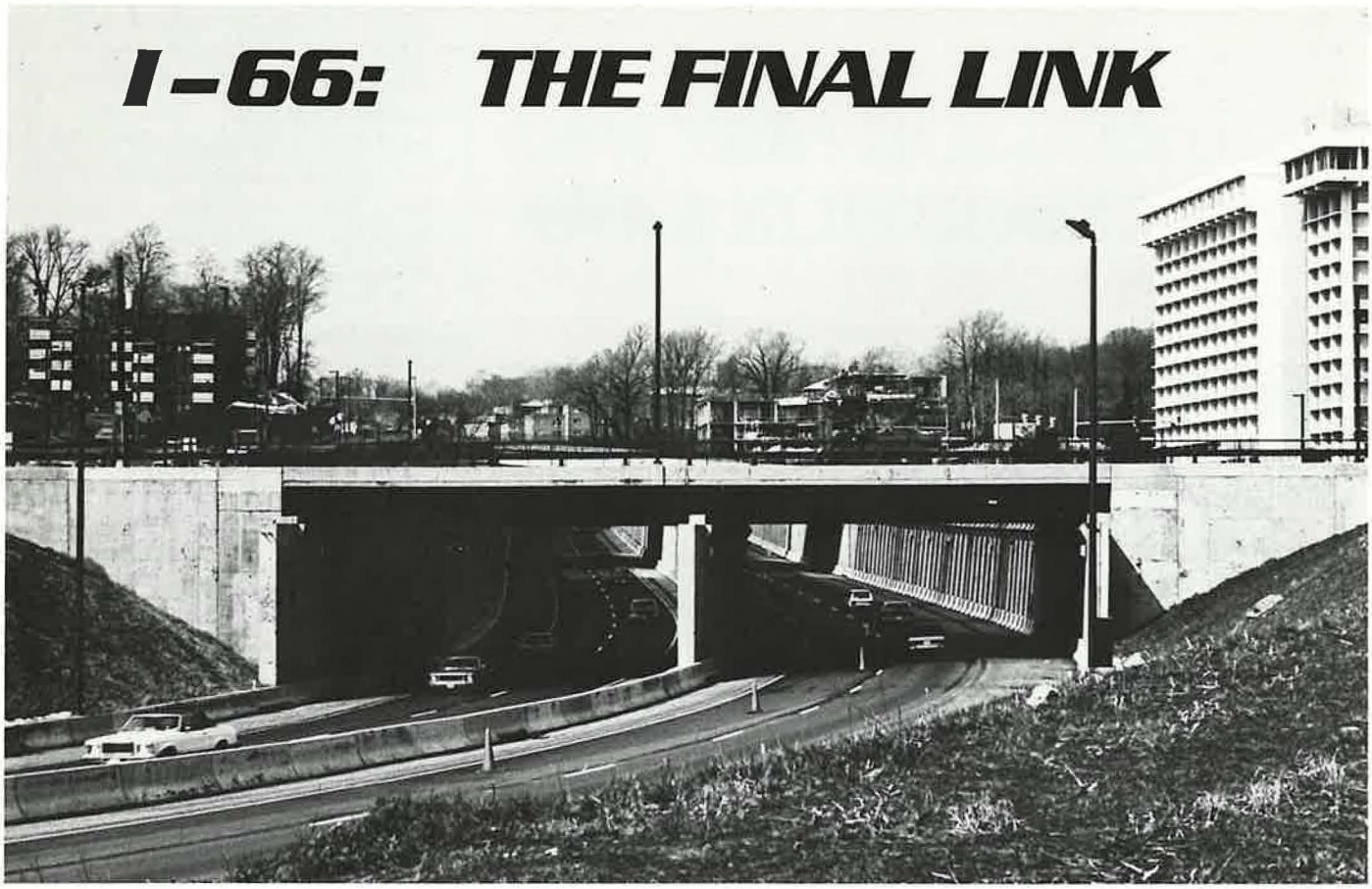
I-66: THE FINAL LINK



Future site of the pedestrian plaza planned for construction over I-66 at Rosslyn.

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Interstate 66 is a 75-mile highway extending from Interstate 81 at Strasburg in the Shenandoah Valley of Virginia to Washington, D.C. The first 65 miles stretching eastward from I-81 was constructed routinely and with few problems. The final 10-mile segment in the Washington, D.C., suburbs of Northern Virginia (Figure 1), however, has been surrounded by considerable controversy in the public arena because of its impacts on the environment and on commuters. This highway section is also of considerable interest to the transportation profession owing to its state-of-the-art concepts. In this article, the history of the final link of I-66 is briefly recounted, the concepts employed in the design are discussed, and its operating characteristics are discussed.

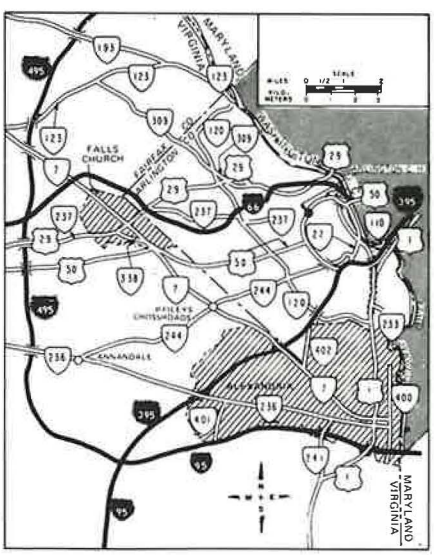

FIGURE 1 The final segment of Interstate 66 in the Virginia suburbs of Washington, D.C.

BACKGROUND

The need for a high-capacity, east-west road linking the Virginia counties of Fairfax and Arlington with the District of Columbia was first recognized in a 1938 study conducted by Arlington County. This need was reflected in the local zoning and land use policies adopted over the next 20 years to reserve a corridor for the road. In June 1959 the corridor was incorporated into the Interstate highway system.

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The planning and design of I-66 began and took place during a period characterized by a renewed interest in public transit, the development of opposition in urban areas to large-scale freeway projects, and an increased concern for environmental quality. After much controversy, including several court decisions and design changes, the Virginia Department of Highways and Transportation submitted plans for a four-lane, multimodal facility to the Federal Highway Administration (FHWA) for approval in 1976.

In early January 1977, the then Secretary of Transportation, William Coleman, approved construction of the final link of I-66, subject to certain conditions. Key among these conditions were (a) provision of right-of-way in the median to the regional transit authority for construction of a heavy-rail line; (b) restriction of the facility in the peak direction and period to buses, car-pool vehicles carrying four or more persons, emergency vehicles, and vehicles bound to or from Dulles Airport; (c) exclusion of heavy-duty trucks from the facility at all times; and (d) incorporation of design features intended to minimize adverse environmental impacts.

The final 10-mile segment of Interstate 66 was opened to traffic in 1982 as a four-lane, parkway-type roadway.

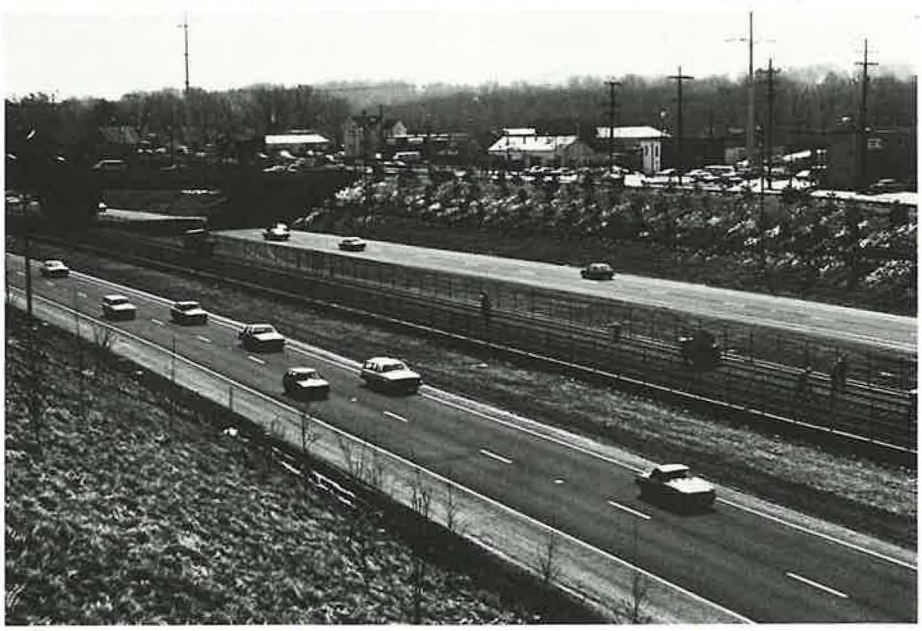
DESIGN CONCEPTS

The governor of Virginia agreed to the conditions noted above and construction began in the fall of 1977. On December 22, 1982, a facility that had received approval as an Interstate segment more than 23 years earlier, and had at one time been designed as an eight-lane highway, was opened to traffic as a four-lane, parkway-type roadway with a heavy-rail transit line and two stations in the median. Further, heavy-duty trucks were excluded at all times, and peak period and direction use was restricted to high-occupancy vehicles (HOVs), emergency vehicles, and vehicles bound to and from Dulles Airport.

Finally, to maintain safe and efficient traffic flows on the facility, a comprehensive, computer-controlled traffic management system (TMS) is scheduled to be installed. Basic elements of the system include closed-circuit television (CCTV), ramp metering, motorist advisory signing, interface with adjacent traffic signal systems, and incident detection and management.

Approximately 8 miles of paved and lighted hiking and biking paths has been built within the right-of-way, with connections to parks and playgrounds. Surplus right-of-way has been used to create a 4.6-acre linear park, and an additional 10.5 acres supplement existing parks. A parking deck has been constructed over the roadway at a local high school, and a two-block pedestrian plaza is being planned over a recessed portion of the roadway at Rosslyn.

Metrorail line in the median can be seen in this view of the final link of Interstate 66.



Extensive use has been made of specially designed and aesthetically pleasing noise and retaining walls. A lighting system on the main line, which has been specially designed to minimize adverse impacts on the surrounding neighborhoods, provides continuous lighting on the roadway. Enforcement areas on the main line and ramps have been constructed to facilitate the identification and the citation of violators. Finally, operational control of the completed TMS will be housed in a new two-story building containing the computer system, the dynamic display map, and the CCTV monitors. A special contingent of state police assigned to I-66 is housed on the first floor of the building.

EVENTS SINCE OPENING

The opening of the final link of I-66 did not end the controversy. The facility opened with the agreed-on traffic restrictions in place; that is, only vehicles with four or more occupants could legally traverse the facility eastbound toward Washington from 6:30 to 9:30 a.m. and westbound from Washington from 3:30 to 6:30 p.m. Just before and on opening a major controversy occurred, which involved the small section of I-66 that had been constructed much earlier in conjunction with the Theodore Roosevelt Bridge. This section begins in Rosslyn, Virginia, and includes the ramps at Lynn Street and the George Washington Memorial Parkway (see Figure 2). State officials believed that the U.S. DOT's decision to include this section of I-66 was intended to restrict the on-ramps from Lynn Street and the George Washington Memorial Parkway to high-occupancy vehicles. The National Park Service, which controls the operation of the Parkway, did not want to deny its users access to the Theodore Roosevelt Bridge, and hence would not agree to the placement of signs advising of the restrictions on its property. The state appealed to the FHWA, and it was ruled that the U.S. DOT decision did not apply to the on-ramp from the Parkway. On the basis of this decision, the state later lifted the HOV restriction at Lynn Street, subject to the maintenance of an adequate level of service.

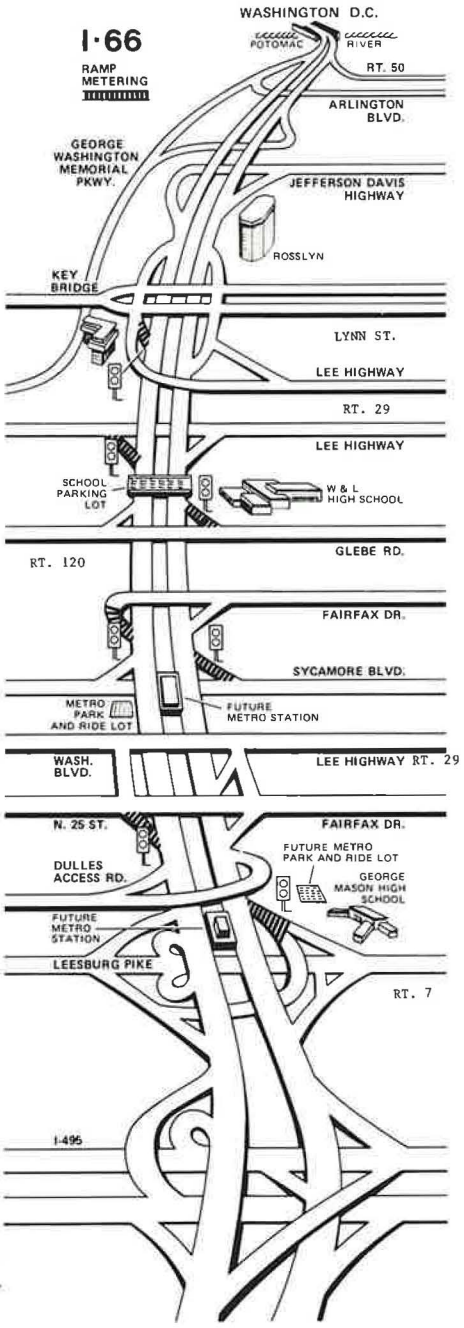


FIGURE 2 Schematic of the final segment of I-66.

The controversy over the restrictions on I-66 continued, and eventually spilled over into the political arena as local governmental and legislative officials were bombarded with complaints from their constituency. In April 1983 a public hearing on I-66 was scheduled by the area's representative to the U.S. House of Representatives. More than 200 Northern Virginia commuters attended the hearing, which featured a panel consisting not only of Virginia's congressman, but also Virginia's two U.S. senators, the commissioner of the Virginia Department of Highways and Transportation, and other officials. Of the 80 speakers at the hearing, approximately 60 percent called for easing the restrictions and 40 percent voiced support for the restrictions, at least for the present time.

Shortly after the public hearing, the two senators and the representative recommended to the governor of Virginia that the restriction be lowered to three persons and that the hours of restriction be reduced. The governor did not endorse the recommendation at that time; however, he was amenable to future consideration of the proposal.

The state's position was that the restrictions were required by its agreement with the U.S. DOT and should remain intact for a suitable trial period. A similar public outcry had occurred when the reversible HOV lanes on I-395 (Shirley Highway), another major commuter route in Northern Virginia, were put in service. Utilization of that facility has grown to near capacity during the peak hour. Further, direct connection to the Dulles Airport limited-access roadway was scheduled for opening in late 1983, and there was a need to assess the traffic impacts of that event. Finally, the DOT's decision detailed a procedure for implementing change in the restrictions, should conditions warrant such a change.

The issue of the HOV restrictions was finally resolved, at least at the time, by the passage of federal legislation changing both the occupancy requirement and the time of restriction on I-66. These changes became effective on Jan-

uary 3, 1984. The pertinent portion of the final bill is given below (italics added for emphasis).

> ... the Secretary of Transportation, in cooperation with the Commonwealth of Virginia, shall carry out a *demonstration project* on Interstate Highway 66 ... for a *period not less than 12 months.* ... The Commonwealth of Virginia shall restrict the use of such highway between I-495 and the District of Columbia to high occupancy vehicles carrying *three or more passengers* during the hours of *7 a.m. to 9 a.m.* on Monday through Friday, exclusive of holidays, on eastbound lanes and during the hours of *4 p.m. to 6 p.m.* on Monday through Friday, exclusive of holidays, on westbound lanes during the demonstration period. ...

OPERATIONAL CHARACTERISTICS

The facility has been closely monitored since its opening. In addition, an evaluation of I-66 and its impacts has been undertaken by the Virginia Department of Highways and Transportation. Table 1 summarizes the following discussion of the operating statistics.

The facility carries between 70,000 and 80,000 vehicles during an average weekday, and this figure has been growing steadily since the roadway opened.

Traffic volumes in both the morning and afternoon restricted periods exhibit similar patterns. Traffic is very heavy just before and, especially in the morning, during the first 15 minutes of the restricted periods. It takes about 10 to 15 minutes to travel the length of the restricted portion, which explains why the volumes are still high during the first 15 minutes. Fifteen-minute volumes result in capacity conditions or even stop-and-go traffic for that period. Volumes then drop significantly, with morning volumes tending to bottom out and afternoon volumes tending to remain fairly constant. Then, after the restricted period ends, traffic becomes very heavy again, with volumes indicative of capacity or forced-flow conditions.

The facility carries approximately 3,300 vehicles during the restricted hours of 7:00 a.m. to 9:00 a.m., and 3,600 vehicles between 4:00 p.m. and 6:00 p.m. Approximately 120 to 140 vehicles are buses, mostly Metrobuses operated by the regional transit authority. Usually these buses are on express runs into Washington, especially those coming from Reston, or on feeder runs to the authority's Metrorail stations at Ballston and the Pentagon. Most, if not all, of these buses were diverted to I-66 when it opened, and thus are not indicative of new ridership.

It should be noted that a significant number of vehicles—1,100 in the morning and 1,200 in the afternoon—contain fewer than the required three persons. A large percentage—specifically, 51 percent in the morning and 29 percent in the afternoon—of the one- and two-person vehicles travel in the first 15-minute clearing period. Also, some are legitimate users of Dulles Airport. Obviously, there are also some violators. State and Arlington County police issued an average of 15 citations per day for violation of the HOV-3 occupancy requirement during February and March of this year. Enforcement was heavy in January, with an average of 62 citations issued each day. The fine amounts to between $40 and $50 for the first offense.

TABLE 1
I-66 Operating Characteristics, HOV-3

Statistic	A.M.	P.M.
Peak Hour		
Time[a]	7:15-8:15	4:45-5:45
Total volume	1,700	1,900
Buses	77	79
Vol. <HOV-3	200	400
Persons	8,100	8,400
Occupancy[b]	3.4	3.4
Restricted Period		
Time	7:00-9:00	4:00-6:00
Total volume	3,300	3,600
Buses	141	121
Vol. <HOV-3	1,100	1,200
Persons	13,600	14,000
Occupancy[b]	2.9	3.0
Overall speed[c]	37 mph	51 mph
Average Daily Traffic	—— 70,000-80,000 ——	
Average Daily Citations[d]	———— 15 ————	

[a] Excluding first 15-minute "clearing" time.
[b] Excluding buses.
[c] Between Route 50 and Washington, D.C.
[d] February and March 1984.

The overall speed of travel during the peak period along I-66 between Route 50, which is about 6½ miles west of the Beltway, and downtown Washington is 37 mph eastbound in the morning and 51 mph westbound in the afternoon. With the exception of the HOV lanes on the Shirley Highway, these speeds are much higher than the overall speeds found on similar commuting routes in the region.

If the first 15 minutes is excluded because of the clearing time, then the peak hours in the restricted periods are 7:15 to 8:15 in the morning and 4:45 to 5:45 in the afternoon. Volumes are 1,700 and 1,900, respectively. Assuming capacity at 2,000 vehicles per lane, or 4,000 vehicles for the roadway, the facility operates at around 43 percent to 48 percent of capacity during the peak hour. The 200 to 400 vehicles carrying fewer than 3 persons is a much smaller percentage of the total peak-hour volume than the percentage found over the entire period of restriction. Approximately 80 buses use the facility during the peak hours.

As suggested by the previous discussion on the percentage of one- and two-person vehicles, the occupancy rates (excluding buses) of 3.4 and 3.3 during the peak hours are higher than the rates of 2.9 and 3.0 observed over the entire period of restriction. Occupancy rates on I-66 compare very favorably with the rates found on other major commuting routes in Northern Virginia. With the exception of the HOV lanes on the Shirley Highway, occupancy rates on the other facilities are 1.2 or 1.3.

Person movement is important in the evaluation of a HOV facility. It is estimated that between 13,600 and 14,000 persons travel the restricted portion of I-66 during each of the restricted periods.

Approximately 8 miles of paved and lighted hiking and biking paths has been built within the I-66 right-of-way.

Peak-hour movements range from 8,100 to 8,400 persons. If these persons traveled at the fairly typical rate of 1.2 or 1.3 persons per vehicle found in the area, between 6,200 and 7,000 vehicles would be on the road, which is well in excess of the theoretical capacity of 4,000 vehicles.

Given the controversy surrounding the restrictions on I-66 and the change to HOV-3 and reduced hours, a comparison of current statistics with similar ones obtained during the HOV-4 operation is of interest. Traffic has increased by approximately 60 percent in the morning and by approximately 80 percent in the afternoon during the hours of restriction. Volumes during peak hours have more than doubled, from 800 to 1,700 in the morning and from 900 to 1,900 in the afternoon. As expected, occupancy rates have dropped by about one person under HOV-3. Person movement has also increased; e.g., approximately 8,100 persons are currently traveling the facility eastbound during the peak hour of the morning restricted period, whereas 5,500 persons utilized the facility under the HOV-4 operation.

SUMMARY

The opening of the final link of I-66 to traffic inside the Capital Beltway that circles Washington, D.C., has not stopped the controversy surrounding the facility. Public opinion, public outcry, and citizen input have played a major role in its operation. Specifically, federal legislation was enacted recently that changed the operation of the highway to HOV-3 and reduced periods of restriction. In the opinion of many transportation professionals, this change was premature.

Operation at the HOV-3 level has proven successful, although problems exist. Although there is additional capacity during the heart of the restricted periods, there is significant congestion and users are experiencing delays immediately preceding and following these periods. The change to HOV-3 from HOV-4 has increased utilization of the facility, which is advantageous during the restricted periods but not on the fringes.

The story of I-66 is far from over, especially since the impacts of the TMS have not yet been determined. More time and more analyses are needed before final conclusions regarding the successes and failures of this state-of-the-art facility can be drawn.

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