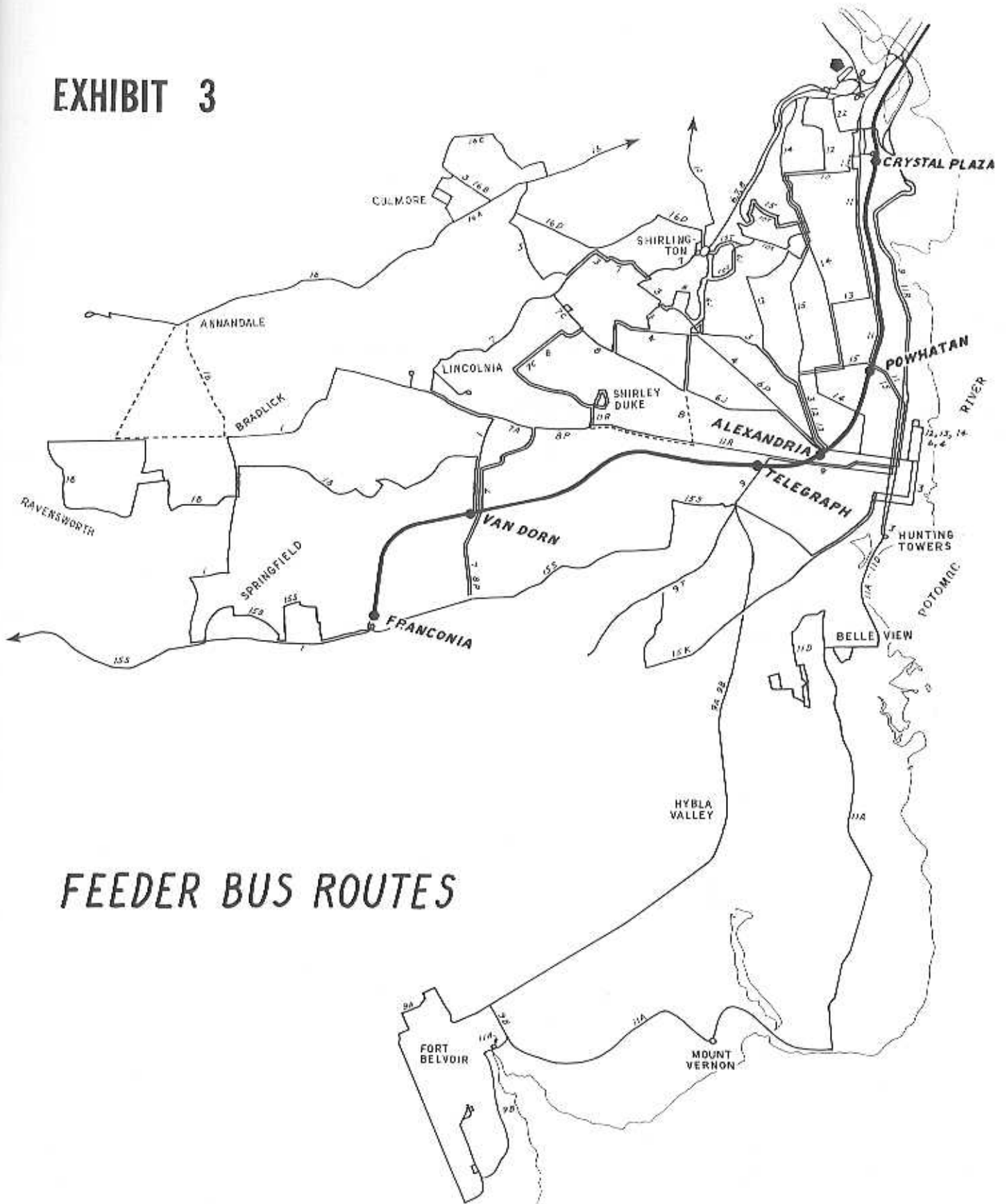
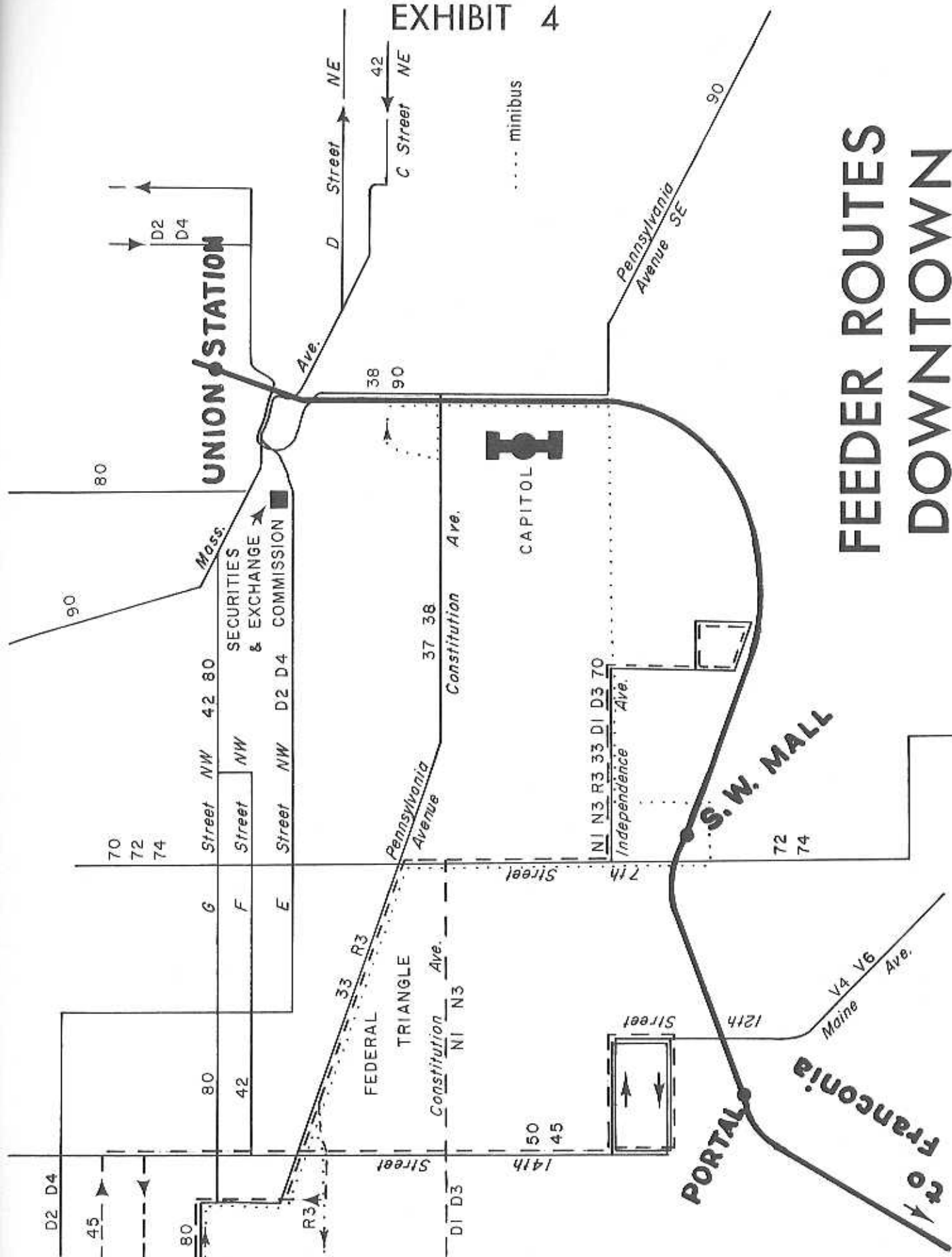


EXHIBIT 3



FEEDER BUS ROUTES

EXHIBIT 4



FEEDER ROUTES DOWNTOWN

NVTC RF&P

PROPOSED FEEDER BUS ROUTE 18

EDSALL - NORTH SPRINGFIELD

Miles	Run 1	Run 2	Run 2	Run 1	Run 1	Run 4	Run 1	Run 4	Run 1	Run 4
VAN DORN STATION	0									
Bren Mar Park	2.2	6:48	7:13	8:22	7:15	4:22	5:04	5:39	6:17	
Chatham-Glen Allen	5.5	6:57	7:22	8:30	3:24	4:31	5:13	5:48	6:26	
Braddock-Ravenworth	6.6	7:11	7:36	8:44	3:38	4:44	5:27	6:02	6:40	
Queensbury-Heming	8.5	6:09	7:16	8:49	3:43	4:49	5:32	6:07	6:45	
Chatham-Glen Allen	9.2	6:17	7:24	8:57	3:50	4:57	5:40	6:15	6:53	
Bren Mar Park	12.5	6:34	7:41	9:15	3:53	5:01	5:44	6:19	6:57	
VAN DORN STATION	14.7	6:43	7:54	9:24	4:08	5:15	5:58	6:33	7:11	
		6:43	7:14	7:24	4:17	5:24	6:07	6:42	7:20	
		turn for 6:48	to 7P 7:28	turn for 8:22	turn for 4:22	turn for 5:39	turn for 6:17	turn for 6:42	turn for 7:20	

Run 4 in afternoon to make on 8R for Date end Quaker will have to transfer to 8P.

can work route 8R from Navy Annex 4:35 pm more efficient use of men and buses. Passengers

- A - Connects with bus route 7A
- B - Connects with bus route 7B
- N - Connects with bus route 7N
- T - Commuter train connection
- X - Connects with bus route 7x

N V T C R F & P

PROPOSED FEEDER BUS ROUTE 1 LINCOLNIA - BRADDOCK RD - SPRINGFIELD

Miles	to TN	to TP	to IIR	Run	dead head	Run	Run	Run	Run	from	from	Run	Run	Run
	6:47	7:27	8:09	4	Penon	2	2	3	2	7P	5:33	7X	2	2
					8:01							6:10		
FRANCONIA STATION .0	6:04	6:34	7:12	7:36	8:42	7:50	3:20	4:19	5:07	5:42	6:20	8:20	7:45	9:45
Hanover-Floyd 3.0	6:16	6:46	7:24	7:48	8:54	2:02	3:33	4:33	5:21	5:55	6:32	8:32	7:57	9:57
Backlick-Braddock 5.0	6:24	6:54	7:32	7:56	9:02	2:10	3:41	4:41	5:29	6:03	6:40	8:40	8:05	10:05
Duke-Beauregard 8.1	6:37	7:07	7:46	8:10	9:16	2:23	3:55	4:55	5:44	6:16	6:53	8:53	8:18	10:18
VAN DORN STATION 9.5	6:43	7:14	7:54	8:18	9:24	2:30	4:03	5:03	5:52	6:25	7:02	9:02	8:27	10:27

EXHIBIT 6

Miles	to TN	to TP	to IIR	Run	Run	Run	Run	Run	Run	Run	Run	Run	Run	Run
	7:10	7:10	8:39	4	2	3	2	3	2	3	2	3	2	2
VAN DORN STATION 0.0	7:10	7:10	8:39	4	2	3	2	3	2	3	2	3	2	2
Duke-Beauregard 1.4	6:08	6:36	7:16	7:39	8:46	2:41	4:24	5:11	5:40	6:24	7:07	9:07	8:32	10:32
Backlick-Braddock 4.5	6:20	6:48	7:28	7:53	8:58	2:53	3:37	4:30	5:24	6:07	6:50	8:50	8:15	10:15
Hanover-Floyd 6.5	6:28	6:57	7:37	8:02	9:07	3:02	3:46	4:45	5:32	6:08	6:45	8:45	8:10	10:10
FRANCONIA STATION 9.5	6:40	7:10	7:50	8:15	9:20	3:15	3:59	4:58	5:44	6:21	7:07	9:07	8:32	10:32

- A - Connection to bus Route 7A
- B - Connection to bus Route 7B
- T - Close train connection
- N - Connection to bus Route 7N
- X - Connection to bus Route 7X
- R - Connection with bus Route 11R

By cross-routing buses, early and late shuttles can be filled by adding early or late pieces to existing rush hour trippers.

EXHIBIT 7

N V T C - R F & P

STATION ACCESS

INBOUND ONLY

STATION	WALK IN	DRIVEN	PARK	BUS	TOTAL
Crystal Plaza	220	70	150	90	530
Powhatan	245	130	255	200	830
Alexandria Union	200	40	50	190	480
Telegraph Rd.	245	130	382	150	907
Van Dorn	15	175	358	200	748
Franconia	<u>22</u>	<u>260</u>	<u>555</u>	<u>300</u>	<u>1137</u>
Total	947	805	1750	1130	4632

NOTE: Feeder bus estimate is optimistic - Safe estimate would be but 138.

R. F. & P.

N V T C

TRAVEL TIME IMPROVEMENT WITH RAIL SERVICE

From Zero Sector SW Mall to:	Bus Route	Rail	Auto	Bus	Rail faster (min.) than Auto - Bus - Express bus	Rail faster	Diversion Auto to Bus vs. to Rail
Crystal Plaza	9-13	8	10	15	2 7	-	80% 49%
Powhatan	9-11x	13	15	29	2 16-7	20	80% 76%
Alexandria Un. Sta.	11R	16	26	36	10 20-15	31	90% 83%
Hunting Towers (rail-bus)	11	30	27	33	(-3) 3		75% 25%
Telegraph Rd.	11R	18	27	40	9 22-17	35	89% 88%
Hybla Valley (rail-bus)	9	38	34	65	(-4) 20	58	74% 92%
Van Dorn	7	23	33	45 ^b	10 22-32	55	90% 93%
Lincolnia (rail-bus)	7	36	29	39 ^b	(-7) 3-9	45	71% 60%
Bren Mar Park (rail-bus)	18	37	31	-	(-6) 8	45	72% 55%
North Springfield [†]	4-16	52	36	61	(-16) 9	-	56% 60%
Franconia	1	26	33	52	7 26-37	63	86% 93%
Springfield (rail-bus)	18	37	32	58	(-5) 21	58	73% 93%

EXHIBIT 8

† Auto diversion to bus and rail. Percentages based on Philadelphia experience.
 ‡ Chatham and Glen Allen
 § Off peak local times - all express in peak, but slower.
 Peak hour travel times used - preponderance of commuter travel at that time.

N V T C - R F & P

ESTIMATED ANNUAL REVENUE

Comparison of Estimates	<u>1968</u>	<u>1969</u>	<u>1970</u>
Empirical Riding Habit Calculation	1,600,000	2,025,000	2,434,920
Origin - Destination Modal split estimate	1,663,000	2,107,000	2,530,000
Adjustment of work trips to rapid transit level	<u>1,725,000</u>	<u>2,180,000</u>	<u>2,620,000</u>
AVERAGE OF CLOSEST TWO ESTIMATES	<u>1,694,000</u>	<u>2,143,500</u>	<u>2,575,000</u>
Riding Habit Revenue Estimate	\$ 740,000	\$ 953,000	\$1,162,000
Modal Split Revenue Estimate	\$ 788,000	\$1,015,000	\$1,238,000
Work Trip Method Revenue Estimate	<u>\$ 798,000</u>	<u>\$1,025,000</u>	<u>\$1,252,000</u>
AVERAGE OF CLOSEST TWO ESTIMATES	<u>\$ 793,000</u>	<u>\$1,020,000</u>	<u>\$1,245,000</u>

EXHIBIT 10

N V T C - R F & P

ESTIMATED ANNUAL COSTS

Maintenance of Way

514,000 car miles @ 5½¢	\$ 28,250	
depreciation @ 1.3¢	<u>6,750</u>	\$ 35,000

Maintenance of Equipment

15 RD Cars	201,400	
7% Supervision and shop overhead	14,100	
3% Employee welfare	<u>6,500</u>	222,000

Transportation

Supervision, Dispatching, signals, etc.	32,100	
Injuries & damages @ 2½%	25,000	
Fuel @ 4.75¢	24,500	
Engine house & locomotive (RDC) supplies	7,355	
Crews	187,500	
Train Supplies and Expenses	<u>25,700</u>	302,155

Washington Union Terminal Agreement

Car charges in and out	793,000	
Yard movement	<u>126,300</u>	919,300

Alexandria Union Station

Reevaluated rate of \$16.77		120,000
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General Expenses

Legal, executive, etc. @ 4.8¢	24,650	
Taxes on property	9,200	
Return on investment	<u>23,900</u>	57,750

<u>Amortization and Interest on Rolling Stock</u>		<u>420,000</u>
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Total Estimated Charges Against Revenue		\$2,076,205
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(Profit before Union Terminal costs)		(\$ 13,095)
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EXHIBIT 11

N V T C - R F & P

ECONOMIC ADVANTAGES OF RAIL COMMUTER SERVICE

The projected peak-hour travel on the proposed RF&P commuter service is about 2,000 passengers one way. This is the equivalent of two four-lane (both ways) free-flowing arterial streets in a city-suburban area. At the rate of \$1,000,000 per year contract payment for commuter service, this represents a sizeable saving to the taxpayers as compared to the two new arterial streets that would otherwise be necessary. Excluding the aesthetic havoc new streets might do to existing neighborhoods and parks, the following estimated costs will be saved with the provision of rail service:

1. New land for 15 miles of arterial street	\$13,860,000
2. Construction of arterial streets and bridges	12,340,000
3. Parking space in city for commuters' autos	10,000,000
4. Additional automobiles required by commuters	<u>1,800,000</u>
	\$38,000,000
Annual cost of \$38 million at 40 yr-4½% bonds	2,065,000
Taxes lost on land occupied by new arterials 2½%	346,500
Operating cost only of city parking lots	62,500
Street maintenance	60,000
Traffic police and control	70,000
Increased injuries and damage cost	280,000
Less fuel taxes earned by new arterials (incremental)-	<u>220,000</u>
Annual cash saving from commuter service	\$ 2,664,000
Additional value of time saved @ \$1/hr motivation price	90,000
Increased yield on improved property values	<u>600,000</u>
Annual tangible and intangible total benefit	\$ 3,354,000

Diversion of motorists to commuter trains as estimated herein will reduce air pollution by 13 tons of exhaust gases each day in the rail corridor.

AUTHOR E.L Tennyson for NVTC

TITLE Proposed Washington-Alexandria-Franconia Commuter Train Service

SUBJECT Commuter Rail Feasibility Study

TYPE Final Report

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REVIEWER R.K.T.

REVIEW DATE 12/14/84

LOCATION Library

COMMENTS:

Concludes that, with a reordering of AB&W bus routes, only 2 1/2 percent of bus riders will divert. AB&W will gain 1/2 percent influx of new riders, plus retire nine buses for a net gain. Four rush-hour train trips (plus later trips for stragglers and possible mid-day shuttles between Forrestal Building and Pentagon) would be operated with two seven-car trains on the RF&P right-of-way. About \$1 million annually in revenue was expected from 2 million riders, or 9,000 daily. Also suggests service to Richmond on weekends would contribute to fixed costs with only 100 passengers each way each Sunday.

Three different patronage estimate methods were used: ^{Gravity} ~~Granty~~ models; travel times in mode split calculations; and using experience of other cities with similar rail operations,

Costs were estimated at \$2 million annually, including Maintenance of Way at 5 1/2 cents per mile; maintenance of equipment as a per car item; transportation, including fuel at 4.75 cents per mile and crews as a fixed item; Union Station costs based on the number of moves (and totaling almost \$1 million); plus amortization and interest on rolling stock at \$420,000.

A comparison is given to the costs of building two four-lane arterials for equivalent capacity. The land, construction, parking, and new cars total \$38 million. Amortized over 40 years at 4 1/2 percent, plus taxes lost on land occupied by arterials, plus police, parking management, injuries, less fuel taxes collected, yields \$2.7 million annually. Adding time saved and increased property taxes from commuter rail raises the total to \$3.3 million per year, versus a \$1 million expenditure for commuter rail.