RAIL RAPID TRANSIT FOR THE NATION'S CAPITAL

INTRODUCTION AND SUMMARY

The National Capital Transportation Agency was established by the National Capital Transportation Act of 1960 (74 Stat. 537) which requires, in section 204(a), that the Agency shall prepare and may from time to time revise a transit development program for the transportation of persons within the National Capital region. Section 204(c) states that no part of the program is to be carried out until expressly authorized by legislation.

In a November 1, 1962, report to the President, the Agency recommended an 83-mile network of rail rapid transit, consisting of a downtown distributor system with six radials extending well beyond the District of Columbia, plus 15 miles

of improved commuter service on the Pennsylvania Railroad between Union Station and Bowie, Md. All of the downtown portion and parts of the radials would be in subway; 19 miles in all.

The 1962 program was endorsed by President Kennedy and forwarded to the Congress in May 1963. After hearings during the summer of 1963, the District Committee of the House of Representatives favorably reported a bill (H.R. 8929) authorizing a 23-mile portion of the rail transit system proposed by the Agency, mainly within the District of Columbia, plus the commuter railroad line. On December 9, 1963, this proposal was considered by the House of Representatives and returned to the District Committee for further study.

Since December 1963, the Agency has concluded that certain revisions of the program approved by the House District Committee would be desirable. The resulting recommended system is, nevertheless, essentially similar to that approved by the committee. It calls for 25 miles of rail rapid transit lines of which 13 miles would be in subway. This revised system is capable of extension later to a system of the scope recommended by the Agency in its 1962 report.

The present report describes the revised transit development program which the Agency has prepared for consideration by the 89th Congress, and proposes a plan for its financing.

There is a clear and pressing need for a rail rapid transit system that will alleviate congestion on downtown streets and on the crowded arteries leading into the city. The proposed system will do this and more. By means of convenient transfer arrangements for bus riders and automobile drivers at junctions with major arterials, the benefits of frequent, dependable, rail rapid transit service will be extended into the region, well beyond the city boundaries.

Preliminary engineering studies by NCTA's Office of Engineering and its consultants have been carried far enough to assure sound proposals, based on realistic cost estimates, taking advantage of the experience of other cities engaged in constructing and operating similar facilities. Vehicles and equipment will be the most modern available, making use of the latest industrial developments. Total estimated cost of constructing and equipping the proposed rail system (excluding interest) is $431 million.

It is estimated that revenues will cover operating expenses and repay 65 percent of the capital costs. The Agency proposes that the required capital be raised through $150 million of appropriations, shared $100 million by the Federal Government and $50 million by the District of Columbia, and the public sale of $333 million of revenue bonds of which $52 million will be used to pay interest charges during the construction period. Additional security required to assure marketability at acceptable interest rates would be underwritten by the Federal and District governments on the same two-thirds to one-third formula.

Negotiations are underway, in accordance with title III of the —— act, for creation of an interstate-compact organization capable of providing for the continued development of transportation facilities on a regional basis. Since the compact organization cannot be operative before 1967, even under the most optimistic time schedule, action on the basic rail rapid transit system should proceed promptly under the auspices of the present Agency. Responsibility for its further development and operation would be assumed by a successor agency established by interstate compact or otherwise.

The transit development program for 1965, covering the proposed 25-mile rail rapid transit system depicted in figure 1 on the opposite page, consists of this report and an engineering supplement, "Engineering Plans and Cost Estimates."

I. MODERN TRANSPORT FOR THE CAPITAL CITY

The most urgent transport problem facing Washington today—one than can only increase in severity until adequate steps are taken to solve it—is the traffic congestion created by the daily movement of commuters to and from their places of employment. There is a limit to the highway capacity that can be aimed at the towntown area, and there is no doubt that future traffic will exceed that capacity.

To avoid intolerable congestion, a substantial number of people must be carried into the city by new mass transport facilities operating on grade-separated rights-of-way. This was a major conclusion of the Mass Transportation Survey Report of 1959 and of the Congress in its statement of findings and policy in the act establishing the National Capital Transportation Agency (74 Stat. 537). It is the basis for highway planning today.

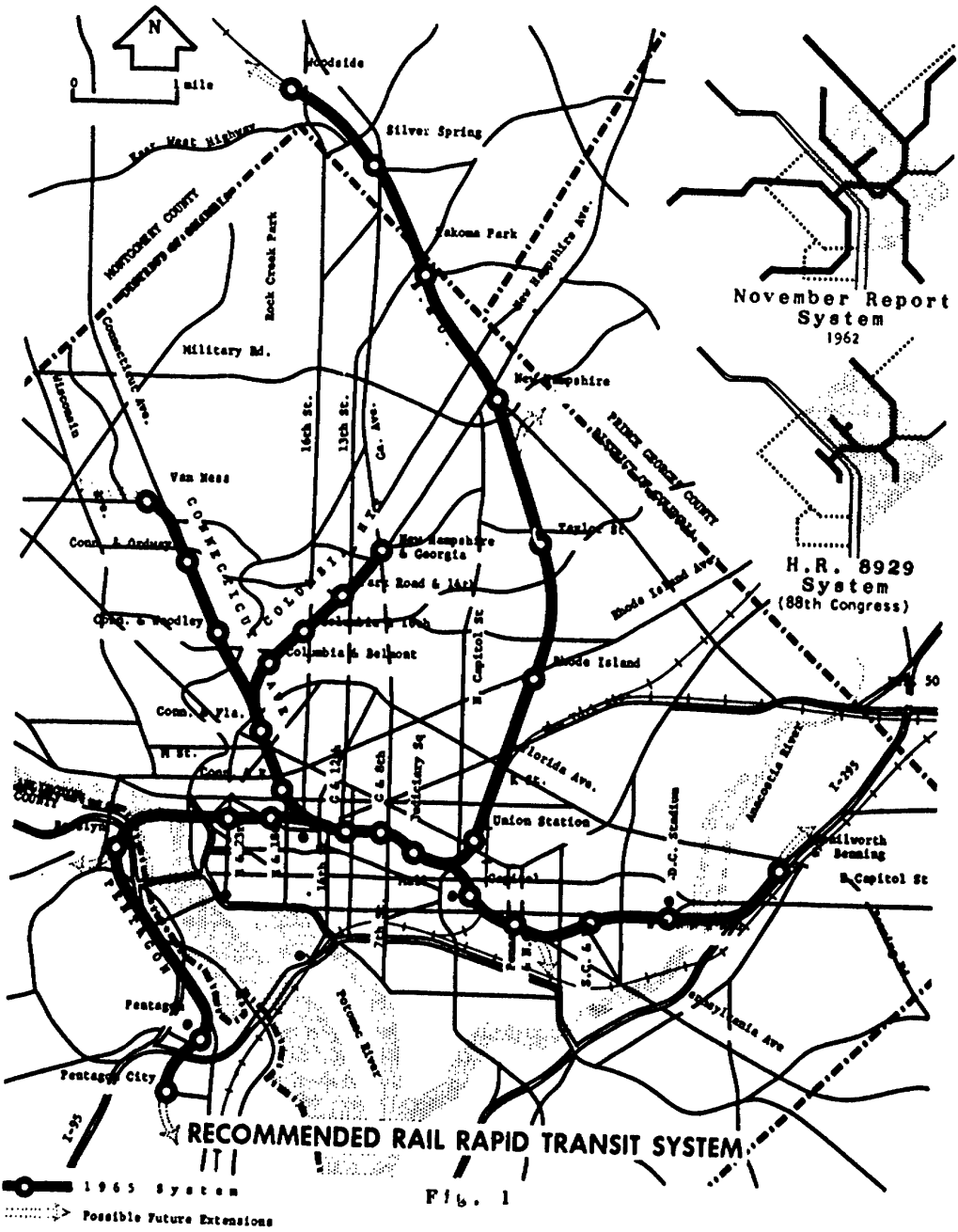


Fig. 1

No highway system could be designed for the central area that would be both capable of handling all peak-hour trips and compatible with the city of Washington. In fact all plans, including the District of Columbia highway program, are predicated on construction of the rail rapid transit system. Thus, peak-hour problems in central Washington can be solved only by a combination of new highways and grade-separated rail rapid transit. Unless the proposed rail transit system is begun promptly, congestion in the downtown area threatens to become intolerable. Such an increase in congestion would undermine all of the public and private efforts now being made to preserve and enhance the unique qualities of our National Capital.

Balanced transportation

In the past, public transportation has served the community well, shaping metropolitan growth on a skeleton of trolley lines and commuter railroads at a time when there were few automobiles and few paved roads. More recently, with improved highways and near universal car ownership in the suburbs, the rail transport services have withered away, while streets and highways—even the new freeways—have become clogged with traffic.

TABLE 1.—*Foreign rapid transit systems—Post-World War II construction and 1964 mileage*

Cities (ranked in order of total mileage)	Metropolitan population [1] (thousand)	Route miles		
		Completed since 1945	Total, 1964	Under construction
London, England	10,900	36.0	244.0	10.5
Paris, France	7,750	2.7	117.2	9.0
Moscow, Russia	8,200	45.0	61.0	16.8
Tokyo, Japan	14,700	28.3	37.2	21.1
Hamburg, Germany	2,280	6.0	46.1	10.0
West Berlin, Germany	4,000	10.1	42.8	11.0
Stockholm, Sweden [2]	1,140	32.0	32.0	7.0
Madrid, Spain	2,430	.6	18.6	4.2
Osaka, Japan	8,350	11.3	16.8	5.6
Buenos Aires, Argentina	7,175		19.0	2.0
Milan, Italy [2]	2,575	7.5	7.5	13.2
Barcelona, Spain	2,070	5.2	16.5	
Vienna, Austria	2,005		16.5	
Athens, Greece	1,890	8.0	15.9	
East Berlin, Germany [2]	1,070		15.5	
Leningrad, Russia [2]	3,875	15.2	15.2	
Montreal, Canada [2]	2,150			15.1
Oslo, Norway [2]	520			15.0
Toronto, Canada [2]	1,860	6.5	6.5	8.0
Rome Italy [2]	2,325	6.8	6.8	6.1
Budapest, Hungary	2,150		2.3	5.0
Glasgow, Scotland	1,885		6.6	
Kiev, Russia [2]	1,300	3.7	3.7	2.5
Lisbon, Portugal [2]	1,350	4.5	4.5	
Nagoya, Japan [2]	2,025	1.6	1.6	2.1
Rotterdam, Netherlands [2]	1,000			3.5
Frankfurt-am-Main, Germany [2] (and other West German cities)	1,405			5+

[1] Washington population, 2,390.
[2] Entire system since 1945.
[3] City population only.

Explosive growth during recent decades has put demands on transportation that no longer can be met by gradual imporvement; new levels of service must be achieved. For highways, this has been accomplished by the Interstate System program and other high-design freeways built to "interstate standards." For public transportation in the larger cities, it must be done with high-speed rail rapid transit lines.

Construction of a complete system of high-speed, high-capacity freeways for the Washington area is well underway. When completed, this network will provide access to all parts of the region, but it is not designed to carry the full burden of downtown-destined work trips. Moreover, the center-city terminal problem (i.e., downtown parking and traffic congestion) has been intensified to the point of crisis by the increased highway capacity. In order to maintain the balance between capacity and demand, rail rapid transit service must be introduced in the more heavily traveled corridors, thus relieving the burden of peak-loads to the center and permitting more attention to be paid to the distribution network of major arterials. Close coordination of rail and highway programs will produce the greatest public benefit.

Revival of rapid transit

Washington deserves a transportation system commensurate with its size and befitting its position as a great capital. Other countries, including Russia, have taken precisely the steps recommended here to improve and enhance their national capitals. Some 26 foreign cities with populations ranging from one-half

million (Oslo) to more than 10 million (London, Tokyo) have rail rapid transit in operation or under construction. See table 1. Over half of the total mileage has been constructed since 1945 and each year brings new cities into the ranks of those planning subways. Of the 26 cities, 14 are national capitals. Washington is practically alone among major capitals of the Western World in not having rail rapid transit.

Programs for development of rail rapid transit in North America have been very active in recent years. Four U.S. cities with long-established subway systems (Boston, New York, Philadelphia, Chicago) have made considerable progress in extending and modernizing their networks. Since 1945, new systems have been opened in Cleveland and Toronto; both are being extended. A great new system for the San Francisco Bay area, which will cost $792 million, was approved by the voters in 1962. Montreal is building a subway which is expected to open in 1966. In the southern New Jersey suburbs of Camden and Philadelphia a new line is under construction which will cost about $60 million. Voters in the five-county Atlanta area on November 3, 1964, approved an amendment to the Georgia constitution which will enable the setting up of a rapid transit authority; it is hoped that actual construction of a system will be underway soon.

Rail rapid transit for Washington

The Washington rapid transit system must reflect the convenience and comfort that people have come to expect in their private automobiles. Service must be fast and frequent, with convenient, attractive stations and the finest modern equipment, operating on rights-of-way designed for speed and comfort. The image of rail transit, as people will come to know it, will be like that associated with air travel, with clean, functional vehicles and handsomely appointed public spaces.

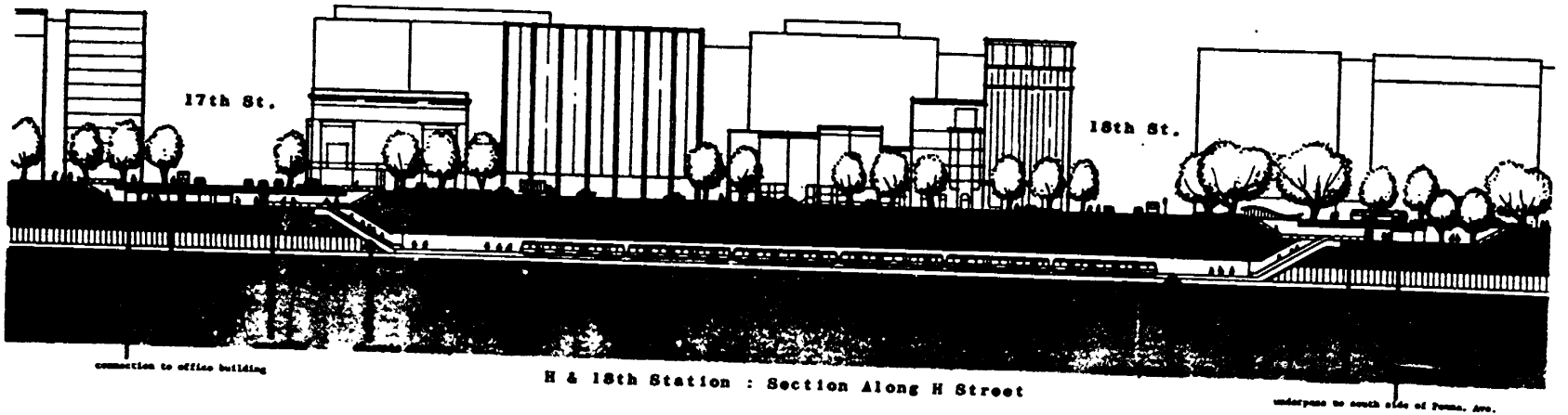
The rail system must be geared to the highway and street network so that people can use their automobiles to drive to and from rapid transit stations. The relationship of the proposed rail rapid transit system to the existing network of arterial streets and highways is illustrated in figure 1.

A substantial portion of the system must be in subway, for within Washington's monumental, historic central area and central business district, operation on overhead structures is out of the question. Fortunately, because soil conditions will permit bored tunnels, disruption to residential and commercial areas can be kept to a minimum. For example, in the entire central area south of K Street between the Potomac River and the stadium, the street surface will not have to be broken except at stations, which will be constructed by cut-and-cover methods.

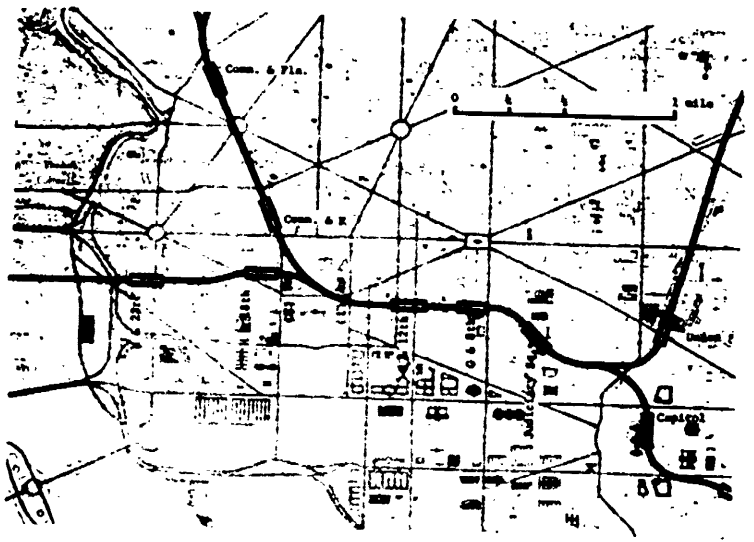
Downtown subway.—A key feature of the system is the portion connecting the main concentration of employment and public buildings, illustrated in figure 2. This is the core of the system where all radial lines converge, connecting Union Station and the Capitol with principal Federal and commercial employment centers north of the Mall. Any future system that is developed will expand from this nucleus.

Three downtown stations are common to all routes—12th Street and Eighth Street on G Street in the heart of the retail shopping area, and Judiciary Square, between Fourth and Fifth, and E and F Streets. To the west and north of the White House, two branches provide service to traverse areas of growing activity: (1) the so-called Northwest rectangle, located west of 17th, south of H, with stations at 18th and 23d on H Street, and (2) the lively area of hotels and office buildings centered on Connecticut Avenue, with stations at K Street and at Florida Avenue.

With trains scheduled 3 minutes apart throughout the day on the branches, this downtown distributor will unify and strengthen the activities of central Washington. A running time of no more than 7 minutes will link all stations from the State Department to the Capitol or from Dupont Circle to Union Station. Cross-platform transfers at three of the central stations will facilitate trips involving a change of trains—with only 1½ minutes to wait for the next train going in the same direction and 3 minutes at the most for a train going in the opposite direction. The accumulated time saved in meeting business appointments by subway will, by itself, benefit both Government and private business tremendously. In addition, the many thousands of daily visitors to Washington will appreciate the convenience and comfort (especially in summer) of being put within easy reach of the places they came to see.



H & 18th Station : Section Along H Street



STATION DESIGN The downtown subway will do more than bring people to their destinations. Each station will become a vital force in the future development of its immediate neighborhood. Without any sacrifice of utility, the public spaces of the transit system -- stairs, concourses, escalators, platforms -- will be designed to enhance the amenities of the street, with architectural treatment to match the best new buildings.

At some of the busiest street intersections, traffic conflicts between vehicles and pedestrians will be relieved by the ready access that subway entrances will provide. Mezzanines will extend across intersections and even into buildings where conditions are favorable. Attractive concession areas will be provided in mezzanines for the convenience of the public. In effect, the concourse areas of stations will be "all-weather" streets.

Several of these points are illustrated in the drawing above.

DOWNTOWN SUBWAY

Fig. 2

The subway in central Washington is designed to serve both the existing development of the city and its potential expansion. It allows for growth and adjustment while preserving the monumental and historic places, parks, and residential neighborhoods that make the Capital City unique.

Radial routes.—The five branch lines (see fig. 1) serve heavily built-up areas in the District of Columbia and two of them extend short distances beyond the District boundary. Any one of the branches is capable of extension in response to future demand, either to serve growing population or to serve expanding Federal installations such as an improved Washington National Airport or new concentrations of Federal employment.

Ample parking and bus transfer facilities are provided at outer stations for the convenience of passengers coming from all parts of the region as will be described in some detail in the next section of this chapter. Physical descriptions of routes will be found in chapter II.

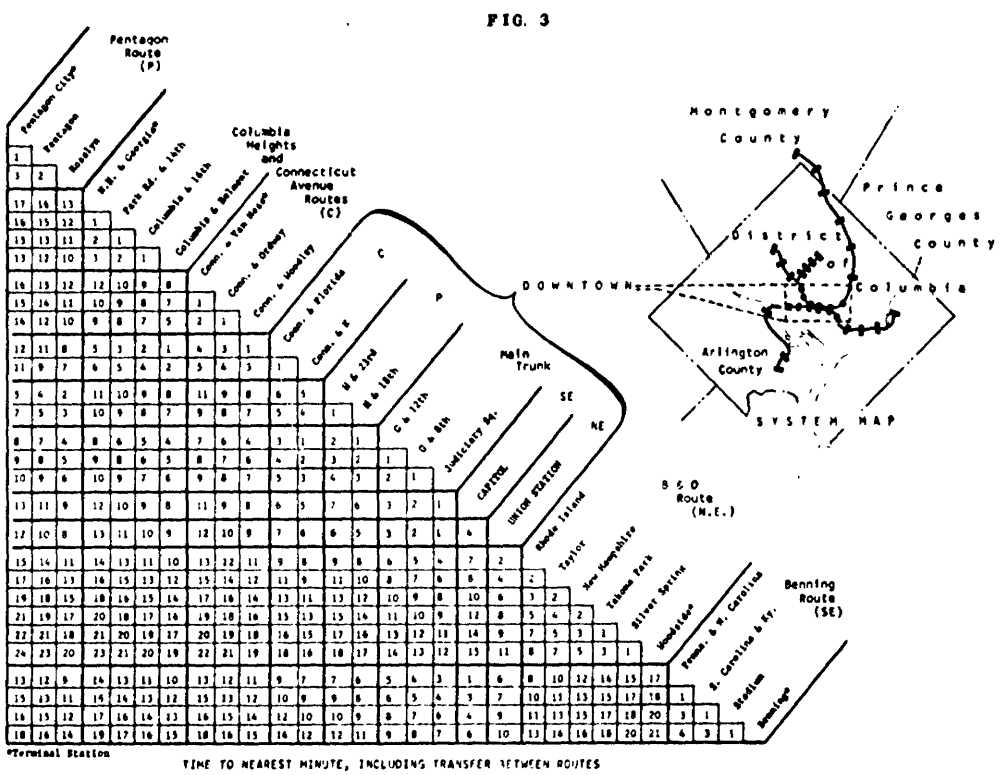
Operation

The recommended rail rapid transit system will carry 50,000 peak-hour passengers with ease and will provide a high level of all-day service. Total annual passengers in 1980 are estimated at 135 million.

All-day schedules in the central portion of the system will be the same as at peak periods (described above under "Downtown Subway") but, for operating economy, trains will be shortened as required and turned back at intermediate points on all but the two northwest routes. The station-to-station running times for the entire system, including time between trains on trips requiring transfer, are shown in figure 3.

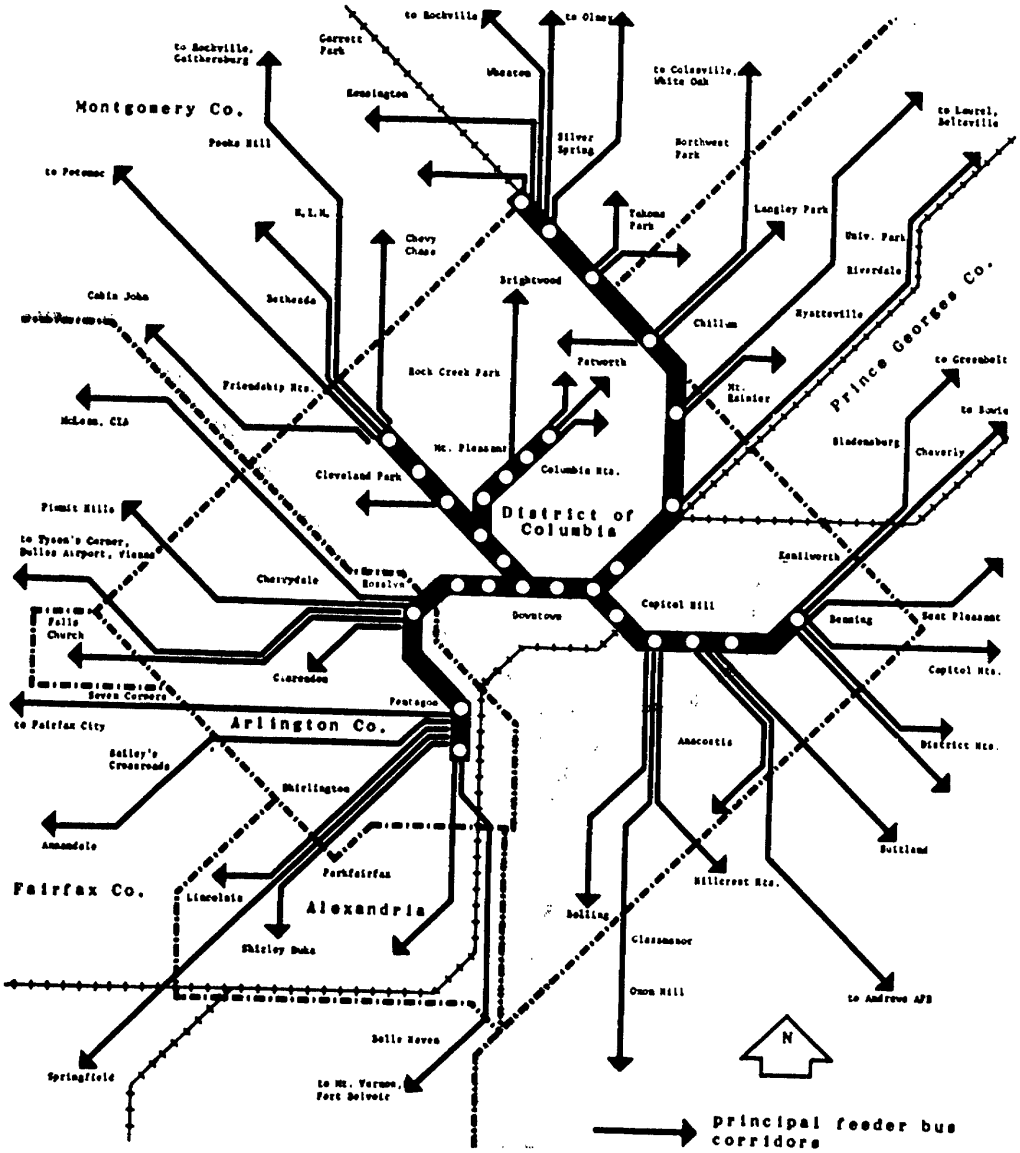
RAIL RAPID TRANSIT TRAVEL TIME: STATION TO STATION

FIG. 3



Extended coverage by bus.—Rail rapid transit cannot do an effective job of freeing the streets and highways of congestion unless it serves motorists and bus passengers. In the case of bus passengers the opportunity for coordination is suggested in figure 4, which indicates, diagrammatically, the existing bus routes that could connect with the proposed rapid rail system. This coordinated feeder arrangement is advantageous to the bus operators, as well, because:

It will permit the companies, in many instances, to eliminate the slower, and therefore the more costly portion, of trips within the congested central area.



RAIL RAPID TRANSIT FOR THE BUS RIDER

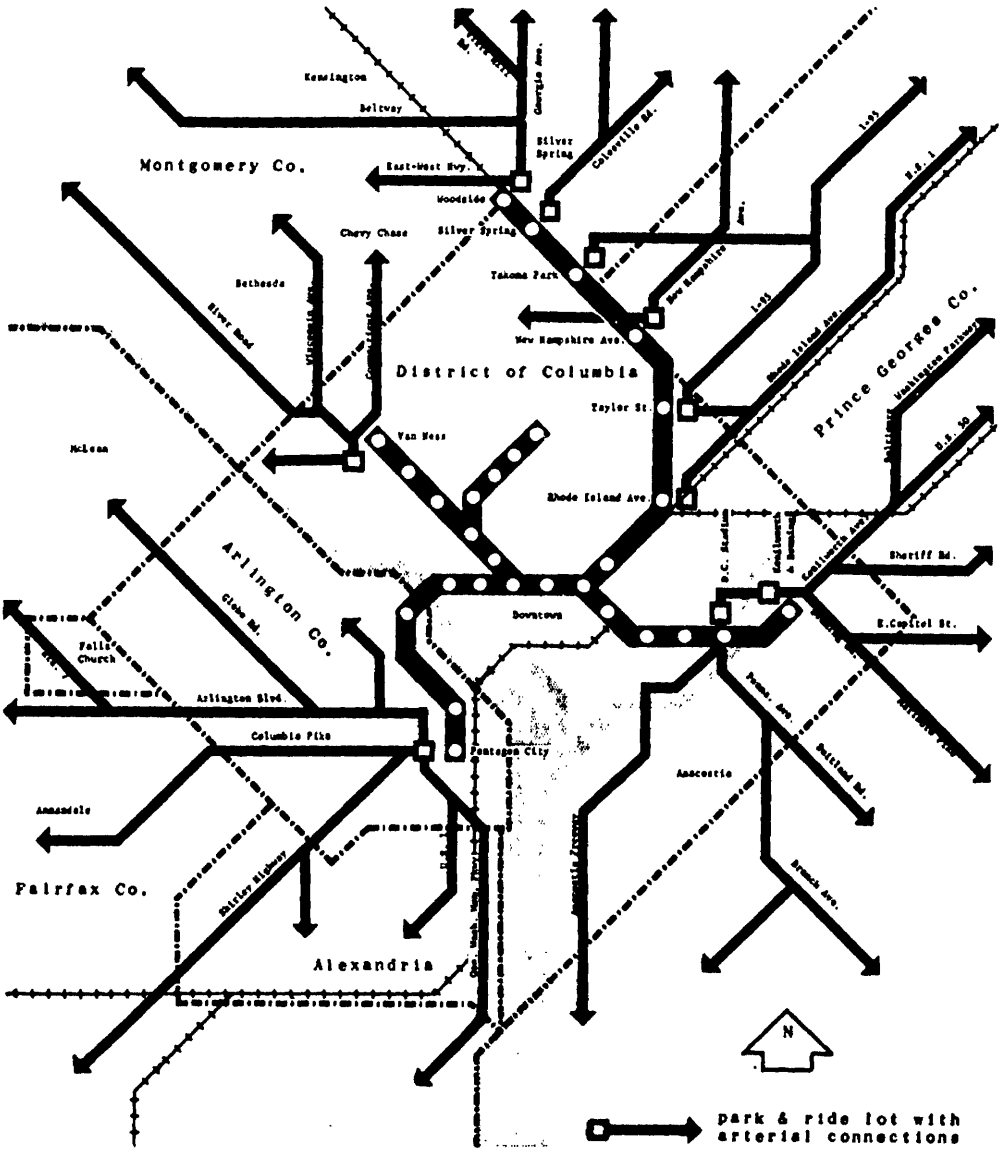
It will cause more efficient utilization of vehicles on routes that pass transit stations, making room for passengers boarding beyond the station.

Turning back buses at rapid transit transfer points will permit greater utilization of buses in local service.

The greater speed and comfort of the combined bus-rail system will attract more riders to the buses.

For the transit rider, the advantages consist mainly in time savings combined with broad coverage of the close-in suburbs. This coverage will be intensified through the efficient use of local feeder buses, each one making several trips in the time it would take to make one long trip all the way downtown.

Automobile connections.—Offstreet parking facilities are provided at all terminals except Columbia Heights and at all stations on the B&O route—nearly 12,000 spaces in all at 10 stations, in open lots, or in parking garages. As indicated in figure 5, these locations give access to the whole network of arterial

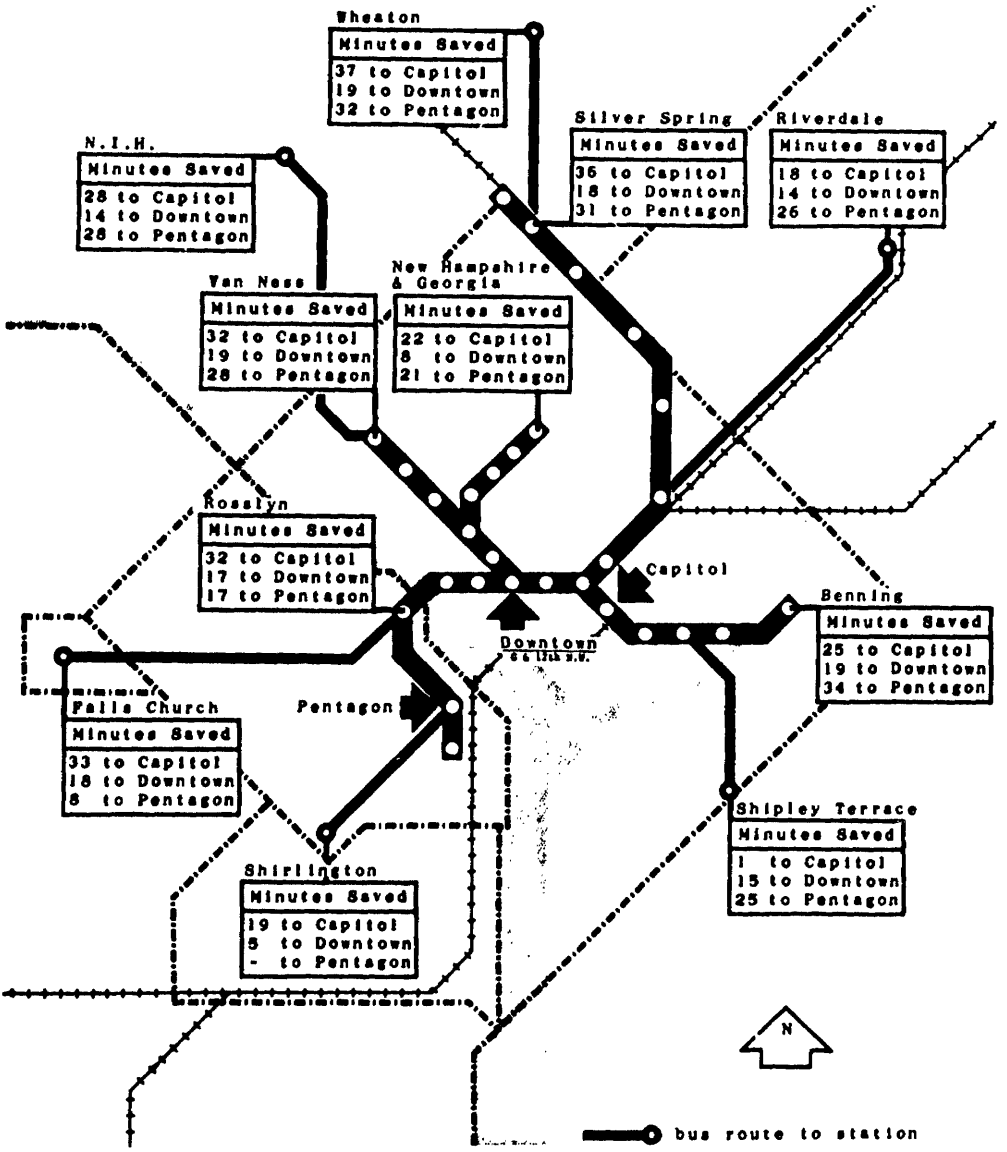


RAIL RAPID TRANSIT FOR THE MOTORIST

highways at points well outside the central destination area, making it convenient for "park and ride" use of rail rapid transit. In addition, spaces will be set aside for "kiss and ride" commuters (those whose wives drive them to the station, allowing the family car to remain in use during the day). This practice also will be common at many stations without special parking facilities but with good arterial accessibility.

Inner arterial connections are not shown in figure 5, which is intended to demonstrate the extensions of rail rapid transit service that are available on existing and planned highways. The entire network of arterials, as indicated in figure 1, will function all the better for the diversion of 12,000 or more cars at the outer stations.

Time savings.—Although rail rapid transit is most appreciated by those who live and work near stations, its advantages extend far beyond the system itself, as is shown by figures 4 and 5. The most readily measured advantage is the saving in time that improved transit provides. The time advantages of rail transit for a number of selected locations are indicated in figure 6.



RAIL RAPID TRANSIT SAVES TIME

Minutes Saved by Use of Rail : All-Bus vs Bus-Rail or All-Rail

Benefits

The rail rapid transit system described in this report is a sound proposal in itself—both physically and economically—but its chief importance will be the service that it provides to the community at large. Further, the system is capable of flexible adaptation to future needs by adjusting the operating schedules within the system as it stands or by extending routes beyond the limits of the present proposal.

Substantial benefits will be felt within the District of Columbia, which is the main focus of the Federal interest in the National Capital region and the particular responsibility of the Congress. Direct benefits to transit riders have been noted above, and indirect benefits to street and highway users have been touched upon. Other obvious benefits to the economy of the District of Columbia and to the convenience of its citizens will derive from increased densities of development near transit stations. These will follow as a matter of course after the new service is instituted. All of these benefits are important to the Federal establishment, which occupies so much of the District of Columbia, and

to those doing business with the Government. The rail rapid transit system will become part and parcel of the Federal plant, as vital to it as the streets and highways and public utilities. The net effect will be to shrink the distances between stations, making all centers of activity more accessible to each other. The Pentagon, for example (a part of the central employment area for planning purposes), will be only 10 minutes from the Capitol.

Most important are the long-range benefits that derive from the interaction of transportation improvements and metropolitan growth, when directed by an enlightened public policy. Since the transportation network is the frame on which the regional growth is formed, careful programing of both rail and highway improvements will go far toward molding the future region in the public interest. The proposed transit program will be an important implementation of the President's policy directive for the development of the National Capital region.[1]

II. ENGINEERING

During 1963 and 1964, engineering study by the Agency has been concentrated on careful evaluation of the basic system recommended in the present report and illustrated by figure 1. The detailed results of this engineering study are embodied in a separate engineering supplement entitled "Engineering Plans and Cost Estimates."

Previous engineering studies by NCTA include: preliminary engineering of alternative transit route alinements within traffic corridors defined by traffic forecasting and system planning studies; feasibility and cost of utilizing existing railroad facilities for mass transportation; a comparative analysis of rapid transit vehicle systems; research and development studies relating to transit vehicles, noise reduction, automatic train control, and construction methods and costs. The Agency conducted a thorough examination of the available geological information concerning subsurface conditions in the region. In addition, soil borings and analyses were made at points along and near the proposed downtown subway routes. These studies indicate that no special problems exist respecting subway construction in the District of Columbia.

The above engineering studies are reported in detail in Appendix Volumes I, "Engineering," and II, "Use of Railroad Facilities," published in support of the Agency's November 1, 1962, report.

In two-thirds of the downtown area it will be feasible to make use of tunneling methods whereby the surface of existing streets will not be broken except at station locations. Thus interference with surface traffic will be kept to a minimum. Where the cut-and-cover method of construction has been found to be preferable to tunneling, street traffic will be subject to brief interruption until temporary decking is installed to permit traffic to continue while construction proceeds below the surface.

Recommended rail rapid transit system

The proposed system is 24.9 miles long, with 29 stations. About half (13.1 miles) is underground and another 7.5 miles utilizes existing railway rights-of-way. Except for short extensions to the Pentagon and the so-called Pentagon City area in Arlington County and to Woodside in Montgomery County, the system is contained within the District of Columbia and serves directly the most densely populated sections. This does not mean that the effects of rail rapid transit are limited to the District: outer stations have convenient means for transfer to bus routes, thus providing extensive coverage of the spreading suburban development (fig. 4); and several stations will have large parking facilities enabling motorists from the suburbs to save both time and money by riding the trains. The system has been planned to serve the greatest possible number of people, to generate as much revenue as possible per dollar of capital outlay, and to minimize cost of construction.

The transit development program calls for the construction of five radial rapid transit routes, which are described separately below, following each line inward toward the center at 12th and G Streets. Provisions are made for grade-separated junctions so that the system can be extended in the future without costly alterations. Operation is continuous through the downtown trunkline (16th to First Streets NW.), with three stations common to all routes; i.e., 12th Eighth, and Judiciary Square. (See fig. 2.)

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[1] Memorandum for the heads of executive departments and establishments and the Commissioners of the District of Columbia, Nov. 27, 1962.

Connecticut Avenue route.—This route begins at a rock tunnel station beneath Van Ness Street NW., just west of Connecticut Avenue in the Federal reservation occupied by the U.S. Bureau of Standards. The station will provide for feeder bus service utilizing offstreet, weather-protected bus transfer and "kiss and ride" facilities, and will include a 590-space multilevel parking garage. The route follows the alinement of Connecticut Avenue downtown, with stations located near Ordway Street, Woodley Road, Florida Avenue, and K Street. Provision is made, south of Columbia Road, for a grade-separated junction with the Columbia Heights route. Except for aerial crossings of Klingle Valley and Rock Creek Park the entire line will be in subway. At H Street, the line leaves Connecticut Avenue and curves eastward beneath Lafayette Square where there is a grade-separated junction with the Pentagon route. Both routes then continue into the alinement of G Street NW., to a major transfer station at 12th and G Streets. Pedestrian connections with a subsequent north-south route under 12th Street can be arranged at this station.

Columbia Heights route.—This route originates at a station located on New Hampshire Avenue near its intersection with Georgia Avenue and will be served by bus transfer facilities. The line follows the alinement of New Hampshire Avenue, Park Road, and Columbia Road. A station on Park Road serves 13th and 14th Streets with bus transfer facilities. There are two stations on Columbia Road; at 16th Street and at Belmont Road. At Connecticut Avenue the route merges with the Connecticut Avenue route described above.

B. & O. route.—This route originates at Woodside in Montgomery County, Md., and will occupy a portion of the existing Baltimore & Ohio Railroad right-of-way to the Washington Terminal in the District of Columbia. A terminal station will be located at Woodside a short distance northwest of the existing 16th Street railroad bridge, and equipment storage facilities will be established on the west side of the B. & O. tracks in an area presently devoted primarily to industrial and commercial uses. Other stations will be located at Georgia Avenue, Takoma Park, New Hampshire Avenue, Taylor Street, and Rhode Island Avenue. The tracks used by the transit system and the B. & O.'s railroad operations will be entirely separated.

All stations on the line will include bus transfer, "kiss and ride," and parking facilities (a total of 6,550 spaces). The line will enter Union Station in subway beneath the existing structure. Within Union Station, connections will be established with the existing concourse and ticket hall to permit easy movement between railroad and transit facilities.

From Union Station, the line continues in subway beneath Union Station Plaza and curves westward into the alinement of D Street NW., where it emerges with the Benning route at First Street. The line then curves northwest through Plaza and curves westward into the alinement of D Street NW., where it merges then curves west into G street, with stations at Eighth and at 12th. These three stations are common to all routes.

Benning route.—This route begins as a surface operation on exclusive right-of-way in the vicinity of Kenilworth Avenue and Benning Road NE., where a station with offstreet, weather-protected bus transfer and "kiss and ride" facilities and parking space for 250 automobiles will be provided. Equipment storage and maintenance facilities will be located north of Benning Road and west of Kenilworth Avenue.

From the Kenilworth-Benning Station, the line proceeds southwest at grade along the west side of Kenilworth Avenue, then curves westward to cross the Anacostia River on a bridge downstream from the East Capitol Street Bridge and on an alinement with Independence Avenue SE. The line continues west of the river over the stadium parking lot to a surface station located south of District of Columbia Stadium and a short distance from the District of Columbia Armory and the District of Columbia General Hospital. This station will include "kiss and ride" facilities, and envisages maximum utilization of existing parking areas in the vicinity, to a total of 2,500 spaces.

From the Stadium Station, the line runs in subway beneath Independence Avenue and South Carolina Avenue to its next station at Kentucky Avenue SE. (14th Street), and thence under South Carolina Avenue and Pennsylvania Avenue to a station at North Carolina Avenue (4th Street). The route then continues under Pennsylvania Avenue and Independence Avenue to First Street SE., where it curves northward to a station inside the U.S. Capitol Grounds east of the Capitol Building. From the Capitol Station, the route continues to the north, passing beneath the existing U.S. Senate subway and a portion of the Senate Garage, and curves to the west into the alinement of D Street where it joins the B. & O. route at First Street NW., as described above.

Pentagon route.—This route begins in the so-called Pentagon City area in Arlington County, Va., with a terminal station located in a widened South Hayes Street to include bus transfer, "kiss and ride," and parking facilities (2,000 spaces). Provision for equipment storage also will be made within the Pentagon City area. From this terminal, the line proceeds north in open cut to a portal south of Shirley Highway and continues in subway to the Pentagon Station, which will include a major bus-transfer facility. From the Pentagon, the route proceeds northwest along the right-of-way of the old Rosslyn Branch, Pennsylvania Railroad (a surface operation) until it runs into a portal south of the Marine Memorial. A multilevel station will be located beneath the Rosslyn commercial area, constructed so as to permit later extension of a route from this station westward into Arlington and Fairfax Counties.

From Rosslyn the line curves to the east beneath the Potomac River and into the alinement of H Street NW., with stations at 23d and 18th Streets. The route merges with the Connecticut Avenue route beneath Lafayette Square.

Stations.—Of the 29 stations in the recommended system, 20 will be constructed in subway. Platforms of all stations will be 600 feet long to accommodate 8-car trains. Except in a few cases where side platforms are dictated by physical limitations, all stations will have center platforms, and all stations will have escalators as well as stairs for movement between levels. All subway stations will have a mezzanine level providing for centralized fare collection and access to both sides of the street above. Concession space will be provided in many stations.

Stations will be well lighted and ventilated, and as attractive and comfortable as modern architectural design can make them. Walls will be of glazed tile, structural glass, baked enamel on steel, or other material with durable, easily cleaned surfaces. Rapid identification of stations will be facilitated by different color schemes.

Displacement.—The clearance required by construction of rapid transit routes has been considered carefully and relocation of families has been kept to a minimum. It is estimated that no more than 128 family units will be displaced.

Variants from prior recommendations

There are three major changes from previous plans in the present proposal: (1) the Pentagon route; (2) substitution of the Benning route for the Anacostia route; (3) elimination of the commuter railroad line to Bowie.

1. The Pentagon route provides improved service to Virginia by combining two branches into a single line, permitting more frequent scheduling and better utilization of trains.
2. The Benning route serves more of the built-up area of the District than the previously planned Anacostia route, which was justified, in the Agency's original proposal, by potential growth in the "Henson Creek corridor" in Prince Georges County. Service to the armory and the stadium is also a factor, as well as a better location for storage yards and shops.
3. Commuter railroad service to Bowie is not essential to the initial system, in view of change (2). Express bus service from the Benning route via Kenilworth and Annapolis Expressways will reach more destinations in the same area.

Rapid transit vehicles

The passenger equipment for the recommended rail rapid transit system is being designed from the point of view of the passenger and his needs for comfort, convenience, and economy of time.

The Agency has studied and evaluated all of the transit vehicle systems presently in use in the United States and abroad, and has carefully considered many new mass transportation concepts, including rubber-tired vehicles and monorail. The Agency is cooperating with transit operators, manufacturers, and planners in other cities in a continuing search for a high-performance vehicle of advanced design. Available improvements will be incorporated in the vehicles ultimately purchased for use on the system.

Equipment requirements are estimated to consist of 184 rapid transit cars which will incorporate the latest available high-performance features and the latest engineering advances of equipment recently introduced in Chicago and Toronto. The cars will be 75 feet in length, have an overall width of 10 feet, will seat 84 passengers, and will be capable of rapid acceleration permitting speeds of up to 75 miles per hour. They will be air conditioned, attractively appointed, quiet, and comfortable. The total estimated cost of the rapid transit cars is $26,100,000, and is based upon actual cost experience in other cities and cost estimates obtained from equipment manufacturers.

Capital cost

The total estimated cost of constructing and equipping the proposed facilities is $431 million. A route-by-route breakdown of the estimate is presented in table 2 and distances by type of construction are presented in table 3. These figures are the result of preliminary engineering studies conducted by NCTA's Office of Engineering and its consultants, and take account of the experience of other cities in designing or constructing similar facilities. Route plans and profiles and details of the construction cost estimate are contained in the engineering supplement.

TABLE 2.—*Estimated capital cost*

[In millions of dollars]

	Connecticut Ave.	Columbia Heights	Baltimore & Ohio	Benning	Pentagon	Totals
Basic construction	59.5	28.8	48.8	66.9	65.8	269.8
Public utilities	.6	.3	.2	4.0	.6	5.7
Track and special work	1.6	.7	3.5	2.5	2.1	10.4
Power distribution	1.2	.6	3.2	2.2	1.9	9.1
Signals and interlocking	1.5	.7	3.5	1.9	2.0	9.6
Communications	.1	.1	.2	.1	.2	.7
Substation equipment	1.9	1.1	2.7	2.9	2.1	10.7
Subtotal, construction	66.4	32.3	62.1	80.5	74.7	316.0
Engineering (10 percent)	6.6	3.2	6.2	8.1	7.5	31.6
Right-of-way	.8	2.3	7.3	4.4	5.7	20.5
Contingency (10 percent)	7.4	3.8	7.6	9.3	8.7	36.8
Total, excluding vehicles	81.2	41.6	83.2	102.3	96.6	404.9
Vehicles, 184 cars						26.1
System total						431.0

TABLE 3.—*Distances (miles) by type of construction*

Route	Tunnel	Cut and cover	Aerial structure	Railroad right-of-way	Other open construction	Total
Connecticut Ave	1.9	1.7	[1] 0.3			3.9
Columbia Heights	1.5	.4				1.9
Baltimore & Ohio	.2	.6	[2] 1.6	6.6		9.0
Benning	2.6	.9	[3] 0.7		0.8	5.0
Pentagon	2.5	.8		.9	0.9	5.1
System total	8.7	4.4	2.6	7.5	1.7	24.9
Percent of system	35.0	17.7	10.4	30.1	6.8	100.0
Percent of underground construction	66.0	34.0				

[1] Rock Creek and Klingle Valley Bridges.
[2] Washington Terminal Co.
[3] Anacostia River Bridge and approaches.

Staging of construction

The entire system proposed here can be put into operation by 1972. Service would be initiated 2 years earlier, however, on one through route, which must include the terminal at Benning Road, needed for its car-maintenance facilities. Operation from the Pentagon, where many buslines converge, through downtown to the Capitol and eastward to the stadium, with its extensive parking, and to Benning Road, with its heavily traveled feeder buslines, would make a dramatic demonstration at a very early stage of the service that rail rapid transit can provide.

III. REVENUES AND EXPENSES

The Agency has estimated revenues from both passenger traffic and from commercial services; i.e., sale of advertising and leasing of concessions. Calculations of expenses have been based on industry experience applied to specific schedules and operating conditions applicable to the proposed system.

Traffic

The Agency has estimated that the percentage of persons using public transportation to downtown Washington in the peak hour will be raised from the present 40 to 48 percent by introduction of the proposed rapid transit system. These estimates are conservative, compared with other cities that have rapid transit systems in operation. Table 4 shows that cities such as Chicago, Philadelphia, Boston, and Toronto achieve percentages ranging from 70 to 80 percent.

TABLE 4.—*Percent of peak hour total trips to downtown by public transportation*

	Percent
New York	90
Chicago	80
Philadelphia	75
Toronto	70
Boston	70
Cleveland	55
Washington [1]	48

[1] Estimate assuming introduction of rail rapid transit.

The traffic forecasts were developed by projecting present riding habits in the region, taking account of the experience of other cities with rapid transit systems. In addition, the resulting estimates were spot checked against forecasts of future highway and public transportation usage previously made by the Agency, in collaboration with the area highway departments, and were found to accord with these forecasts.

Estimates were made for three potential sources of traffic: (*a*) persons who would find it convenient to walk between their homes and the nearest rapid transit station; (*b*) feeder bus passengers who would use bus services to connect with the rapid transit system; and (*c*) persons who would either be driven to and from the rapid transit stations or who would drive their autos and park them in parking areas adjacent to the rapid transit stations.

Passengers walking to and from stations.—Based on current Washington riding habits and research on riding habits in cities with rapid transit systems, the Agency estimated that 70 percent of all persons residing within 1,500 feet of a station, and working in the downtown area within 1,500 feet of a station, would use the rapid transit system to and from work. Residential population figures were derived from the 1960 census. Downtown employment figures are consistent with those previously used for traffic forecasting purposes by the Agency and the area highway departments and by the National Capital Planning Commission for general development planning purposes.

Feeder bus passengers.—Actual counts of current bus passengers, traveling in the corridors to be served by the rapid transit system, form the basis for the estimate of total bus passengers. This estimate was expanded to account for the projected increase in downtown employment. The number of bus passengers who would transfer to the rapid transit system was estimated by use of diversion curves based on field surveys and experience in other cities. Diversion percentages, based on time savings, were calculated for each busline passing a rapid transit station.

Passengers using automobiles.—A total of almost 12,000 parking spaces will be provided adjacent to various stations on the rapid transit system. Based on experience of comparable rapid transit parking lots in other cities, particularly in Cleveland, the Agency's traffic forecasts assume that these lots will be fully utilized. The Agency has not included, in the traffic forecasts, potential passengers who might park their cars on surface streets near rapid transit stations, though experience indicates it would be reasonable to expect traffic from this source.

Studies of other cities with rapid transit systems show that persons who are driven to rapid transit stations account for between 5 and 15 percent of downtown-destined peak-hour rapid transit ridership in these cities. A 5-percent figure was used by the Agency in calculating such patronage.

Total yearly passengers.—The foregoing sources of traffic were estimated to produce, in 1980, a total of 50,797 rapid transit passengers passing the maximum load point en route to the downtown area in the morning peak hour. It was estimated that local passengers—those beginning and ending their trips either inside or outside the maximum load point—would amount to 20 percent of those passing the maximum load point. This percentage is substantially lower than the experience of Toronto and Philadelphia, in both of which local traffic amounts

to more than 30 percent of traffic passing the maximum load point. Also, the percentage does not take into account the fact that Washington has a good deal more tourist traffic than either of these other two cities and that it is virtually certain that a great many tourists visiting Washington will use the subway system.

Several factors were applied to the estimate of the total number of passengers that could be expected to use the rapid transit system in 1980 in the morning peak hour to obtain an estimate of total ridership for that year. First, it was assumed that morning peak-hour ridership would represent 13.5 percent of total daily ridership. This percentage is higher than that indicated by the latest available data for D.C. Transit and accords with industry experience. Second, the resulting estimate of total daily ridership was multiplied by 299.6 to obtain an estimate of total yearly ridership. This factor, too, is in accordance with industry experience.

Revenues

Passenger revenue.—The Agency's estimate of total yearly revenue from passenger traffic for 1980 is shown in table 7, page 29. This is based on a rapid transit fare of 25 cents at all stations except Silver Spring and Woodside, outside the District line, where the fare will be 35 cents and on the further assumption that the rapid transit system would receive only 12.5 cents for each feeder bus passenger transferring to or from the rapid transit system within the 25-cent zone. The bus operators would retain the remaining 12.5 cents.

Other revenue.—In addition to passenger revenues, it was estimated that revenue accruing from advertising, the leasing of concessions, and similar activities would amount to 1 cent per passenger. (See table 7)

Expenses

In order to obtain operating cost estimates, train schedules were developed by the Agency for the entire rapid transit system. These schedules were designed to provide capacity in peak and offpeak periods to carry all of the estimated traffic without undue delay or an excessive number of standees.

On the basis of these schedules, the consulting engineering firms of Coverdale & Colpitts and Kaiser Engineers developed for the Agency an analysis of all costs that would be incurred in the operation of the system. For each facet of the operation; e.g., maintenance, station operations, and train schedules, the consulting engineers prepared estimates of the total number of personnel that would be required. These manpower requirements accord with safety and operating practices of the rapid transit industry. Work rules and working conditions were assumed to be those set forth in the current agreement between D.C. Transit System, Inc., and Division 689 of the Amalgamated Transit Union, AFL–CIO.

Operating expenses.—Wage rates and annual salaries were estimated on the basis of the current agreement between D.C. Transit and Division 689. Where D.C. Transit presently has job classifications that are comparable with rapid transit classifications, the wage rates adhered to by D.C. Transit were used in estimating rapid transit wage costs. Where there were no comparable job classifications, wage rates were estimated on the basis of the existing differentials on other rapid transit systems, principally that in New York. Administrative salaries were based on salary levels prevailing in the rapid transit industry.

Since it is anticipated that the proposed rapid rail facilities will be contracted out for operation by private enterprise, a sum has been added to the estimate of general and administrative costs to cover the expense of an operating contract.

A summary of operating expenses for 1980, excluding depreciation but including a 10-percent contingency item, is shown in table 5. These expenses, when measured against the Agency's estimate that a total of 9,519,000 car-miles will have to be operated each year to accommodate forecast traffic, result in an estimated cost of 77.39 cents per car-mile for the Washington rapid transit operation before the 10-percent contingency item is included. The cost, after allowing for contingencies, is 85.13 cents per car-mile.

Depreciation expense.—The basis for the Agency's estimate of $848,796 for annual equipment depreciation expense is shown in table 6. Other depreciation expenses, covering items; such as, turnstiles, escalators, ticket booths, wiring, etc., have been estimated at 6 percent of operating expenses. These other depreciation expenses are estimated to amount to $486,600 annually. Total annual depreciation expense is thus estimated at $1,334,800.

TABLE 5.—*Operating expense for 1980, excluding depreciation*

Daily car-miles	31,190
Annualization factor	305.2
Annual car-miles	9,519,000
Operating expenses (thousands of dollars):	
Maintenance-of-way and structure (9.6 cents per car-mile)	913.4
Maintenance of equipment (4.09 cents per car-mile)	389.2
Conducting transportation (22.17 cents per car-mile)	2,110.1
Power (18.37 cents per car-mile)	1,749.1
Injury and damage (6.46 cents per car-mile)	615.0
General and administrative (16.7 cents per car-mile)	1,590.0
Operating expense	7,366.8
10-percent contingency	736.7
Total operating expenses	8,103.5

TABLE 6.—*Depreciation on rapid transit vehicles*

Vehicles required	184
Average cost per vehicle	$141,939
Investment	$26,116,800
Residual at 2½ percent	$652,920
Depreciable base	$25,463,880
Annual depreciation over 30 years	$848,796

Summary of revenues and expenses

Table 7 shows the Agency's estimate of 1980 revenues available to meet debt service charges. Total operating revenue is estimated at $26,991,000, and operating expenses, including depreciation, is estimated at $9,439,000. Thus, total yearly revenue, after depreciation, available to meet debt service charges is estimated at $17,552,000.

Table 8 sets forth the Agency's estimate of total yearly revenues and expenses for the year 1970 and then for each succeeding year until 2010 when it is estimated that the debt incurred for the construction of the system will be repaid.

TABLE 7.—*1980 revenues available to meet debt service charges*

[In thousands of dollars]

Gross passenger revenue		34,657
Maximum load point tarffic[1]	29,020	
Local traffic[2]	5,637	
Less payment to feeder bus[3]		9,019
Net passenger revenue		25,638
Non-fare-box revenue[4]		1,353
Total operating revenue		26,991
Operating and maintenance expense[5]		8,104
Depreciation[6]		1,335
Vehicle	849	
Other	486	
Total operating expense		9,439
Revenue available to meet debt service charge after depreciation		17,552

[1] Based on annual maximum load traffic of 112,731,691.
[2] Based on 22,546,338 annual passengers.
[3] Based on 72,148,283 annual passengers at 12.5 cents per passenger of which 67,639,015 passengers represent 60 percent of maximum load traffic and 4,509,268 passengers represent 20 percent of local traffic.
[4] Based on 135,278,029 total passengers using system, at 1 cent each.
[5] See table 5.
[6] See table 6.

TABLE 8.—*Estimated revenues and expenses*

[In thousands of dollars]

Fiscal year	Gross revenues	Operating expenses excluding depreciation	Revenues before depreciation	Depreciation	Net revenues after depreciation
1970	1,619	3,242	(−1,623)		(−1,623)
1971	6,748	6,888	(−140)	1,201	(−1,341)
1972	13,496	7,091	6,405	1,274	5,131
1973	17,544	7,294	10,250	1,287	8,963
1974	20,243	7,415	12,828	1,294	11,534
1975	22,942	7,537	15,405	1,301	14,104
1976	24,292	7,658	16,634	1,308	15,326
1977	24,967	7,780	17,187	1,316	15,871
1978	25,641	7,901	17,740	1,323	16,417
1979	26,316	8,023	18,293	1,330	16,963
1980	26,991	8,104	18,887	1,335	17,552
1981	27,261	8,185	19,076	1,340	17,736
1982	27,534	8,267	19,267	1,345	17,922
1983	27,809	8,350	19,459	1,350	18,109
1984	28,087	8,434	19,653	1,355	18,298
1985	28,368	8,518	19,850	1,360	18,490
1986	28,652	8,603	20,049	1,365	18,684
1987	28,939	8,689	20,250	1,370	18,880
1988	29,228	8,776	20,452	1,376	19,076
1989	29,520	8,864	20,656	1,381	19,275
1990	29,815	8,953	20,862	1,386	19,476
1991	30,014	9,013	21,001	1,390	19,611
1992	30,214	9,073	21,141	1,393	19,748
1993	30,416	9,134	21,282	1,397	19,885
1994	30,619	9,195	21,424	1,401	20,023
1995	30,823	9,256	21,567	1,404	20,163
1996	31,029	9,318	21,711	1,408	20,303
1997	31,236	9,380	21,856	1,412	20,444
1998	31,444	9,443	22,001	1,416	20,585
1999	31,654	9,506	22,148	1,419	20,729
2000	31,865	9,569	22,296	1,423	20,873
2001	31,971	9,601	22,370	1,425	20,945
2002	32,077	9,633	22,444	1,427	21,017
2003	32,184	9,665	22,519	1,429	21,090
2004	32,291	9,697	22,594	1,431	21,163
2005	32,398	9,729	22,669	1,433	21,236
2006	32,506	9,761	22,745	1,435	21,310
2007	32,614	9,794	22,820	1,437	21,383
2008	32,723	9,827	22,896	1,439	21,457
2009	32,832	9,860	22,972	1,441	21,531
2010	32,941	9,893	23,048	1,443	21,605
Total	1,129,863	354,919	774,944	55,000	719,944

IV. FINANCING THE PROGRAM

On the matter of financing the transit development program, section 204(g) of the National Capital Transportation Act of 1960 provides, in part, as follows:

"* * * *Provided*, That any recommendations submitted by the Agency shall provide as far as possible for the payment of all costs by persons using or benefiting from regional transportation facilities and services, and shall provide for the equitable sharing of any remaining costs among the Federal, State, and local governments."

It will cost an estimated $431 million (excluding interest) to construct and equip the proposed rail rapid transit system. The Agency estimates that revenues from the system will be sufficient to cover all operating expenses, and to repay

65 percent of the costs of construction, equipment, and financing. Thus, under the Agency's estimates, user charges will be sufficient to meet the bulk of the financial burden involved. The balance of the funds required, in the amount of $150 million, will have to be provided by the Federal and District of Columbia Governments.

The financing plan

First, in order to launch construction of the system, the Agency recommends that the Congress authorize expenditures from appropriated funds in the total amount of $150 million—$100 million in the Federal budget and $50 million in the District of Columbia government budget. In the Agency's view, such a two-thirds and one-third sharing of the initial expense is equitable. It is also compatible with the pattern for Federal-local financing established in the Urban Mass Transportation Act of 1964.

Second, the Agency recommends that the remaining $281 million of capital funds, plus an additional $52 million to cover interest charges during the construction period, be raised through the sale of bonds, to be repaid out of system revenues. However, since such bond financing will be necessary prior to the completion of the construction period, to assure their marketability at acceptable rates of interest, additional security will be required. To supply this necessary security, the Agency proposes that the Federal and District of Columbia Governments be authorized to underwrite the bonds, on a fully taxable basis, and that the ultimate responsibility for such underwriting be shared according to the same two-thirds and one-third formula recommended with respect to the appropriations described above.

Timing of capital outlays

Table 9 shows the schedule of capital outlays, together with sources of capital, for the period 1966–75. Federal and District of Columbia appropriations provide all needed funds for the first 2 years of design and construction and the bulk of the funds for the third year. Thereafter, the private loans would be required.

Repayment

The anticipated schedule for repayment of bonds is shown in table 10. It is expected that all bonds will be retired by the year 2010. At that time, the system would be debt free with adequate funds in a depreciation account to insure the continuance of modern and efficient equipment and facilities.

TABLE 9.—*Schedule of capital outlays by source*

[Thousands of dollars]

Fiscal year	Revenue bonds	Grants		Total capital outlays
		Federal	District of Columbia	
1966		11,467	5,733	17,200
1967		35,400	17,700	53,100
1968	5,500	53,133	26,567	85,200
1969	109,000			109,000
1970	114,000			114,000
1971	73,500			73,500
1972	21,000			21,000
1973	5,500			5,500
1974	3,500			3,500
1975	1,000			1,000
Total	[1] 333,000	100,000	50,000	483,000

[1] Includes $52,000,000 to cover payment of interest charges during construction.

TABLE 10.—*Anticipated payout schedule—Capital outlays—Financed by $150,000,000 in appropriated funds and $333,000,000 in bonds (4½ percent nontax exempt publicly underwritten), estimated principal and interest payments assume that excess net revenues are used to retire bonds prior to maturity*

[In thousands of dollars]

Fiscal year	Capital outlays	Net revenue before depreciation	Depreciation account (cumulative)	Annual interest on depreciation fund at 3¾ percent [1]	Net revenue after depreciation	Appropriations	Bonds	Total bonds outstanding	Interest on bonds at 4½ percent	Principal payments	Total debt service	Cash balance	Interest on cash balance at 3¾ percent [2]	Balance
1966	17,200					17,200								
1967	53,100					53,100								
1968	84,800					79,700	5,500	5,500	248		248	152		
1969	103,900						109,000	114,500	5,152		5,152	100		
1970	102,100	−1,623			−1,623		114,000	228,500	10,282		10,282	95		
1971	58,600	−140	1,201		−1,341		73,500	302,000	13,590		13,590	64		
1972	11,300	6,405	2,475		5,131		21,000	323,000	14,535		14,535	360		
1973		10,250	3,762		8,963		5,500	328,500	14,782		14,782	41		
1974		12,828	5,056		11,534		3,500	332,000	14,940		14,940	135		
1975		15,405	6,357		14,104		1,000	333,000	14,985		14,985	254		254
1976		16,634	7,665		15,326			333,000	14,985		14,985	595	10	605
1977		17,187	8,981		15,871			333,000	14,985		14,985	1,491	23	1,514
1978		17,740	10,304		16,417			333,000	14,985		14,985	2,946	57	3,003
1979		18,293	11,634	1,717	16,963			332,000	14,985	1,000	15,985	5,698	113	5,811
1980		18,887	12,969	436	17,552			331,500	14,940	500	15,440	8,259	218	8,577
1981		19,076	14,309	486	17,736			330,500	14,918	1,000	15,918	10,881	322	11,203
1982		19,267	15,654	537	17,922			329,500	14,872	1,000	15,872	13,790	420	14,210
1983		19,459	17,004	587	18,109			327,500	14,828	2,000	16,828	16,078	533	16,611
1984		19,653	18,359	638	18,298			323,000	14,738	4,500	19,238	16,309	623	16,932
1985		19,850	19,719	688	18,490			318,000	14,535	5,000	19,535	16,575	635	17,210
1986		20,049	20,671	739	18,684			312,500	14,310	5,500	19,810	16,823	645	17,468
1987		20,250	21,616	775	18,880			306,500	14,062	6,000	20,062	17,061	655	17,716
1988		20,452	22,554	811	19,076			299,500	13,792	7,000	20,792	16,811	664	17,475
1989		20,656	23,490	846	19,275			292,500	13,478	7,000	20,478	17,118	655	17,773
1990		20,862	24,424	881	19,476			285,000	13,162	7,500	20,662	17,468	666	18,134
1991		21,001	25,355	916	19,611			277,000	12,825	8,000	20,825	17,836	680	18,516
1992		21,141	26,281	951	19,748			268,500	12,465	8,500	20,965	18,250	694	18,944
1993		21,282	27,204	986	19,885			259,000	12,082	9,500	21,582	18,233	710	18,943
1994		21,424	28,124	1,020	20,023			248,500	11,655	10,500	22,155	17,831	710	18,540
1995		21,567	29,042	1,055	20,163			238,000	11,182	10,500	21,682	18,077	695	18,772
1996		21,711	29,959	1,089	20,303			227,000	10,710	11,000	21,710	18,454	704	19,158
1997		21,856	30,875	1,123	20,444			215,500	10,215	11,500	21,715	19,010	718	19,728
1998		22,001	31,790	1,158	20,585			202,500	9,698	13,000	22,698	18,773	740	19,513
1999		22,148	32,703	1,192	20,729			189,000	9,112	13,500	22,612	18,822	732	19,554
2000		22,296	33,615	1,226	20,873			174,500	8,505	14,500	23,005	18,648	733	19,391
2001		22,370	10,870	1,261	20,945			159,000	7,852	15,500	23,352	18,235	727	18,962
2002		22,444	9,972	408	21,017			144,000	7,155	15,000	22,155	18,232	711	18,943

2003	.....	22,519	10,874	374	21,090	.....	.....	128,500	6,480	15,500	21,980	18,427	710	19,137
2004	.....	22,594	11,773	408	21,163	.....	.....	112,000	5,782	16,500	22,282	18,426	718	19,144
2005	.....	22,669	12,669	441	21,236	.....	.....	94,500	5,040	17,500	22,540	18,281	718	18,999
2006	.....	22,745	13,563	475	21,310	.....	.....	76,500	4,252	18,000	22,252	18,532	712	19,244
2007	.....	22,820	14,452	509	21,383	.....	.....	57,500	3,442	19,000	22,442	18,694	722	19,416
2008	.....	22,896	15,339	542	21,457	.....	.....	37,000	2,588	20,500	23,088	18,327	728	19,055
2009	.....	22,972	16,225	575	21,531	.....	.....	16,500	1,665	20,500	22,165	18,996	715	19,711
2010	.....	23,048	17,109	608	21,605	.....	.....	[3]	742	16,500	17,242	24,682	739	25,421
Total	431,000	774,944	.....	25,458	719,944	150,000	[4] 333,000	.....	459,536	333,000	792,536	.....	20,555	.....

[1] Use of interest from depreciation account deferred until 1st year of debt retirement.

[2] No interest on cash balance account assumed during the period in which private bonds are issued.

[3] Bonds of up to 50-year maturity will be issued. The schedule of debt service payments is so related to net revenues as to provide 1.25 times coverage at all times. This results in a reserve accumulation that permits actual retirement of the total bonded indebtedness in 42 years, provided the anticipated revenues are realized.

[4] Includes $281,000,000 for payment of capital costs and $52,000,000 for payment of interest during construction.

V. ORGANIZATION AND OPERATION

It is proposed that the Agency begin the work of constructing and equipping the system. In the meantime, it is expected that efforts will be made to obtain enactment by the legislatures of Virginia and Maryland of the interstate compact contemplated by title III of the National Capital Transportation Act of 1960. Once the compact has been enacted by the States, it will be transmitted to the Congress for approval. Following such approval, title III provides for the submission by the President to the Congress of a plan for transferring responsibility for the system from the National Capital Transportation Agency to the compact agency.

Pending the establishment of the compact agency, the powers granted under the 1960 act and those sought in the present legislation will be sufficient to permit the Agency to begin at once with construction of the system. If the contemplated interstate compact, with appropriate financing powers, has been approved by the time additional funds for capital outlay are needed, the interstate agency thus created would continue the construction and develop plans for additions and extensions. If not, then the question of organization and finance can be reviewed and appropriate legislation enacted to provide for continued construction.

It is proposed that the system be operated by a private company. Examination of the experience of other cities where mass transportation systems are publicly owned but managed by private enterprise has persuaded the Agency that a satisfactory arrangement can be worked out with a private operator that will provide efficient operation and will adequately protect the public interest in the rapid transit facilities.

In the cities referred to above, the public agencies concerned are vested with control over system operation, including key matters affecting the public interest such as fares, schedules, purchase of equipment, maintenance policies, etc. Such controls would be retained by the Agency under any arrangement with a private operator. Also, under the Agency's proposal, any such arrangement would include provisions for the protection of the rights of existing transit company employees. These would be the same as those provided nationally under the Urban Mass Transportation Act of 1964.

VI. CONCLUSIONS AND RECOMMENDATIONS

The principal transportation problem confronting the National Capital region, and every other large metropolitan area, is the ever-increasing traffic congestion caused by the movement of multitudes of people to and from their places of employment during a few hours of peak demand each day.

The solution to the problem is to develop an alternative to travel by automobile that will offer convenient, fast, economical home-to-work transportation and will enable the highway system to function more effectively by encouraging some people who might otherwise drive to make use of public transportation.

The Agency concludes that—

The most efficient and economical method of transporting large numbers of people during peak demand periods is by high-capacity, high-performance rail rapid transit.

Such a system involves minimal right-of-way requirements, preserves taxable property, reduces the problem of displacing and relocating families and business establishments, and reduces the burden of traffic on streets and highways.

By utilizing underground routes, the integrity of neighborhoods and central Washington will be protected and the beauty and dignity of the Nation's Capital preserved.

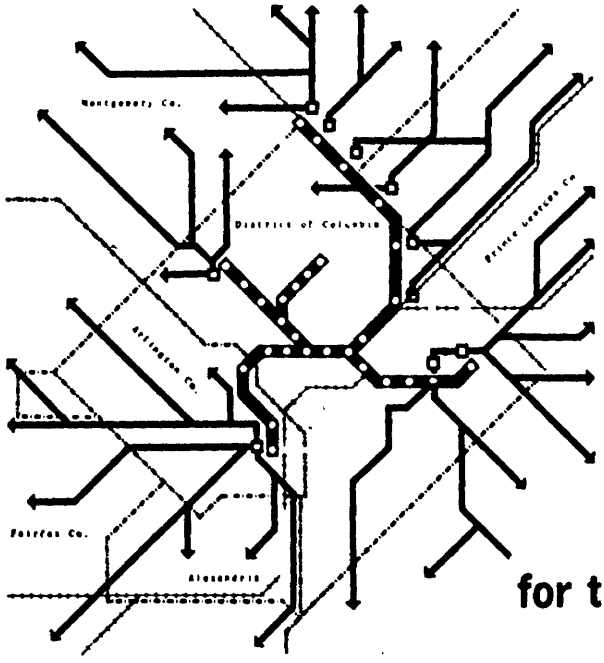
The downtown subway and the network of rapid transit routes described in this transit development program are not only required but are economically practicable.

The Agency recommends—

That the Congress authorize the Agency to undertake development of the rail rapid transit system described in this report and detailed in the engineering supplement.

That Congress appropriate the funds necessary to implement the transit development program.

NCTA RAIL RAPID TRANSIT



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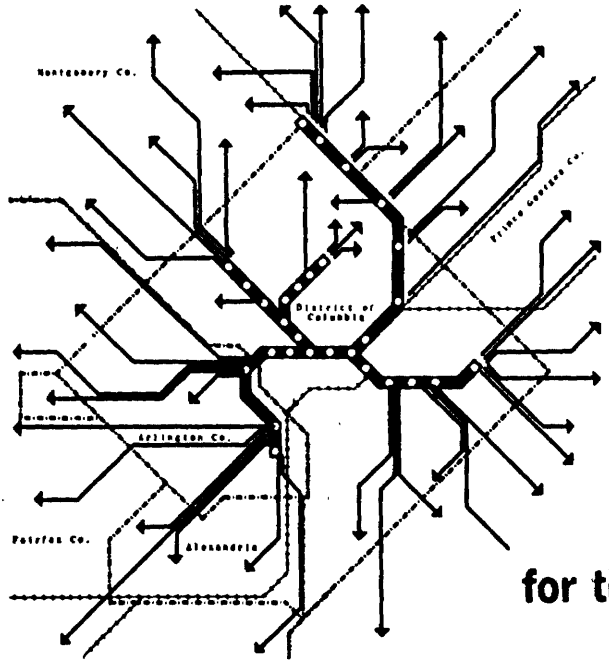

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