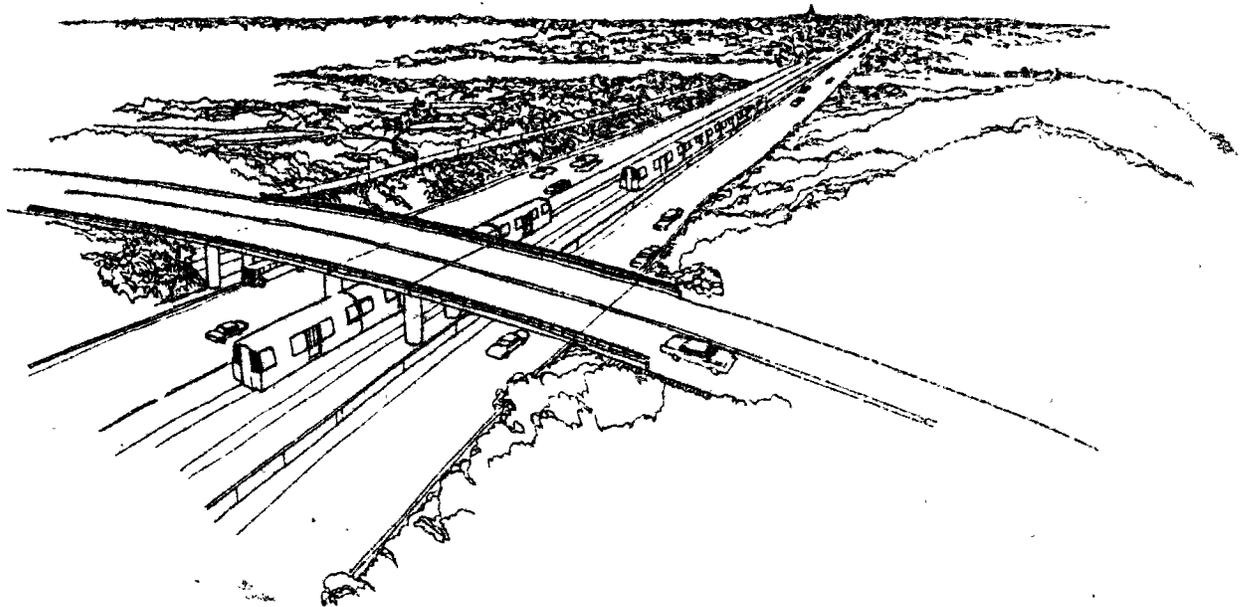
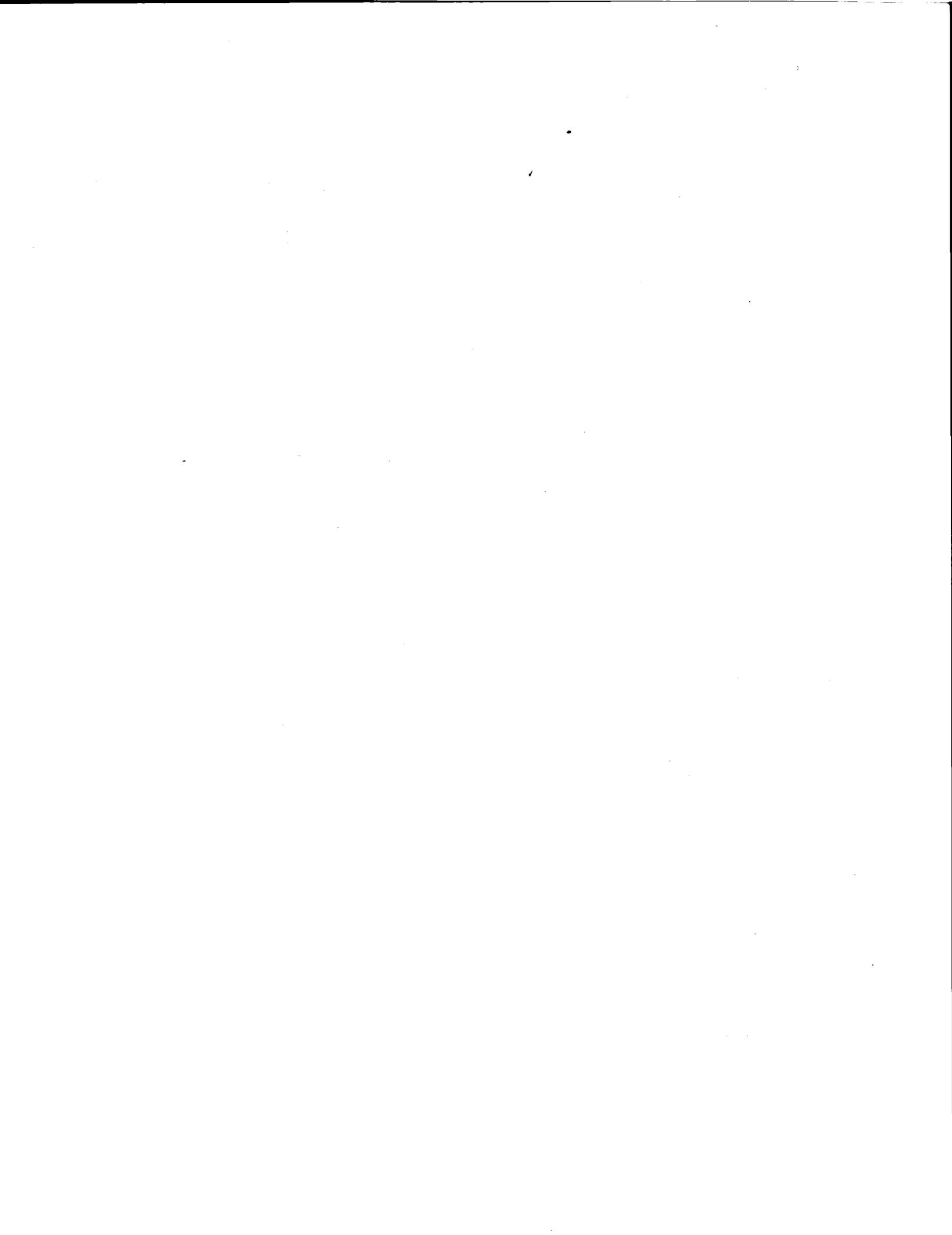


# I-66 — A CASE STUDY



JOHN PAGE and ED DEASY



## Chapter I - Introduction

The Arlington-Fairfax County section of I-66 is similar to many urban highway projects, yet in many ways this project represents a milestone in urban transportation planning. I-66, not unlike many others, required non-technical political groups to make difficult, technically complex decisions. These decisions took place over a long period of time, 1959-1979, during which the information base, as well as public attitudes reflected by local governmental policies, shifted. The decision process encompassed a large number of political jurisdictions from the federal level to the community civic associations, as well as a wide range of special interest groups varying in size from federal departments to environmental action groups. Finally, the political process when faced with a very controversial decision, tried to hide behind its trusted friends; delay, debate and study.

In spite of all of this, the project and its history are unique. The final I-66 facility, marked by litigation, build and no-build decisions and intense adversarial debate, would not be recognized by the 1959 highway planner. Some of the many individuals and groups which opposed the project claimed that they did not have an impact on the final result. Granted, these groups did not stop the project; however, the final design was altered dramatically by their opposition.

I-66 was conceived and born during the 1950's highway era characterized by domestic preoccupation with congestion, the decay of the central city and flight to the suburbs. It survived the late 1960's and 1970's rebirth of transit age including citizen involvement, concern for the environment and the energy crisis. The project survived by adapting and changing its role from a Los Angeles freeway to a multi-modal, traffic managed facility. The history and its

adversary involvement are a case study of the urban planning evolution process. The project could be the urban highway of tomorrow.

As an aid to understanding this very complex project, the case study is divided into three sections. Chapter II will develop the history of I-66, describing the design changes and political changes in its checkered past. Chapter III will be a discussion of the major urban planning issues which came to the forefront during the adversary debate. Finally, Chapter IV will describe the final result of the planning process - the design, concentrating on the traffic management concepts and the operation of those concepts.

## Chapter II: I-66 Background and Design Evolution.

The history of the I-66 project is a lengthy and complex one. Throughout this chapter a symbol of a scale will be used to represent the ebb and flow of the decision process: a monthly time clock to mark the passing of time, a number of lanes to indicate major design changes, and the approximate amount of money spent to that date. The symbol is a graphic demonstration of the important benchmarks in the I-66 case study. Also, the history of the project will be divided into five phases.

- . The Pre-Interstate Phase 1938-1958
- . The I-66 Approval Phase 1958-1971
- . The Litigation/Restudy Phase 1966-1973
- . The Federal/State Decision Phase 1973-1977
- . The Construction Phase 1977-present

The I-66 was planned to connect I-81, near Strasburg, Virginia to Washington, D.C., a distance of 75 miles. The portion to the west of the I-495 beltway was planned and constructed with little or no opposition. However, the 9.6 miles of I-66 inside the beltway had a great deal of opposition and is the subject of this case study.

### The Pre-Interstate Phase 1938-1958

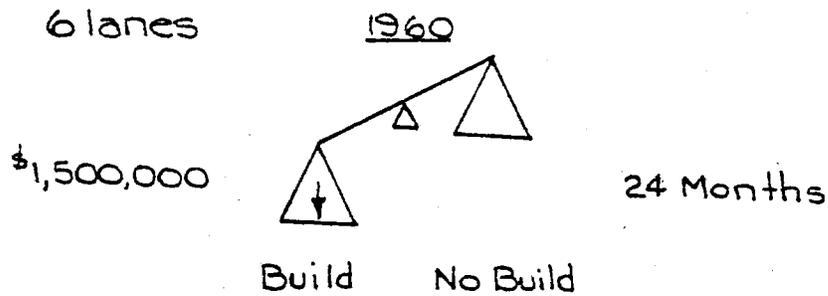
The present I-66 location has been an important transportation corridor. Mr. C.L. Kinnier, the Arlington County Engineer, recommended that the proposed Fairfax Drive be constructed to state highway specifications and the corridor be recognized as an important transportation facility. This recommendation is documented by the 1938, "First Report to Arlington County Planning Commission."<sup>(1)</sup> This policy, reflected in zoning and highway improvement, evolved during the next twenty years

when the corridor was developed as the county's access route to the west. The 1956 Federal Aid Highway Act, authorized the development of an Interstate Highway System. In response to this program, the Commonwealth of Virginia and the Counties of Arlington and Fairfax proposed that this regionally important corridor be incorporated into the Interstate System on March 29, 1958.<sup>(1)</sup>

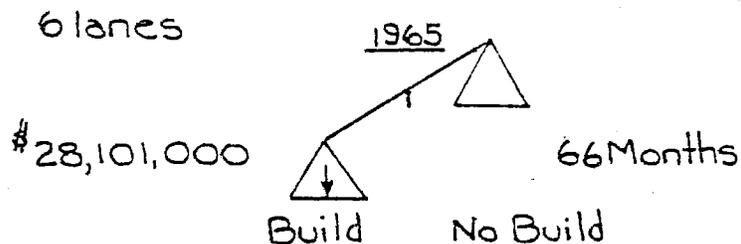
#### The I-66 Approval Phase 1958-1968

This phase was a period of support for the project. Nationally and locally, highway projects were welcomed as the savers of the city, the reducer of congestion and the provider of suburban living. On October 29, 1958, after a brief location hearing, the corridor was endorsed as a possible location for an Interstate connection for Washington, D.C. to the west. At this time, the Arlington County Board of Supervisors did endorse the corridor as the "least objectionable" alternative.<sup>(1)</sup> Virginia Department of Highways (VDH) forwarded the plan to the U.S. Bureau of Public Roads and the corridor was approved and the location finalized on June 4, 1959.<sup>(1,2)</sup> As a result of this decision, the route was included in the area jurisdictional land use and transportation plans. The Arlington County General Land Use Plan, dated 1961, includes I-66.<sup>(1)</sup>

Also as a result of Interstate approval, VDH started to acquire the necessary right of way for the project on June 28, 1962. This process continued throughout the 1960's. By 1968, 93.9 percent of all dwellings were acquired, 98.5 percent of all businesses were acquired, 75.6 percent of all families were relocated, and 84.4 percent of all right-of-way purchased, at a cost of \$28.7 million for right-of-way acquisition.<sup>(1,3)</sup>

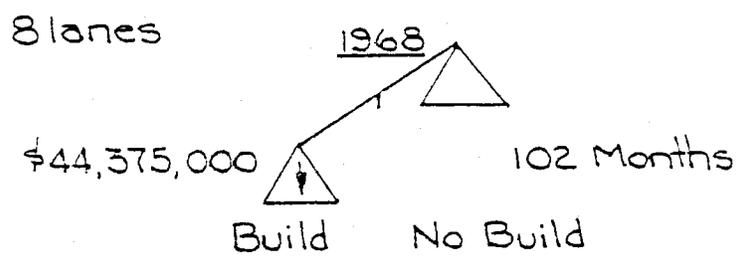


During the early 1960's the I-66 project went into the construction phase to the west of the beltway; by 1964, 32 miles were open for use. Also, the important bridge linkage between Virginia and Washington, D.C., Theodore Roosevelt Bridge, was completed. However, the important urban link inside the beltway was delayed. This delay was a result of two factors: traffic forecasts and METRO. In early 1964, VDH&T asked for construction bids for I-66 between I-495 and the Arlington County line in Fairfax Co. and one of the Arlington sections between the county line and Glebe Road.<sup>(3)</sup> The original concept of the I-66 facility was a 6 lane facility. VDH&T reviewed these plans in light of the proposed highway traffic and realized that 6 lanes were not sufficient for the traffic. Also, the Washington, D.C., Council of Governments (COG) was developing plans for a regional rail transit system, METRO, and requested VDH&T to delay I-66 construction until their plans were approved. This would enable the two transportation projects to proceed at the same time using the same right-of-way. As a result of these factors, VDH&T withdrew its call for construction bids.



In October of 1964, the Virginia State Highway Commission approved an 8 lane plan for I-66 and the Federal Highway Administration (FHWA)

concluded. No additional action was undertaken due to 1) the local controversy over a second Potomac River crossing, the Three Sisters Bridge/I-266, 2) coordination of the proposed METRO system and the I-66 project; and 3) legal negotiations to retain the Washington and Old Dominion as a commuter line.<sup>(2)</sup> These three issues delayed further I-66 development until March 1, 1968 when the final METRO system was approved, which included the addition of a METRO line in the I-66 right-of-way between Glebe Road and Nutley Street, a distance of 6 miles.



The Litigation/Restudy Phase 1968-1973

The Litigation/Restudy Phase of the I-66 project marked an important shift in the urban transportation planning process. The emergence of a vocal, informed, and politically active group opposed to large scale highway projects, and new environmental/public action legislation pushed the urban transportation planning process from the back rooms of technical expertise to the sunshine of public debate.

These new federal transportation regulations, administrative directives and amendments were designed to shift the justification of a highway project from the user's criteria, reduced congestion and increased travel time, to a more general criteria which measured the project's impact on the entire community. These new criteria forced the transportation planner and highway engineer to consider the following elements.<sup>(1)</sup>

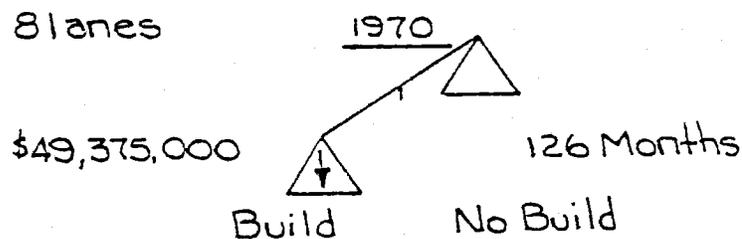
- . Comprehensive Planning Process
- . Social and Economic Impacts of Highway Projects
- . Regional and Local Agency Review
- . Protection of Parks and Recreational Areas
- . Protection of Wildlife and Waterfowl Areas
- . Protection of Historical Sites
- . Needs of Local Neighborhoods
- . Public Hearing Process
- . Community Input to Planning
- . Environmental Impacts

The first of these new Federal directives was the 1966 Federal Aid Highway Act Section 138, Section 4(f) which prohibited the approval of projects that used parklands unless there was no "feasible and prudent" alternative to such use, and if no alternative existed then the project had to demonstrate that it had included all possible planning to minimize harm to the parkland. This was followed by Title 23 to Section 128 of the U.S. Code in 1968 which required that the economic, social and environment impacts of a highway project must be considered and debated in public hearings for that project. The final piece of legislation was the 1970 National Environment Policy Act (NEPA), Section 102 which required the preparation of environmental impact statements (EIS) for all federally funded projects which might be "significantly affecting the quality of the human environment."<sup>(2)</sup> These major pieces of environmental and public participation legislation would play a very important role in the I-66 controversy.

The previously delaying concerns of METRO and the correct number of lanes had been satisfied and VDH&T convened a public meeting in September of 1970 to inform the citizens of plans to lessen the high-

way's environmental impact. The public hearing covered the section of I-66 between North Glebe Road and North Lynn Street. This portion of I-66 did not include right-of-way for METRO. At this time VDH&T's plans called for the taking of 9.7 acres of the 22 acre Bon Air Park and 5 acres of the Spout Run 30 acre park. The Washington Post later described the public hearing as "a raucous match between Fairfax supporters and Arlington opponents."<sup>(4)</sup> The battle lines were starting to be drawn.

The end products of the September 1970 meeting were the formation of a group of citizens against the project into Arlington Coalition on Transportation (ACT) and the re-opening of public hearings on the overall design of the project in December of 1970. Near the end of 1970 COG, the metropolitan planning organization (MPO), using its A-95 area wide planning review powers, endorsed the I-66 project.



The year 1971 opened with a bang as the battle lines were clearly drawn. VDH&T and the State Highway Commission reaffirmed the project sighting the support of COG and FHWA, while ACT as well as Arlingtons for the Preservation of the Potomac Palisades filed a suit in U.S. District Court to stop I-66 construction in February 1971.

ACT contended that the county's character had changed dramatically since 1958; therefore, the original approval was not valid. They petitioned Secretary of Transportation, John Volpe, to stop the construction until a new public hearing on the project was held. The plaintiffs also contended that:

- . The 1958 public hearings did not consider the economic, social and environmental impacts of the project as specified by the 1968 Section 128, Title 23, U.S. Code.
- . The Secretary of Transportation had violated Section 138 of the 1966 Federal-Aid Highway Act by approving a federally funded project which used parklands for right-of-way.
- . The Secretary of Transportation had also violated the Section 102 of the 1970 National Environmental Policy Act as no environmental impact statement had been submitted for the project. (1)

VDH&T maintained that the I-66 project had received public endorsement as a result of the 1958 public hearings and this event superseded the sighted legislation. Judge Oren L. Lewis, in his 22 page October 10, 1971 decision, stated: (4)

'Although this suit could and probably should have been brought sooner, the (13 year) delay - standing alone - is hardly sufficient to justify dismissal,' he wrote, adding another point. 'The transportation needs of the area have been monitored over the years by many agencies ... (these agencies) have reaffirmed their choice on numerous occasions up to the present time.'

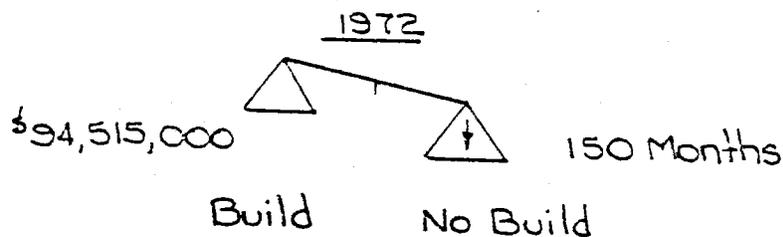
Judge Davis also, in his rejection of ACT's petition, specifically separated the I-266 spur to the Three Sisters Bridge. This project was the northern and second crossing of the Potomac and was involved in a court fight. Judge Lewis said, "The Three Sisters Bridge is not part of I-66, neither is the proposed connecting road I-266." This decision thus separated the two projects. Upon reviewing Judge Lewis's decision, Lawrence J. Latta, ACT's counsel said, "(ACT) will certainly appeal." (4)

And appeal they did. On 4 April 1972 the U.S. Court of Appeal for Fourth Circuit, reversed Judge Lewis. The appellate court ordered

that the 1958 public hearings had been inadequate and new hearings must be held before any work on I-66 could continue or right-of-way be purchased. The court ruled that prior to continuing construction VDH&T must:

- . file an Environmental Impact Statement;
- . ascertain that there is "no feasible and prudent alternative" to taking right-of-way from Bon Air Park and Spout Run Park;
- . conduct public hearings on social, economic, and environmental impacts of I-66 on Arlington County; finally
- . conduct a design public hearing on the proposed 14 lane section near Rosslyn. ( 2 )

VDH&T officials, on 17 May 1972, announced that they were going to pursue the Appeals Court decision to the U.S. Supreme Court on the grounds that the "review of the highway plans in 1958 was sufficient and the NEPA, since it took effect long after that review, did not apply to I-66."<sup>(5)</sup> VDH&T was not overly confident of its case, as in September of 1972 they instructed the consultant firm of Howard, Needles, Tammen and Bergendoff to prepare an EIS for the project. On Nov. 7, 1972, the U.S. Supreme Court refused to hear an appeal of the lower court decision, thus killing the challenge of VDH&T to the court order stopping I-66 construction.



The Federal/State Decision Phase 1973-1977

The fourth phase of the history of I-66 was characterized by political group oscillation and design changes by VDH&T as a result

of those pressures. During this period the various federal governmental agencies, special interest groups and regional/local governmental organizations declared their positions on the question, restudied their positions and sometimes reversed their positions only to re-reverse their positions later. An appropriate slogan would have been, "These are the times that try men's souls" or "You can't tell the players without a score card."

As a result of the April 4, 1972 Appeals Court decision, the public debate on the I-66 issue had escalated into open warfare between pro and anti-highway groups. A January 31, 1973 article from the Washington Post reviewed the situation as follows: (6)

"In the past few weeks, the major opposing citizen coalitions have packed public hearings, launched petition drives, organized in out-of-the-way communities, cut up opponents' bumper stickers and wheedled a consulting firm preparing a major study of the issue."

Meanwhile, the pro-highway group was distributing 20,000 "Build 66 Now" bumper stickers and forming a "Citizens for I-66" group. This group was also preparing petitions and busing their supporters to public meetings. (The use of chartered buses by a pro-highway group seems somewhat ironic.)

During a February 1973 workshop conducted by VDH&T consultants, spokesmen for the two groups voiced their comments: (6)

"Those of us who live outside the beltway and must commute daily into the District of Columbia have a very serious problem."  
"The cost to Virginia of abandoning the highway plan would be astronomical and the effect disastrous."  
"Help us break this vicious cycle of more roads and more roads."  
"I-66 would increase air pollution, noise and traffic congestion in Arlington neighborhoods."

Not to be out-quoted in the press by these amateurs, the professional bureaucrats started to publicly voice their opinions. On

1 March 1973, Senator William L. Scott (R-Va.) urged the Senate Public Works Committee to approve the I-66 construction. "You can be assured that I'm going to ~~bird~~-dog this thing. I'll go to the White House on it," he claimed. (7)

The Environmental Protection Agency (EPA) and the Department of Housing and Urban Development (HUD) published their comments. These were very supportive of the position that the highway should not be constructed. "Location alternatives are given less than a full page of discussion and it appears that no real analysis was made in weighing and considering other corridor location alternatives to the proposed corridor," (8) the HUD statement said. The EPA report listed various alternatives to I-66 construction, including mass transit, exclusive bus lanes, more one-way streets during peak hours and a higher D.C. parking charge to discourage automobile commuters. EPA also made the observation that new highways generate their own demand and it was unlikely any long term reduction of congestion would occur as a result of I-66. (8) As expected, ACT was reinforced by this new high-caliber ally and said that the EPA comments "are very much in line with what the citizens have been say(ing); in fact, they're probably stronger." (8)

On November 17, 1973, the long awaited draft of the E.I.S. was released by VDH&T and their consultants Howard, Needles, Tammen and Bergendoff (HNT&B). The initial reaction of the public to this 400 page document as expressed by the Washington Post was, "I-66 would create more highway congestion, noise and air pollution, yet would still be of 'significant benefit' to Northern Virginians." (9) The E.I.S. appeared to provide the anti-highway forces a great advantage in their opposition to the project. The Post reported that the report

provided a limited victory for ACT and when ACT co-chairperson Emilia Govan was asked to comment on the report, she replied, "I'm delighted. I had hoped the study would show that mass transit can do the job, do it better than I-66 and with fewer adverse social and environmental impacts and that's what it seems to show."<sup>(9)</sup>

HNT&B developed the I-66 E.I.S. by dividing the study into 7 phases; they were: 1) Inventory, 2) evaluation, 3) identification of alternatives, 4) Preliminary Evaluation of Alternatives, 5) Detailed Evaluation of Feasible Alternatives, 6) Refinement of Selected Alternatives and 7) Conclusion.<sup>(1)</sup>

The final alternatives which were evaluated for their environmental impacts were: (1) The Base Case - existing transportation system plus METRO and some bus lanes; (2) the Transit Option - more use of line haul and feeder service to METRO and more transit than Base Case; (3) the Highway Option - I-66 plus the Dulles Access Road, I-266 and Three Sisters Bridge; (4) Multi-mode/New Facilities Option - a combination of the Base Case, Transit Option and Highway Option; and (5) Multi-mode/Improvements to Existing Facilities Option - a combination of the base case and transportation and some additional highway improvements.<sup>(1)</sup>

The study's most critical comments concerned:

- Traffic Congestion - The highway option would produce the second highest levels of congestion. The Base Case rated the highest, assuming no transit system development in the next 20 years. The street networks adjacent to I-66 interchanges would be overloaded due to large amounts of turning movements.

- Noise - The noise impact of the highway option would be larger than all other options except the base case.
- Air Pollution - Air pollution impacts would be highest for the highway option. The highway would have significant deleterious impact on adjacent property.
- Energy - The highway option showed the highest energy consumption while the transit option was the most energy efficient.
- Transportation Needs - "Analyses...indicated that the construction of the Vienna Metro line generally will absorb the growth of radially oriented travel demand if I-66 is not built."<sup>(1)</sup>

As a direct result of the E.I.S., the Arlington County Board of Supervisors adopted a resolution opposing I-66 and Fairfax County Board also reversed its previously favorable position by a 5 to 4 vote. From December 17-22, 1973, the location public hearings took place. The unprecedented six day hearing heard 339 speakers, divided into 170 who endorsed the project and 168 who opposed it, while the Fairfax County Park Authority took no stand.<sup>(11)</sup> At the conclusion of the testimony the audience was informed that the Virginia State Highway Commission would re-evaluate the project and if approved, the final decision would be made by the U.S. Department of Transportation.

Now that the E.I.S. was part of the public record, various federal agencies stated their positions on the question. On 11 January 1974, the Assistant Secretary for Environment and Consumer Affairs for the U.S. DOT released a report opposing the construction of I-66. The report concluded that construction of I-66 "appears to be unnecessary and illegal"<sup>(12)</sup> and "the project does not warrant

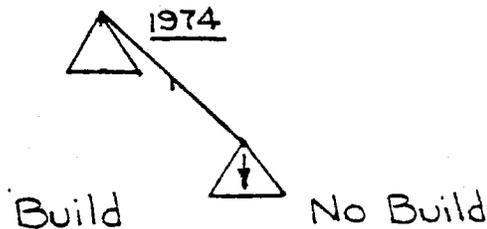
any additional support as it is based on questionable needs."<sup>(12)</sup>  
The report further concluded that, "At this point it would appear doubtful that construction of the project would meet requirements of applicable law."<sup>(12)</sup> The EPA also released a statement which concluded that the transit option was a "feasible and prudent" alternative.

Only two days later, the President's Council on Environmental Quality concluded in a letter to the Department of Transportation, that there seemed to be little justification for construction of I-66. The council criticized the E.I.S. as it did not "adequate(ly) research" the impact of the I-66 facility on the land development in rural Loudoun and Prince William Counties.<sup>(13)</sup> The chief objection of all the federal agencies was the taking of park land, which was illegal if there was a "feasible and prudent" alternative. The E.I.S. had clearly demonstrated that the transit alternative could work and would minimize the impacts to the park lands. Therefore, the transit alternative was preferred over all other options.

In the face of all this opposition to the project, on 21 February the Virginia State Highway Commission adopted the Multi-Mode/New Facility Option which did include METRO in the corridor. It is of some interest to note that the option selected was not the highway option, but a combination of the base case, transit and highway options and the METRO was included in the corridor. It is quite possible that VDH&T was convinced by the E.I.S. and public testimony that a highway solution was impossible and the best possible alternative which included a highway was this Multi-mode/New facility option. However, if this move was an attempt to keep the METRO supporters in the I-66 camp, the strategy was dealt a quick death blow when, on

the same day, 21 February, the Transportation Planning Board of C.O.G. voted to oppose I-66 and removed the facility from the regional transportation plan. The resolution declared that I-66 "is not compatible with the regional goals and objectives."<sup>(14)</sup>

8lanes



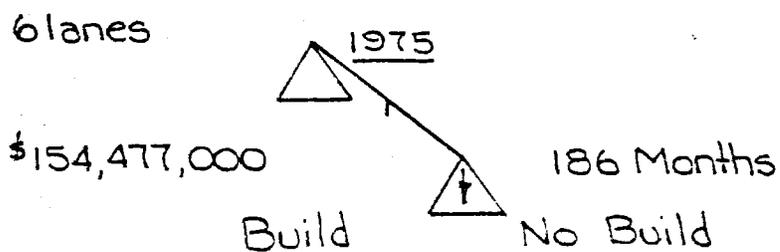
On July 9, 1974, the Final Environmental/Section 4(f) statement was completed and submitted by VDH&T to FHWA for approval by the Secretary of Transportation. The plan called for 8-10 lanes with shared right-of-way with METRO. At this time, a lively debate began between Arlington County and VDH&T over the design of the project near Spout Run Park. The final design for I-66 called for a double decked structure 10 stories tall and 3500 feet long between the existing Spout Run Parkway and adjoining apartment buildings. VDH&T engineers claimed that the structure would be a monstrosity and the noise level would be above the maximum level allowed by federal standards. The design was the result of Arlington County's reversal of a 1969 agreement which would have allowed the highway to use the edge of the park for I-66. Without this needed parcel, the amount of space remaining forced the design of a 100 foot structure costing \$31 million. When asked if the noise level of the structure could be reduced, the design engineer replied, "There is no way we can abate the noise level unless we put an ugly wall around it, and the thing is ugly enough already."<sup>(15)</sup>

The FHWA, supporting the construction of I-66 and having tested the waters, asked VDH&T in September 1974, to reduce the project's

environmental impact by removing two lanes, prohibiting trucks and redesigning the two level structure near Spout Run Park. In order for VDH&T to make these changes as quickly as possible, a median lane was removed from each direction. This reduction of size allowed the Spout Run area to be redesigned with some minimal lateral shift to accommodate an at-grade section. Finally, the traffic figures were manually adjusted "to provide comparative analysis between travel demands on local radial routes with a six or eight-lane plan."<sup>(3)</sup> Trucks were excluded from the project. The VDH&T then provided a supplemental document to the E.I.S. for this new design. The justification for the 6 lane project was:

"In modifying the proposed action, the paramount considerations were reducing roadway capacity, restricting truck traffic, revising project design in the Spout Run Parkway area and identifying the environmental variations associated with these changes. The feasibility of reversing these design actions if a six-lane concept were implemented appears unlikely. Lane elimination is proposed to achieve maximum enhancement of both the communities traversed and the transportation network. The cost of restoring these lanes, especially through the section 4(f) areas, would be enormous in terms of community impact and construction cost. Also no consideration was given to the adaptability of this plan."<sup>(3)</sup>

This statement appeared to indicate that the 8 lane plan was a thing of the past and would never again be mentioned. However, the anti-highway forces noted that the design was the same as the 8 lane design, the structures were the same, and the right-of-way was the same. The Environmental Evaluation for a 6 Lane Roadway Design was submitted to the FHWA in November of 1974.



The submission of the revised E.I.S. to the FHWA signaled the beginning of the federal approval process which would culminate with a decision by the Secretary of Transportation. As an aid to the department in developing their position, a public information file was opened for comments. This file contained the positions of various federal, state, and local agencies, as well as special interest groups and civic organizations on the project. A Washington Post article in early June reported some of these comments which had been placed in the D.O.T. file. (16)

"A decision to build I-66 would be inconsistent with the national goal of reducing our reliance on imported petroleum." (Federal Energy Administration)

"Some highways are desirable others are not. This one is not." (Federal Energy Administration)

"A decision to approve I-66 would mean that the administration is not serious about energy and making the most efficient use of petroleum resources." (ACT) (16)

In the FEA report, it was estimated that if I-66 was built, there would be an 11 percent increase in gasoline consumption during the rush hour as compared to the adoption of the transit option. The report also suggested that if the project were to be built, it should be restricted to carpools and buses during peak hours as a measure to save energy. (16) This proposal would be incorporated into the final I-66 design. On 21 June, 1975, the Department of Transportation held a public hearing on the 6 lane design of the I-66 project. This hearing was a condensed version of the Dec. 17-22, 1974 session and little new or dramatic action occurred. However, the public opinion had shifted against the project, and the modification by VDH&T to a 6 lane, no truck, multi-mode facility had not saved I-66.

This new and rapidly forming feeling that VDH&T would not construct I-66 started to cause some concern with the METRO officials.

METRO had delayed the project in the mid '60's and had incorporated its design into the median for a 6 mile section of I-66. If there was no I-66, where would the METRO be located? The Virginia Attorney General, Andrew P. Miller, reviewed the question and expressed his opinion that if the I-66 facility was not constructed, then the previously purchased right-of-way would be returned to the original owner at the original selling price.

Miller's opinion appeared to force the proponents of mass transit to support the I-66 project by making METRO a hostage of I-66. The cost of freeing METRO from I-66 would be their purchase of the right-of-way by METRO. "There is no doubt that (the re-purchase) would cost us more money and create a long delay if we had to re-acquire the right-of-way," reported a METRO official.<sup>(17)</sup> VDH&T had purchased 84% of the total 10 mile section in 1971 for \$30 million and had allowed METRO free access to 6 miles along the median of I-66. This question of who controlled the right-of-way was defused by the next major event in the continuing saga of I-66.

On the first of August, Secretary of Transportation William T. Coleman, Jr. presented the federal decision on I-66. The ruling was a denial to VDH&T to build the 6 lane multi-mode facility. Coleman in his decision commended VDH&T on its design, "but this is simply the wrong time and the wrong place for an otherwise excellent project."<sup>(18)</sup>

The two reasons given by Secretary Coleman for his decision were: the improvement of existing roads and the METRO line in the corridor provides a transportation system which is "more consistent with metropolitan development goals and planning objectives, and has fewer long term adverse consequences." The changing

circumstances make the construction of this "segment of I-66 as an Interstate Highway no longer suitable."<sup>(18)</sup> Secretary Coleman also directed his staff to seek ways to speed up the completion of METRO in the corridor, and to study the Dulles Airport access to determine if improvements were needed.

The decision was specific in nature as it directed VDH&T not to build the Interstate Highway segment of I-66 between the I-495 beltway and the Theodore Roosevelt Bridge. It did not instruct VDH&T not to build any highway in the corridor. The possibility of a toll road or a high grade state highway was still available; however, these proposals would have to face strong legal and financial objections.

The reactions to Secretary Coleman's decision were predictable.<sup>(19)</sup>

- "I really feel the people of Northern Virginia are going to be the losers. We've been accused of wanting to build a road for the sake of roads, but we felt we needed a facility there." J.E. Hartwood-VDH&T
- "A splendid, well-justified decision." Rep. J. L. Fisher (D-Va.)
- "I am convinced that if this badly needed highway is lost, that the transportation system of Northern Virginia will suffer a mortal blow, impossible to correct in the foreseeable future." D.B. Fugate - VDH&T

Virginia officials were quick to realize that the August decision by Sec. Coleman did not rule out a highway in the corridor. On August 22, 1975, the Virginia Highway Commissioner, Douglas B. Fugate, said, "I have not given up the idea of building a highway in the corridor no matter what kind of highway you call it."<sup>(20)</sup> Meanwhile, Gov. Mills Godwin was arranging a meeting between Mr. Fugate and Sec. Coleman "to explore alternatives."<sup>(20)</sup> A spokesman for Sec. Coleman told reporters that the Secretary was not "trying to establish

priorities in the corridor for all time" and would "decide issues as the facts are presented."<sup>(20)</sup>

The 1975 Federal Aid Highway Act would allow unused interstate funds to be transferred to transit projects or other highway projects. The Coleman decision had not achieved a final resolution of the problem but had intensified the action. Now the prize was the \$150 million dollar federal share of the I-66 money and the race was on between METRO, other Virginia Interstate Projects, and the possibility of building a non-interstate commuter highway in the corridor. On September 12, 1975, several Virginia officials, including Godwin and Fugate, met with Sec. Coleman to discuss the possibility of the use of federal funds for a commuter-type highway in the I-66 corridor. This meeting signaled to the public, as well as those interest groups which were trying to get all or part of the I-66 money, that the fight for I-66 was far from over. Secretary Coleman's statement that:

"This decision is without prejudice to any further consideration on the part of VDH&T of the need for a non-interstate commuter highway in the I-66 corridor if, after consultation with appropriate metropolitan authorities, the state finds it in the best interest of the metropolitan area to build a highway in the corridor, and if the proposal meets all the appropriate legal tests,"<sup>(18)</sup>

had opened the next round of the controversy.

The VDH&T and the pro highway lobby wasted no time in pressing for a facility in the corridor. After the November election, Fairfax County re-reversed its position and the Board of Supervisors voted on January 6, 1976 to support the construction of a scaled-down version of the highway.

A second meeting between Gov. Godwin and Sec. Coleman was held on Feb. 26, 1976. This meeting resulted in Sec. Coleman asking

Gov. Godwin to submit a revised I-66 plan "on a scale of lesser dimensions than the original proposal...that would not harm the environment."<sup>(21)</sup> VDH&T announced that the new plan would be similar to the Fairfax County resolution - a four lane facility limited to buses and carpools during peak hours traveling in the peak direction; however, it would be open to all non-truck traffic at other hours.<sup>(21)</sup> Gov. Godwin also stated that Sec. Coleman had promised to give the alternative plan a "quick decision."<sup>(21)</sup> On March 8, 1976, VDH&T submitted the scaled down version of I-66 to the D.O.T. for approval.

The federal approval process began for the second time. As in the previous proposal, the draft E.I.S. was forwarded to all interested parties for review and comment on 2 June 1976 and a public hearing was scheduled for 10-11 July, 1976. However, in contrast to the 8/6 lane proposal, VDH&T made specific references to the reduced environmental, social and economic impacts of the 4 lane option. They pointed out that the 4 lane commuter highway would reduce the loss of parkland, displace fewer residents, and decrease potential noise levels. The multi-modal aspect of the project and its unique traffic management proposals were also touted. This new proposal and the promotion of it was directed at those portions of the public and their elected officials who were viewed as on the fence or as mild critics of the highway.

Some of the methods used to influence key special interest groups were products of design modifications. The two-level elevated highway structure in the Spout Run Park area was not included in the new proposal. The reduced amount of parkland was needed for the 4 lane facility and new 4.6 acre park near Lincoln Street with small pond and children's play area was included. An additional 5.5 acres would be returned to Arlington County for use as a park. The project was

designed with more sound barriers and a bike path was added as the  
icing on the cake. (10)

The METRO advocates were given a hard sell. After the threat of loss of right-of-way, VDH&T made a major element of the new 4 lane facility, the free right-of-way to 6 miles of median plus preparation for construction available to METRO. It was estimated that the existence of a highway in the corridor would save METRO \$45 million in construction costs and an estimated \$50 million in right-of-way costs. The entire total cost of the multi-modal, 4 lane commuter highway was estimated at \$160 million. (10)

When the public hearings were held on July 10-11, the opposition to the project was concerned about the following issues:

- . Project Justification - VDH&T had not demonstrated a need for the project. The base case could accommodate all future travel demand. (10)
- . Design Capacity - There were no assurances that once the 4 lane project was built that it would not be expanded to 6 or 8 lanes. (10)
- . Air Quality - The E.I.S. did not present adequate technical data on the amount of air pollution the facility would add to the already poor air quality of the region. (10)
- . Noise Impact - The noise levels produced by the facility would exceed the federal standard at 9 locations. (10)
- . Parkland - Construction would remove existing parklands as well as existing trees and grasslands. (10)
- . Energy Consumption - The national effort to reduce gasoline consumption would not be met by the construction of a facility designed for private automobiles. (10)

- . Traffic Management - The E.I.S. did not specify how this proposed system would work. (10)
- . Community Disruption - The facility would split the community in half and make 30 existing streets deadends. (10)
- . Impacts to the District of Columbia - The additional traffic generated by the facility would further reduce the existing level of service. (10)

As a counter to these arguments, the proponents of the 4 lane, multi-modal facility gave the following list of reasons why the facility should be constructed:

- . Improved Accessibility - The facility would improve access to Arlington commercial areas from other areas in the region. (10)
- . Balanced Transportation System - The area needed a balanced system of highways, transit, and rapid rail to adequately serve the area needs. (10)
- . Dulles Airport Access - METRO alone could not provide adequate access to Dulles Airport. (10)
- . Planning, Zoning and Land Use - The corridor had been zoned, planned, and developed for a highway since 1938. (10)
- . Contribution to METRO - Virginia would transfer the I-266 funds, provide right-of-way and aid in construction of the METRO. (10)
- . Air Quality - The present stop/go congestion on local streets would be removed, thereby reducing local air pollution. (10)
- . Safety - The parkway design would reduce traffic accidents. (10)
- . Energy Consumption - The facility would encourage the use of carpools, thereby reducing fuel usage. (10)

During the time period prior to and following the public hearing, VDH&T developed a strategy to divide the previously successful combi-



conditions and stipulations. These conditions were designed to serve as a safe-guard against the future expansion of the facility. They were also the conditions for receiving federal highway funds and were legally binding to VDH&T. These conditions were:

- . Provide to METRO the right-of-way and perform all construction in the median without cost.
- . Transfer the I-266 funds to METRO.
- . Restrict the use of the facility as outlined in the E.I.S.
- . Exclude heavy truck traffic from the facility.
- . Submit an enforcement plan within 60 days.
- . Restrict construction to 4 lanes.
- . Minimize opportunities for minority construction contracts.<sup>(2)</sup>

The Commonwealth of Virginia was given 10 days to agree to these conditions. On January 13, 1977, Governor Mills E. Godwin, Jr., forwarded his acceptance of the conditions and further instructed the Attorney General to remove all legal injunctions against I-66 construction as a result of the U.S. Court of Appeals decision on April 4, 1972.<sup>(22)</sup> After 4 years and 10 months and three design changes, the project was out of limbo.

As the construction re-started, a second major citizen group, CONTACT, opposing the project, also started action to halt the project. On January 21, 1977, less than a week after receiving Gov. Godwin's acceptance letter, Sec. Coleman left office, along with the Ford administration; Sec. Adams and the Carter administration assumed the reigns of power. One of Sec. Adam's first actions was to re-affirm Sec. Coleman's I-66 decision.<sup>(23)</sup>

In July of 1977, CONTACT filed a suit in the U.S. District Court to stop construction of I-66 because the VDH&T was in non-compliance

with the conditions stated in Sec. Coleman's decision. CONTACT alleged that:

- . VDH&T violated its agreement to build a right-of-way for a four-lane highway.
- . VDH&T violated its agreement to design I-66 structures to prevent future widening.
- . VDH&T violated its agreement to provide a traffic management plan.<sup>(24)</sup>

The suit was heard by Judge Oren Lewis and dismissed. The plaintiffs again turned to the U.S. Circuit Court of Appeals. The court upheld the lower court decision on April 15, 1980.<sup>(25)</sup> It is interesting to note that the 1977 suit appeared to have more substance than the 1972 suit which was overturned by the same Court of Appeals.

CONTACT's claim that VDH&T was not constructing a 4 lane right-of-way as specified by the Coleman decision, was verified by actions of VDH&T and a letter from D.O.T. to Rep. Joseph L. Fisher. VDH&T had stripped all vegetation for the original 8 lane right-of-way. Rep. Fisher stated in a May 12, 1978 letter to CONTACT, that the D.O.T. had authorized VDH&T to clear the right-of-way for eight lanes but only build 4 lanes.<sup>(26)</sup>

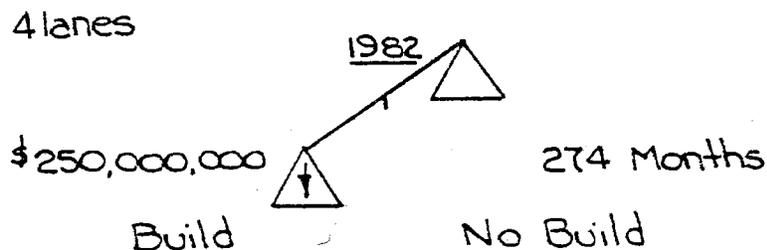
The question of the size of the overpass structures is straightforward. The overpasses were originally designed for a 8 lane facility in early 1970. When the FHWA requested that VDH&T reduce the 8 lane facility to 6 lanes in Sept. 1974, the revised E.I.S. indicated that the original 8 lane designs were used and a lane was removed in each direction. Now there were 6 lanes in a 8 lane right-of-way. As this plan was not approved in August 1975, VDH&T produced a new 4 lane design in 10 months. It appeared that once again the original design

was maintained and 2 lanes were removed. A measurement of the existing structures clearly indicated the necessary clearance for 6 to 8 lanes. VDH&T responded that the extra 30 feet clearance was for safety and was a standard design; however, no other facility in the area had more than 12 feet clearance except the Dulles Airport Access Road, (24) and it was designed to be widened.

The last point in CONTACT's suit was that VDH&T did not submit an adequate traffic management plan in the required 60 days. VDH&T had hired JHK and Associates to perform a feasibility study; the results of this study were accepted by D.O.T. as a traffic management report which indicated that several plans were feasible. However, the report did not outline any single plan for I-66. (The entire question of traffic management and enforcement will be discussed in greater detail in Chapter IV of this report.)

In an April 25, 1979, letter from Sec. Adams to the Chairman of the Council on Environmental Quality, he commented on the CONTACT suit by stating, "I do not believe that the terms of Sec. Coleman's decision, which I affirmed, are being violated." The letter continued and indicated that he was forwarding additional material to back up his beliefs.

The final April 15, 1980, 4th U.S. Circuit Court of Appeals decision has seemingly removed the I-66 project from the judicial arena. The multi-modal, 4 land, computer facility known as I-66 will be opened to traffic in the summer of 1982.



It is important to discuss why the 4 lane proposal submitted in 1977 was approved and the previously submitted 6 lane design was not. The success of the 4 lane proposal was due to a combination of factors. The VDH&T had changed their design to meet some of the opposition's concerns. This amount of flexibility and the use of compromise helped to weaken the anti-highway lobby. The second factor, was the ability of VDH&T to separate the anti-highway lobby into individual groups and then deal with each group's concerns: the METRO supporters were provided free right-of-way plus construction; the parkland advocates were provided additional parks and a reduced loss of property; the E.P.A. was provided a bus/carpool facility, and the environmentalists were assured that noise walls and landscaping would be a major part of the highway. Finally, perhaps the most important factor, was time. VDH&T successfully used time to wear down the anti-highway lobby. Once the coalition was broken, the remaining force was citizen opposition. This group, through the law of crisis and response, could not stay united for a long period of time. If the lion is not at your door step, it is difficult to stay alert. As each crisis occurred, the group had to lose energy; therefore, after 7 years, it is little wonder that the pro-highway planners finally got their road.

This is not to say that the opposition lost. ACT and the other very effective lobbies managed to reduce the facility from an 8 lane interstate to a 4 lane multi-modal, facility with very extensive traffic management capabilities. This project could well be the urban highway of the future and will serve as an example for further planning and data collection. All of this could not have happened, if in 1970, at a public meeting called by VDH&T to inform the citizens of Arlington about a highway which all the local governmental bodies wanted, those in attendance had not voiced their opposition.

### Chapter III: Issues in the I-66 Controversy

As in any major project which is very controversial there remains, after the decision is made, a number of interesting issues. Some are significant, resolved and/or portentous; others are trivial, unresolved and/or historical. This section of the report will introduce 5 issues which arose during the I-66 controversy. Some of the issues are unique to the I-66 project, others are relevant to any major transportation projects. This discussion will not attempt to resolve or fully develop any of the issues as each could warrant a great deal of additional research. However, each issue will be introduced and its impact on the I-66 case study evaluated.

1. I-66 is an important link in the state and federal interstate system.

This statement was used repeatedly by the pro-highway position. However, the data presented in the various E.I.S. documents predicted large numbers of commuters using the facility. Sec. Coleman's 1975 decision rejecting the 6 lane proposal sighted the local nature of the highway as a reason for rejection of interstate status. Yet the 1977 decision by Sec. Coleman permitted the use of interstate funds on a 90/10 split to be used to construct a "commuter" facility.

2. The delays caused by the many court cases and public hearings caused an excessive increase in the cost of constructing I-66.

The projected cost of I-66 is \$250 million which represents an increase of over 250% in 10 years. However, if all highway projects were built as quickly as possible to avoid the inflationary impacts, the result might well be unnecessary and ill-planned highways. In the specific case of I-66, the benefits, which will be derived from the lengthy review process caused by litigation and the design changes as a result of public pressure, will outweigh the increased costs.

3. A regional planning agency and local governments withdrew their support or opposition to the project after the project was underway.

The regional planning agency, C.O.G./T.P.B., and the Counties of Arlington and Fairfax each reversed a previously stated position during the controversy. The impacts of the Arlington County reversal were minimal as their support in 1958 was qualified and the county made its position known in 1970 as opposing I-66. However, the action taken by C.O.G./T.P.B. and Fairfax County was instrumental in the federal decision process. One of the reasons stated by Sec. Coleman in his 1975 negative decision was that Fairfax County and Arlington County elected officials were opposed to the project. However, more important was the C.O.G./T.P.B. removal of the facility from the regional plan after right-of-way had been purchased. The local planning agencies had made their local forecasts based on the existence of the facility; the removal of the project could have caused additional problems in the overall planning process of the region. Once agreement was given and significant decisions were made subject to that agreement, could the original agreement have been withdrawn? Can a local/regional planning agency delay a federal project? These questions will have to be decided by the legal system.

4. VDH&T must return the right-of-way if a highway was not built.

The issue of the METRO and the right-of-way appeared to be a bargaining chip in the process. The threat to spend the I-66 funds in other sections of the state and return the right-of-way to the original owners came after Coleman's 1975 decision, when Virginia was trying to regain needed support for I-66. The use of the threat, and the carrot of \$45 million in construction aid to METRO, appeared to influence the final I-66 decision.

5. In spite of many local rejections of the project, VDH&T continued to press for a major highway in the corridor.

After a considerable amount of research into the I-66 controversy and interviews of various individuals who were active in the decision process, it appears that the Governor of Virginia, the Highway Commissioner and other very prominent politicians supported the plan to such a large extent that it became impossible for them to accept defeat by a group of "radical" activists. VDH&T's position that technical experts knew that Arlington County needed a highway and it was VDH&T's duty to meet this need, overcame all other objections. This project was the first time the highway planners had had to justify their decisions to the public and VDH&T did not accept this radical new philosophy of citizen approval nor did they believe that a vocal group should determine what solution to a difficult engineering problem should be accepted. The pride of knowing that VDH&T's technical staff had in the past been correct, forced them to reject any opposing solution.

## Chapter IV: I-66 Design and Operation

### The Four Lane Restricted I-66

After the 1975 disapproval of the multi-modal new facility favored by VDH&T, the FHWA and VDH&T worked together to develop the four lane, multi-modal, restricted highway concept. Many of the negative impacts of I-66 cited by its many opponents were related to problems associated with the single occupant vehicle. Congestion, pollution, fuel wastage, central business district congestion and parking problems were perceived as the possible effects of an 8 or 6 lane I-66. The opponents correctly perceived that a highway moving at 5-10 mph during peak periods wouldn't constitute much of a transportation improvement. The new four lane concept with its restriction of peak hour traffic to four occupant vehicles answered these criticisms by providing a facility that would encourage the efficient movement of people rather than placing priority on car movement alone. The 4(f) document for the proposed four lane projected a significant lessening of vehicle-miles-traveled as a result of the HOV incentive.

On January 5 the Secretary Coleman gave DOT approval for the new I-66 proposal based on a number of conditions. They can be summarized as follows:

- . Provision of right-of-way in the median for Metro (without cost)
- . Transfer funds allocated to I-266
- . Restrict highway lanes in peak direction, during peak hours to buses, carpools (4 or more persons), emergency vehicles, and vehicles bound to or from Dulles Airport.
- . Exclude heavy duty trucks
- . Submit a detailed enforcement plan of traffic limitations
- . Build only 4 lanes

- . Include design elements to minimize adverse social and environmental impacts (develop a facility similar to G.W. Parkway)
- . Provide assurances that minorities and minority-owned enterprises will participate in all construction. (28)

The traffic management concepts for I-66 can be broken down into two major areas, the proposed enforcement of restrictions, and the proposed automatic comprehensive flow control system implemented by restrictive ramp metering. This will be the most advanced control system ever applied to a highway. The control system indicates the priority given to keeping I-66 from becoming the congested "mess" the critics envisioned.

#### The Proposed I-66 Traffic Management System

The individual elements of the I-66 TMS are:

- . Ramp meter implemented control system
- . Incident detection and response
- . Closed circuit television
- . Central control facility
- . Motorist advisory signing
- . Interface with other control systems

#### Ramp Metering

The primary objective of restrictive ramp metering in the I-66 TMS is to keep the mainline below capacity while maximizing throughput. The primary input device is the "loop detector", able to sense vehicles passing over it. Loop detection will be installed on all entry and exit ramps, and on the mainline at  $\frac{1}{2}$  mile intervals. Ramp control will be implemented through a number of different strategies. As long as the mainline is below a preset occupancy threshold, the ramp will be metered at a present rate relating to time of day. A

local time of day metering rate will be used as a backup in case of computer failure. When demand exceeds the threshold level restrictive metering is initiated on all ramps in the same direction of travel. A more restrictive rate will be set for those ramps with sufficient queue storage capacity and viable alternate routes. Ramps with less storage and impractical alternate routes will be metered less restrictively. All ramps have detection logos to sense spillover of queues, and restrictive rates are temporarily withheld until the queue problem has cleared.

Determination of metering rate is dependent on computation of capacity in the "weakest" downstream link. A link is defined as the mainline area between an entry ramp and the next exit ramp. A computation based on all upstream demand is made after a capacity reading on the most congested downstream link is made. An advantage of this system is that its immediately responsive to accident related lane closure. The general goal of such a "reflected capacity" system is to maximize throughput on each link of the system. However, one possible disadvantage of this system is that downstream ramps tend to be metered more restrictively. Arlington County has already made its objection to the procedure known to the VDH&T. Arlington fears that its access to the highway will be unfairly reduced by the TMS. However, there is a software adjunct called "Fairput" which has been used successfully in California which minimizes this problem. Fairput distributes delay slightly between ramps compared to straight demand responsive metering, and thus hopefully it keeps delays below what might be considered unreasonable by drivers.

A problem with a ramp meter implemented control system not addressed in any of the consultant reports is its possible lack of effectiveness in the p.m. peak period. In the a.m. peak period traffic is moving from dispersed areas to the CBD, and a large percentage of

this traffic will enter on ramps. However, the p.m. peak's largest demand will be leaving the CBD (downtown Washington) on the Theodore Roosevelt Bridge, and will be unmetered. The system will have to respond by limiting access on Arlington ramps, whose demand is estimated in the Phase I consultant report as nearly equal to the Roosevelt Bridge demand. This will lead to a limitation of access for Arlington commuter headed west.

### Ramp Design

Ramp design on I-66 has been accomplished by designing each ramp on a projected demand for that ramp, within the constraints of physical location. The range of ramp designs on I-66 are:

- . Single lane, unmetered
- . Single lane, metered
- . Dual lane, staggered metering
- . Dual lane, metered with a bus bypass lane

An overhead view of a typical dual lane ramp is shown in figure 1. The bus bypass ramps were also determined by demand projections, based on an interface with metro at the Ballston terminal in Arlington. Signals were determined to be a better metering method than closure arms, primarily because signals can meter at a higher rate. All metered ramps have signs advising motorists of the metering. All metered ramps have loop detector systems for determining queue length and possible spillover.

### Incident Detection and Response

Accidents (Incidents) will be detected on I-66 in two ways. During periods of moderate to heavy traffic, the mainline loop detectors in conjunction with the central computer will be able to sense the increased occupancy caused by incident related congestion. The low

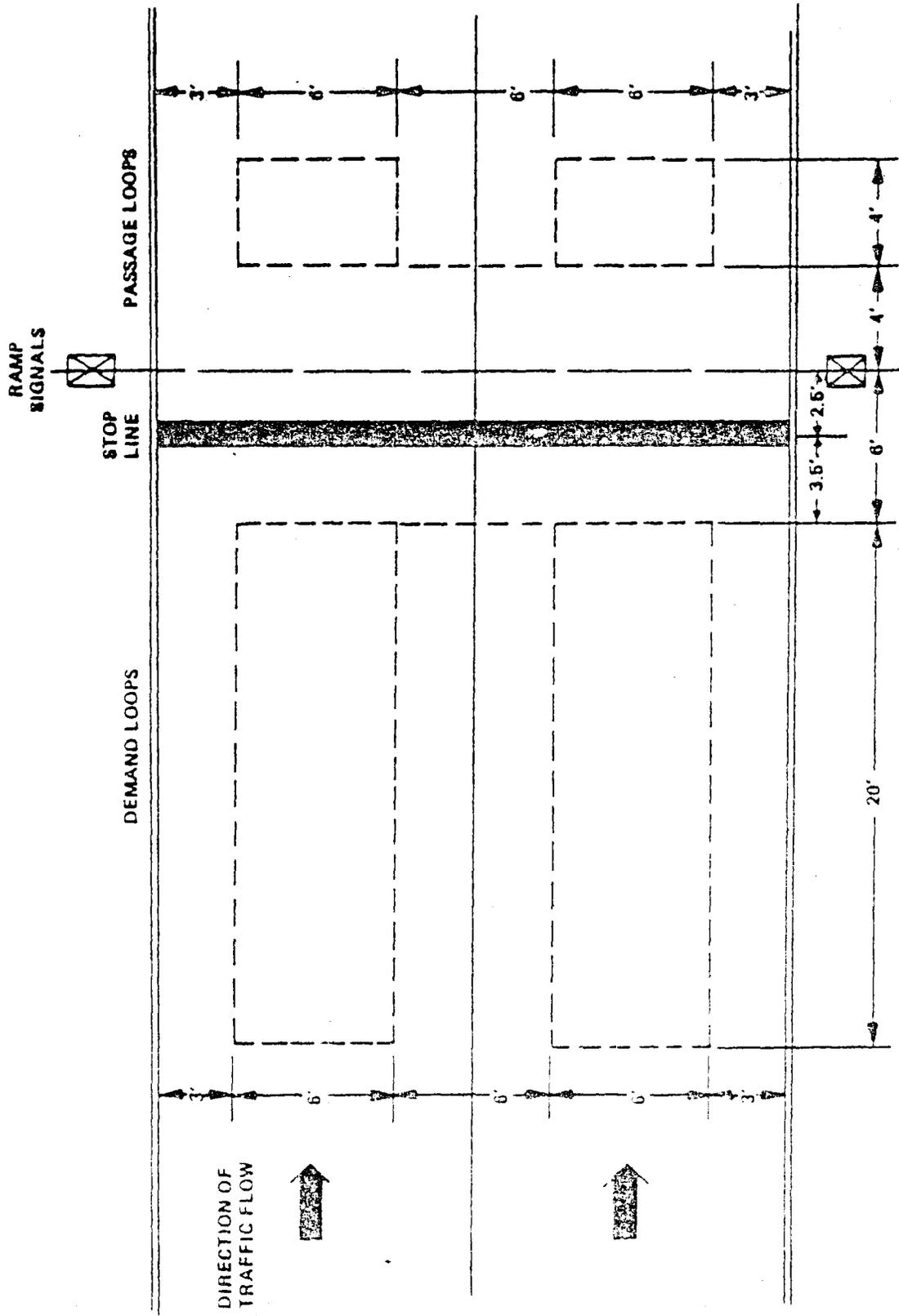


FIGURE 1.  
 DUAL-LANE RAMP LOOP INSTALLATION (TYPE C)  
 FOR TWO 12-FOOT WIDE LANES

occupancy ahead of the incident is compared to the high occupancy behind the incident, sounding an alarm in the control center and displaying incident location and capacity on the CRT. When the highway is at low occupancy conventional methods, such as police patrol, are necessary for incident detection. The closed circuit television system is then used to determine the nature of the incident. A hotline is used to pass information to State Police and VDH&T. The TMS operator is also responsible for contact with the media if the accident is serious enough to warrant an advisory message. The variable-message advisory signs are automatically brought into operation after the incident is identified. The signs indicate "congestion ahead." The operator must also manually verify the clearance of the incident before the computer will remove the "accident" advisory. This is to prevent possible false alarms and false incident clearance responses from causing confusion. The goal of these incident strategies is to shorten response time, a benefit to both the accident victims and the other users of the highway.

#### Closed Circuit Television Surveillance

The most important function of the CCTV system, which will initially consist of ten cameras will be used to determine the seriousness of accidents and appropriate response. They will also be used to monitor and diagnose possible problems with queue storage on ramps and variable message signs. They cannot be used to determine the number of passengers in a car because of viewing angle, so they will be of no assistance in HOV enforcement. However, their presence may be a deterrent to violators who aren't aware of their limitations.

There has been some criticism of the CCTV surveillance system, relating to cost-benefits justification. However, it is not really

possible to run a computer incident detection system without some way of monitoring possible false alarms caused either by temporary congestion or equipment malfunction. The CCTV is a necessary part of the system.

Lighting on I-66 has been complicated somewhat by the requirements of the CCTV. While these cameras are designed for relatively low light levels, a certain minimum amount of illumination is required. Because of opposition to a high glare highway in Arlington, special directional lights will be used on I-66. They are designed to keep most of the light on the road surface and eliminate scatter to the sides.

#### Central Control Center

The control center houses the TMS hardware and the operating staff. The computer system recommended for TMS implementation consists of the following hardware:

- . Central processing unit, 128 K memory
- . 2 Disk memories
- . Keyboard/printer
- . Interactive CRT terminals
- . Card reader
- . Line printer
- . 2 magnetic tape drives (to provide "log" of operations)

A simplification of central processing needs is to be accomplished by having field located microprocessors to condense information from the loop detector network. This minimizes the total words-of-memory requirement for the central processor which in turn minimizes both complexity and cost.

The control center also will house monitors and remote control for the CCTV system. Based on a study of other freeway surveillance systems already in operation, the consultants have recommended a one monitor per camera situation. The consultants felt that less than one monitor per camera could lead to undetected incidents in off peak hours. Since sections of Shirley Highway will also be monitored at this control center, an extensive array of wall mounted monitors will be needed. Two separate monitors mounted in the control console (Figure 2) will allow selection and remote operation of individual cameras.

Another feature of the control center will be the computer driven system map. The map will be designed to indicate conditions that depart from the norm; for instance, when speed drops below a preset threshold. The map will be able to display volume, occupancy and speed at detector locations, the condition of ramp signals, variable signs, CCTV locations and failed equipment locations. Detected incident locations. The location of the detector will be indicated by a flashing light. The map will be a modular grid-tile design to allow expansion for possible future controlled segments of the Beltway and Shirley Highway.

#### Motorist Advisory Signing

An integral part of the I-66 TMS system is the provision for changeable advisory signing. The signs will have two functions, to advise motorists of HOV restrictions during peak periods, and to advise motorists of possible problems and suggest alternate routes. The Phase 1 Report indicated that the disc-matrix type of sign was the most cost effective due to its low energy requirements. As was mentioned earlier, the control strategy prevents the display or removal

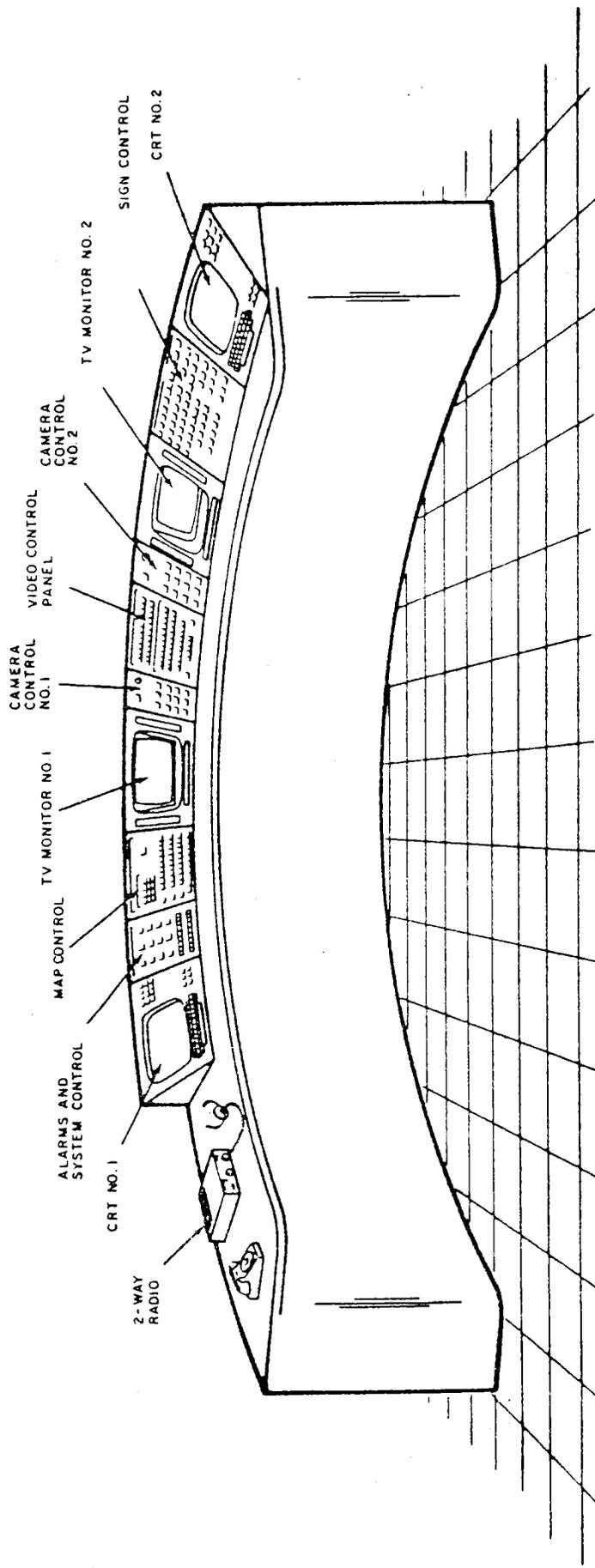


FIGURE 2  
CONTROL CONSOLE LAYOUT

of the word "accident" without operator intervention, to prevent false alarms from effecting traffic flow.

#### Interface with Other Traffic-Control Systems

The TMS computer at the I-66 control center has been designed to be interactive with other demand responsive arterial street control systems in the area. A modem is included in the planned processing unit design to interface with the Arlington County Traffic Control System, which is still in the planning stages. There are also plans for interface with a proposed system in Alexandria also. The primary advantage of this data sharing is in possible alternate route strategies. If congestion or an accident indicates a need for alternate routing, the TMS can evaluate possible routs by sampling the Arlington System's data. The Arlington System can respond by giving the route chosen higher priority in control patterns.

#### System Costs

The highway of the future doesn't come cheaply; it will cost about 13 million to construct, program, and debug the TMS. Some of the proposed system will receive 100% federal funding (the CCTV is an example), while most will receive the traditional 50% funding. The operating costs, which will be paid by the State, are estimated in the Phase 1 Report at around \$800,000 a year, if projected enforcement needs are correct. The Phase 1 Report justifies the expenditure for the elaborate system on the basis of user benefits of other similar systems now in operation. More importantly, I-66 is just four lanes operating in a high demand corridor, capacity could possibly during daytime, non-peak, non HOV hours. Since avoiding congestion has been a high priority of both the opposition and supporters of I-66

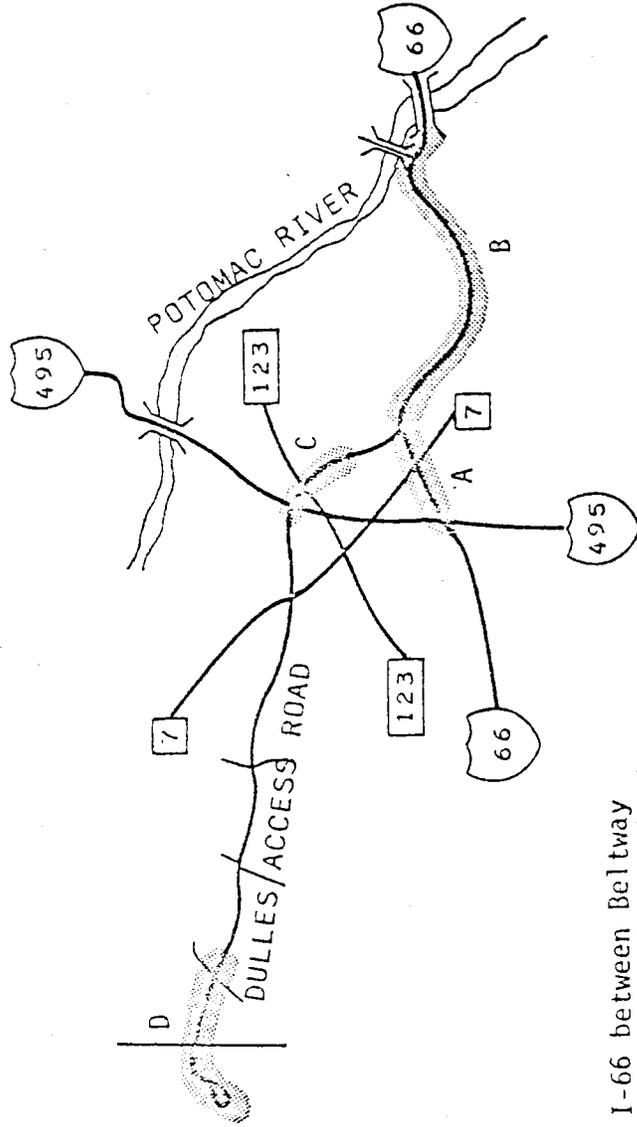
in recent years, there appears to be a real need for some form of occupancy control.

#### H.O.V. and Dulles Traffic Enforcement Strategies

Perhaps the most difficult of Secretary Coleman's conditions to implement is the enforcement of the peak hour HOV restriction, and the Dulles airport traffic access problem. Specifically, cars with less than four occupants are banned from the highway during peak hours, while all forms of Dulles Airport traffic are allowed at all times. Proponents of I-66 have expressed doubts about the enforceability of the complex restrictions and Secretary Coleman asked that a complete study of the enforcement program be submitted to him. The VDH&T contracted with JHK Associates for a study of the enforcement problem, which is contained in their report, I-66 Traffic Management Concepts.

The JHK study divides I-66 into four areas of differing enforcement requirements. (Figure 3) Segment A, the area between the Beltway and the Dulles Airport Access Road (DAAR), will not have any Dulles Airport traffic on it. HOV violators will be identifiable in mainline traffic, making enforcement a fairly routine problem.

Segment B, the area between the DAAR and the Theodore Roosevelt Bridge, will have a mix of carpool and Dulles Airport traffic, which will make conventional mainline enforcement tactics useless. The only way to enforce this area is by enforcing the entry and exit ramps. During the a.m. peak hour, entry ramps will be monitored and violators ticketed, preventing violators from reaching the mainline area of segment B. During p.m. peak hours the same technique will be used on exit ramps, identifying violators as they leave the facility.



Segment A - I-66 between Beltway and Dulles Access Road

Segment B - I-66 between Dulles Access Road and Theo. Roosevelt Bridge

Segment C - Interchange Area - Dulles Access Rd., Beltway and Route 123.

Segment D - Dulles Access Road - in immediate vicinity of the airport.

Figure 3 SEGMENTS OF DIFFERING ENFORCEMENT TECHNIQUES.

Segment C consists of the interchanges of Rt. 123 and the DAAR, and the Beltway and the DAAR. Segment C uses the same program as section B, morning entry ticketing and evening exit ticketing.

Segment D consists of the Dulles Airport area itself. The existing Dulles Airport Road in this area has always been restricted to Airport-only traffic but it has never been enforced. Because of this the DAAR is heavily used by non-airport during morning and evening peak hours. This illegal use requires "back tracking" by the violator; driving towards onto the airport and then making a U-turn. The JHK report estimates that violators outnumber legitimate traffic during peak hours. If backtracking were allowed to continue during I-66 implementation, these violators could not be distinguished from legitimate Dulles Airport traffic. Since the area around the Airport has no ideal alternate route, the temptation to violate should be high. The JHK study presents 9 alternatives for enforcing this segment. The problem is made more complex by the fact there are three areas where the backtrack maneuver may be accomplished. The ninth alternative is the one promoted by JHK, because only it can guarantee complete compliance. This alternative uses a screenline (similar to a toll booth) across both lanes of traffic on the DAAR just outside the airport area. Cars going toward the Airport during peak periods would receive a ticket stamped with the day, time and number of occupants in the vehicle. When leaving the Airport they would be required to surrender these tickets at the outbound screenline. If the vehicle contained the same number of occupants (indicating that no passengers had been picked up or dropped off) and had returned in less than 15 minutes, the vehicle would be fined. The delay time of 15 minutes is assumed to be a deterrent. The actual strategy to be used at

Dulles is as yet undetermined, although it will probably be some form of the screenline system. Enforcement of the DAAR will be the responsibility of the FAA, and they are still considering the enforcement options.

### Enforcement Strategy

Both consultants reports for I-66 recommended a period of saturation enforcement, followed by random enforcement. This is a procedure used on preferential HOV facilities for many years, and is generally considered an effective way of convincing possible violators of the probability of being ticketed. Saturation enforcement must eventually be followed by lower levels of enforcement for reasons of cost. On I-66 the need for ramp related enforcement makes this a more complex problem than what might be encountered on a limited access facility like Shirley Highway. The JHK report points out that the visibility of enforcement at ramps during non-saturation enforcement periods may limit effectiveness. A violator could avoid an enforced ramp and move on to the next unenforced one. For this reason, JHK recommends the use of one-way-glass booths for ramp enforcement, so that determining enforcement presence would be impossible. They also conclude that:

"If spot enforcement is being used, the resulting violation rates might be significantly higher without booths than with them."<sup>(29)</sup>

However, the Phase I Report has eliminated the booth design, after consulting with the Va. State Police and other agencies. Instead, enforcement "pull over" areas are recommended. The JHK plan would have confined officers to "toll" style booths for long periods, a situation likely to be unacceptable to the Va. State Police. An alternative not considered that has been used successfully on a few

HOV projects is the passage of a special law for citing of violators. A law passed in Boston allowed the citing of violators by mail after license identification. It is also preferable to allow ticketing by civilians rather than police. Police are trained and paid to handle more complex problems.

With any system as complex as the I-66 enforcement program there is a certain wisdom in running the system to determine the possible problems. The two consultants reports vary somewhat on the enforcement issue, primarily because there are some unknowns in the problem. Further speculation is not likely to clarify these unknowns. Periodic checks of violation rates are planned by VDH&T Personnel, and these should reflect problems as they arise.

#### Enforceability and Costs

The oppositions stand that the Coleman conditions for HOV and Dulles traffic are unenforceable appears to be basically unfounded on the basis of the consultants proposals. The restrictions will be complex and costly to enforce, but they are enforceable. If a random enforcement plan proves to be effective, Va. State Police salary costs could be held to 330,000 a year. At saturation enforcement levels the const would be about 461,000 a year, according to the Phase 1 Report. The lower figure represents almost a third of total predicted operating and maintenance costs of I-66 on a per year basis.

## REFERENCE/BIBLIOGRAPHY

1. "Final Environmental Impact Statement/Section 4(f) Statement Base Document, Proposed I-66 Corridor Transportation Improvements," July 1974.
2. "Secretary's Decision on Interstate Highway 66, Fairfax and Arlington Counties, Virginia," D.O.T., Washington, D. C., January 5, 1977.
3. "I-66 Corridor Environmental Evaluation for a Six Lane Roadway Design," VDH&T, Richmond, Virginia.
4. Nancy Scannell, "I-66 Suit Quashed By Judge," Washington Post, October, 10, 1971, p. A14.
5. Jay Mathews, "Virginia to Appeal I-66 Rule," Washington Post, May 17, 1972, p. B7.
6. Jay Mathews, "Suburban Battle Escalates," Washington Post, January 31, 1973, p. C1.
7. Herbert H. Denton, "Measure to Build I-66 in Arlington Passes Senate Unit," Washington Post, March 1, 1973, p. B2.
8. \_\_\_\_\_, "Environmental Unit Scores Va. on Planning of Rte. I-66," Washington Post, April 5, 1973, p. A14.
9. Jay Mathews, "I-66 Report Mixed," Washington Post, November 17, 1973, p. B1.
10. "Final Supplemental Environmental/Section 4(f) Statement, Proposed Four Lane Multi-Modal Concept," FHWA/VDH&T, August 10, 1976.
11. Paul G. Edwards, "339 Talked in 6 Days of I-66 Hearings," Washington Post, December 23, 1973, p. D1.
12. Ron Shaffer, "Federal Report Oppose I-66," Washington Post, January 11, 1974, p. A1.
13. Ron Shaffer, "3d U.S. Panel Criticizes I-66," Washington Post, January 13, 1974, p. A1.
14. Unpublished Minutes of TPB's February 21, 1974 Meeting.
15. Ron Shaffer, "I-66 Plan: 10-Story Highway," Washington Post, August 21, 1974, p. A1.
16. Ron Shaffer, "EPA Cites Fuel Use in Opposing I-66," Washington Post, June 13, 1974, p. C1.
17. Paul G. Edwards, "I-66 Right-of-Way Question, A Possible Snag for Metro," Washington Post, June 14, 1974, p. C1.
18. The Secretary of Transportation's Decision on Whether the Department of Transportation Should Approve the Construction of Interstate Route 66 in Arlington and Fairfax Counties, Virginia." D.O.T., August 1, 1975.

19. Ron Shaffer, "Coleman Bars I-66 Between Beltway and Potomac," Washington Post, August 2, 1975, p. A1.
20. Ron Shaffer, "I-66 Fight Far From Truce," Washington Post, August 22, 1975, p. C1.
21. Paul G. Edwards, "Godwin Sees Hope for Modified I-66," Washington Post, February 26, 1976, p. A1.
22. Letter to Secretary William T. Coleman from Governor Mills E. Godwin, Jr., dated January 13, 1977.
23. Memo; "Subject: Viloations of Secretary Coleman's conditions for approval of the I-66 urban segment," CONTACT dated 21 June 1978.
24. "Violations of Contract Conditions for the Urban Segment of I-66 in Northern Virginia," CONTACT Internal Report.
25. \_\_\_\_\_, "Court Lets I-66 Ruling Stand," Washington Post, April 15, 1980, p. C5.
26. Letter to Mrs. Igor Belusivich from Rep. Joseph L. Fisher, dated May 12, 1978.
27. Letter to Mr. Charles Warren, Chairman, Council on Environmental Quality from Mr. Brock Adams, Sec. of D.O.T.
28. Howard, Needles, Tammen and Bergendoff, Phase I Report, VDH&T, Richmond, Virginia, 1980.
29. JHK Associates, Traffic Management Systems Concepts for I-66, VDH&T, Richmond, Virginia, 1977.
30. John Keryeski, Effects of Television Surveillance in Police Response Time to an Urban Freeway Incident, 1965.