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Virginia Department of Transportation

VDOT

I-95 / I-64 / I-195

Feasibility Study

Richmond, Virginia

Submitted by:

Baker

November 1999

Includes Report Prepared By The Bryan Park Interchange Advisory Committee

Prepared for the
Virginia Department of Transportation

Submitted by

Michael Baker Jr., Inc.

Richmond, Virginia

November 1999

EXECUTIVE SUMMARY

The I-95/I-64/I-195 Feasibility Study was conducted for a study area around Bryan Park on the border of the City of Richmond and the County of Henrico (see Figure 1). The I-95/I-64/I-195 Interchange is commonly known as the Bryan Park Interchange. The study area includes several miles along I-95 and shorter sections of I-64 and I-195. The purpose of the study was to identify multiple feasible strategies that address the year 2018 traffic conditions anticipated on the roadways in the study area. In order to accomplish this, several tasks were undertaken.

1) Existing data (traffic volumes, truck percentages, crash records, roadway geometrics) were collected and analyzed in order to understand the existing operating conditions.

2) Year 2018 traffic was forecasted for a multi-modal transportation system and analyzed in order to understand the 2018 operating conditions if only the projects in region's constrained Long-Range Transportation Plan are implemented or constructed.

3) Potential alternative strategies were developed by Michael Baker Jr., Inc. through a collaborative effort with the Bryan Park Interchange Advisory Committee (BPIAC), the Virginia Department of Transportation, local jurisdictions, and citizens through public information meetings.

4) Alternative strategies were developed to the level of detail necessary to determine their feasibility and then evaluated for their effectiveness in addressing the 2018 traffic conditions.

The evaluation indicated that most strategies, as stand alone strategies, did not sufficiently address the 2018 traffic conditions. Many of the roadway strategies addressed specific locations in the study area and therefore could be combined to form a comprehensive strategy. Likewise, multi-modal alternative strategies could be combined with roadway alternatives as part of comprehensive strategies.

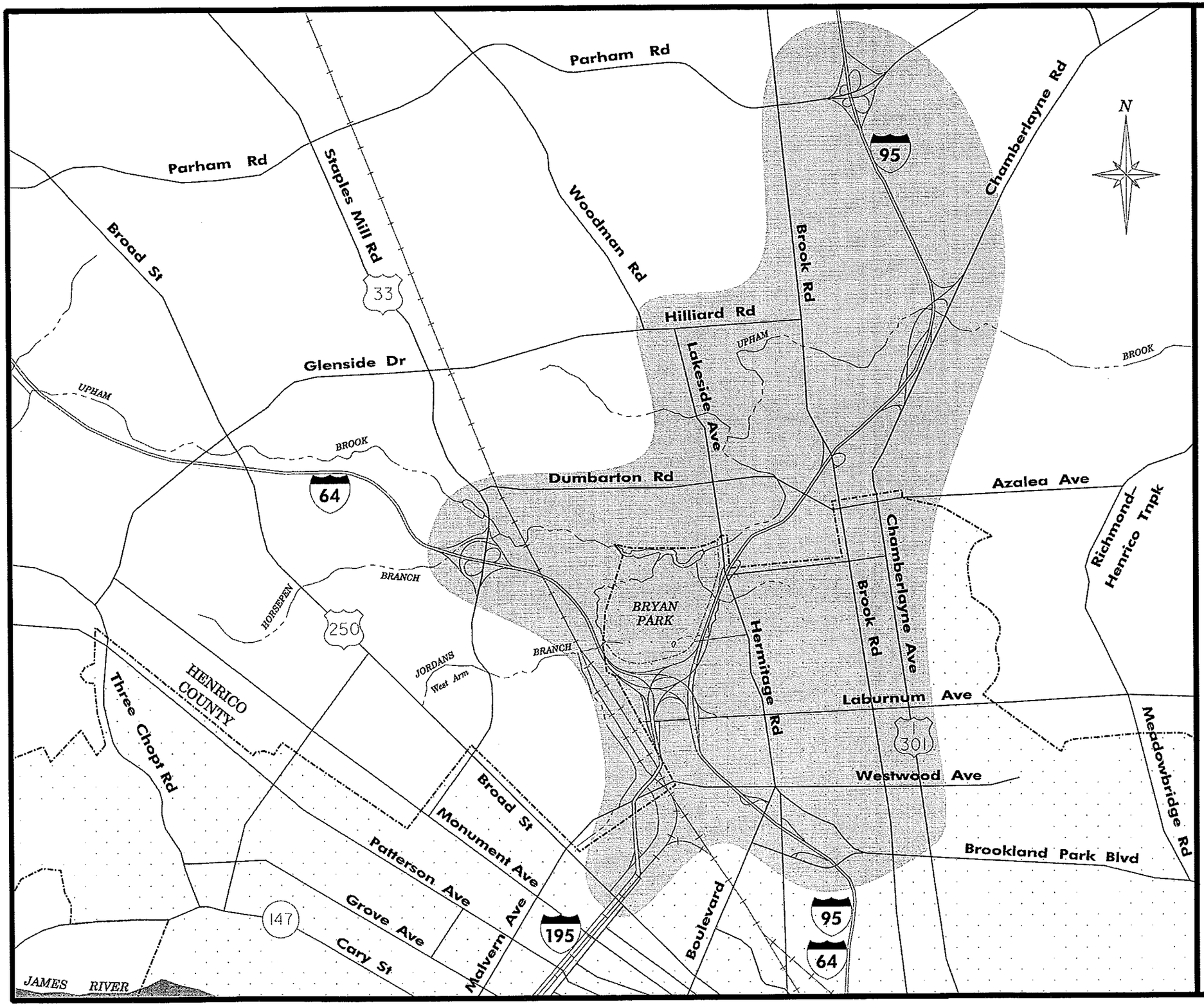
The consultant study team recommends that the following twelve (12) strategies be carried forward for more detailed study:

Concept	Description
1	Enhanced bus service
2a	Commuter rail with land use changes
3a	Light rail transit extension with land use changes
5	Carpooling/Vanpooling/Transit/Flextime/Telecommuting
6	Walking/Bicycling
11b	Provide two-lane on-ramp to I-95 northbound from I-64/I-195, Replace the Hermitage Road off-ramp from I-95 northbound and the Hermitage Road on-ramp to I-95 southbound with an off-ramp to Dumbarton Road from I-95 northbound and an on-ramp from Dumbarton Road to I-95 southbound
20	Construct collector-distributor road system at the I-95/Parham Road Interchange
24	Provide an auxiliary lane on I-64 eastbound from Staples Mill Road to the I-195 off-ramp
29	Provide an additional through lane in each direction on I-95 and I-64
30	Extend the I-95 southbound exit only lane at the Boulevard off-ramp across the Boulevard and then merge it into the I-95 mainline
31	Replace the left-hand on-ramp from I-195 northbound to I-64 westbound with a right-hand on-ramp
39b	Reconstruct I-95 northbound in the vicinity of I-64 westbound / I-195 southbound exit area to provide a five-lane section south of the diverge gore. I-64 will exit toward the left and I-95 northbound will exit to the right. Provide a left exit from I-95 northbound to I-64 westbound for traffic using the Boulevard on-ramp and traveling to I-64 westbound / I-195 southbound.

I–95 / I–64 / I–195 FEASIBILITY STUDY

FIGURE 1

STUDY AREA



LEGEND:

- RAIL LINES
- CITY OF RICHMOND
- STUDY AREA

NOVEMBER 1999

Scale
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Virginia Department of Transportation

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1.0 INTRODUCTION

This feasibility study report documents the tasks conducted in conjunction with the study. The report includes existing and projected future (year 2018) traffic data, analysis methodologies and results for existing and 2018 conditions, alternative strategy descriptions and graphic depictions, a description of evaluation criteria and results, impact assessments, and a recommendation of strategies for further, more in-depth, study.

The following paragraphs describe the evolution of the study and some of its key characteristics.

1.1 Project History

In 1993, the Virginia Department of Transportation (VDOT) initiated an in-house study to address operational concerns for southbound I-95 adjacent to Bryan Park between the Hermitage Road on-ramp and the off-ramp to I-64 West and I-195 South. Sparking much controversy was the potential demolition of the Bellevue Avenue bridge over I-95 that provides secondary access to Bryan Park (primarily pedestrian access). That study resulted in the preservation of the Bellevue Avenue bridge and the recommendation to construct an auxiliary lane in the southbound direction between the Hermitage Road on-ramp and the I-64 West/I-195 South off–ramp. In addition, VDOT decided to fund a more comprehensive study of the interstate system around the Bryan Park area that became known as the I-95/I-64/I-195 Feasibility Study.

1.2 Study Area

The project study area includes I-95 between Parham Road and Robin Hood Road, I-64 between its northern connection with I-95 through the Staples Mill Road Interchange, and I-195 from I-95 to Broad Street (see Figure 1). A substantial amount of land in and around these four legs of the interchange is also considered part of the study area due to potential changes in travel patterns that may be associated with alternative strategies. Potential impacts to the neighborhood and local street system are a sensitive issue and therefore the study area size was determined accordingly.

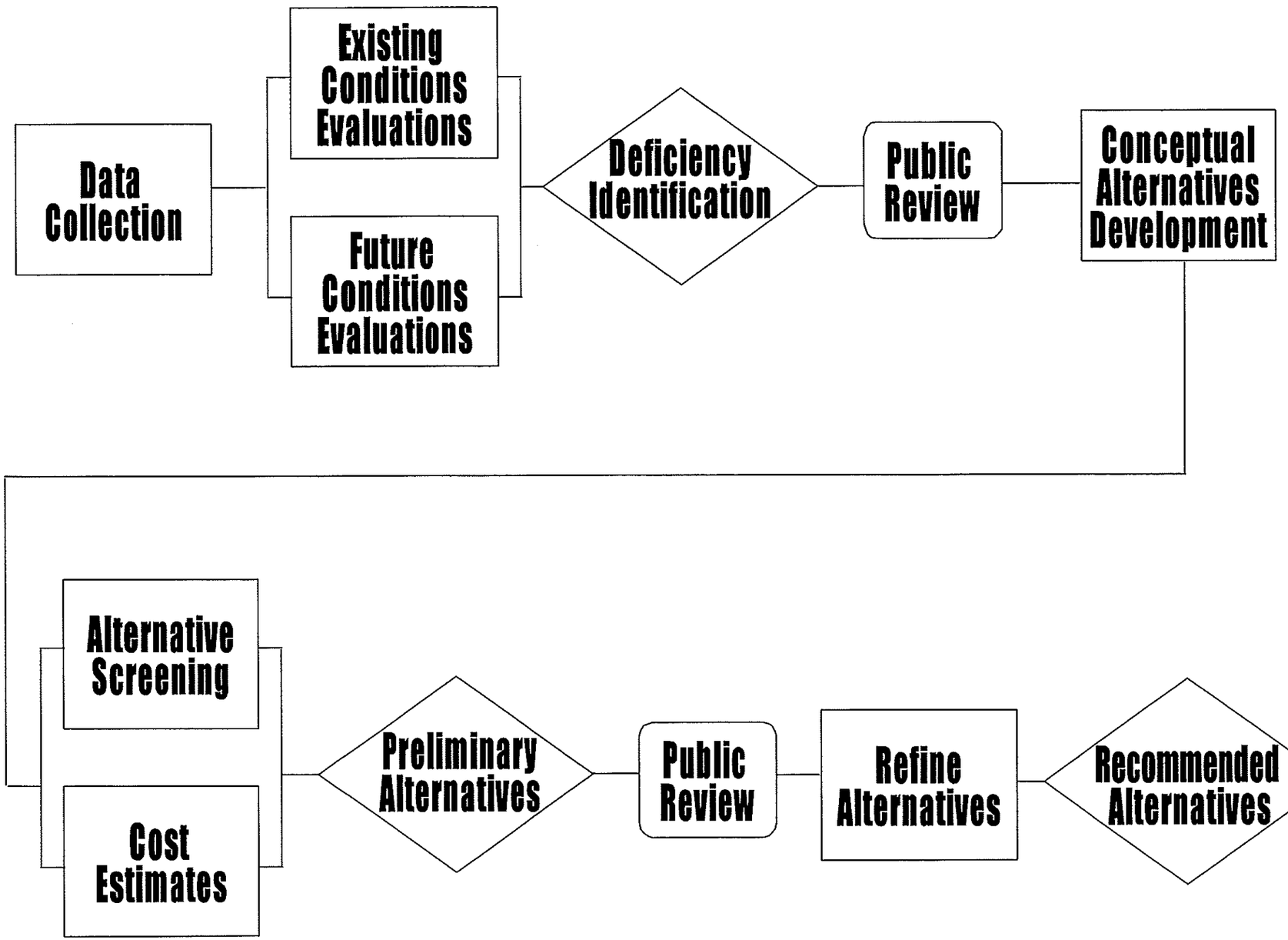
1.3 Scope of the Feasibility Study

The feasibility study was conducted to a level of detail necessary to determine the feasibility of the potential strategies. The engineering was very conceptual in nature and was not done with mapping detailed enough to depict the vertical and horizontal dimensions to any significant degree. Very limited environmental impact assessments were conducted that included the determination of potential fatal flaws. For those alternatives determined to be feasible, construction cost and estimated right-of-way cost estimates were developed. The purpose of the study was to recommend several potential strategies that could be carried forward to the next level of study, which would include a more refined detail of design and environmental impacts (an environmental document). The recommended alternatives would need to be approved by VDOT before any subsequent environmental study would be initiated. A flow chart depicting the feasibility study procedure is illustrated in Figure 2.

1.4 Bryan Park Interchange Advisory Committee

The Bryan Park Interchange Advisory Committee (BPIAC) was formed at the outset of this project. A number of the Committee members had been involved with the previous in-house project conducted by VDOT. In order to address the diversification of opinions of the surrounding communities in and around the study area, VDOT contracted with a professional facilitation organization, the Institute of Environmental Negotiation (IEN), to facilitate interests of the BPIAC, VDOT, and VDOT's study consultant, Michael Baker Jr., Inc. (Baker). The BPIAC, VDOT, and Baker met regularly throughout the study to discuss issues, process, and procedures, to review technical information, and to understand the interests and concerns of the respective groups, agencies, and policy makers that were involved with the study.

The final BPIAC report is included in Appendix A of this report. The BPIAC report contains the committee's reaction to each of the concepts that are recommended in this report. BPIAC developed their recommendations based upon how well each concept met the goals of the committee. For various reasons, the committee was not able to show support for all of the recommendations included in this feasibility study final report. The reader is encouraged to review the BPIAC report to better understand the committee's perspective and concerns.



I–95 / I–64 / I–195 FEASIBILITY STUDY

FIGURE 2

FEASIBILITY STUDY PROCESS

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2.0 STUDY AREA NEEDS ASSESSMENT

This part of the study was conducted in order to understand existing and year 2018 traffic operating conditions in the study area. With the existing conditions as a point of reference, the traffic conditions that are projected in the year 2018 without any roadway improvements (2018 No-Build Alternative) in the study area were also evaluated. Any locations that operated at an unacceptable level of service (see section 2.1.3) were considered to be deficient from a roadway capacity standpoint. The deficiencies associated with the 2018 No-Build Alternative identify the locations in the study area that required relief in order to provide acceptable operating conditions to the motoring public. The identification of these deficiencies established the study area needs for the year 2018.

2.1 Existing Conditions

2.1.1 Traffic

A substantial amount of information was collected in conjunction with this study. Some of the traffic count information was obtained from another project in the study area that had recently been conducted (summer and fall of 1997). That study was the I-95 bridge rehabilitation project in which 13 bridges are to be rehabilitated/reconstructed. Additional counts were conducted specifically for this study in February and March of 1998. A perusal of this count information revealed that the peak hours of travel in the study area occur between the hours of 7:00 – 8:00 AM and 5:00 – 6:00 PM during a typical weekday. Figures 3.1 – 3.9 in Appendix B illustrate the existing AM and PM peak hour traffic volumes on the interstate facilities in the study area.

2.1.2 Lane Configurations

Figures 4.1 – 4.9 in Appendix B illustrate the existing lane configurations of the interstate system in the study area. Each heavy line denotes a lane and the arrows indicate the direction of travel. These geometric features were used as input for the analysis of the existing conditions.

2.1.3 Levels of Service

Capacity analyses were conducted using the methodologies outlined in the 1994 Highway Capacity Manual and the Highway Capacity Software (HCS). Analysis results indicate operating conditions in terms of a criterion known as level of service. The concept of level of service uses qualitative and quantitative measures that characterize operational conditions within a traffic stream and their perception by motorists and passengers. The descriptions of individual levels of service characterize these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels of service are defined. They are given letter designations, from A – F, with level of service (LOS) A representing the best operating conditions and LOS F the worst, much like a report card. Each level of service represents a range of operating conditions. The threshold for acceptable operations in this study area is LOS D.

Level of service is defined on the basis of measures of effectiveness, which vary depending on the analysis situation. For instance, weaving sections are evaluated based on the average speed of the vehicles, merge and diverge locations are evaluated based on flow rates, and basic freeway segments are evaluated based on density. Figures 5.1 - 5.9 in Appendix B illustrate the existing operating conditions along the interstate facilities in the study area. The majority of the I-95 and I-64 roadway segments are expected to operate at unacceptable conditions in the year 2018.

2.1.4 Crash Information

Crash information on the interstate roadways in the study area for the years 1994, 1995, and 1996 was reviewed and analyzed. The information was used to develop three (3) different items. First, the crash rate, is calculated by dividing the number of crashes at a location by the amount of traffic that passes through the location in one hundred million vehicle-miles of travel. The 1996 average Virginia crash rate for interstate facilities is 69. It was decided that any interstate roadway segment that had crash rates more than twice the statewide average (i.e., 138) would be considered an area of concern. Second, the fatality rate indicates the number of fatalities that occurred at a location per one hundred million vehicle-miles of travel. Lastly, the percentage of crashes that were caused by congestion are also presented. This percentage was calculated by reviewing the crash description on the accident reports and making the assumption that most rear end collisions in which differential speed was a factor were a result of congestion. Figures 6.1 – 6.9 in Appendix B illustrate the three crash items for the interstate roadway segments in the study area.

Table 1 shows a summary of information presented in Figures 6.1 – 6.9.

Table 1
Crash Data Summary

Location	From	To	Number of Crashes from 1994-1996	Percentage of Crashes Caused By Congestion
I-64 Eastbound	Just west of the Staples Mill Interchange	I-95 / I-64 / I-195 Interchange	200	56%
I-64 Westbound	I-95 / I-64 / I-195 Interchange	Just west of the Staples Mill Interchange	148	34%
I-95 Northbound	I-95 / I-64 / I-195 Interchange	Just north of the Parham Road Interchange	132	11%
I-95 Southbound	Just north of the Parham Road Interchange	I-95 / I-64 / I-195 Interchange	218	39%
I-95 Northbound	Robin Hood Rd Overpass	I-95 / I-64 / I-195 Interchange	165	50%
I-95 Southbound	I-95 / I-64 / I-195 Interchange	Robin Hood Rd Overpass	109	34%
I-195 Northbound	Monument Ave Overpass	I-95 / I-64 / I-195 Interchange	83	10%
I-195 Southbound	I-95 / I-64 / I-195 Interchange	Monument Ave Overpass	33	3%

2.1.5 Travel Patterns

In order to determine the travel patterns in the study area, an origin-destination (O-D) study was conducted. This information was used to assist in the development of appropriate alternatives

targeted at the specific needs of the users of the interstate system in this study area. The study involved observing and recording license plate numbers at the fringes of the study area, matching the plate numbers to registered owners, mailing out questionnaires to the owners, and tabulating the results of the returned questionnaires. Due to practical limitations, we were not able to include out-of-state vehicles in this survey; however, the presence of out-of-state plates was recorded during a subsequent exercise that is described in section 2.1.7. A total of 2,361 questionnaires were mailed, and 821 usable questionnaires were returned and tabulated. This return rate of 35% is considered a very high return rate since the normal rate is around 20-25%. From the returned questionnaires, several trip characteristics were compiled.

Figures 7.1 – 7.4 in Appendix B illustrate the travel trends between the four approaches to the I-95/I-64/I-195 interchange area for the AM and PM peak periods. Each figure illustrates the dispersion of traffic from one of the four approaches to the interchange (I-64 eastbound, I-95 southbound, I-195 northbound, and I-95 northbound). Please note that in some instances, the percentages do not add up to 100% because some of the traffic entering the study area does not pass right through it. Some traffic has a destination within the study area.

A more detailed breakdown of the travel patterns was conducted in order to determine more specifically where motorists were starting and ending their trips. General locations were established based on zip codes:

- Ashland
- Charlottesville and points west
- Chesterfield County
- Fredericksburg and points north
- Goochland County
- Hanover County
- Henrico County
- New Kent County and points east
- Petersburg and points south
- Powhatan County
- City of Richmond

Tables 2-9 illustrate the origins and destinations of traffic passing through the four (4) observation points on the fringes of the study area during the AM and PM peak periods.

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Table 2

Origin-Destination Matrix

I-95 Southbound, AM Peak Period

		To										
		Ashland	Charlottesville and points west	Chesterfield County	Fredricksburg and points north	Goochland County	Hanover County	Henrico County	New Kent County and points east	Petersburg and points south	Powhatan County	City of Richmond	Total
From	Ashland		1					2				7	10
	Charlottesville and points west							2				2	4
	Chesterfield County												0
	Fredricksburg and points north			3				3	1	1		3	11
	Goochland County												0
	Hanover County			6				13		1		37	57
	Henrico County			3				6				24	33
	New Kent County and points east												0
	Petersburg and points south												0
	Powhatan County												0
	City of Richmond											2	2
	Total	0	1	12	0	0	0	26	1	2	0	75	117

Table 3

Origin-Destination Matrix

I-95 Southbound, PM Peak Period

		To											
		Ashland	Charlottesville and points west	Chesterfield County	Fredricksburg and points north	Goochland County	Hanover County	Henrico County	New Kent County and points east	Petersburg and points south	Powhatan County	City of Richmond	Total
From	Ashland			2					1				3
	Charlottesville and points west												0
	Chesterfield County												0
	Fredricksburg and points north			1	1			2				7	11
	Goochland County							1					1
	Hanover County			6		1		3		2		14	26
	Henrico County		1	11				7	1	1		20	41
	New Kent County and points east												0
	Petersburg and points south												0
	Powhatan County												0
	City of Richmond			2				2		2		3	9
	Total	0	1	22	1	1	0	15	2	5	0	44	91

Table 4

Origin-Destination Matrix

I-64 Eastbound, AM Peak Period

From \ To	Ashland	Charlottesville and points west	Chesterfield County	Fredricksburg and points north	Goochland County	Hanover County	Henrico County	New Kent County and points east	Petersburg and points south	Powhatan County	City of Richmond	Total
Ashland												0
Charlottesville and points west											2	2
Chesterfield County							3	1				4
Fredricksburg and points north							1					1
Goochland County							5	1			5	11
Hanover County							3					3
Henrico County			6			3	25	1	3		75	113
New Kent County and points east												0
Petersburg and points south												0
Powhatan County							1					1
City of Richmond				1			5	1			1	8
Total	0	0	6	1	0	3	43	4	3	0	83	143

Table 5

Origin-Destination Matrix

I-64 Eastbound, PM Peak Period

		To											
		Ashland	Charlottesville and points west	Chesterfield County	Fredricksburg and points north	Goochland County	Hanover County	Henrico County	New Kent County and points east	Petersburg and points south	Powhatan County	City of Richmond	Total
From	Ashland												0
	Charlottesville and points west											2	2
	Chesterfield County												0
	Fredricksburg and points north												0
	Goochland County				1			1				1	3
	Hanover County											2	2
	Henrico County	1		16	1		8	20	2	4		18	70
	New Kent County and points east												0
	Petersburg and points south												0
	Powhatan County												0
	City of Richmond			4	4			4	3	2	1	1	19
	Total	1	0	20	6	0	8	25	5	6	1	24	96

Table 6

Origin-Destination Matrix

I-95 Northbound, AM Peak Period

		To											
		Ashland	Charlottesville and points west	Chesterfield County	Fredricksburg and points north	Goochland County	Hanover County	Henrico County	New Kent County and points east	Petersburg and points south	Powhatan County	City of Richmond	Total
From	Ashland												0
	Charlottesville and points west							1					1
	Chesterfield County							7				8	15
	Fredricksburg and points north											2	2
	Goochland County												0
	Hanover County												0
	Henrico County						1	22				23	46
	New Kent County and points east		1					6				8	15
	Petersburg and points south					1		6				5	12
	Powhatan County												0
	City of Richmond	1			1		3	7				2	14
	Total	1	1	0	1	1	4	49	0	0	0	48	105

Table 7

Origin-Destination Matrix

I-95 Northbound, PM Peak Period

From	To											
		Ashland	Charlottesville and points west	Chesterfield County	Fredricksburg and points north	Goochland County	Hanover County	Henrico County	New Kent County and points east	Petersburg and points south	Powhatan County	City of Richmond	Total
	Ashland												0
	Charlottesville and points west							1					1
	Chesterfield County		2		1		2	1					6
	Fredricksburg and points north												0
	Goochland County												0
	Hanover County												0
	Henrico County							15				5	20
	New Kent County and points east		1					1					2
	Petersburg and points south		1				1						2
	Powhatan County												0
	City of Richmond	2	2	1	7	3	10	47				11	83
	Total	2	6	1	8	3	13	65	0	0	0	16	114

Table 8

Origin-Destination Matrix

I-195 Northbound, AM Peak Period

From \ To	Ashland	Charlottesville and points west	Chesterfield County	Fredricksburg and points north	Goochland County	Hanover County	Henrico County	New Kent County and points east	Petersburg and points south	Powhatan County	City of Richmond	Total
Ashland												0
Charlottesville and points west											1	1
Chesterfield County	2			4		8	24				7	45
Fredricksburg and points north												0
Goochland County												0
Hanover County												0
Henrico County						4	2				3	9
New Kent County and points east												0
Petersburg and points south							1				1	2
Powhatan County							2				1	3
City of Richmond	5	1		1	1	12	27		1		11	59
Total	7	1	0	5	1	24	56	0	1	0	24	119

Table 9

Origin-Destination Matrix

I-195 Northbound, PM Peak Period

From	To											
		Ashland	Charlottesville and points west	Chesterfield County	Fredricksburg and points north	Goochland County	Hanover County	Henrico County	New Kent County and points east	Petersburg and points south	Powhatan County	City of Richmond	Total
	Ashland												0
	Charlottesville and points west						1						1
	Chesterfield County						7	7				2	16
	Fredricksburg and points north												0
	Goochland County												0
	Hanover County												0
	Henrico County	1		1			1	1				3	7
	New Kent County and points east												0
	Petersburg and points south				1			1				1	3
	Powhatan County							1					1
	City of Richmond	1	1		6	2	21	53	1			8	93
	Total	2	1	1	7	2	30	63	1	0	0	14	121

2.1.6 Trip Purposes

The travel survey questionnaire also provided information about the purpose of the trips that were observed in the study area. Tables 10 and 11 illustrate, by approach to the I-95/I-64/I-195 interchange, the percentages of the trips that were destined for home, work, shopping, tourist attractions or other purposes, for the AM and PM peak hours, respectively.

Table 10
O-D Study Trip Purpose Data
AM Peak Period

		Trip Destination					
		Home	Work	Shopping	Other	Tourist Attraction	Total
Trip Origin	I-95 SB	4.3%	86.3%	0.9%	8.5%	0.0%	100%
	I-95 NB	5.7%	84.8%	1.0%	8.6%	0.0%	100%
	I-195 NB	3.4%	92.4%	0.8%	3.4%	0.0%	100%
	I-64 EB	3.5%	80.4%	0.7%	14.7%	0.7%	100%
	Total	4.1%	85.7%	0.8%	9.1%	0.2%	100%

Table 11
O-D Study Trip Purpose Data
PM Peak Period

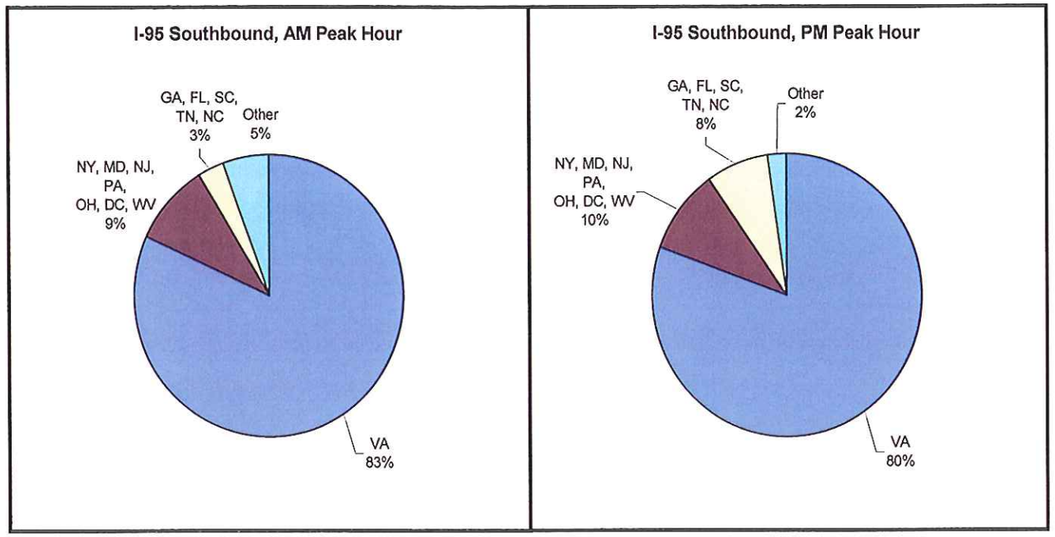
		Trip Destination					
		Home	Work	Shopping	Other	Tourist Attraction	Total
Trip Origin	I-95 SB	60.4%	19.8%	5.5%	14.3%	0.0%	100%
	I-95 NB	74.6%	10.5%	8.8%	6.1%	0.0%	100%
	I-195 NB	78.7%	10.7%	2.5%	8.2%	0.0%	100%
	I-64 EB	72.9%	14.6%	7.3%	4.2%	1.0%	100%
	Total	72.3%	13.5%	5.9%	8.0%	0.2%	100%

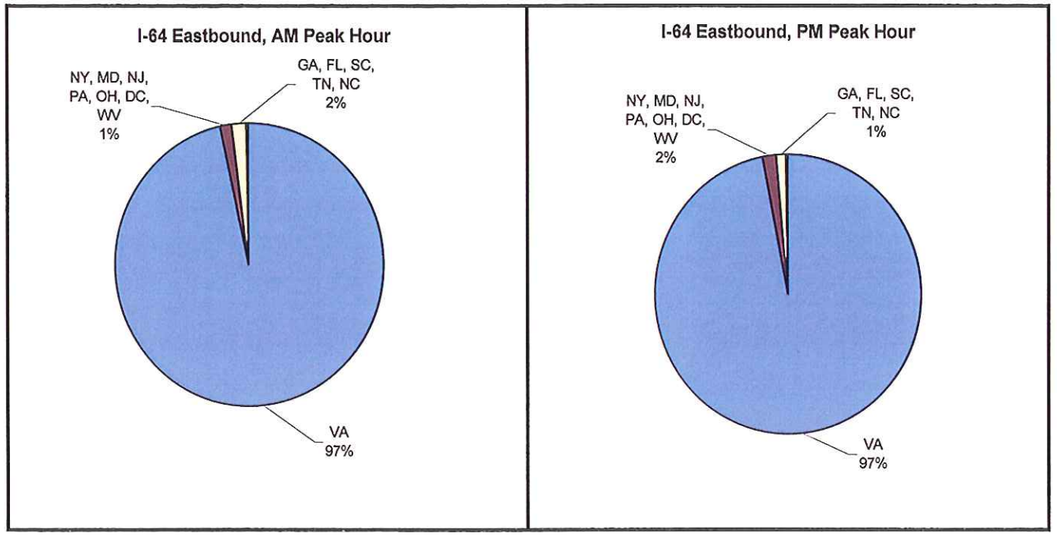
2.1.7 In-State vs Out-of-State Travel

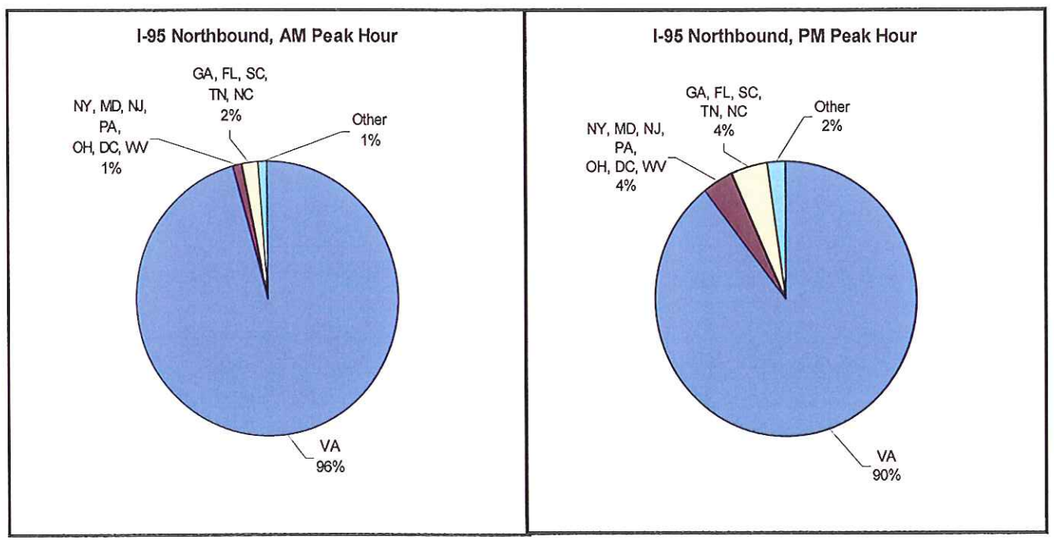
In June of 1998, a license plate survey was conducted to ascertain the percentage of out-of-state vehicles traveling through the study area. The same observation points that were used for the O-D study were used for this survey. Four categories of states were developed to simplify the aggregation of the information. The four categories were:

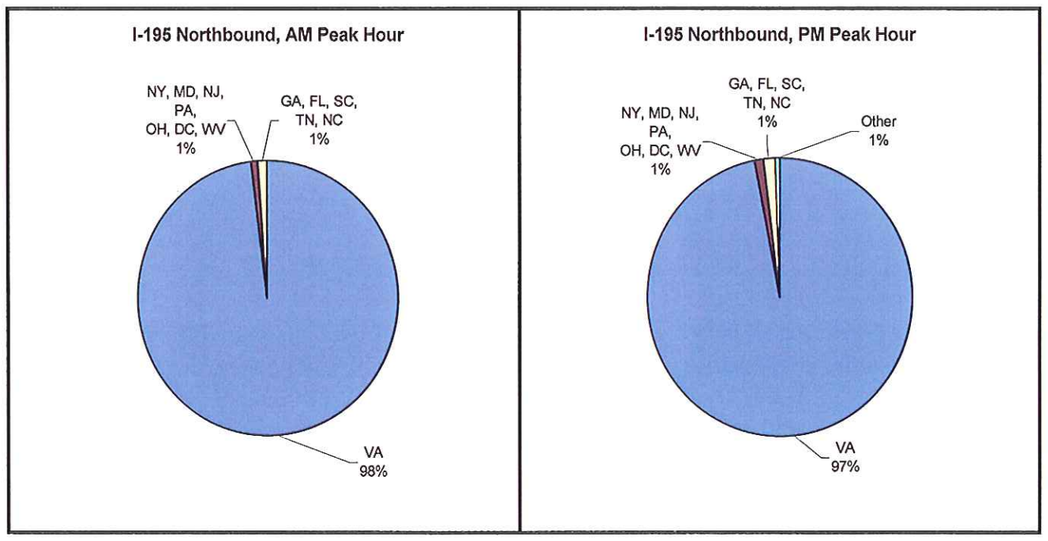
- Virginia
- Georgia, Florida, South Carolina, North Carolina, and Tennessee
- New York, Maryland, New Jersey, Pennsylvania, Ohio, Washington, D.C., West Virginia
- Other

The following pie charts illustrate the appropriate percentages for each category at the four (4) observation points in the AM and PM peak periods. The I-95 southbound traffic had the lowest percentage of in-state vehicles (83% and 80%, in the AM and PM peak hours, respectively). The other three (3) observation points experienced a range of in-state vehicles between 90% to 98%. While it can not be conclusively determined that a vehicle with Florida license plates, for example, is traveling to or from Florida in this particular trip, this exercise was intended to provide a sense of what may be happening in this study corridor.


I-95 Southbound, AM Peak Hour
GA, FL, SC, TN, NC 3%
Other 5%
NY, MD, NJ, PA, OH, DC, WV 9%
VA 83%
I-95 Southbound, PM Peak Hour
GA, FL, SC, TN, NC 8%
Other 2%
NY, MD, NJ, PA, OH, DC, WV 10%
VA 80%


I-64 Eastbound, AM Peak Hour
NY, MD, NJ, PA, OH, DC, WV 1%
GA, FL, SC, TN, NC 2%
VA 97%
I-64 Eastbound, PM Peak Hour
NY, MD, NJ, PA, OH, DC, WV 2%
GA, FL, SC, TN, NC 1%
VA 97%


I-95 Northbound, AM Peak Hour
GA, FL, SC, TN, NC 2%
NY, MD, NJ, PA, OH, DC, WV 1%
Other 1%
VA 96%
I-95 Northbound, PM Peak Hour
GA, FL, SC, TN, NC 4%
Other 2%
NY, MD, NJ, PA, OH, DC, WV 4%
VA 90%

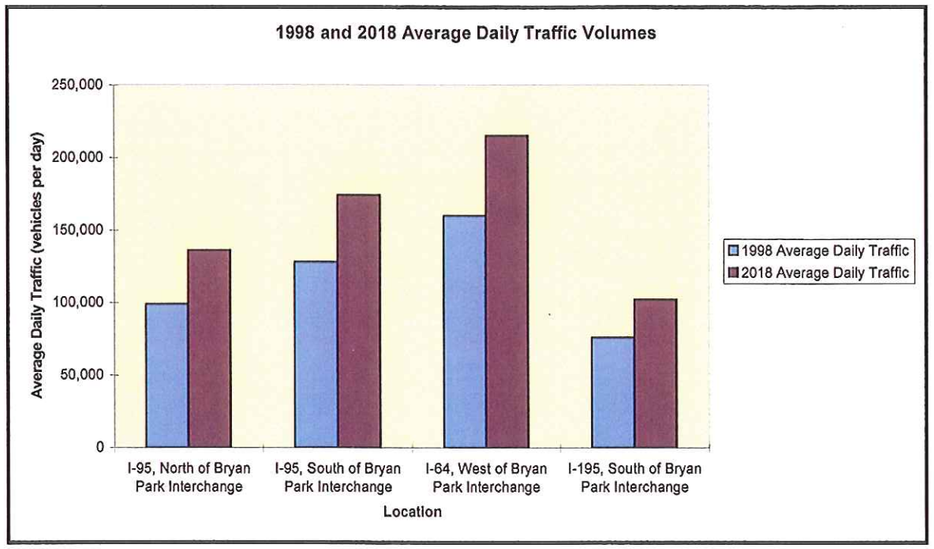

I-195 Northbound, AM Peak Hour
NY, MD, NJ, PA, OH, DC, WV 1%
GA, FL, SC, TN, NC 1%
VA 98%
I-195 Northbound, PM Peak Hour
GA, FL, SC, TN, NC 1%
NY, MD, NJ, PA, OH, DC, WV 1%
Other 1%
VA 97%

2.2 2018 No-Build Conditions

2.2.1 Traffic

The year 2018 traffic projections were developed from a process involving a review of historic traffic counts as well as reference to the Richmond region travel demand model. The model was enhanced as part of this study to include a mode-choice module. This feature enables the model to project passenger trips rather than vehicle trips. The passenger trips are then assigned in accordance to the different modes of travel that could include transit modes such as bus and rail, as well as conventional vehicles. The 2018 No-Build Alternative includes transportation improvement projects that have been formally adopted by the Richmond Metropolitan Planning Organization in their fiscally constrained Long-Range Transportation Plan. All improvement projects are assumed to be constructed and operational in the year 2018. Figures 8.1 – 8.9 in Appendix B illustrate the 2018 peak hour traffic volumes.

The following graph shows a comparison between the 1998 average daily traffic and 2018 projected daily traffic on each of the four approaches to the interchange.



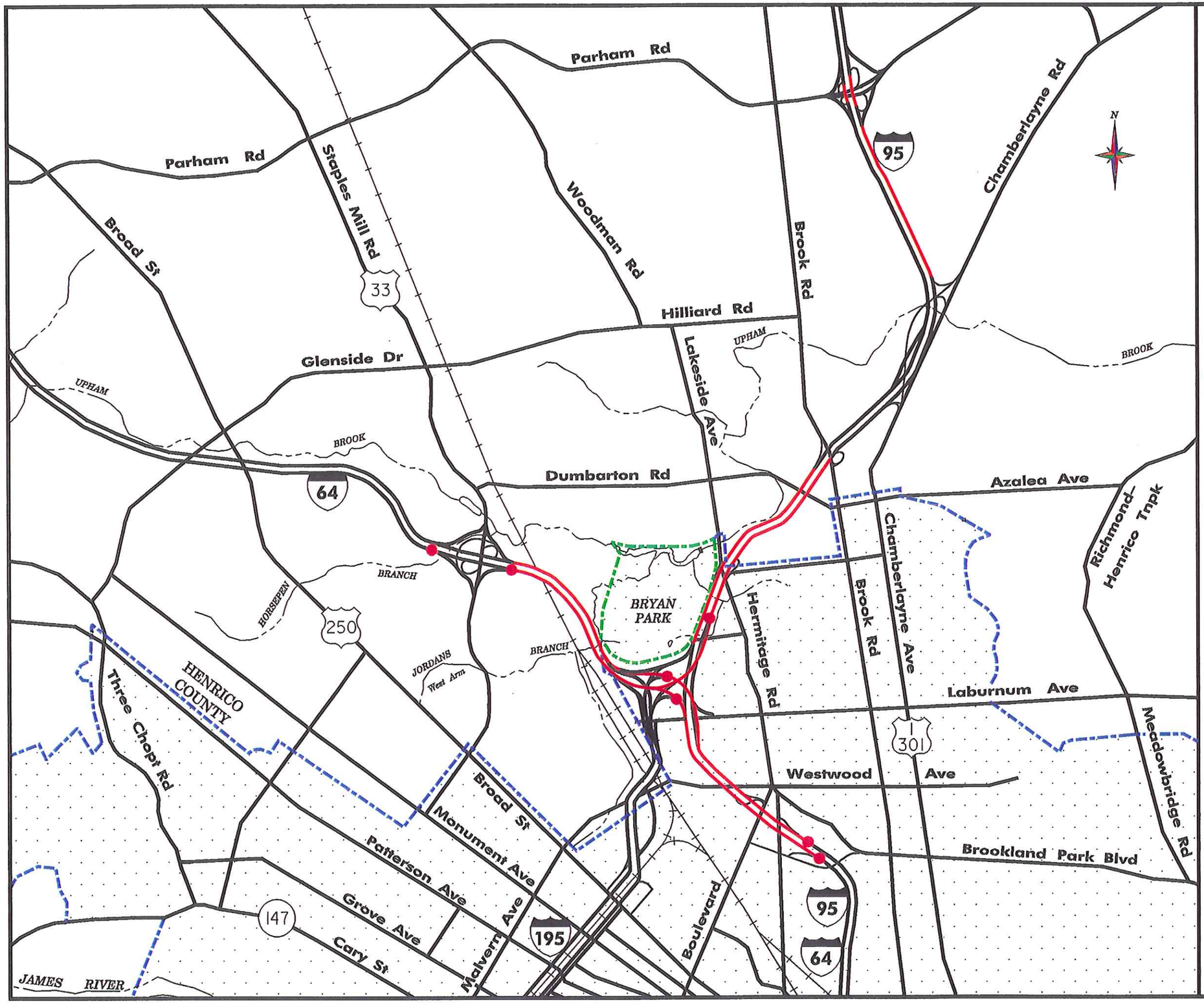
2.2.2 Levels of Service

Year 2018 capacity analyses were conducted using the same methodology used to conduct the analyses of the existing conditions. Figures 9.1 – 9.9 in Appendix B illustrate the operating conditions associated with the 2018 No-Build Alternative. For comparative purposes, the existing levels of service are also depicted on these figures. In all cases, the operating conditions either stay the same or become more congested. Figure 10 illustrates in red those portions of the study area where unacceptable levels of service are experienced in the existing conditions, and Figure 11 illustrates in red those portions of the study area where unacceptable levels of service will be in the year 2018. These areas indicate capacity deficiencies. The increased amount of red on Figure 11 indicates that operating conditions are going to erode over the next two decades as the Richmond area and through traffic continues to grow. These red areas indicate where strategies were investigated in order to address the operational deficiencies.

I–95 / I–64 / I–195 FEASIBILITY STUDY

FIGURE 10

EXISTING STUDY AREA OPERATING DEFICIENCIES



LEGEND:

- RAIL LINES
- WATER
- CITY OF RICHMOND
- MAINLINE LOCATIONS WITH LOS E or F
- MERGE or DIVERGE AREAS WITH LOS E or F
- APPROXIMATE PARK BOUNDARY

NOVEMBER 1999

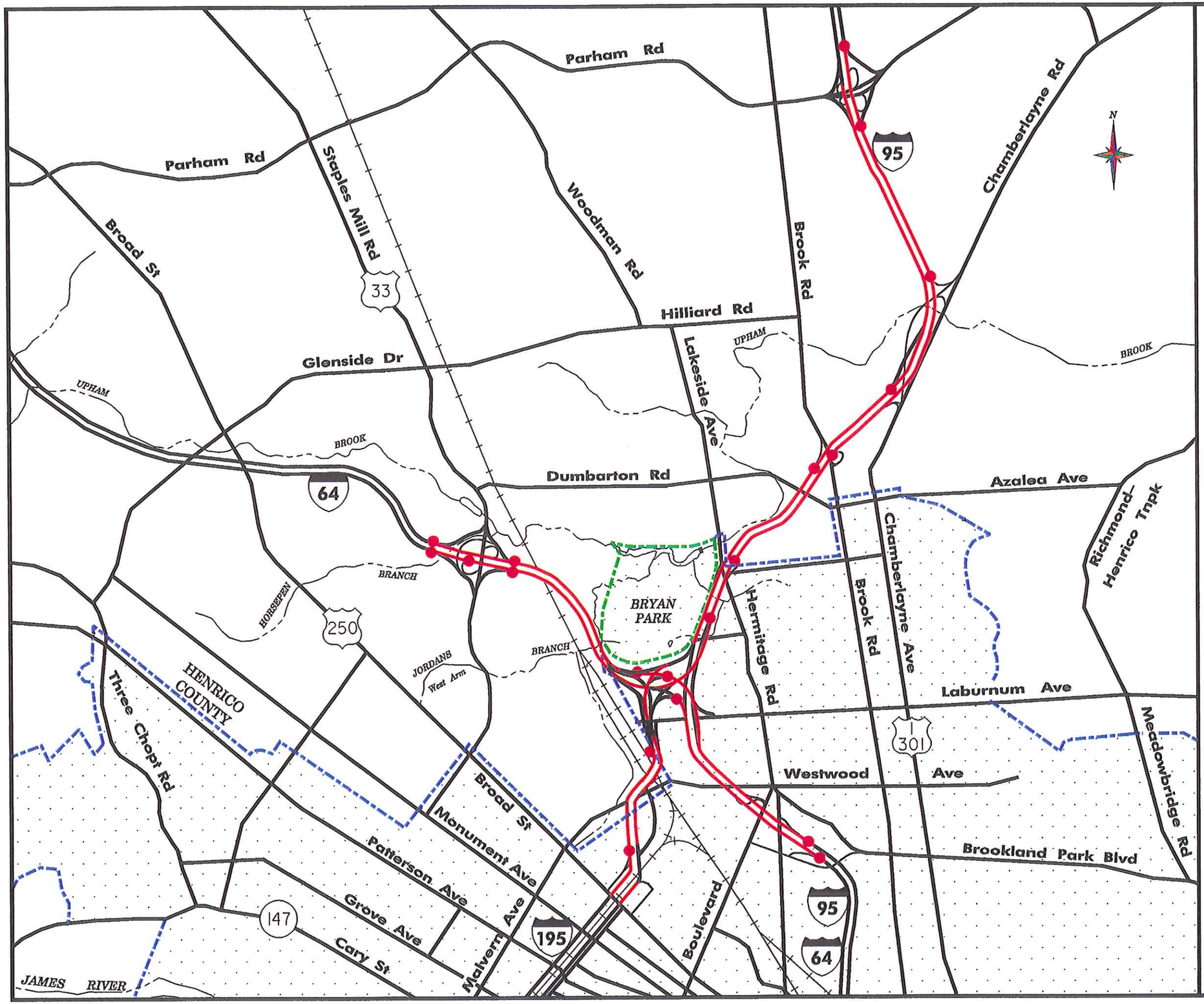
Scale
2000' 1000' 0 2000'

Virginia Department of Transportation

I–95 / I–64 / I–195 FEASIBILITY STUDY

FIGURE 11

2018 STUDY AREA OPERATING DEFICIENCIES



LEGEND:

- RAIL LINES
- WATER
- CITY OF RICHMOND
- MAINLINE LOCATIONS WITH LOS E or F
- MERGE or DIVERGE AREAS WITH LOS E or F
- APPROXIMATE PARK BOUNDARY

NOVEMBER 1999

Scale
2000' 1000' 0 2000'

Virginia Department of Transportation

3.0 ALTERNATIVE CONCEPTS

3.1 Initial Concept Development

Based on the study area needs identified from the 2018 No-Build Alternative analysis, potential strategies to address the deficiencies were developed. Sources for the potential strategies were the BPIAC, comments received from the Citizen Information Meetings held in January and August 1999, and the study team. A total of thirty-nine (39) feasible concepts were initially developed for consideration.

3.1.2 Initial Concept Descriptions

The following paragraphs describe the original thirty-nine (39) concepts developed for consideration in the study area. Figures were prepared only for those roadway alternatives that progressed beyond the initial screening process.

Concept #1 – Enhanced Bus Service

This concept consists of improving bus service within the metropolitan Richmond area beyond what is already recommended in the region. No new bus routes were added to the system described in the 2018 Long-Range Transportation Plan; however, peak hour headways (the amount of time between the arrival of transit scheduled vehicles) were reduced by 30% for those routes with headways greater than 14 minutes. Even though new bus routes would not be added, buses would run more frequently on the existing routes as a result of the decrease in headways. For example, the Northside line servicing Brookland Park Boulevard and the Cary Street Shopping Center would have a headway of 60 minutes as described in the 2018 Long-Range Transportation Plan (2018 No Build condition). In the case of Concept #1, this bus route would have a headway of 42 minutes.

Concept #2 – Commuter Rail

Concept #2 consists of implementing a commuter rail line from the Ashland train station to downtown Richmond (Main Street station) with one stop at the Staples Mill Road train station near Glenside Drive. The commuter rail would operate along the existing CSX / Amtrak line. Park-and-ride lots are added to the system near each of the train stations (Ashland—College Avenue and Center Street, Staples Mill—Staples Mill Road and Glenside Drive, Downtown—17th Street and Grace Street). Peak hour headways of 30 minutes are assumed, and there is no commuter train service during the off-peak hours.

Concept #2b – Commuter Rail with Land Use Changes

This concept includes commuter rail (Concept #2) as well as land use changes to areas located around two of the three stations. Metropolitan areas with more mature rail transit service find that higher density housing and population will tend to 'cluster' near rail stations due to the benefit of the rail service. Alternative #2b was designed to reflect those trends. The population was increased by a factor of 3 within a three-mile radius of the Ashland station and the Staples Mill Road station. Land use was not altered around the downtown Main Street station since sufficient density would already exist.

Concept #3 – Light Rail Transit Extension

The 2018 Long Range Transportation Plan includes light rail transit along Broad Street from Main Street Station to the Science Museum of Virginia as well as from Main Street Station to Church Hill. Concept #3 consists of a light rail extension along Broad Street from the Science Museum to proposed VA Route 288 in western Metropolitan Richmond. Peak hour headways of 10 minutes and non-peak hour headways of 15 minutes are assumed for the light rail line. A park-and-ride lot is added near West Broad Street and VA Route 288. In addition, the bus service along the Broad Street corridor is reduced due to the fact that these are competing modes.

Concept #3b – Light Rail Transit Extension with Land Use Changes

Concept #3b includes the light rail transit extension as described in Concept #3 as well as land use changes to areas located along the light rail corridor. The rationale for this alternative is similar to that described in Concept #2b. As stated in the report LUTRAQ (Making the Land Use Transportation Air Quality Connection; Cambridge Systematics, Inc., 1000 Friends of Oregon, "The LUTRAQ Alternative / Analysis of Alternatives: An Interim Report." October 1992.), to support a transit system, the population near the corridor needs to be approximately 14 to 21 people per acre. In the year 2018, the average population along the Broad Street corridor west of Bryan Park will be 5.43 people per acre. The population along the corridor was increased by a factor of 3.

Concept #4 – Conversion of Existing Interstate Through Lane to HOV 2+ Lane

This concept includes converting an existing interstate through lane to a High Occupancy Vehicle lane in which vehicles with only one occupant would be legally prohibited from the use of this lane during the peak periods. HOV 2+ lanes would be designated on I-64 from Gaskins Road to downtown and on I-95 from Parham Road to downtown. Two existing through lanes, in each direction, would remain for unrestricted travel. This alternative is based on the premise that such a strategy would result in increased carpooling in the study area.

Concept #5 – Carpooling / Vanpooling / Transit / Flextime / Telecommuting

The purpose of this concept was to test the impacts of implementing employer-based incentives for carpooling, vanpooling, transit, flextime, and telecommuting. For example, in-house carpool and vanpool matching services would exist. A transit information center as well as on-site bus pass sales would be made available to employees. There would be one employee who dedicates part of his or her time to carpool, vanpool, and transit coordination activities. A policy of flexible work schedules would be enacted in order to allow employees to modify their work day based on transit schedules and off-peak travel times. All of the above mentioned activities would be implemented voluntarily by the employers. No legal or regulatory pressure would be placed upon the employer to participate. These initiatives were all 'bundled' together to illustrate an aggregate benefit for the purposes of this study.

Concept #6 – Walking / Bicycling
Providing sidewalks and bicycle lanes along facilities parallel to the interstate can draw vehicle trips from the interstate. The percentage of individuals utilizing a bicycle facility or sidewalk is directly related to the amount and availability of these facilities. This concept examines the impact of providing sidewalks in almost 100% of the area as well as striping bicycle lanes and providing grade separated bicycle facilities. These facilities would provide access to employment centers, residential areas, and other attractions. The analysis of this concept was based upon studies conducted in Virginia.

Concept #7 – Close On-Ramp from Hermitage Road to I-95 Southbound
This concept consists of closing the existing on-ramp to I-95 southbound. Closing the ramp forces motorists to find another point of access to I-95 southbound and changes traffic patterns on the local street system. The primary objective of this concept is to mitigate the unacceptable operations associated with the weaving area between this on-ramp and I-95 southbound traffic destined for the downstream ramps to I-64 westbound and I-195 southbound.

Concept #8 – Construct Two-Lane On-Ramp to I-95 Northbound from I-64 Eastbound and I-95 Northbound
This concept consists of constructing two additional lanes for northbound I-95. The lanes will be constructed as auxiliary lanes (short distance lanes that usually terminate as exit ramps) the first of which will terminate at the Hermitage Road off-ramp and the second will terminate at the Brook Road off-ramp. The primary objective of this concept is to mitigate the unacceptable operations associated with the weaving area between this on-ramp traffic and northbound I-95 traffic destined for the Hermitage Road and Brook Road off-ramps.

Concept #9 – Close the On- and Off-Ramps to Brook Road from I-95
This alternative consists of closing the existing ramps to and from Brook Road for I-95 southbound and I-95 northbound traffic, respectively. The primary objective of this concept, which was suggested by citizens, was to limit truck traffic in the Brook Road/I-95 interchange vicinity.

Concept #10 – Close the Off-Ramp to Hermitage Road from I-95 Northbound
This alternative consists of closing the existing I-95 northbound off-ramp that leads to Hermitage Road and connects to Westbrook Avenue. The primary objective of this concept is to mitigate the unacceptable operations associated with the weaving area between northbound I-95 traffic destined for the Hermitage Road off-ramp and the I-64 eastbound and I-195 northbound traffic destined for I-95 northbound. Additionally, this concept addresses some citizen concerns about the high traffic volume (particularly truck traffic) that utilizes this ramp.

Concept #11 – Construct Two-Lane On-Ramp to I-95 Northbound from I-64 Eastbound and I-195 Northbound, Close the Hermitage Road Off-Ramp from I-95 Northbound, and Provide a new Off-Ramp from I-95 Northbound to Dumbarton Road
This concept introduces two lanes of traffic from the I-64 eastbound and I-195 northbound ramp to the I-95 northbound mainline and closes the I-95 northbound off-ramp to Hermitage Road. One lane is carried to the proposed Dumbarton Road off-ramp and the remaining lane is carried to the Brook Road off-ramp. The primary objective of this concept is to mitigate the unacceptable operations associated with the weaving area between this on-ramp traffic and northbound I-95 traffic destined for the Hermitage Road and Brook Road off-ramps. (See Figure 12.)

Concept #12 – Extend Hilliard Road to I-95
This concept proposes to construct an eastward extension of Hilliard Road to provide ramp connections to I-95. The primary objective of this concept is to determine the effectiveness of additional access on the traffic operations at adjacent I-95 interchanges. (See Figure 13.)

Concept #13 – Close the Two Existing Ramps at Hermitage Road and Provide Northbound On-Ramp and Southbound Off-Ramp at Brook Road
This concept consists of closing the two existing ramps at Hermitage Road, thereby making it directly inaccessible from I-95, and constructing two additional ramps at Brook Road, thereby creating a complete interchange at that location. The primary objective of this concept, recommended by citizens, was to eliminate traffic in the I-95/Hermitage Road vicinity and redirect it to a more truck-tolerant environment.

Concept #14 – Construct Two Additional Ramps at Brook Road Interchange
This concept consists of the construction of two new ramps at Brook Road that will make it a complete interchange that accommodates traffic to and from both directions of I-95. The primary objective of this concept is to determine the effectiveness of additional access to I-95 on the traffic operations at other I-95 interchanges in the study area.

Concept #15 – Construct a Partial Interchange at Dumbarton Road and Close the Brook Road On-Ramp to I-95 Southbound
This concept consists of constructing ramps onto and off of the I-95 southbound mainline and a loop on-ramp onto the I-95 northbound mainline, and the closing of the existing on-ramp from Brook Road to I-95 southbound. The Brook Road on-ramp needed to be closed in conjunction with the proposed Dumbarton Road ramps due to required spatial relationships between on and off-ramps. The primary objective of this concept is to determine the effectiveness of additional access to I-95 on traffic operations of adjacent interchanges. (See Figure 14.)

Concept #16 – Construct New On-Ramp from Hermitage Road to I-95 Northbound
This concept consists of constructing an on-ramp from Hermitage Road to I-95 northbound. The primary objective for this concept, recommended by citizens, was to provide an alternative to Chamberlayne Avenue and the Boulevard for access to I-95 northbound.

WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement

Proposed Structures and Bridges

Existing Bryan Park R/W

X X X *Denotes Demolition of Ramp*

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

RICHMOND, VIRGINIA

Concept 11

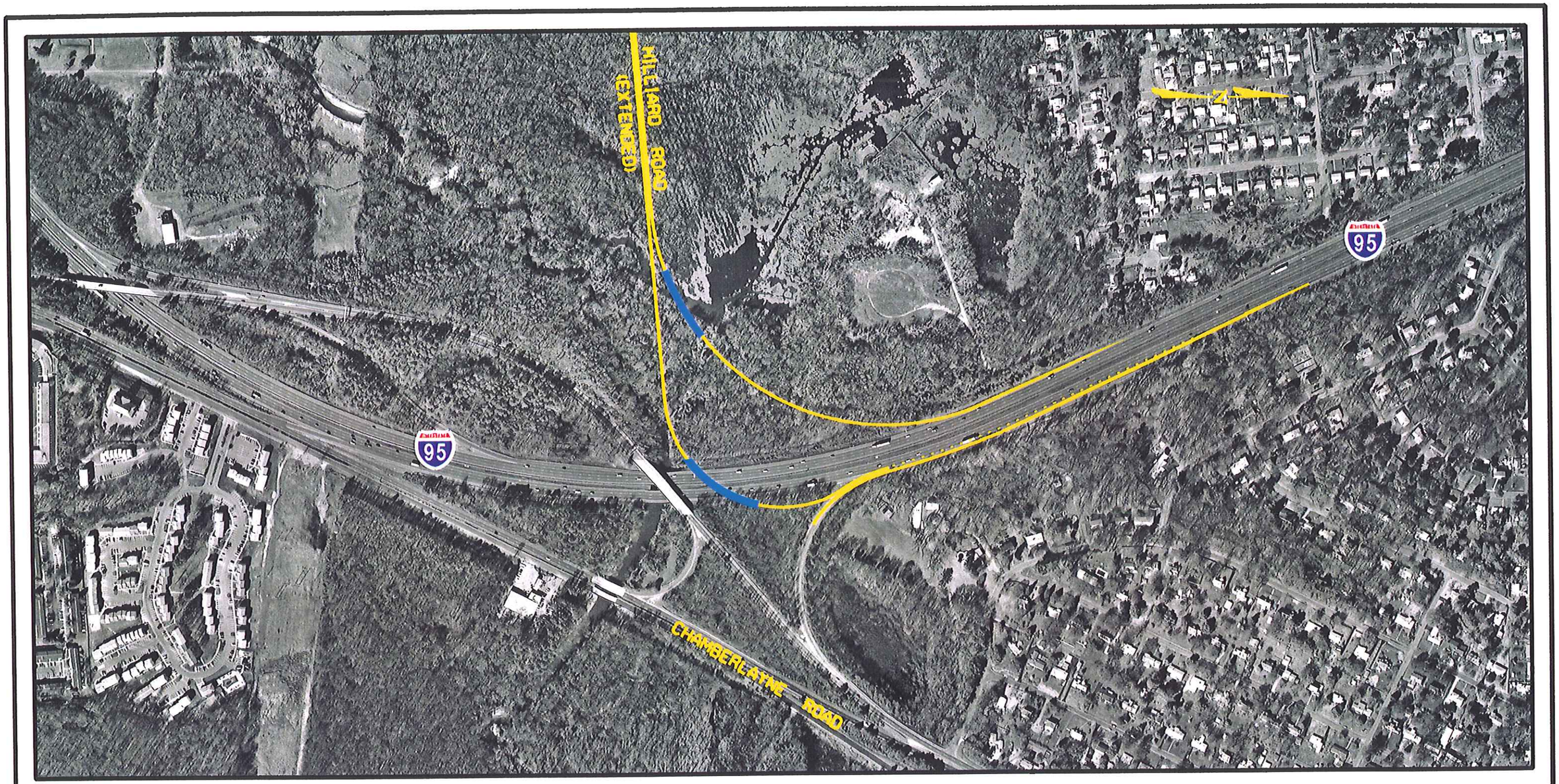
METRIC SCALE 1 : 10,000

0 200 m 400 m

VDOT METRIC

Date: November 1999

Figure 12



WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS
TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement
Proposed Structures and Bridges

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

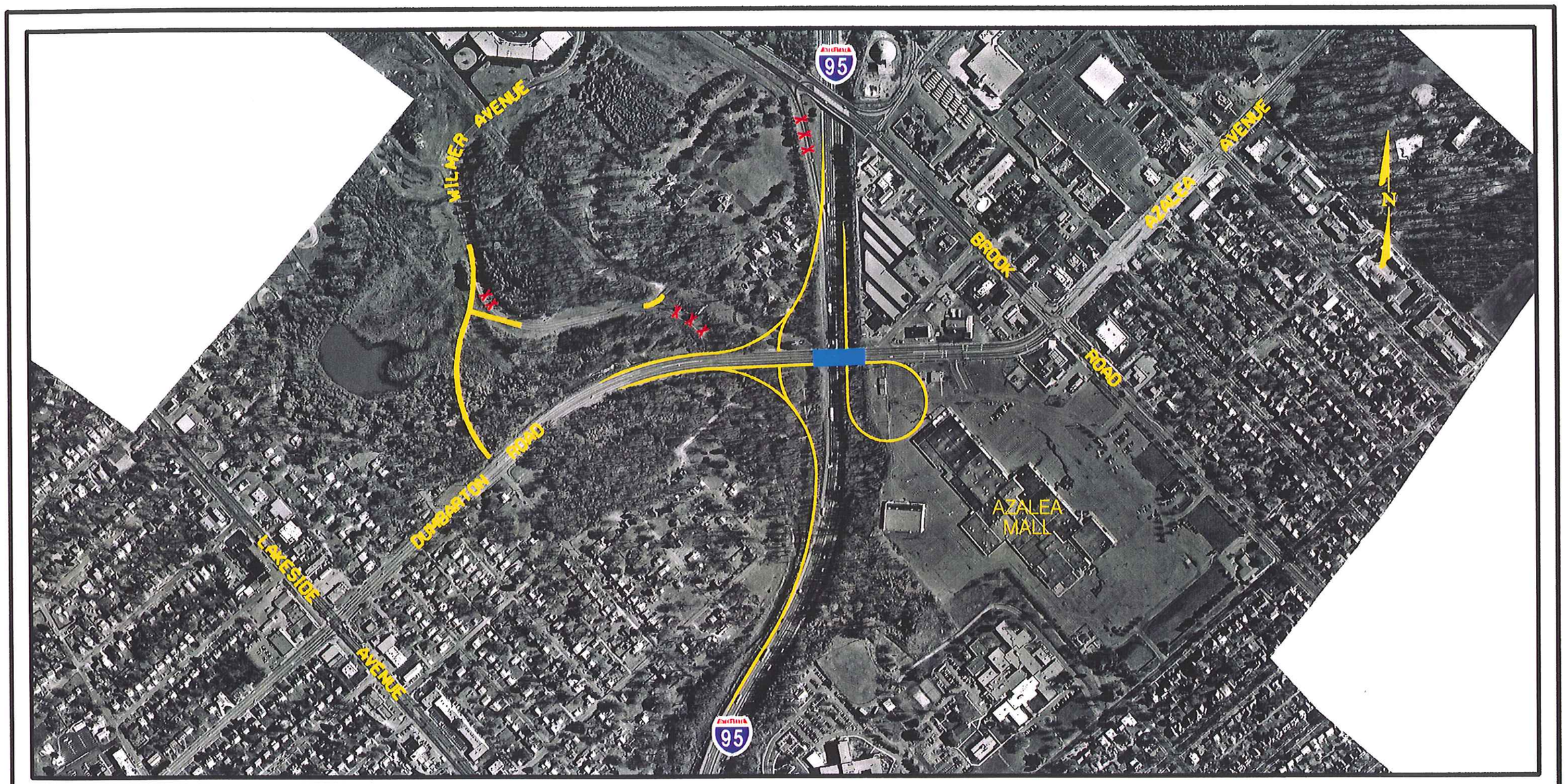
RICHMOND, VIRGINIA

Concept 12

METRIC SCALE
1 : 5000
0 100 m 200 m
VDOT METRIC

Date: November 1999

Figure 13



WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement

Proposed Structures and Bridges

X X X *Denotes Demolition of Ramp/Roadway*

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

RICHMOND, VIRGINIA

Concept 15

METRIC SCALE
1 : 6000
0 120 m 240 m
VDOT METRIC

Date: November 1999

Figure 14

Concept #17 – Install a Traffic Signal at the Ramp Termini of the I-95 Northbound Off-Ramp to Hermitage Road
This concept consists of installing a traffic light at the termini of the I-95 northbound off-ramp and Westbrook Avenue. The primary objective of this concept, recommended by citizens, is to provide safer pedestrian movements in this vicinity.

Concept #18 – Replace the Existing Hermitage Road On-Ramp to I-95 Southbound with a New On-Ramp in the Northwest Quadrant of the I-95/Hermitage Road/Lakeside Drive Interchange
This concept consists of closing the existing on-ramp from Hermitage Road to I-95 southbound and constructing a loop ramp to accommodate the same traffic movement. The loop ramp will align with Bryan Park Avenue at its Lakeside Avenue intersection. The primary objective of this concept is to mitigate the unacceptable operations associated with the weaving area between the existing Hermitage Road on-ramp and I-95 southbound traffic destined for the downstream ramps to I-64 westbound and I-195 southbound. (See Figure 15.)

Concept #19 – Replace the Existing Hermitage Road On-Ramp to I-95 Southbound with a New Ramp at Dumbarton Road
This concept consists of the closing of the existing on-ramp from Hermitage Road to I-95 southbound and the construction of a new ramp from Dumbarton Road to I-95 southbound. The primary objective of this concept is to mitigate the unacceptable operations associated with the weaving area between the existing Hermitage Road on-ramp and I-95 southbound traffic destined for the downstream ramps to I-64 westbound and I-195 southbound. (See Figure 16.)

Concept #20 – Construct a Collector-Distributor Road System at the Parham Road / I-95 Interchange
This concept consists of the construction of a collector-distributor road system along I-95 in both directions of travel. The primary objective of this concept is to remove the weaving traffic associated with the existing loop ramps in this interchange off the I-95 mainline so that through traffic is not impeded by these traffic movements exiting and entering I-95. (See Figure 17.)

Concept #21 – Implement a Truck-Only Lane
This concept consists of designating one lane of the existing interstate mainlines in the study area for truck use only. The primary objective of this concept, recommended by citizens, is to make travel in the study area safer by restricting trucks to designated lanes, thereby limiting lane changes and restricted visibility.

Concept #22 – Retire Richmond Metropolitan Authority (RMA) Bonds for the Downtown Expressway and Eliminate Tolls on This Facility
This concept involves a policy decision that would result in the removal of the tolls on the Downtown Expressway. The primary objective of this concept was to determine the effectiveness of the policy on traffic diversion from the study area roadways to the Downtown Expressway.

Concept #23 – Construct an I-64 Westbound Off-Ramp to Dickens Road
This concept consists of the construction of a new ramp to Dickens Road from I-64 Westbound. The primary objective of this concept is to help mitigate the unacceptable traffic operations that occur between traffic from the I-195 northbound on-ramp destined to the Staples Mill Road off-ramp and the I-95 to I-64 westbound traffic.

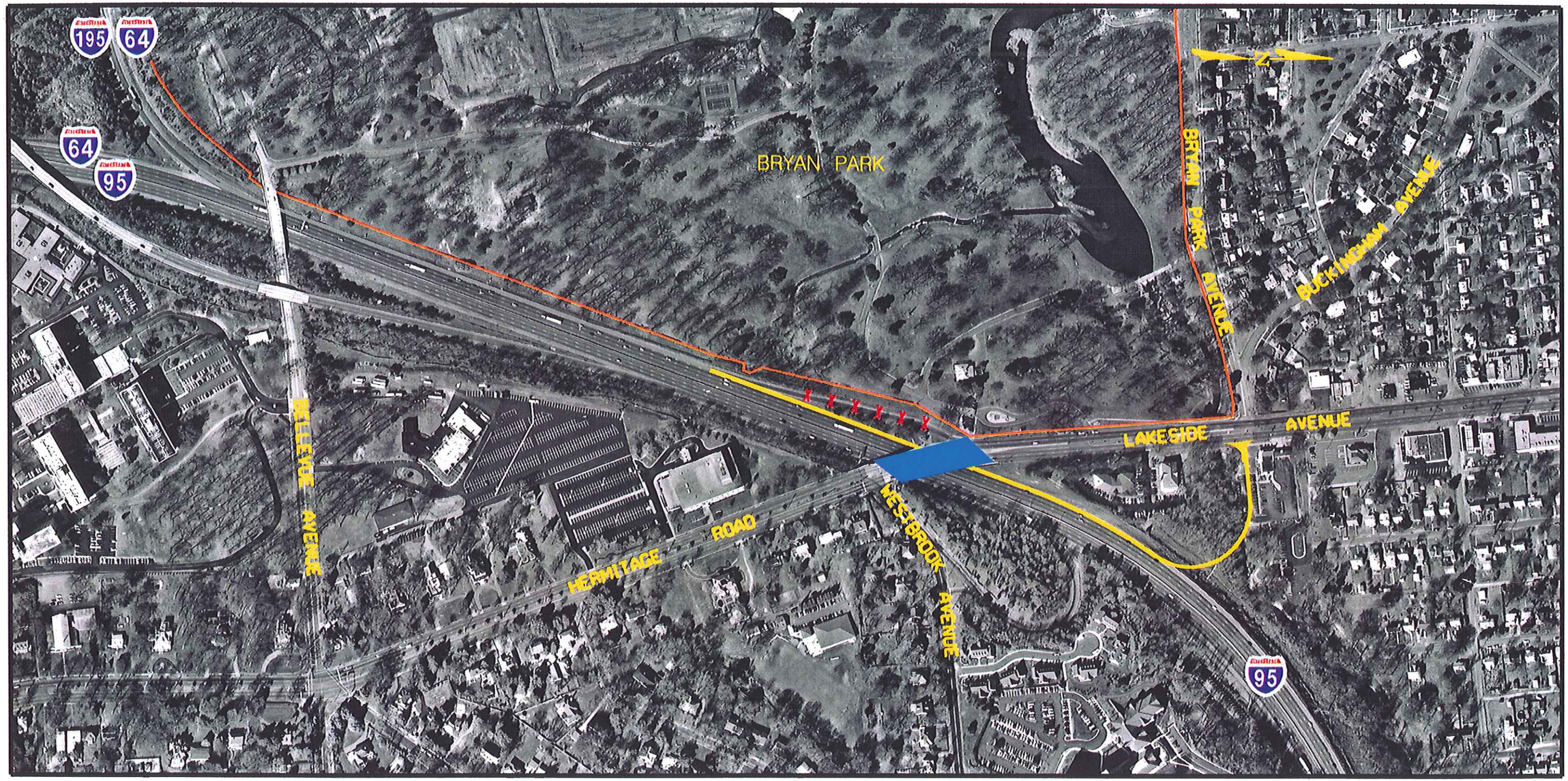
Concept #24 – Construct an Auxiliary Lane on I-64 Eastbound Between the Staples Mill Road On-Ramp and the I-195 Southbound Off-Ramp
This concept consists of constructing an additional lane between the Staples Mill Road on-ramp from northbound Staples Mill Road over the ACCA railroad yard tracks to the off-ramp to I-195 southbound. (See Figure 18.)

Concept #25 – Relocate Boulevard Off-Ramp from I-95 Southbound to the South Side of Boulevard and Connect To Robin Hood Road
This concept consists of closing the existing I-95 southbound off-ramp to the Boulevard and constructing a new off-ramp at a location further south (beyond the bridge over the Boulevard) and constructing an exit ramp that connects to Robin Hood Road. The primary objective of this concept was to mitigate the poor operating conditions associated with weaving traffic between the I-95 southbound traffic destined to the Boulevard off-ramp and the traffic entering I-95 southbound from the I-64 eastbound/I-195 northbound ramp that is destined for the I-95 southbound mainline. (See Figure 19.)

Concept #26 – Construct an On-Ramp from Laburnum Avenue to I-95 Northbound
This concept consists of the construction of an on-ramp from Laburnum Avenue to I-95 northbound. The primary objective of this concept is to evaluate the effectiveness of additional access to I-95 on traffic operations of adjacent interchanges that have I-95 northbound on-ramps.

Concept #27 – Narrow I-95 Southbound to Two Lanes prior to the I-64 Eastbound/I-195 Northbound On-Ramp
This concept consists of restricting I-95 southbound traffic to two lanes, rather than the existing three lanes, prior to the introduction of the I-64 eastbound/I-195 northbound on-ramp to the I-95 southbound mainline. The primary objective of this concept is to provide a more efficient and safer merge into the I-95 southbound mainline for the I-64 eastbound/I-195 northbound on-ramp traffic.

Concept #28 – Narrow I-95 Northbound to Two Lanes Prior to the I-64 Eastbound/I-195 Northbound On-Ramp
This concept consists of restricting I-95 northbound traffic to two lanes, rather than the existing three lanes, prior to the introduction of the I-64 eastbound/I-195 northbound on-ramp to the I-95 northbound mainline. The primary objective of this concept is to provide a more efficient and safer merge condition into the I-95 mainline for the I-64 eastbound/I-195 northbound on-ramp traffic.



WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement

Proposed Structures and Bridges

Existing Bryan Park R/W

X X X *Denotes Demolition of Ramp*

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

RICHMOND, VIRGINIA

Concept 18

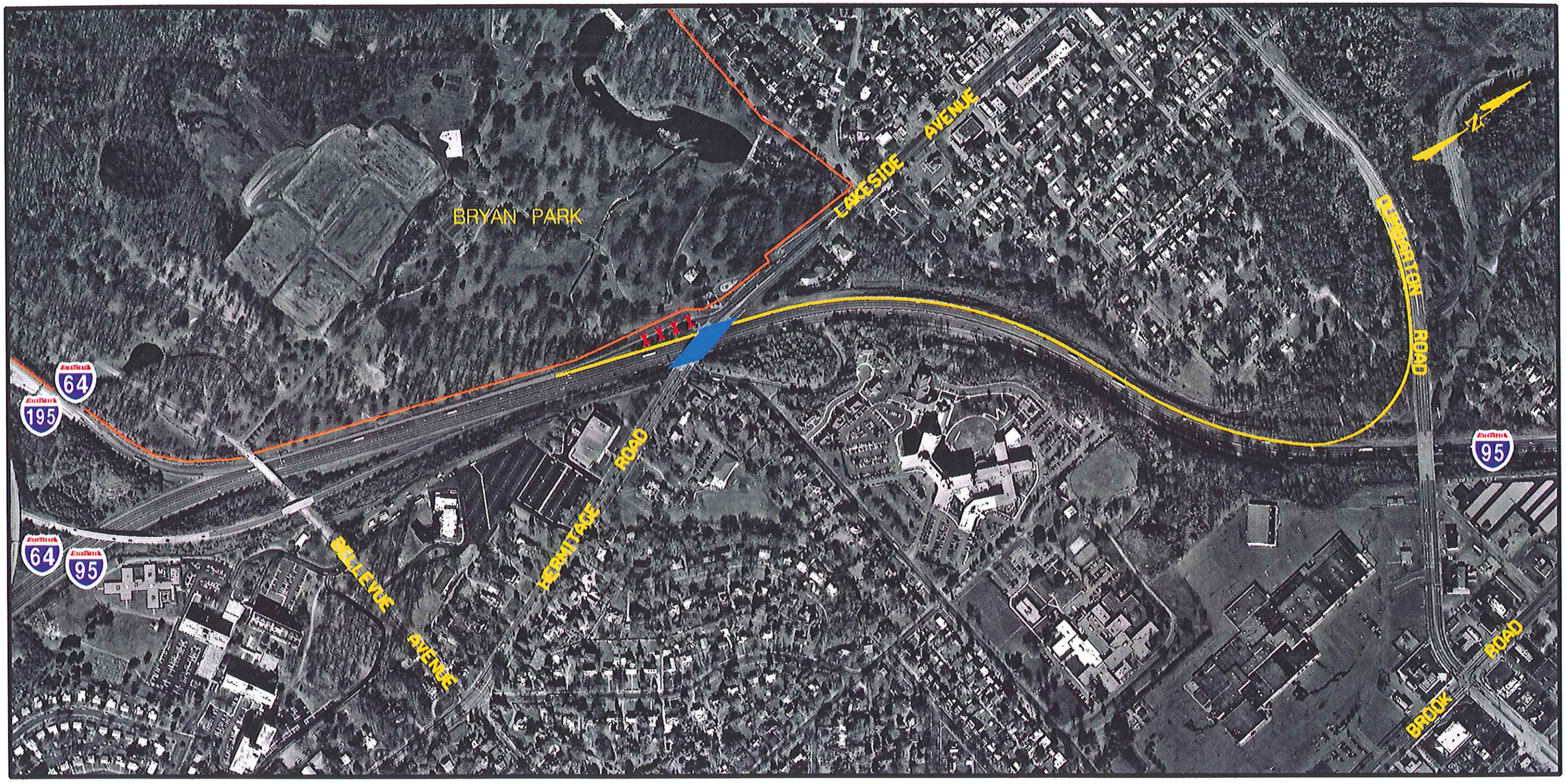
METRIC SCALE 1:4000

0 80 m 160 m

VDOT METRIC

Date: November 1999

Figure 15



WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement

Proposed Structures and Bridges

Existing Bryan Park R/W

X X X *Denotes Demolition of Ramp*

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

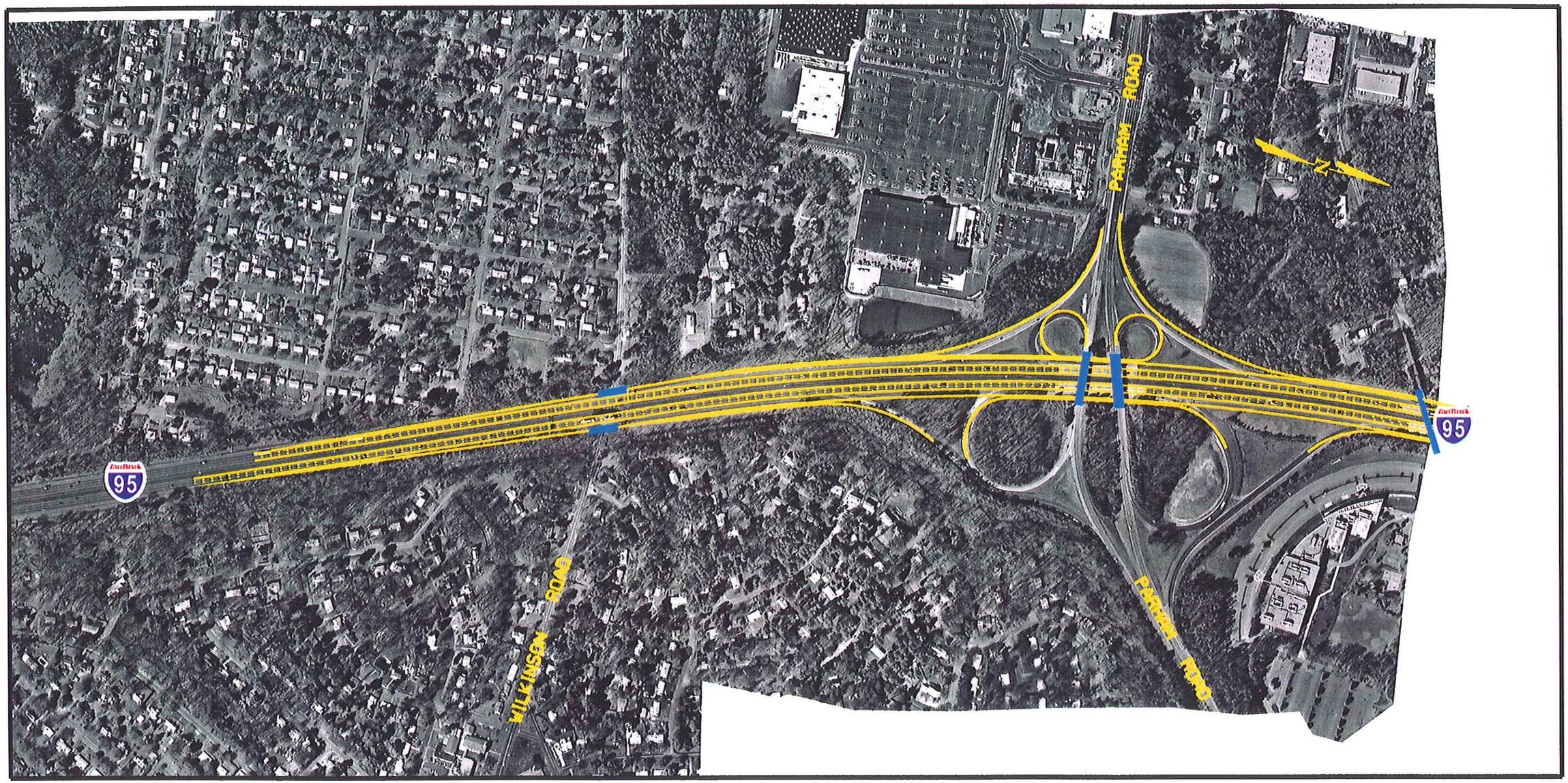
RICHMOND, VIRGINIA

Concept 19

METRIC SCALE
1 : 6000
0 120 m 240 m
VDOT METRIC

Date: November 1999

Figure 16



WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS
TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement
Proposed Structures and Bridges

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

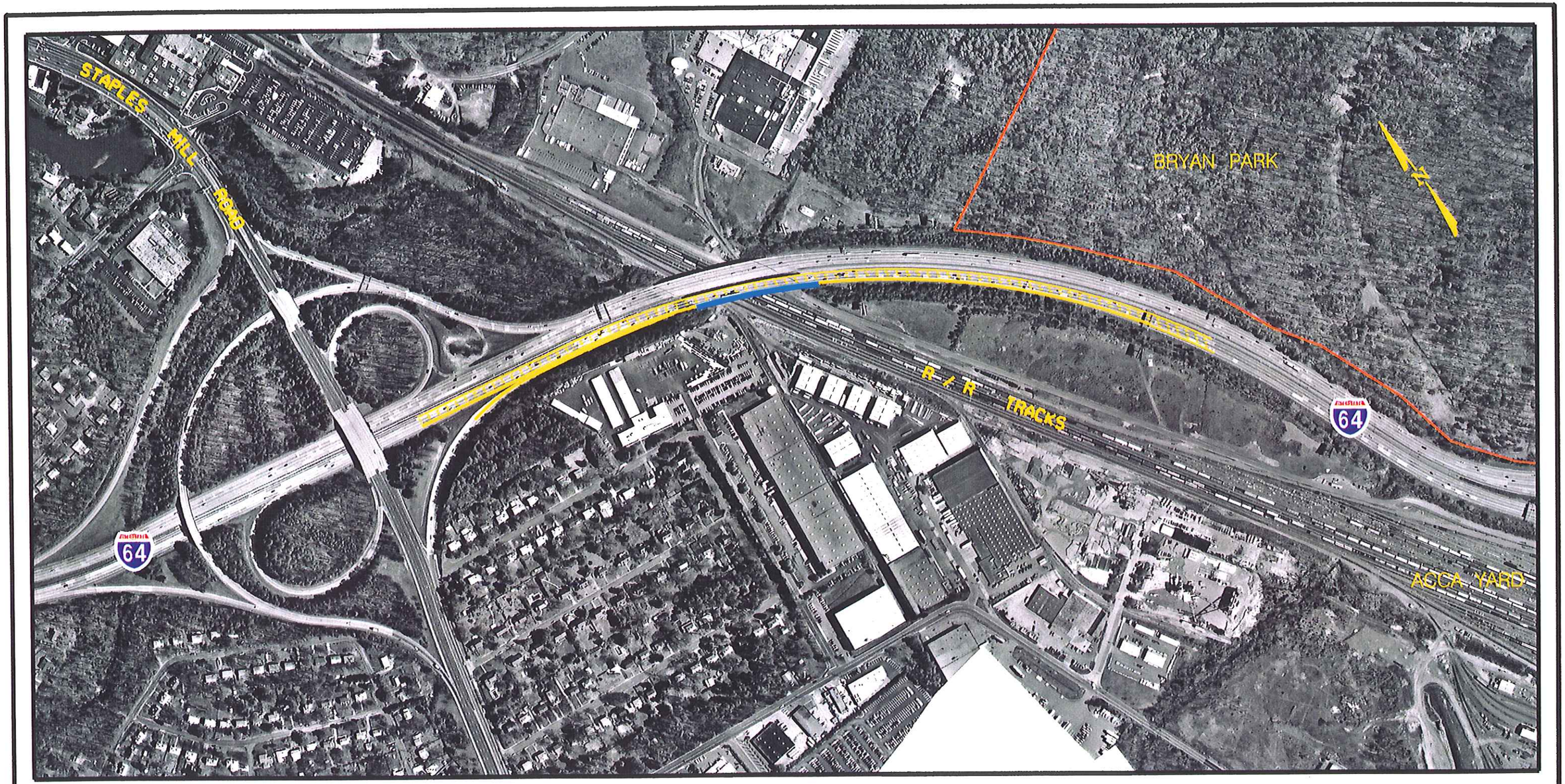
RICHMOND, VIRGINIA

Concept 20

METRIC SCALE
1 : 6000
0 120 m 240 m
VDOT METRIC

Date: November 1999

Figure 17



WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement

Proposed Structures and Bridges

Existing Bryan Park R/W

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

RICHMOND, VIRGINIA

Concept 24

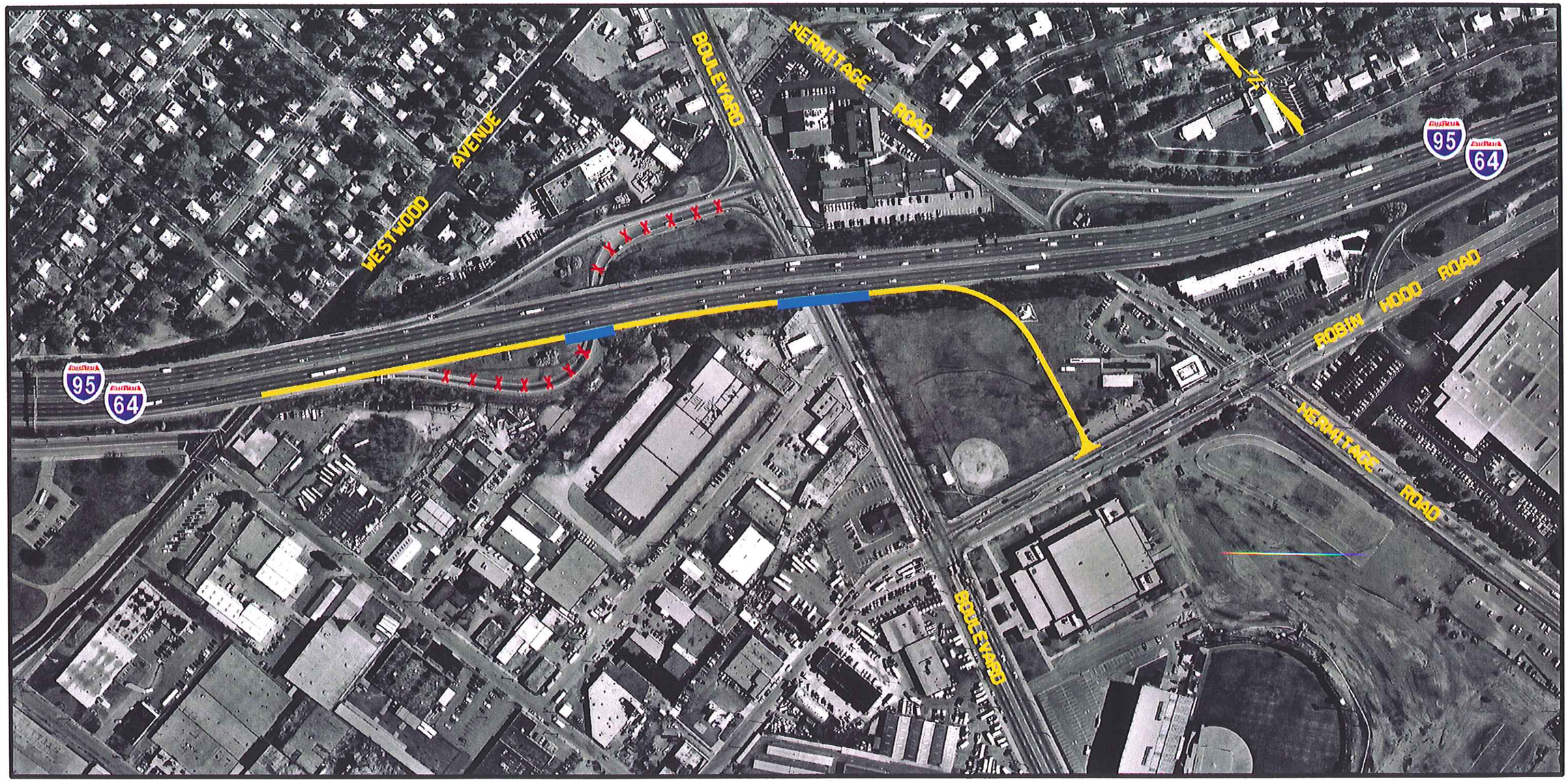
METRIC SCALE 1 : 5000

0 100 m 200 m

VDOT METRIC

Date: November 1999

Figure 18



WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement

Proposed Structures and Bridges

X X X *Denotes Demolition of Ramp*

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

RICHMOND, VIRGINIA

Concept 25

METRIC SCALE
1 : 3000
0 60 m 120 m
VDOT METRIC

Date: November 1999

Figure 19

Concept #29 – Construct an Additional Through Lane in Each Direction of I-95 and I-64
This concept consists of constructing an additional through lane in each direction of I-95 and I-64 in the study area. This magnitude of improvement would in all likelihood encompass a greater length of these facilities with termini determined by future traffic operations, but for the purposes of this study the limits of the concept are confined to the study area in order to provide a basis of comparison between concepts. The primary objective of this concept is to provide capacity to accommodate anticipated traffic volumes and to provide acceptable and safe operations. (See Figure 20.)

Concept #30 – Extend the I-95 Southbound Exit Only Lane at the Boulevard Off-Ramp across the Boulevard and then Merge into the I-95 Southbound Mainline
This concept consists of constructing an extension of the existing auxiliary lane between the I-64 eastbound/I-195 northbound on-ramp and the Boulevard off-ramp to a location south of the Boulevard and then tapering it into the mainline. The primary objective of this concept is to provide a longer distance for I-64 eastbound/I-195 northbound on-ramp traffic to merge safely into the I-95 southbound mainline. (See Figure 21.)

Concept #31 – Replace the Left-Hand On-Ramp from I-195 Northbound to I-64 Westbound with a Right-Hand On-Ramp.
This concept consists of the demolition of the existing on-ramp from I-195 northbound to I-64 westbound and the construction of a replacement ramp that includes a grade-separation over the existing mainline so that introduction of the ramp occurs from the right-hand side. The primary objective of this concept is to eliminate the unacceptable operating conditions associated with the weaving of traffic from the existing left-hand ramp to the Staples Mill Road off-ramp and the I-64 westbound traffic. (See Figure 22.)

Concept #32 – Construct a Fourth Through Lane on I-95 Northbound South of the Boulevard and Construct a Two-Lane Off-Ramp at this Location
This concept consists of constructing an additional lane for the I-95 northbound direction prior to the off-ramp location for I-64 westbound and I-195 southbound. At this exit area, two lanes would continue northbound on I-95 (currently there are three lanes, one of which is an optional lane where motorists would have the option of continuing north on I-95 or exiting to I-64/I-195) and two lanes would exit to I-64 westbound/I-195 southbound (currently there are two lanes, one of which is an optional lane where motorists would have the option of continuing north on I-95 or exiting to I-64/I-195). The primary objective of this concept is to provide additional lanes for the heavily traveled I-64 westbound/I-195 southbound movement so that the I-95 mainline would not experience as much congestion in the far right-hand lane prior to this exit location.

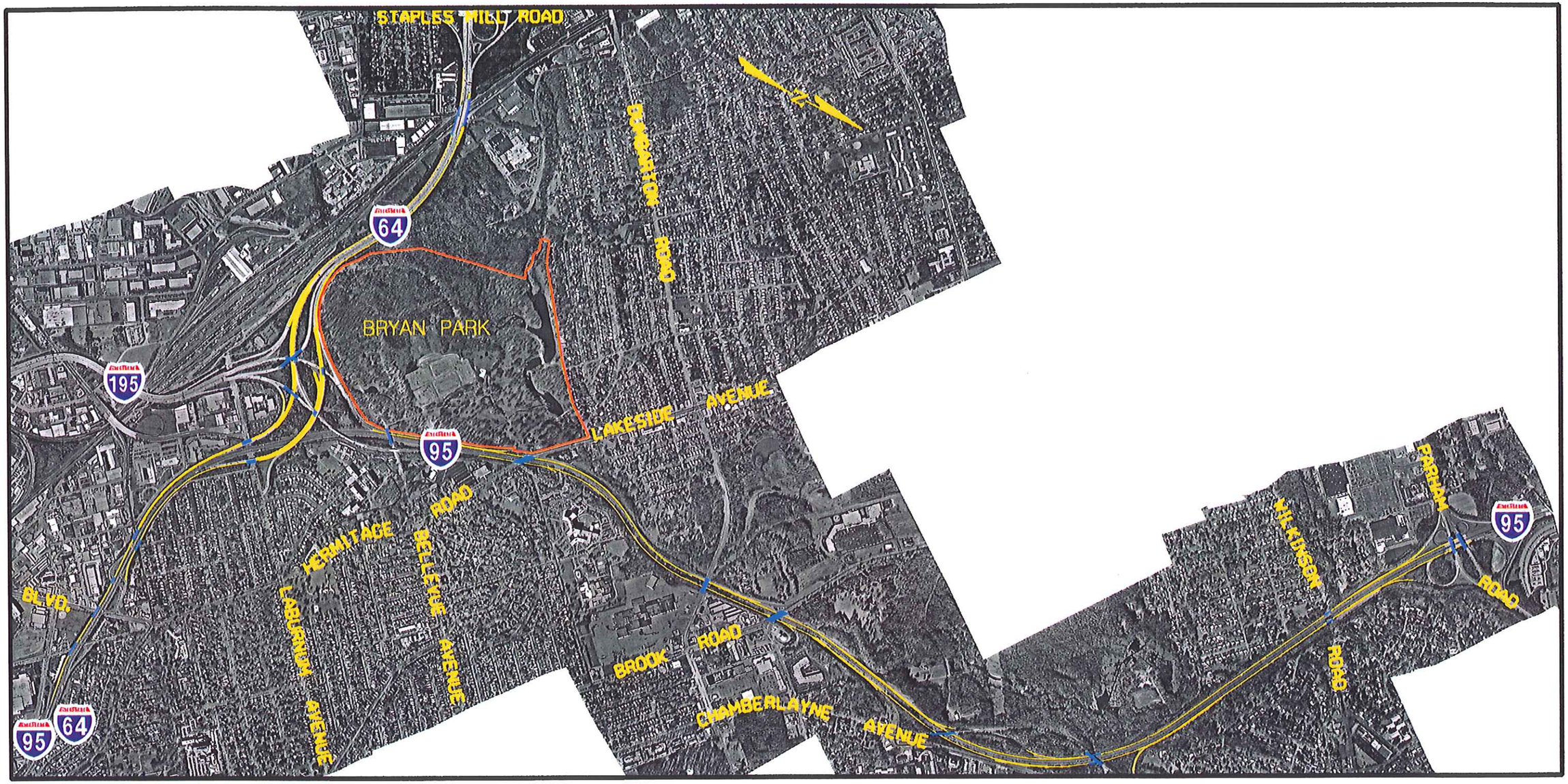
Concept #33 – Construct a Fourth Through Lane on I-95 Northbound South of the Boulevard and Construct a Two-Lane Off-Ramp at this Location and an On-Ramp to I-95 Northbound from Laburnum Avenue
This concept consists of the same components as Concept #32 and the construction of a new on-ramp from Laburnum Avenue to I-95 northbound. The primary objectives of this concept are also similar to Concept #32 with the added objective of evaluating the effectiveness of additional access to I-95 on traffic operations of adjacent interchanges that have I-95 northbound on-ramps.

Concept #34 – Construct a Collector-Distributor Road System for the I-95 Northbound Direction Near the Boulevard and I-64 Westbound/I-195 Southbound Exits
This concept consists of constructing a C-D system for I-95 northbound from south of the Boulevard and connecting to the I-64 westbound/I-195 southbound off-ramp. The primary objective of this concept is to provide safer and more efficient operating conditions for the traffic associated with the Boulevard on-ramp and the I-64 westbound/I-195 southbound off-ramps by removing it from the I-95 northbound mainline.

Concept #35 – Construct Connector Ramps Between I-95 to the North and I-64 to the West Along the North Edge of Bryan Park
This concept consists of the construction of a new roadway facility whose alignment is along the northern boundary of Bryan Park (essentially on the Bryan Park Avenue alignment) that has direct ramp connections to I-95 (to and from the north) and I-64 (to and from the west). The primary objective of this concept is to evaluate the effectiveness of this new roadway to divert traffic out of the existing I-95/I-64/I-195 interchange area.

Concept #36 – Re-Designate Lanes for the I-64 Westbound/I-195 Southbound Off-Ramp from I-95 Northbound and Provide an Additional On-Ramp to I-95 Northbound
This concept consists of modifying the exit area of I-95 northbound and the I-64 westbound/I-195 southbound ramps so that only two lanes would continue north on I-95 and three lanes would be utilized for the I-64 westbound/I-195 southbound ramp. The third ramp lane will be accommodated by what currently is the on-ramp from Laburnum Avenue to I-64 westbound. Access from Laburnum Avenue to I-64 westbound would no longer be provided. An on-ramp from Laburnum Avenue to I-95 northbound would be constructed and an off-ramp from the I-64 westbound ramp to get back onto I-95 northbound would be constructed so that motorists entering I-95 northbound at the Boulevard on-ramp would not have to weave across three lanes of traffic, instead they could stay in the right lane and use this newly constructed ramp. The primary objective of this concept is to accommodate the more predominant I-64 westbound movement and to mitigate the weave condition between the Boulevard on-ramp traffic destined for I-95 northbound and the I-95 northbound traffic destined for I-64 westbound/I-195 southbound. (See Figure 23.)

Concept #37 – Close the ramp between I-95 Northbound and I-195 Southbound
This concept consists of closing the existing ramp that accommodates traffic exiting I-95 northbound that is destined for I-195 southbound. The primary objective of this concept is to evaluate the effectiveness of this strategy on removing traffic from the weave condition between the Boulevard on-ramp traffic destined for I-95 northbound and the I-95 northbound traffic destined for I-64 westbound/I-195 southbound.



WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement

Proposed Structures and Bridges

Existing Bryan Park R/W

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

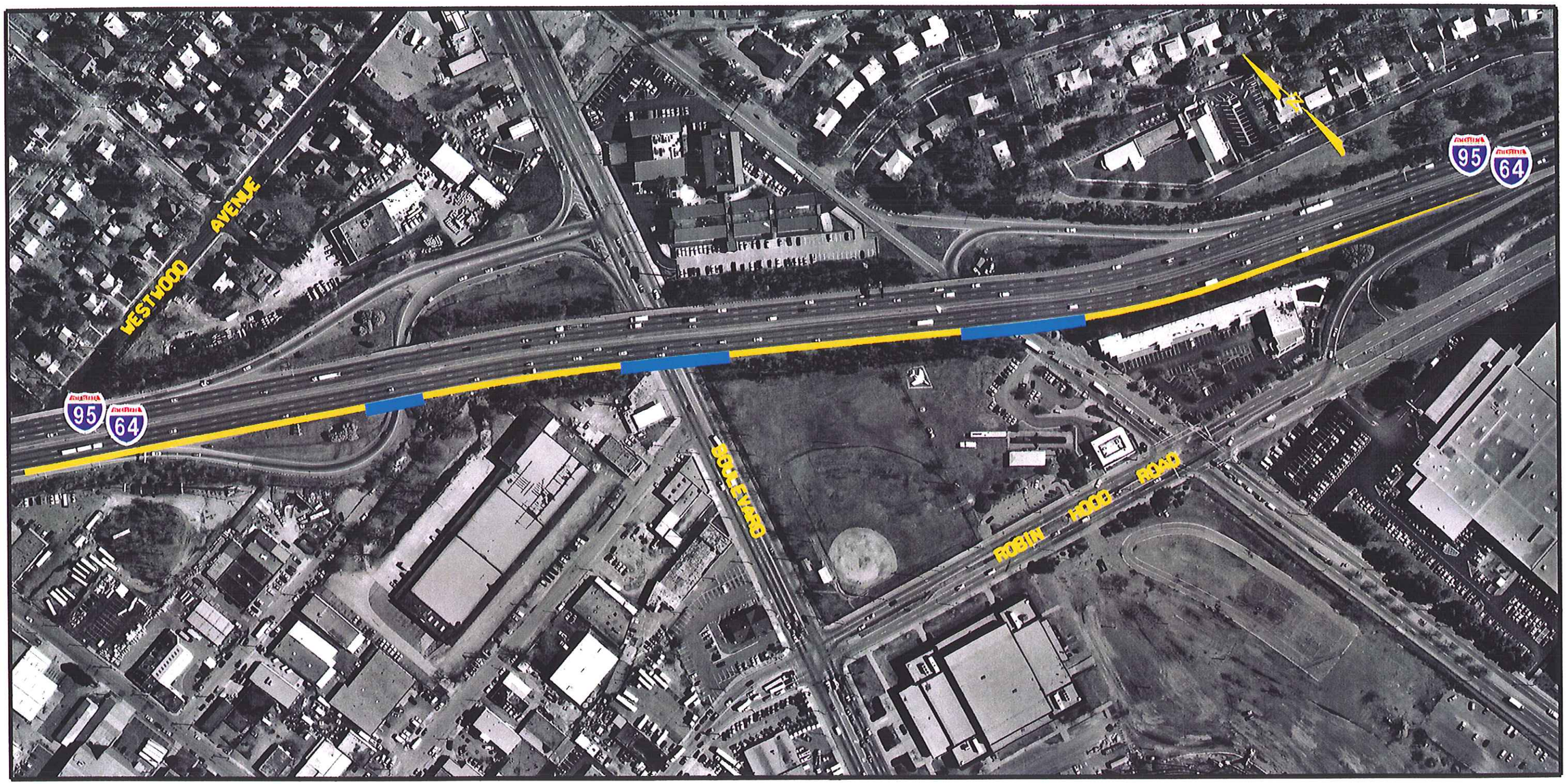
RICHMOND, VIRGINIA

Concept 29

METRIC SCALE
1 : 20000
0 400 m 800 m
VDOT METRIC

Date: November 1999

Figure 20



WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS
TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement
Proposed Structures and Bridges

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

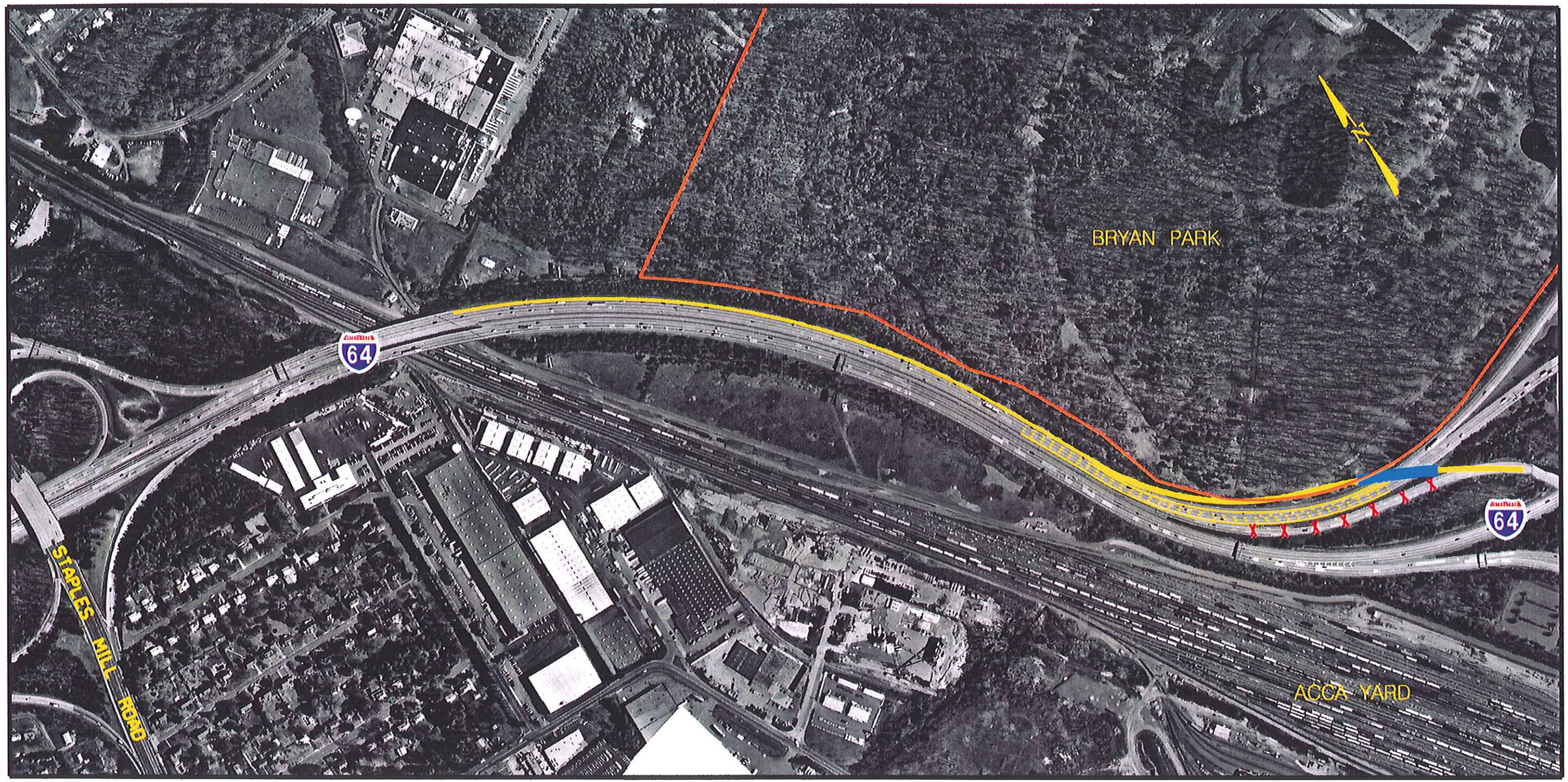
RICHMOND, VIRGINIA

Concept 30

METRIC SCALE
1 : 2500
0 50 m 100 m
VDOT METRIC

Date: November 1999

Figure 21



WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement

Proposed Structures and Bridges

Existing Bryan Park R/W

X X X *Denotes Demolition of Ramp*

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

RICHMOND, VIRGINIA

Concept 31

METRIC SCALE
1 : 5000
0 100 m 200 m
VDOT METRIC

Date: November 1999

Figure 22

WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement

Proposed Structures and Bridges

Existing Bryan Park R/W

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

RICHMOND, VIRGINIA

Concept 36

METRIC SCALE
1 : 5000
0 100 m 200 m
VDOT METRIC

Date: November 1999

Figure 23

3.2 First Screening Process

A screening process was developed in order to evaluate the initial concepts. The initial screen consisted solely of reviewing the concepts for their ability to accommodate future traffic demand. In order to do this, concepts were designed to the level of detail necessary to perform traffic analyses, which requires spatial relationship information. Based on this sole criteria, the number of concepts was reduced to twenty (20) in the first screen. With regard to the multi-modal concepts, the analysis shows that none of these alternatives, singly or combined, will solve the future deficiencies of the interstate confluence being studied. However, we feel that these multi-modal strategies are an important part of an effective and efficient transportation system in this growing region, and therefore are not being screened out.

3.3 Concept Refinement

The next step in the concept development process was to develop the twenty (20) concepts to the level of detail necessary to estimate approximate costs (construction and right-of-way), to identify potential environmental and property impacts (quantification of the number of property parcels that would be impacted by the geometrics of the concepts), to estimate traffic impacts on local streets, to assess potential maintenance of traffic during construction concerns, and to determination the traffic operational benefit of each concept. More weight was given to the concept's ability to accommodate the future traffic demand than any other criteria, because this is the only feature of the concepts that addresses the identified capacity deficiencies in the study area. In the process of preparing these concepts, an additional four (4) concepts were developed as a type of spin-off or refinement of one of the original twenty (20) concepts. That increased the number of concepts under consideration to a total of twenty-four (24).

3.3.1 Additional Concept Descriptions

The following paragraphs describe the four (4) additional concepts that were developed after the first screening process. The need for these additional alternatives was precipitated by the fact that none of the original concepts for the I-95 northbound/I-64 westbound/I-195 southbound exit area adequately addressed the future roadway deficiencies. While exploring these concepts, it became apparent that the local street connection to the interstate needed to be addressed. If further study is conducted in the area of the Boulevard on- and off-ramps on I-95, it is recommended that the study consider inclusion of the local street network. Also, the nearby on-ramp from Robin Hood to I-95 southbound should be considered when studying this area.

Concept #38 – Construct a Five-Lane Section for I-95 Northbound South of the I-95 Northbound/I-64 Westbound/I-195 Southbound Exit Area and a Three-Lane Ramp to I-64 Westbound/I-195 Southbound

This concept consists of constructing two additional lanes for I-95 northbound traffic and creating an exit area that has two exclusive lanes for I-95 northbound and two exclusive exit lanes for the I-64 westbound/I-195 southbound off-ramp, and a center lane that is optional (can choose to stay on I-95 northbound or exit to I-64 westbound/I-195 southbound). A new ramp segment would be constructed to accommodate the three-lane ramp to I-64 westbound/I-195 southbound that would connect to the existing structure that currently accommodates this ramp. The existing structure would be re-striped to accommodate three lanes of traffic from the I-95 mainline and the I-64 westbound ramp from Laburnum Avenue. The total width of the existing structures can accommodate four lanes of traffic. The primary objective of this concept is to mitigate the weaving conditions and congestion associated with the existing configuration. (see Figure 24.)

Concept #38b – Same as Concept #38 and Construct an Off-Ramp from the I-64/I-195 Southbound Off-Ramp to Connect to I-95 Northbound

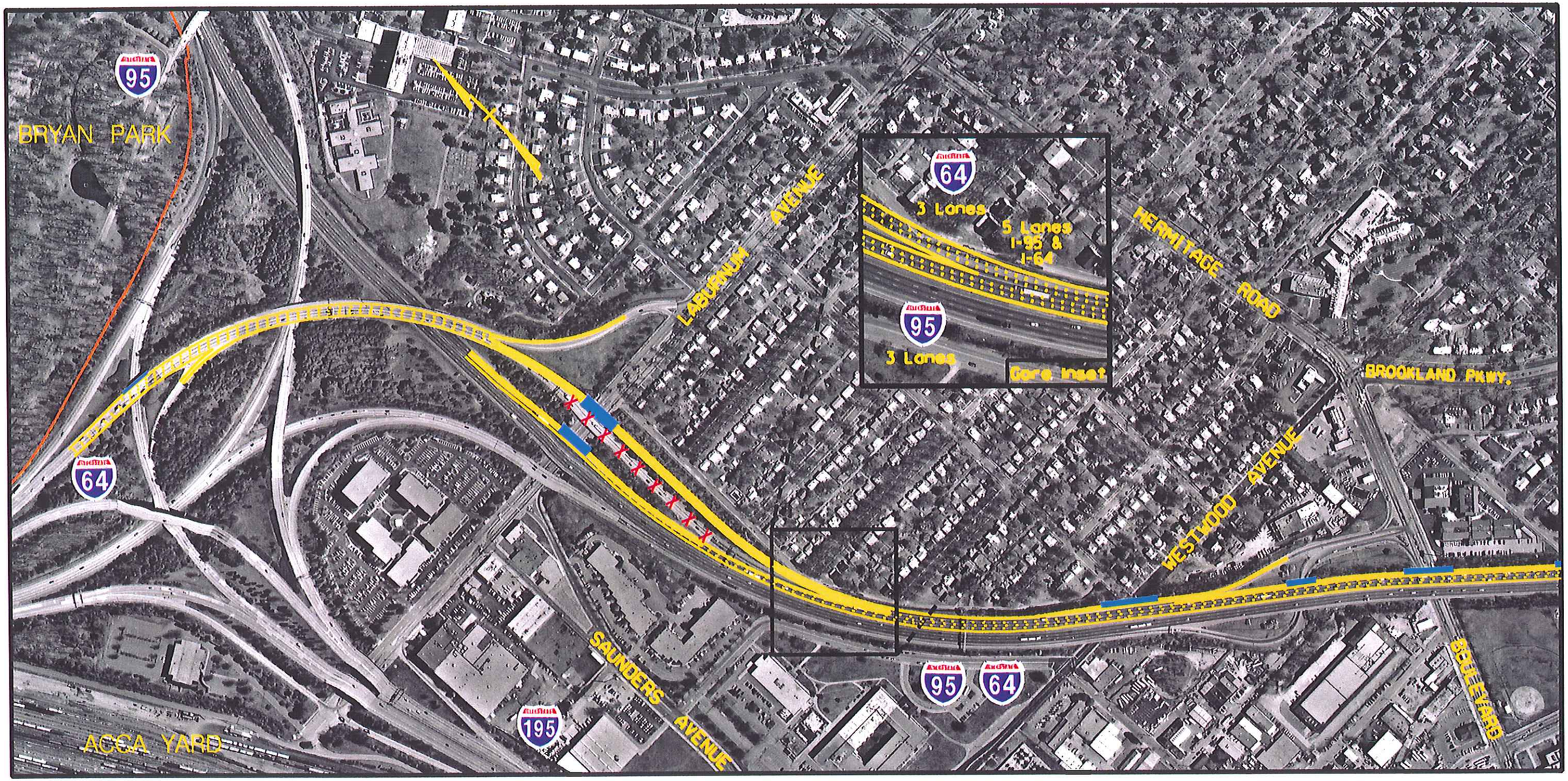
This concept consists of the same features as Concept #38 with the exception of the elimination of the Laburnum Avenue on-ramp to I-64 westbound. That movement would be superceded by the addition of a slip ramp from the three-lane off-ramp back to the I-95 northbound mainline. The objectives of this concept are to provide the benefits of Concept #38, with the exception of the access to I-64 westbound provided by the Laburnum Avenue on-ramp, yet provide a safer alternative for traffic utilizing the Boulevard on-ramp that is destined to I-95 northbound. This configuration would allow that movement to be made without having to weave across three lanes of traffic. (See Figure 25.)

Concept #39 - Construct a Five-Lane Section for I-95 Northbound South of the I-95 Northbound/ I-64 Westbound/I-195 Southbound Exit Area, a Three-Lane Ramp to I-64 Westbound/I-195 Southbound, and On-Ramps from Laburnum Avenue to I-64 Westbound and I-95 Northbound

This concept consists of a major reconstruction of the I-95 northbound/I-64 westbound/I-195 southbound exit area. The reconstruction includes accommodating traffic during construction by using existing facilities as much as possible. The orientation of the exit area would be changed so that I-64 westbound/I-195 southbound traffic would exit to the left and I-95 traffic would proceed to the right (opposite of the current orientation). The concept also consists of constructing two new lanes for I-95 northbound traffic prior to the exit area and creating an exit area that has two exclusive lanes for I-95 northbound and two exclusive exit lanes for the I-64 westbound/I-195 southbound off-ramp, and a center lane that is optional (could choose to stay on I-95 northbound or exit to I-64 westbound/I-195 southbound). In addition the concept provides ramps from Laburnum Avenue to I-64 westbound/I-195 southbound and to I-95 northbound. The objectives of this concept are to mitigate the congestion in the exit area, to provide as much access as possible to the surrounding roadway network, and to maintain traffic as efficiently as possible during construction. (See Figure 26.)

Concept #39b – Same as Concept #39 with Additional Off-Ramp from I-95 Northbound to I-64 Westbound/I-195 Southbound

This concept is identical to Concept #39, with the exception of the provision of an additional off-ramp that would provide a second off-ramp from I-95 northbound to I-64 westbound. The objectives of this concept are the same as the objectives for Concept #39 and also to provide a safer routing alternative for traffic entering the I-95 mainline from the Boulevard on-ramp that is destined for I-64 westbound (would allow a longer distance to weave across I-95 northbound traffic). (See Figure 27.)



WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement

Proposed Structures and Bridges

Existing Bryan Park R/W

X X X *Denotes Demolition of Ramp*

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

RICHMOND, VIRGINIA

Concept 38

METRIC SCALE 1 : 5000

0 100 m 200 m

VDOT METRIC

Date: November 1999

Figure 24

WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement
Proposed Structures and Bridges
Existing Bryan Park R/W
X X X *Denotes Demolition of Ramp*

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

RICHMOND, VIRGINIA

Concept 38b

METRIC SCALE 1 : 5000

0 100 m 200 m

VDOT METRIC

Date: November 1999

Figure 25

WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement
Proposed Structures and Bridges
Existing Bryan Park R/W
X X X *Denotes Demolition of Ramp/Roadway*

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

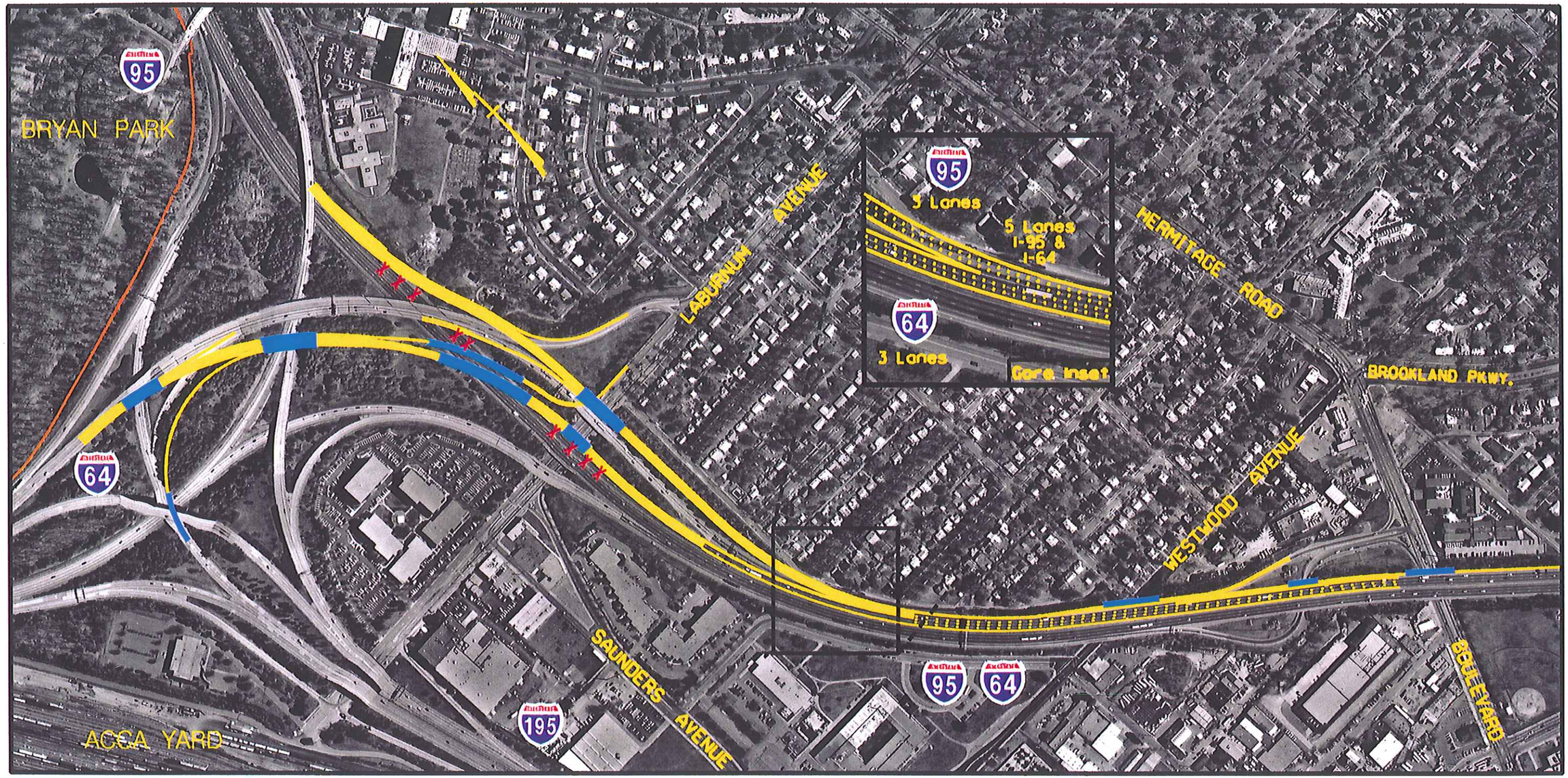
RICHMOND, VIRGINIA

Concept 39

METRIC SCALE 1:5000
0 100 m 200 m
VDOT METRIC

Date: November 1999

Figure 26



WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement

Proposed Structures and Bridges

Existing Bryan Park R/W

X X X *Denotes Demolition of Roadway*

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

RICHMOND, VIRGINIA

Concept 39b

METRIC SCALE 1 : 5000

0 100 m 200 m

VDOT METRIC

Date: November 1999

Figure 27

3.4 Second Screening Process

Table 12 illustrates the concepts that were subjected to the second screening including quantifiable characteristics (cost and the number of right-of-way parcels required) used to evaluate the concepts. The prices of the concepts range from $0 to $260 million. The cost estimates were developed in the context of the level of detail available in this study. Unit costs were based on historic records of similar construction projects. The number of required right-of-way parcels ranges from 0 to 22. Likewise, the number of right-of-way parcels required was a crude estimate from the visual study of the aerial photography involving numerous assumptions. Tax maps, showing actual property boundaries, were not researched as part of this process.

Table 12
Concepts Considered for Second Screening

Concept Number	Description of Concept	Cost	ROW parcels required
1	Enhanced bus service	$60M	0
2a	Commuter Rail with land use changes	$176M	0
3a	Light Rail Transit extension with land use changes	$260M	0
4	Conversion of existing through lane to HOV 2+ lane	$16M	0
5	Carpooling / Vanpooling / Transit / Flextime / Telecommuting	$0	0
6	Walking / Bicycling	$2.5M	0
7	Close on-ramp from Hermitage Rd to I-95 SB	$110K	0
10	Close off-ramp to Hermitage Rd from I-95 NB	$100K	0
11	Provide 2-lane on-ramp to I-95 NB from I-64/I-195, Close Hermitage Rd off-ramp from I-95 NB, Add a new off-ramp from I-95 Northbound to Dumbarton Road	$28.9M	12
12	Extend Hilliard Rd to I-95	$19.2M	16
15	Partial interchange at Dumbarton Rd, Eliminate 1 ramp at Brook Rd interchange	$14.5M	20
18	Replace Hermitage Rd on-ramp to I-95 SB with a new ramp in the NW quadrant of the Hermitage Interchange	$10.3M	4
19	Replace Hermitage Rd on-ramp to I-95 SB with a new ramp at Dumbarton Rd	$10.9M	3
20	Construct CD road system at I-95 / Parham Rd. interchange	$37.3M	15
24	Provide auxiliary lane on I-64 EB from Staples Mill Rd. Interchange to I-195 off-ramp	$5.5M	5
25	Relocate Boulevard off-ramp from I-95 SB to the south side of Boulevard and connect to Robin Hood Rd	$4.2M	5
29	Provide an additional through lane on I-95 and I-64	$117.4M	22
30	Extend the I-95 SB exit only lane at the Boulevard off-ramp across the Boulevard, then merge into mainline	$9.6M	4
31	Replace the left-hand on-ramp from I-195 NB to I-64 WB with a right-hand on-ramp	$12M	1
36	Change orientation of I-95 NB so that I-95 exits to the left and I-64 WB / I-195 traffic utilizes existing pavement	$6.6M	6
38	Reconstruct I-95 NB / I-64 WB as a major fork with a five lane section south of the diverge gore. I-64 WB would exit toward the left and I-95 NB would exit to the right.	$33.3M	3
38b	Same as Alternative 38, and provide a ramp from I-64 WB off-ramp to I-95 NB for the traffic coming from the Boulevard on-ramp traveling to I-95 NB.	$34.6M	5
39	Reconstruct I-95 NB / I-64 WB as a major fork with a five lane section south of the diverge gore. I-64 WB would exit toward the right and I-95 NB would exit to the left.	$72.3M	3
39b	Same as Alternative 39, and provide a left exit from I-95 NB to I-64 WB for traffic using the Boulevard on-ramp and traveling to I-95 NB.	$74.1M	3

The focus of this screening iteration was those locations in the study area where more than one concept was under consideration. The concept considered to be the most effective in accommodating future traffic and keeping potential impacts to a minimum was recommended. The following four (4) locations in the study area are where multiple concepts were considered:

1) Southbound I-95/Boulevard Area
2) Northbound I-95/Boulevard Area
3) Southbound I-95/Hermitage Road Area
4) Northbound I-95/Hermitage Road Area

Table 13 illustrates the two (2) concepts under consideration in the Southbound I-95/Boulevard area (Concepts #25 and #30). Concept #30 was recommended as the preferred concept for this area for two (2) principle reasons. First, Concept #30 (see Figure 21) does not impact the recreation area at the I-95/Boulevard grade separation as significantly as Concept #25 (see Figure 19). Additionally, Concept #30 does not impact the traffic operations of the local street system as severely as Concept #25. Concept #25 would require a signalized ramp termini intersection with Robin Hood Road a very short distance from two adjacent intersections (Boulevard and Hermitage Road). The potential for poor signal coordination and queuing on the local street network associated with Concept #25 led to the recommendation of Concept #30.

Table 13
Southbound I–95 / Boulevard Area Concepts

Concept Number	Description of Concept	Cost	ROW parcels required
25	Relocate Boulevard off-ramp from I-95 SB to the south side of Boulevard and connect to Robin Hood Rd	$4.2M	5
30	Extend the I-95 SB exit only lane at the Boulevard off-ramp across the Boulevard, then merge into mainline	$9.6M	4

Table 14 illustrates the five (5) concepts under consideration in the northbound I-95/Boulevard area (Concepts #36, #38, #38b, #39, and #39b). Concept #39b (see Figure 27) was recommended for a number of reasons. Although it is the most costly concept, it provides the best maintenance of traffic options during construction (utilizes existing pavement and structures while new interchange features are under construction). It provides the most access options for the local street system (ramps are provided to I-64 westbound/I-195 southbound and to I-95 from Laburnum Avenue). Concept #39b also provides Boulevard on-ramp traffic with more options so that congestion and weaving movements in the congested interchange area would be minimized to a greater degree than the other concepts under consideration. Environmental impacts associated with Concept #39b include the impact on adjacent property and increased traffic on Laburnum Avenue as a result of the additional access it provides to the interstate system.

Table 14
Northbound I–95 / I-64 / Boulevard Area Concepts

Concept Number	Description of Concept	Cost	ROW parcels required
36	Change orientation of I-95 NB so that I-95 exits to the left and I-64 WB / I-195 traffic utilizes existing pavement	$6.6M	6
38	Reconstruct I-95 NB / I-64 WB as a major fork with a five lane section south of the diverge gore. I-64 WB would exit toward the left and I-95 NB would exit to the right.	$33.3M	3
38b	Same as Alternative 38, and provide a ramp from I-64 WB off-ramp to I-95 NB for the traffic coming from the Boulevard on-ramp traveling to I-95 NB.	$34.6M	5
39	Reconstruct I-95 NB / I-64 WB as a major fork with a five lane section south of the diverge gore. I-64 WB would exit toward the right and I-95 NB would exit to the left.	$72.3M	3
39b	Same as Alternative 39, and provide a left exit from I-95 NB to I-64 WB for traffic using the Boulevard on-ramp and traveling to I-95 NB.	$74.1M	3

Table 15 illustrates the five (5) concepts under consideration in the southbound I-95/Hermitage Road area. Concept #18 (see Figure 15) was recommended primarily because the BPIAC was adamant about losing access from Hermitage Road and it was the only concept under consideration that maintained southbound I-95 access from Hermitage Road. It was second cheapest to construct and required the second fewest right-of-way parcels but did impact a creek and small recreation area in its replacement ramp location. In conjunction with this concept, the BPIAC suggested that the land previously used for the on-ramp adjacent to Bryan Park be donated by the Commonwealth of Virginia for reintegration into the park.

Table 15
Southbound I–95 / Hermitage Road Area Concepts

Concept Number	Description of Concept	Cost	ROW parcels required
7	Close on-ramp from Hermitage Rd to I-95 SB	$110K	0
12	Extend Hilliard Rd to I-95	$19.2M	16
15	Partial interchange at Dumbarton Rd, Eliminate 1 ramp at Brook Rd interchange	$14.5M	20
18	Replace Hermitage Rd on-ramp to I-95 SB with a new ramp in the NW quadrant of the Hermitage interchange	$10.3M	4
19	Replace Hermitage Rd on-ramp to I-95 SB with a new ramp at Dumbarton Rd	$10.9M	3

Table 16 illustrates the two (2) concepts under consideration for the northbound I-95/Hermitage Road area. Concept #10 did not comprehensively address the congestion problems in the area, it forced traffic to other interchanges, but did not adequately accommodate future traffic. The auxiliary lanes associated with Concept #11 (see Figure 12) were able to relieve some of the congestion in area.

Table 16
Northbound I-95 / Hermitage Road Area Concepts

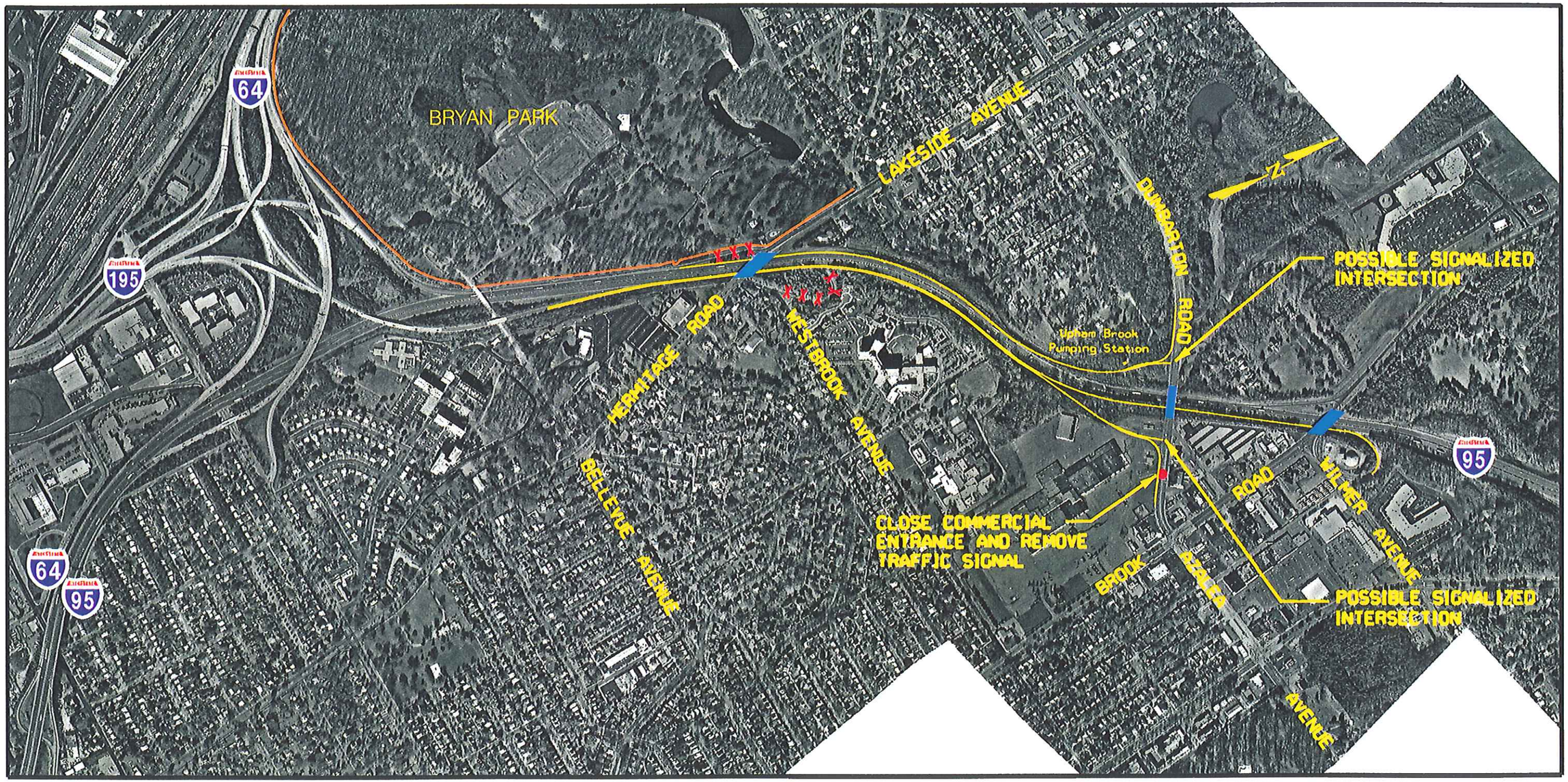
Concept Number	Description of Concept	Cost	ROW parcels required
10	Close off-ramp to Hermitage Rd from I-95 NB	$100K	0
11	Provide 2-lane on-ramp to I-95 NB from I-64/I-195, Close Hermitage Rd off-ramp from I-95 NB, Add a new off-ramp from I-95 Northbound to Dumbarton Road	$28.9M	12

As a result of this second screening process, the number of concepts was reduced to fourteen (14). However, following deliberations, the BPIAC concluded that alternative access to and from Hermitage Road was acceptable to the group and suggested combining two alternatives (Concept #11 and Concept #19) into one (Concept #11b).

Concept #11b – Replace the Two (2) Existing I-95 Hermitage Road Ramps with I-95 Ramps to/from Dumbarton Road, Construct Two-Lane On-Ramp to I-95 Northbound from I-64 Eastbound and I-195 Northbound

This concept (see Figure 28) consists of closing the existing southbound on-ramp and the northbound off-ramp from and to Hermitage Road, respectively. The access would be replaced by the construction of new ramps in a half-diamond configuration at Dumbarton Road. This concept also includes the introduction of two lanes of travel from the I-64 eastbound and I-195 northbound ramp to the I-95 northbound mainline. One lane would be carried to the proposed Dumbarton Road off-ramp, and the remaining lane could be carried northbound to the existing Brook Road off-ramp. The primary objective of this concept is to provide longer distances between successive ramps in both directions so that weaving movements between I-64/I-195 traffic and the I-95 mainline traffic are more easily and safely accomplished. The northbound off-ramp to Dumbarton may impact the Azalea Mall property and create some sequential intersection and traffic signal issues that may impact left-turn access and vehicle storage capacity along this segment of Dumbarton Road. There may be some impacts to wetlands on the west side of I-95 in the vicinity of the new southbound on-ramp.

The BPIAC reached agreement not to endorse Concept #4 (Conversion of an Existing Interstate Through Lane to a HOV 2+ Lane). Committee member concerns were raised as to the effectiveness of this concept. Originally this concept was to be recommended; however, because of a lack of support by the BPIAC as well as the inability to address the traffic operating conditions in the study area, Concept #4 will not be recommended for further study. This reduces the number of concepts being recommended to twelve (12).



WORKING DOCUMENT ONLY. PROVIDES GENERAL ASSUMPTIONS TO SUPPORT PRELIMINARY COST ESTIMATES.

Proposed Pavement

Proposed Structures and Bridges

Existing Bryan Park R/W

X X X *Denotes Demolition of Ramp*

Virginia Department of Transportation
VDOT
Location and Design Division

I-95 / I-64 / I-195 Feasibility Study

RICHMOND, VIRGINIA

Concept 11b

METRIC SCALE
1 : 10,000
0 200 m 400 m
VDOT METRIC

Date: November 1999

Figure 28

4.0 RECOMMENDATIONS

The integration of Concepts #11 and #19 into Concept #11b and the exclusion of Concept #4 reduces the number of concepts recommended to be carried forward for more in-depth engineering and environmental evaluation in a subsequent study to the twelve (12) shown in Table 17.

Table 17
Recommended Concepts

Concept Number	Description of Concepts	Cost	ROW parcels required
1	Enhanced bus service	$60M	0
2a	Commuter Rail with land use changes	$176M	0
3a	Light Rail Transit extension with land use changes	$260M	0
5	Carpooling / Vanpooling / Transit / Flextime / Telecommuting	0	0
6	Walking / Bicycling	$2.5M	0
11b	Replace the existing Hermitage Road ramps with ramps to/from Dumbarton Road, Construct two-lane on-ramp to I-95 Northbound from I-64 Eastbound and I-195 Northbound	$39M	15
20	Construct CD road system at I-95 / Parham interchange	$37.3M	15
24	Provide auxiliary lane on I-64 EB from Staples Mill Rd. Interchange to I-195 off-ramp	$5.5M	5
29	Provide an additional through lane on I-95 and I-64	$117.4M	22
30	Extend the I-95 SB exit-only lane at the Boulevard off-ramp across the Boulevard, then merge into mainline	$9.6M	4
31	Replace the left-hand on-ramp from I-195 NB to I-64 WB with a right-hand on-ramp	$12M	1
39b	Reconstruct I-95 northbound in the vicinity of I-64 westbound / I-195 southbound exit area to provide a five-lane section south of the diverge gore. I-64 will exit toward the left and I-95 northbound will exit to the right. Provide a left exit from I-95 northbound to I-64 westbound for traffic using the Boulevard on-ramp and traveling to I-64 westbound / I-195 southbound	$74.1M	3

The twelve (12) concepts include 5 multi-modal strategies (Concepts #1, #2a, #3a, #5, and #6) and seven (7) roadway improvement strategies (Concepts #11b, #20, #24, #29, #30, #31, #39b). The roadway improvement strategies could be implemented in any combination with one another since they address separate locations within the study area. Some of the multi-modal strategies could also be implemented in combination with the roadway improvement strategies, and in combination with each other.

No attempt was made to combine concepts. Given the magnitude of the capital expenditures required to fund the concepts, it was decided that they would be best presented as individual concepts rather than grouped together.

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5.0 OTHER REPORTS

5.1 Public Involvement Report

A separate public involvement report exists that documents the process undertaken to provide information to solicit comments from the interested citizens affected by the transportation system. Included in this report is a discussion of the nature of the BPIAC as well as the two (2) citizen information meetings held in January 1999 and August 1999.

5.2 BPIAC Report

The BPIAC has prepared a report documenting topics such as the group process, the group goals, and the analysis of the recommended alternatives presented in this report. The BPIAC final report is included in Appendix A of this report.

5.3 Environmental Overview Analysis

A fatal-flaw environmental analysis of the recommended alternatives was conducted by VDOT. Appendix C contains a summary table of the results. It was determined that certain permits would have to be obtained and studies would have to be conducted, including possibly 4(f) documents in cases such as public recreation areas; however, there are no fatal-flaws currently apparent.

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APPENDIX A: BPIAC FINAL REPORT

Bryan Park Interchange Advisory Committee (BPIAC)

Final Report and Recommendations

October, 1999

TABLE OF CONTENTS

Summary of BPIAC's Recommendations

The Bryan Park Interchange Advisory Committee (BPIAC) [1], comprised of 24 citizen members representing a broad range of community interests, was convened by the Virginia Department of Transportation (VDOT) and facilitated by the Institute for Environmental Negotiation, University of Virginia. Operating by consensus during more than two years of monthly meetings, BPIAC worked diligently with VDOT's consultant engineering firm of Michael Baker, Jr., Inc., in a comprehensive study of the I-95/ I-64/ I-195 Interchange adjacent to Bryan Park.

BPIAC and Michael Baker worked to increase mutual understanding about the problems associated with the Bryan Park Study Area and to develop mutually acceptable proposals for feasible long-term solutions to these problems.

As a result of these discussions, the recommendations of BPIAC concur with those of Michael Baker on eight proposals, five of which relate to the imperative for developing multi-modal regional transportation and non-road solutions to problems associated with continued growth.

However, it is also important to note that BPIAC's recommendations diverge from those of Michael Baker on a number of the road construction proposals. This divergence results from the fact that BPIAC's charge differs from that of VDOT's engineering firm. While the principal task of the engineering firm was to determine feasible alternatives from an engineering standpoint, the charge of BPIAC was to place a human face on these alternatives and to determine whether the feasible alternatives adequately address community concerns and values.[2] BPIAC's conclusion, by consensus, is that four road construction proposals are not consistent with BPIAC's goals and need further study for the development of *new* options and that two road construction proposals should be dropped. These are detailed below.

BPIAC'S GOALS

BPIAC adopted four goals that members agreed were of primary importance to their constituencies. Members agreed that these goals should guide the development of all engineering proposals for the Bryan Park Study Area and that the merit of all proposals would be judged by the degree to which they conformed to these four goals. The goals, which were not prioritized, should be considered of equal importance.

- **To maintain the existing boundaries of Bryan Park, including the preservation of the Bellevue Avenue pedestrian and vehicular bridge.**
- **To preserve the adjoining neighborhoods by protecting them from physical, environmental, and aesthetic encroachments.**
- **To maintain a southbound access ramp and a northbound exit ramp to I-95, with the relocation of these ramps a consideration; to eliminate tractor-trailer traffic and to minimize other commercial traffic at the northbound Exit 80 ramp.**

[1] See Appendix E, page 17, for a list of BPIAC citizen and resource members.
[2] See Appendix F, page 19, for more information on BPIAC's background and purpose.

- **To relieve congestion in the Study Area.**

In evaluating the final proposals of Michael Baker, BPIAC reached the following conclusions based on whether or not those proposals were consistent with the above goals.

BPIAC RECOMMENDS IMPLEMENTATION OF PROPOSALS. [3]

BPIAC recommends implementation of five non-construction proposals:

- Concept 1: To provide enhanced bus service.
- Concept 2A: To provide commuter rail with land-use changes.
- Concept 3A: To construct light rail transit extension with land-use changes.
- Concept 5: To create incentives for carpooling/vanpooling /transit/ flextime/ telecommuting.
- Concept 6: To develop walking and bicycling facilities.

BPIAC recommends implementation of three construction proposals:

- Concept 11b(i): To relocate the I-95 northbound exit ramp from Hermitage Road to Dumbarton Road.
- Concept 11b(ii): To extend the existing northbound merge lane, from I-64 to I-95, to the present exit ramp on Wilmer Avenue at Brook Road.
- Concept 24: To construct an additional lane on I-64 eastbound from the Staples Mill Road Interchange to the I-195 exit ramp.

A majority of BPIAC members also recommends that the I-95 southbound access ramp at Hermitage Road be relocated to Dumbarton Road, subject to the constraints detailed on page 9. One member does not endorse this proposal for reasons that are also detailed on page 9.

BPIAC RECOMMENDS FURTHER STUDY OF PROBLEM AREAS AND DEVELOPMENT OF NEW OPTIONS BECAUSE CURRENT PROPOSALS DO NOT MEET BPIAC'S GOALS. [4]

Four proposals address road areas in need of improvement. However, because the proposals are not consistent with BPIAC's goals, BPIAC recommends further study of these problem areas to develop options that would satisfy its four goals.

- Concept 20: To construct a collector-distributor road system at the I-95/Parham Road Interchange. BPIAC is concerned about the extensive construction proposed and its impacts on the Parham Road neighborhoods and recommends that the surrounding neighborhoods and Henrico County be involved in addressing this issue.
- Concept 30: To extend the I-95 southbound exit-only lane across the Boulevard before merging it into the mainline.
- Concept 31: To replace the left-hand access ramp from I-195 northbound to I-64 westbound with a right-hand access ramp. An I-64 flyover that would encroach upon the Bryan Park area is unacceptable, but the current hazardous situation deserves further study for the development of new options.

[3] See Appendix A, page 7, for further explanation of proposals endorsed.
[4] See Appendix B, page 10, for more explanation of proposals requiring further study.

- **Concept 39B: To reconstruct I-95 northbound/I-64 westbound as a major fork with a five-lane section south of the diverge gore.** A massive buildup of the Interchange is an unacceptable solution.

BPIAC RECOMMENDS PROPOSALS BE DROPPED. [5]

One non-construction and two construction proposals were judged by BPIAC as not acceptable because they are not consistent with BPIAC's goals. As a consequence, BPIAC recommends that these proposals be dropped:

- **Concept 4: To convert two existing through lanes to high-occupancy vehicle (HOV) 2+ lanes.** ***(Michael Baker also did not recommend carrying this Concept forward for further study.)***
- **Concept 18: To replace the Hermitage Road on-ramp to I-95 southbound with a new ramp in the northwest quadrant of the Hermitage Road Interchange.**
- **Concept 29: To build an additional through lane on northbound and southbound I-95 and eastbound and westbound I-64.**

NEIGHBORHOOD AND NON-ROAD IMPERATIVES [6]

BPIAC recognizes the importance of safe, efficient transportation for our region, including interstate highways, yet is convinced that highway improvements should not be at the expense of neighborhoods and parks, commercial and civic institutions, or air and water quality. Transportation should be oriented to move people and goods, not merely to move the greatest number of vehicles at the highest attainable speed. A well-balanced regional transportation network is essential to the prosperity of the Richmond metro area if it is to sustain a quality of life superior to competing metropolitan regions.

Several common themes emerged over the course of BPIAC discussions which concern the growing imperative perceived by BPIAC members to develop multi-modal regional transportation and non-road solutions as a way of protecting the quality of life in neighborhoods from further roadway encroachments:

- A priority on protecting neighborhoods, homes, parks, and businesses from negative impacts caused by interstate highways.
- The need for VDOT to seriously solicit, consider, and include neighborhood priorities in developing transportation projects.
- A preference for funding multi-modal transportation and other non-road solutions to traffic congestion.
- A view that, whatever traffic volumes are projected for the Bryan Park Interchange, building new roads may not solve the problem.
- A need for smarter land use and regional transportation planning that aims to reduce single-vehicle use.

[5] See Appendix C, page 12, for more explanation of proposals recommended to be dropped.
[6] See Appendix D, page 13, for BPIAC's Recommended Principles for Transportation Planning.

CONCLUSION

BPIAC members represent a broad range of community interests, including residential and business perspectives. Participants' expertise and credibility are grounded in who they are: local homeowners, business people, and residents who are impacted by the Bryan Park Interchange traffic and whose neighborhoods, parks, and businesses will be most affected by changes in the Interchange. Participants have received a significant education in transportation planning by Michael Baker and VDOT. Many came to the table with experience in community planning, and several are professional planners.

Two points are critical in evaluating this Report. First, the decisions contained in this Report were reached by **consensus**.[7] BPIAC began as a group of citizens not only with diverse backgrounds but with different and often opposing concerns and viewpoints. Therefore, the fact that BPIAC members reached consensus reflects the integrity, the genuine goodwill, and the commitment of the participants.

Secondly, the consensus decisions were reached after **two years** of diligent work by the BPIAC members, who were educated on general aspects of transportation planning and particularly on the issues facing the I-64, I-95, and I-195 Interchange area.

What became clear to BPIAC members through this process is that transportation issues are community issues and that the voice of the community through an informed process is as important as, or even more important than, engineering and technical solutions. Building more roads is no longer the only or the best answer for the regional community.

BPIAC strongly asserts that a policy of simply widening roads and investing almost exclusively in promoting automobile use in the Richmond area will perpetuate congestion, impact neighborhoods and air and water quality, and erode the region's quality of life. BPIAC strongly urges formation of a regional transportation policy which invests in and implements multi-modal transit options (buses and vans, commuter and light rail, ridesharing, etc.). Richmond's 20-year traffic forecast demands cannot be met by continuous road expansions alone. Transportation gridlock, unhealthy air and water, and degraded neighborhoods are unacceptable consequences. Instead, a range of viable transit modes should be introduced into the Richmond region's 6-year Transportation Improvement Plan (TIP) as soon as possible.

BPIAC's findings are a natural result of these shared concerns and represent the consensus views of a diverse citizen group. It is also important to note that BPIAC's findings were confirmed by the broader community, as demonstrated by the many comments received at the August 12, 1999, public meeting concerning the Feasibility Study.

BPIAC strongly urges VDOT, the Commonwealth Transportation Board (CTB), and local government officials to respect BPIAC's findings and to incorporate them in their decisions regarding the Bryan Park Interchange.

BPIAC members thank VDOT for the opportunity to share the community's concerns and sincerely hope that VDOT and the Commonwealth Transportation Board will give strong consideration to the community's findings.

[7] See Appendix G, page 20, for information about BPIAC's process.

Citizen Signatories

BPIAC members were asked to represent the perspectives of their communities and organizations. However, their signatures represent their individual endorsement only. Formal endorsement by citizen and civic organizations is indicated in letters attached to this report.

Signed By *(Citizen Members Listed Alphabetically)*

- Sandra Balster, member of Hermitage Road Historic District
- Elizabeth Barrett, member of Friends of Bryan Park
- Roland Brierre, Jr., Concerned Citizen
- Gretchen Carreras, member of Hatcher Civic Association
- William Correll, resident of Westminster Canterbury
- Doris Davis, resident of Hermitage Park, Lakeside
- Chuck Epes, member of Bellevue Civic Association
- Peter Francisco, member of Lakeside Business Association
- Irene Jennings, member of Parks & Recreation CAP Board
- Tony Pelling, member of Ginter Park Residents' Association
- Tim Pfohl, resident of Bellevue

- Arthur Ratcliffe, member of the Virginia Bicycle Federation
- Isaac Regelson, member of Ginter Park Residents' Association
- Beryl Riley, resident of Hermitage Road Historic District
- Katie Roemer, resident of Bellevue
- Kent Ruffin, resident of Historic Jackson Ward
- Robert Stiff, member of Richmond Area Bicycling Association
- Bernice Strommer, member of Rosedale Civic Association
- Barbara Taggart, Concerned Citizen
- Eileen Tangley, member of Bryan Parkway Civic Association
- Charles Ware, Concerned Citizen
- Mary Ellen Williams, resident of Bellevue Park
- John Zeugner, member of Bryan Parkway Civic Association

Appendix A: Proposals Recommended For Implementation

BPIAC affirmed that the following four goals adopted in January 1998 were to be the measure by which Michael Baker's alternatives were to be objectively evaluated:

- To maintain the existing boundaries of Bryan Park, including the preservation of the Bellevue Avenue pedestrian and vehicular bridge;
- To preserve the adjoining neighborhoods by protecting them from physical, environmental, and aesthetic encroachments;
- To maintain a southbound access ramp and a northbound exit ramp to I-95, with the relocation of these ramps a consideration, to eliminate tractor-trailer traffic and to minimize other commercial traffic at the northbound Exit 80 ramp.
- To relieve congestion in the Study Area.

Concept #1: Enhanced Bus Service

By consensus, BPIAC recommends that this proposal be implemented.

This proposal calls for increasing by 30 percent the frequency of bus service along existing bus routes during peak hours. This proposal addresses one of BPIAC's goals, that of relieving congestion in the Study Area, while also directly addressing one of BPIAC's major concerns that the scope and meaning of "transportation" be broadened to include more than highway traffic. This option would provide long-term benefits to Richmond's transportation system.

Concept #2A: Commuter Rail with Land-Use Changes

By consensus, BPIAC recommends that this proposal be implemented.

This proposal calls for a commuter rail line from Ashland to downtown Richmond and is based on an assumption that housing density will be increased by a factor of three within a three-mile radius of the Ashland and Staples Mill Road stations. This proposal addresses one of BPIAC's goals, that of relieving congestion in the Study Area, while also directly addressing one of BPIAC's major concerns that the scope and meaning of "transportation" be broadened to include more than highway traffic. This option would provide long-term benefits to Richmond's transportation system.

Concept #3A: Light Rail Transit Extension with Land-Use Changes

By consensus, BPIAC recommends that this proposal be implemented.

This proposal calls for extending the planned light rail transit further out Broad Street, from the planned endpoint at the Science Museum to the proposed VA Route 288 in western Richmond. This proposal also adds a park-and-ride lot on the western end of the transit line and reduces the level of bus service along Broad Street. Underlying this proposal are the assumptions that less bus service will be needed and that housing density will be increased by a factor of three along the Broad Street corridor west of Bryan Park. This proposal addresses one of BPIAC's goals, that of relieving congestion in the Study Area, while also directly addressing one of BPIAC's major concerns that the scope and meaning of "transportation" be broadened to include more than highway traffic. This option would provide long-term benefits to Richmond's transportation system.

Concept #5: Carpooling/ Vanpooling/ Transit/ Flextime/ Telecommuting

By consensus, BPIAC recommends that this proposal be implemented.

This proposal calls for encouraging voluntary employer-based incentives for carpooling, vanpooling, the use of public transportation, flextime, and telecommuting. This proposal meets one of BPIAC's goals, that of relieving congestion in the Study Area, while also directly addressing one of BPIAC's major concerns that the scope and meaning of "transportation" be broadened to include more than highway traffic. This option would provide long-term benefits to Richmond's transportation system.

Concept #6: Walking/ Bicycling

By consensus, BPIAC recommends that this proposal be implemented.

This proposal calls for providing sidewalks in almost 100 percent of the Study Area, striping bicycle lanes along roads parallel to the interstate and providing grade-separated bicycle facilities. This proposal meets one of BPIAC's goals, that of relieving congestion in the Study Area, while also directly addressing one of BPIAC's major concerns that the scope and meaning of "transportation" be broadened to include more than highway traffic. This option would provide long-term benefits to Richmond's transportation system.

Concept #11B: Replace the Two Existing I-95 Hermitage Road Ramps with I-95 Ramps to and from Dumbarton Road, and Construct a Two-Lane On-Ramp to I-95 Northbound from I-64 Eastbound and I-195 Northbound

By consensus, BPIAC has dealt with Concept #11B in three parts, detailed below.

#11B(i): By consensus, BPIAC recommends that the I-95 northbound exit ramp be relocated from Hermitage Road to Dumbarton Road. The existing exit ramp would be closed after the Dumbarton Road ramp is opened.

BPIAC recognizes the importance of improving the safety of the I-64/I-95 northbound merge area, in general, and also recognizes that the Hermitage Road exit ramp creates a hazardous situation with the merge lane. However, because maintaining access to the neighborhoods and local businesses is a strong concern of BPIAC, an exit ramp somewhere in the nearby vicinity is critical. BPIAC therefore recommends that the Hermitage Road northbound exit ramp should be relocated to Dumbarton Road and that the Hermitage Road exit ramp would be closed after the Dumbarton Road ramp is opened. The exit ramp at Dumbarton Road could be designed to benefit the Azalea Mall property as well as the Lakeside business area.

#11B(ii): By consensus, BPIAC recommends that the existing northbound merge lane be extended to the present exit ramp on Wilmer Avenue at Brook Road but does not recommend a second additional northbound merge lane.

Michael Baker recommends extending the existing merge lane from I-64/I-195 to the present exit ramp on Wilmer Avenue at Brook Road and adding a second additional merge lane that would extend only to the proposed Dumbarton Road exit ramp. BPIAC accepts the need for an extended northbound merge lane to improve safety of the hazardous merge area from I-64/I-195 but does not recommend a second additional northbound merge lane.

#11B(iii): A majority of BPIAC members recommends that the I-95 southbound access ramp at Hermitage Road be relocated to Dumbarton Road and that the property formerly used for this ramp be returned to Bryan Park. One member does not support this concept.

Michael Baker recommends relocating the I-95 southbound access ramp from Hermitage Road to Dumbarton Road and creating a merge lane that would extend from Dumbarton Road to the existing Hermitage Road access ramp.

A majority of BPIAC members believes that this solution would be feasible and effective and would satisfy the BPIAC goals. However, some of them are concerned that the additional construction would be detrimental to adjacent communities, would require unnecessary acquisition of right-of-way, and is not justified by current traffic conditions. Given these concerns, a majority of BPIAC members therefore recommends the following conditions for implementation:

- Extend the merge lane by the minimum amount required by AASHTO geometric standards (currently 1,000 feet);
- Donate the land no longer needed for the Hermitage Road southbound access ramp to the City for return to Bryan Park;
- Ensure that no additional through lanes on I-95 are added (as proposed in the Michael Baker Report, Concept #29);
- Mitigate impacts of the new construction to minimize visual and noise encroachment on Bryan Park and adjacent neighborhoods;
- Conduct a revised traffic analysis at the time of construction to reflect more accurately real conditions.

One BPIAC member does not endorse the relocation of the southbound access ramp for the following reasons:

- Every loss of natural areas to hard surfacing and to other construction has a detrimental effect on the environment and impacts the quality of life for all (*i.e.*, flooding exacerbated by impermeable surfaces and droughts exacerbated by the loss of plants).
- Limiting the access ramp to 1,000 feet does not seem probable.
- An additional southbound lane would be a visual and noise encroachment on the new Spring Park Historic Site and would destroy the sylvan scenery now enjoyed along Dumbarton Road.
- The scheduled extension of the Hermitage Road bridge and other probable construction needs would limit to a minimum the amount of land that could be returned to Bryan Park; in any case, the proposed use of any returned land as a parking area would not enhance the entrance area of the Park.
- While possibly needed in the future, the relocation – involving major new construction – is not a present necessity, as the recent work seems to have improved the situation sufficiently. At any rate, an alternative southbound ramp is already provided nearby at Brook Road. (If a future need were certain, a revised traffic analysis would not be required.)
- Therefore, the destruction of natural areas and the expense of acquiring more right-of-way, of constructing massive retaining walls and perhaps sound and visual barriers, and of paving probably over 3,000 feet of new roadway do not seem warranted or justified at the present time.

Concept #24: Provide an auxiliary lane on I-64 eastbound from Staples Mill Road Interchange to the I-195 exit ramp.

By consensus, BPIAC recommends that this proposal be implemented.

This option meets one of BPIAC's goals because it helps to relieve congestion.

Appendix B: Proposals That Do Not Meet BPIAC's Goals and Therefore Require Further Study for The Development of New Options

Concept #20: Construct a CD road system at the I-95/ Parham Road Interchange.

By consensus, BPIAC agrees that this proposal is beyond the scope of its mandate, although it recognizes that the proposal would have significant negative neighborhood impacts. It recommends this area to VDOT and Henrico County for further study to develop an option that would satisfy the needs of area residents.

The massive CD (collector-distributor) system proposed was similar to the original Bryan Park Interchange issue – a huge Interchange expansion proposal, with major adverse impacts on the nearby neighborhoods, businesses, air and water quality, and road networks. This proposal for Parham Road is beyond the scope of the Bryan Park Interchange Feasibility Study because the neighborhoods and businesses impacted by this Concept were not represented on BPIAC. This Concept is a matter for VDOT to explore with Henrico County and the neighborhoods.

Concept #30: Extend the I-95 southbound exit-only lane at the Boulevard exit ramp across the Boulevard, and then merge it into the mainline.

By consensus, BPIAC recommends further study to develop an option that would satisfy its goals.

Two major problem areas need better solutions: the I-64 eastbound lane-drop at the I-95 southbound merge area and the poor circulation and congestion on the I-95/ Boulevard Interchange and the city streets. BPIAC recommends that an in-depth study of the Boulevard area (land uses and traffic patterns on city streets, and the I-95 corridor entrance and exit needs) be developed to accomplish a comprehensive solution. BPIAC also recommends the need for the lane extension proposed in Alternative #30 to extend beyond Robin Hood Road.

Concept #31: Replace the left-hand access ramp from I-195 northbound to I-64 westbound with a right-hand access ramp.

By consensus, BPIAC rejects this proposal and endorses further study to develop an option that would satisfy its four goals.

This proposal violates several BPIAC goals. It would take Bryan Park land, which BPIAC agrees should be protected from further encroachment. The proposal would have tremendous noise and visual impacts on the Park, violating BPIAC's goal of protecting the Park from various negative impacts.

However, because BPIAC recognizes the current situation as hazardous and undesirable, it recommends that the entire Interchange complex just south of Bryan Park be studied to determine if it could be re-engineered and shifted further to the south. This study should address concerns about this area in a way that supports BPIAC's four goals.

Concept #39B : Reconstruct I-95 northbound/ I-64 westbound as a major fork with a five-lane

section south of the diverge gore. I-64 westbound would exit toward the right, and I-95 northbound would exit to the left. Provide a left exit from I-95 northbound to I-64 westbound for traffic using the Boulevard access ramp and traveling to I-95 northbound.

By consensus, BPIAC rejects this proposal and endorses further study to develop an option that would satisfy its four goals.

This option is unacceptable because it violates several of BPIAC's goals. Specifically, the proposed new access from I-64 eastbound to I-95 would severely harm nearby neighborhoods through visual impacts, noise, and degraded air quality. This option would greatly expand the overall area consumed by massive interstate connections. As a result, BPIAC recommends that this problematic area be studied further, as noted above in Concepts 30 and 31, for the development of solutions that do not violate BPIAC's goals.

Appendix C: Proposals Recommended To Be Dropped

Concept #4: Conversion of an existing through lane to HOV 2+ lane

By consensus, BPIAC recommends that this proposal be dropped. (Michael Baker also did not recommend carrying this Concept forward for further study.)

This proposal calls for converting two *existing* interstate through lanes, from Gaskins Road to downtown and from Parham Road to downtown, to High Occupancy Vehicle (HOV) lanes. Only vehicles with 2 or more occupants would be able to use the lane during peak hours. Based on the experience with HOV lanes in other areas, BPIAC members do not endorse this proposal.

Concept #18 - Replace the Hermitage Road access ramp to I-95 southbound with a new ramp in the northwest quadrant of the Hermitage Road Interchange.

By consensus, BPIAC rejects this proposal as unacceptable.

This option would have considerable impact on Upham Brook, the Spring Park Historical Site, and the Bryan Park neighborhoods, violating BPIAC's goal concerning the protection of neighborhoods from encroachment.

Concept #29 - Provide an additional through lane on I-95 and I-64.

By consensus, BPIAC rejects this proposal as unacceptable.

This option violates several of BPIAC's goals. First, additional through lanes would negatively impact Bryan Park, which BPIAC strongly feels should be protected from further encroachment. Secondly, additional through lanes would negatively impact nearby neighborhoods and businesses, degrade air and water quality, and intensify transportation problems. Additional through lanes also contravene BPIAC's ongoing concern that the meaning of "transportation" be broadened to include more than highway traffic and that other modes of transportation be developed and encouraged.

Appendix D: Recommended Principles and Concepts For Transportation Planning

TRANSPORTATION PLANNING PROCESS

At the heart of BPIAC's concerns about the future of the transportation system in the Study Area is its core goal of *Preserving the adjoining park land and neighborhoods by protecting them from physical, environmental, and aesthetic encroachments.*

Through two years of deliberations, it has become clear that the transportation needs of the Study Area, and more broadly those of the region, will be addressed successfully and cost-effectively only through concerted and coordinated action at *multiple levels of government and with substantial citizen participation.*

Principle #1: To maintain the quality of life of parks and neighborhoods impacted by actions taken within the Study Area, all entities involved in transportation planning must establish a *primary* decision criterion for transportation projects that addresses the impacts of the proposed project on neighborhood quality of life.

Specifically, the decision criterion should establish that projects that create increased noise, air, or light pollution, increased traffic on residential streets, or other environmental impacts on neighborhoods be given a significant negative weighting that would be factored into the ultimate decision.

Decisions made purely on the basis of improving traffic flow will continue to produce more roads and outcomes that seriously degrade residential quality of life. Such outcomes are considered unacceptable by BPIAC.

LAND USE AND PLANNING TO MAKE LIVABLE COMMUNITIES

Principle #2: Regional decision-making bodies, including the Commonwealth Transportation Board, the Metropolitan Planning Organization, the Richmond Area Planning District Commission, Richmond City Council, area Boards of Supervisors, and VDOT, need to create improved ways of working together to plan and coordinate land-use planning.

As is evident from decades of roadway construction, road construction does not necessarily mean less congestion in the long term, although there may be some short term relief. The main factors driving congestion are population growth and suburban sprawl. Highway construction and expansion is primarily a product of land development and land-use demands.

Furthermore, while some efforts are made to plan regionally, these efforts are currently insufficient to deal with anticipated growth. Even if all the roadway options were implemented – an unlikely scenario given the costs and other impacts – traffic congestion will continue to be a problem in the Study Area.

Principle #3: To plan for the anticipated increase in population and traffic in the next fifty years, land-use planning by the city and counties should have as a clear goal the facilitation of methods of travel that will help minimize car commuter traffic and maximize other modes such as bus, rail, car and van pools, bicycles, and telecommuting.

Family needs, such as schools, jobs, and stores, can be geographically clustered in neighborhoods to decrease the number of trips people make from their homes to these services.

The development of "transportation corridors" where future growth can be channeled would increase the cost-effectiveness of less polluting and congestion-causing transportation, such as bus, rail, and car or van pooling.

Incentives for "infill," redevelopment, and mixed use could also help alleviate pressures for suburban growth and increased commuting.

MULTI-MODAL STRATEGY TO REDUCE CONGESTION

Principle #4: Multi-modal strategies, including those already being planned, to address the transportation concerns of the Richmond metropolitan area must be supported so that, if transportation is not improved by one mode of transportation, other modes will be available to help address the problem.

General Concepts:

Non-highway options need to be explored and developed. Examples include mass transit, light rail, and pedal vehicles.

The continued addition of interstate lanes is not a viable option for improving transportation in the Study Area because of the impacts on neighborhood quality of life and on Bryan Park.

Lastly, the downtown Richmond area needs to function as a transit hub, where various modes of transportation become linked and integrated.

Buses

The current bus system needs to be maintained and improved. In addition to big buses running on main commuter routes, smaller and more comfortable buses and vans (carrying from 15 to 30 people) should have routes in neighborhoods.

More frequent and more diverse bus routes, with quick and easy transfers, need to be provided in order to increase efficiency, convenience, and use.

Buses need to be made aesthetically attractive, quieter, and equipped with bicycle racks.

The possibility of developing shuttle service from the airport to people's homes should be explored, as should the possibility of expanding the bus system to include van pooling, Ride-finders, private sector initiatives, and quasi-public initiatives.

Rail

The possibility of using railroad rights-of-way for commuter rail and/or light rail should be explored. A variety of incentives to use rail needs to be created, such as free parking at transportation hubs and subsidized fares.

Growth needs to be directed near rail stations in order to attain the population density necessary to support rail.

Principle #5: The scope and meaning of "transportation" must be broadened to include more than traditional highway transportation.

Bicycles

In order to create a safer environment for bicyclists, "Bike Only" lanes should be created on city and county roads.

Car and van pools

Incentives to encourage car and van pools need to be created, such as tax breaks for employers who provide incentives to employees.

Telecommuting

Telecommuting, especially for state employees, needs to be encouraged so that the number of commuters on the roads is reduced. The creation of several telecommuting centers in the Richmond area should be explored.

Infrastructure needs

Several infrastructure needs must be met in order for people to reduce their dependence on cars and to rely instead on other modes of transportation. Secure parking at transit points, including such facilities as racks and shelters for bicycles, needs to be provided. Additionally, employers need to be encouraged to provide bike racks and other facilities for employees.

Parking downtown by commuters should be discouraged while still providing for the convenience of those living, working, and visiting in Richmond. Potential ways to do so include creating a commuter tax and providing cash and other incentives for people to take other modes of transportation. To compensate for the loss of downtown parking, parking lots at multi-modal transportation hubs should be constructed.

Education and political action

Along with actions that should be taken to address the physical concerns related to these transportation strategies, educational and political action is also needed. Decreasing the dependency on the highway and automobile will require a change of mindset as well as careful and comprehensive planning.

Breaking out of the "highway only " mode will require political lobbying. Efforts to market non-highway modes of transportation need to be made, recognizing that public and private financial incentives to reduce traffic, such as the price of gas and corporate parking facilities, affect the choice of transportation.

Likewise, a consumer/public campaign to encourage people to consolidate and reduce car trips should be developed. On the private level, employers should be encouraged to implement restricted flextime policies and to provide on-site daycare. Ultimately, employers and residents need to be educated to adjust behaviors to the capacity of the highways.

ROADWAY IMPROVEMENTS

Principle #6: Because truck traffic has significant negative impacts on neighborhood quality of life, truck use of exits into or through residential neighborhoods should be curtailed.

While providing needed services, large trucks also have significant impacts on neighborhoods. Much truck traffic could be diverted to appropriate roads while saving truck drivers time. Trucks should be directed to use Exit 81 instead of Exit 80. Additionally, through trucks travelling on I-95 need to be encouraged to use I-295 instead.

Principle #7: Improved signage must be developed throughout the Study Area to direct drivers to their desired route and to alert drivers to traffic delays. This improved signage might include the use of technology such as electric signboards.

The amount of traffic congestion that could be reduced by improved signage is unknown; however, anecdotal evidence suggests that significant additional travel could be prevented by better

informing drivers of their options. In addition, delays caused by heavy use, roadwork, or accidents could be mitigated by informing drivers, who might then be able to choose better options.

PUBLIC INVOLVEMENT

Principle #8: When planning for local or regional transportation needs, authorities should incorporate public involvement early in the decision process, utilizing citizen advisory committees where feasible.

BPIAC applauds VDOT's decision to convene a citizen advisory committee in the early phases of its decision process about 20-year transportation needs in the Study Area. It encourages the continued use of citizen advisory committees in transportation planning as a way of securing meaningful public input. To be most effective, the citizen advisory committee should be representative of all community sectors and should be provided access to high quality information. Decision makers must participate actively and commit support and resources for the process.

CONTINUING ISSUES AND CONCERNS: ACCESS, ENVIRONMENTAL IMPACTS, AESTHETICS

Principle #9: Access to Bryan Park should be improved so that it is easily accessible to all metro residents.

Pedestrian and bicycle access to and throughout Bryan Park needs to be maintained. Where made possible by the closing of ramps or adjustments to other roadways, VDOT should consider returning to Bryan Park land no longer used for roadways.

Principle #10: Significant measures need to be taken to eliminate, minimize, or mitigate negative environmental impacts.

Everything possible should be done to reduce negative environmental impacts. Wetlands should be avoided. Sound barriers, berms, plantings, and other measures should be implemented to mitigate the effect of noise, lights, highway run-off, impaired air and water quality from vehicle emissions, construction, and other traffic impacts in the Study Area.

Clean-air compliance requirements in the next twenty years may facilitate the acceptance of and the need for non-highway transportation modes. Efforts to encourage and enforce the use of emission-compliant vehicles will need to be made. Use of electrical vehicles, ranging from cars to buses and trolleys, should be encouraged through a variety of measures.

Principle #11: The aesthetics of highway design should reflect the special characteristics of the locality.

Richmond is a city of rich history and unique character that requires a design approach different from the status quo. To reflect these special qualities of our community, we recommend that the physical design of all new highway construction incorporate elements that will respect this character. BPIAC's goal is that all users of the highway be presented with construction methods and features, such as bridge abutments, railings, guardrails, and lighting, that continue the Richmond tradition of quality architecture. While BPIAC understands that improved design quality may require greater resources, it believes that experience has demonstrated that the economic and social benefits of good design would make this effort worthwhile.

Appendix E: BPIAC Membership

Advisory Committee Citizen Members

- Sandra Balster, Member of Hermitage Road Historic District
- Elizabeth Barrett, Member of Friends of Bryan Park
- Roland Brierre, Jr., Concerned Citizen
- Gretchen Carreras, Member of Hatcher Civic Association
- William Correll, Resident of Westminster Canterbury
- Doris Davis, Resident of Hermitage Park, Lakeside
- Chuck Epes, Member of Bellevue Civic Association
- Peter Francisco, Member of Lakeside Business Association
- Irene Jennings, Member of Parks and Recreation CAP Board
- Tony Pelling, Member of Ginter Park Residents' Association
- Tim Pfohl, Resident of Bellevue
- Roland Rackett, Resident of Westminster Canterbury
- Arthur Ratcliffe, Member of the Virginia Bicycle Federation
- Isaac Regelson, Member of Ginter Park Residents' Association
- Beryl Riley, Resident of Hermitage Road Historic District
- Katie Roemer, Resident of Bellevue
- Kent Ruffin, Resident of Historic Jackson Ward
- Robert Stiff, Member of Richmond Area Bicycling Association
- Bernice Strommer, Member of Rosedale Civic Association
- Barbara Taggart, Concerned Citizen
- Eileen Tangley, Member of Bryan Parkway Civic Association
- Charles Ware, Concerned Citizen
- Mary Ellen Williams, Resident of Bellevue Park
- John Zeugner, Member of Bryan Parkway Civic Association

Original Members of BPIAC who did not participate or who withdrew early in BPIAC's two years of work:

- *Martha Anusbigian, Concerned Citizen*
- *Jeff Burns, Concerned Citizen*
- *Lisa Clemmer, Concerned Citizen*
- *Mort Herrick, Resident of Imperial Plaza*
- *Janis Jackson, Concerned Citizen*
- *Holly Anna Jones, Alternate for Chuck Epes, Bellevue Civic Association*
- *Ann McRee, Concerned Citizen*
- *Stan Preston, Concerned Citizen*
- *Rob Tate, Resident of Imperial Plaza*
- *Nancy Porthress, Alternate to John Zeugner, Bryan Parkway Civic Association*

RESOURCE MEMBERS

Virginia Department of Transportation (VDOT)
- Patsy Napier
- John Neal
- Bob Riley
- Connie Sorrell

Michael Baker, Jr., Inc., Consulting Engineering Firm
- Craig Eddy
- Kenneth Mobley
- Paul Prideaux
- Carla Santoro

City of Richmond
- Steve Kane, Parks and Recreation, City of Richmond
- M.S. Khara, Trafficways Coordinator
- Ralph Rhudy, Public Works

Henrico County
- Eric Millirons, Transportation Development Engineer

Richmond Area Planning District Commission
- Brad Shelton
- Todd Steiss

MEDIATORS

- Tanya L. Denckla, UVA Institute for Environmental Negotiation
- E. Franklin Dukes, UVA Institute for Environmental Negotiation

Research Associates, UVA Institute for Environmental Negotiation
- Catherine Cox
- Karen Firehock
- Hanh Le
- David Tipson

Appendix F: BPIAC Background and Purpose

The Bryan Park Interchange Advisory Committee (BPIAC) was convened by the Virginia Department of Transportation (VDOT) in 1997 to seek consensus among citizens concerned about traffic congestion, safety, and the impacts of interstate traffic on Bryan Park and adjacent neighborhoods.

The precipitating issue was an "in-house" proposal in 1996 by a VDOT engineer to construct a "fly-over" on I-95 which would entail the removal of the Bellevue Avenue bridge and would encroach on the Azalea Gardens in Bryan Park, a 285-acre public park in Richmond's northside. The proposal aroused significant concern among area residents that the project would harm the park and nearby neighborhoods. VDOT contended that growing concern about traffic congestion and safety prompted the proposal.

Several meetings between VDOT officials and citizens made it clear that a more intensive and deliberate effort was needed to exchange views, to analyze information, and to identify needs, concerns, and options. In Spring 1997, VDOT initiated a formal public involvement process by inviting concerned citizens and organizations to create a Bryan Park Interchange Advisory Committee (BPIAC). A group of about 35 citizens, representing a variety of park advocacy, civic, and business groups, began meeting in September 1997, mediated by the Institute for Environmental Negotiation (IEN) of the University of Virginia. This public involvement process was developed in conjunction with a Feasibility Study for the I-95/I-195/I-64 Study Area conducted by a transportation engineering firm, Michael Baker Jr., Inc.

PURPOSE OF BPIAC

BPIAC was charged by VDOT with the following purposes:

1) To represent the communities and organizations impacted by the Bryan Park Interchange Study Area.
2) To identify issues that impacted communities and organizations feel are important and present those issues to VDOT and its consulting engineering firm, Michael Baker.
3) To determine if the community's issues were adequately addressed by VDOT and Michael Baker.
4) To provide advice to community members, elected and appointed officials, and VDOT concerning options identified and recommended by the study.

Appendix G: BPIAC Process

BPIAC completed its four phases of facilitated work over the course of two years, from September 1997 through October 1999, in a total of 24 facilitated meetings and three citizen meetings of about three hours each.

Decision Rule: BPIAC members decided at the outset that they would operate on a consensus basis. They recognized that, while consensus would be a more difficult goal, consensus recommendations would carry more weight with local and regional decision makers. Consensus was defined as a decision that could be supported by *all* members of the group, with the understanding that on any given decision a member might have reservations or hesitations but must at least be able to go along with and support the decision. If one person could not live with the decision, then that would block consensus.

Phase One: In its first phase of work, from September 1997 through January 1998, BPIAC members achieved consensus on their overall purpose, on group protocols, and on guidelines for group behavior. Members then created a detailed list of concerns and a detailed list of information needs, both of which were provided to the Feasibility Study's engineering firm, Michael Baker. Lastly, members developed four goals that they would later use to evaluate options and to guide their final recommendations.

Phase Two: BPIAC's second phase of work, from February 1998 through July 1998, involved intensive learning about the complexities of the transportation planning process, about multi-modal transportation, and about design and aesthetic considerations. Members also received detailed information about current and projected traffic conditions in the Interchange area.

Phase Three: The third phase of work, in September and October 1998, generated potential ideas for study by the Michael Baker consultants which would possibly resolve or ameliorate the previously identified issues and problems. In this phase BPIAC participated in a "Traffic Diet Exercise," conceived by Hannah Twaddell of the Thomas Jefferson Planning District Commission. The exercise included an educational component, that familiarized BPIAC members with costs, benefits, and considerations of various traffic reduction options, and an active decision component, that engaged citizens in identifying viable ways of meeting specific traffic reduction goals. A second "brainstorming" session was held to ensure that all possible ideas had been elicited and could be forwarded for consideration to the Baker consultants. An additional method of gathering ideas was added in January 1999 with a Public Meeting held by VDOT to solicit public feedback and concerns. These ideas were also forwarded for consideration to the Baker consultants. Lastly, the Michael Baker consultants completed the idea-generation phase by adding a number of their own ideas.

Phase Four: In its fourth phase of work, from February 1999 through September 1999, BPIAC worked closely with Michael Baker in its evaluation of the ideas generated. As a first step, the engineering firm narrowed the list of ideas to those which they could quantify. Next, the engineering firm conducted an initial analysis of the ideas and alternatives to determine which were worthy of more in-depth study and which should be dropped because they either created more problems than they solved or because they were not feasible. The consultants next conducted a cost-benefit analysis of this last remaining set of ideas/alternatives. Lastly, the consultants used this cost-

benefit analysis along with the decision criteria established by VDOT to determine which ideas it felt would best resolve the traffic problems in the Study Area. Throughout this entire fourth phase, BPIAC provided Michael Baker with its views and recommendations. Michael Baker staff members report that these views were taken into consideration to the extent possible in the development of the firm's final recommendations and Report. As the last step in the process, BPIAC both evaluated the firm's recommendations and developed its own complementary set of recommendations, which have been set forth above in Appendices A-D.

BRYAN PARK INTERCHANGE ADVISORY COMMITTEE PROTOCOLS and GROUND RULES

The following protocols were developed and adopted by consensus by BPIAC and were used to guide its work.

Purpose and Scope of Process	**The Bryan Park Interchange Advisory Committee asserts the following as its purposes:** **1. To represent the views and concerns of the communities and organizations impacted by the Bryan Park Interchange Study Area.** **2. To identify issues that affected communities and organizations feel are important and to present those issues to VDOT for consideration in the Feasibility Study.** **3. To determine if the issues were adequately addressed in the Feasibility Study.** **4. To provide advice to community members, elected and appointed officials, and VDOT concerning options identified in the Feasibility Study.**
Participation	**BPIAC Membership:** See attached list of members. Civic groups and organizations and interested citizens who initially responded to VDOT's calls for interest and participation via newspaper advertisements, Summer 1997, and have continued to participate, constitute the BPIAC voting membership. **Additions and Withdrawals:** No new individuals or groups will be allowed to participate, as of the end of the December 8, 1997 meeting, unless admitted by consensus of the BPIAC. Civic associations, organizations, and interested citizens that have participated in the BPIAC meetings from the onset shall participate in the entire BPIAC process. Members may withdraw at any time from the BPIAC by written notice; if they represent an organization, they agree to seek a replacement member from their organization. A Subcommittee will meet to request withdrawal of members who have not attended a majority of the meetings. **Official Resource Agencies:** VDOT, Henrico County Public Works, City of Richmond Public Works and Department of Parks and Recreation will serve as resource members of BPIAC. They will participate fully in the discussions and will share information about issues, constraints, and possible impediments to implementation. They are expected to be candid in their views. If the representatives of VDOT and the City of Richmond are able to sign the final document without its being legally binding on their agencies and if they individually endorse the recommendations of the final document,

	they will sign the final document. **Observers, Other Interested Parties:** Meetings are open to observers. Comments by observers may be offered in writing or orally at the end of each session. Observer comments may also be invited during the session. **Media:** No consensus exists about whether and how any news media might be included or excluded from meetings. **Alternates:** Alternates may be appointed by representatives of civic groups and organizations. Alternates may participate in discussion and consensus decisions only in the absence of the official BPIAC member. **Note:** Some notice of official BPIAC representation (and alternates) may be required of participating civic groups and organizations.
Roles and Responsibilities	All members shall have equal voice and status. Other participants in the BPIAC work can serve in an advisory and advocacy position. **Participant responsibilities to constituents**: Members agree to obtain guidance from their constituents and communities so that they can accurately represent the views and interests of their constituents and communities. They will communicate information learned at meetings and will present BPIAC decisions to their constituents for endorsement. BPIAC members who speak outside of the meetings will speak for themselves and express their own views. They will not represent an official committee point of view. BPIAC members will refer inquiries for official reports to the facilitators. BPIAC facilitators may describe the group process and share materials with the media and prepare press releases as directed by the group.
Sharing Information During and After Meetings	Members are encouraged to discuss issues raised during the meetings with their constituents without attributing positions and attitudes to specific people. Members will be open and candid in their views and will speak with focus and brevity so that everyone may have an opportunity to speak.
Decision-making	**Consensus:** BPIAC will make decisions by consensus. This means that all members can live with and support the decision. If one member cannot live with the decision, consensus is blocked, in which case the group will continue to work on the issue.
Implementation	The final Report and recommendations of BPIAC will be incorporated into the final Feasibility Study by the VDOT consultants (Michael Baker). BPIAC may also use its final recommendations to provide advice to community members and to elected or appointed officials.
Meeting Organization and Administration	VDOT will arrange and pay for meeting rooms, refreshments, facilitation, special speakers, and research or other informational needs. The facilitators will prepare meeting summaries and agendas and will work with BPIAC and VDOT to prepare and facilitate the process. BPIAC members will come to meetings prepared to speak on behalf of their constituencies. Subcommittees, if formed, will be responsible for their own meeting scheduling, minutes, and other matters.

Timetable	See projected work schedule.
Facilitator: Selection, Goals, Responsibility	A selection subcommittee of BPIAC was responsible for interviewing and selecting the facilitators. Facilitator goals are to help BPIAC members identify and increase their understanding of each other's issues and concerns; to develop, explore, and understand their options; and to engage in productive and civil discourse to reach consensus decisions that best address BPIAC's concerns. By contract, the facilitators are responsible for the following: • Preparing the meeting agendas for distribution at the meeting and providing facilitation materials such as flip charts and markers; • Keeping the discussion focused; • Helping the group resolve differences and disputes that arise in a way that is acceptable to participants and assisting in developing consensus where agreement is possible; • Keeping a record of meeting discussions (*i.e.,* issues raised, information presented, requests for information, specific agreements and resolutions reached during the meetings, and agenda items for next meetings); • Preparing a summary of each meeting and distributing this "sense of the meeting" to BPIAC members and VDOT; • Arranging for speakers requested by BPIAC as appropriate; • Helping BPIAC set up its own meeting schedule for meetings and meetings of subcommittees or work groups; • Maintaining contact with BPIAC members and VDOT as necessary between meetings by telephone, regular mail, or electronic mail; • Serving, should BPIAC so desire, as principal media contact for its work and, in any event, responding as appropriate to media and other inquiries concerning BPIAC's work; • Providing at least two IEN staff for each meeting of BPIAC; • Preparing a summary Report that captures the highlights of the meetings and other discussions and that offers BPIAC's final recommendations, one draft to be submitted to BPIAC for revisions before a final Report is submitted to VDOT; • Discussing with VDOT future actions that may be recommended. At any time, if further discussion does not appear likely to be productive, the facilitators will so indicate to BPIAC and VDOT.

Appendix H: Process Evaluation

ASSESSMENT OF BPIAC PROCESS BY BPIAC MEMBERS

Compilation of 13 Evaluations

Process Quality

1. **Were the objectives of the BPIAC public involvement process made clear to you early in the process?**

1	2	3 (2)	4 (6)	5 (5)
No		Unsure		Yes

2. **Was BPIAC membership representative of the community and stakeholder interests?**

Yes 9 No 2 (1 "Somewhat" and "I Don't Know")

If no, what other interests should have been represented or what changes would you have suggested?

- "Very good for area around Bryan Park, but not enough members from Parham Road or even Staples Mill area. However, the early meetings were widely advertised – people cannot be made to take part. The boundaries of the study may not have been understood – it was always referred to as Bryan Park Interchange. This is a "VDOT" term, not a general-public-use term."

3. **Was the information shared by the VDOT consultants and other presenters credible?**

1	2 (1)	3 (1)	4 (6)	5 (5)
No		Unsure		Yes

- *Comment following "5" response:* "except for accident record"
- *Comment following "4" response:* "I am a road user, not an engineer, and it took some time to see things from the builder's perspective – I am not sure some VDOT people ever saw things from the perspective of the residents of neighborhoods through which they build roads. Other presenters were knowledgeable and articulate. Michael Baker people were knowledgeable and articulate, knew federal and state rules we needed for us to understand why some of our wishes were impossible."
- *Comments following "2" response:* "VDOT has little credibility – have been to several meetings where they will say anything (no matter how absurd or untruthful) to get their way. Other presenters were credible."

4. **Were the resource members of BPIAC knowledgeable?**

1	2	3 (2)	4 (5)	5 (5)	(1 "Who they?")
No		Unsure		Yes	

- *Comment following "3":* "We knew our side of the issue."

5. **Do you have a greater understanding of the issues?**

1 (1)	2	3	4 (1)	5 (11)
No		Unsure		Yes

6. **Do you have a greater understanding of the constraints or factors influencing the decision-making?**

1 (1)	2	3	4 (5)	5 (7)
No		Unsure		Yes

- *Comment following "5":* "But I do wish VDOT could think more in terms of transportation by means other than road building."

7. **Now that you have participated in this consensus-building process, have your views about the Feasibility Study changed as a result of this process?**

1 (3)	2 (3)	3 (2)	4 (1)	5 (4)
No		Unsure		Yes

- *Comment following "3":* "Time will tell. We still have no idea of how much VDOT's thinking has changed."

8. **Did the mediators:**

	Poor				Excellent
• **Explain the process** "Many times needed"	1	2	3 (1)	4 (5)	5 (7)
• **Establish and maintain ground rules** "They must have lost patience with us many times."	1	2	3 (2)	4 (5)	5 (6)
• **Maintain neutrality and impartiality**	1	2 (1)	3	4 (6)	5 (6)
• **Listen well & help bring out information** "And this was very helpful."	1	2	3 (2)	4 (1)	5 (9)
• **Identify and help build common ground**	1	2	3 (2)	4 (6)	5 (4)
Assist the Committee in generating and evaluating options	1	2	3 (2)	4 (6)	5 (4)
• **Facilitate discussion of options**	1	2 (1)	3	4 (6)	5 (5)
• **Keep the process on track** "Despite many constraints."	1	2 (1)	3 (3)	4 (4)	5 (4)
• **Help the Committee resolve differences**	1	2	3 (3)	4 (6)	5 (3)
• **Help the Committee develop a clear, specific, balanced written report reflective of the Committee views**	1	2	3	4 (8)	5 (4)
• **Provide timely reports and Committee support**	1	2	3 (1)	4 (2)	5 (10)

9. **Now that you have participated in a mediated/facilitated process, how important do you think it is that public involvement processes be facilitated by a third party neutral?**

1	2	3 (1)	4 (1)	5 (11)
Not important		Unsure		Very important

Comment following "3": "I have maintained from the start that the citizens were basically on the same track and only needed a little help to bring them together – the mediators were helpful with this. However, no consensus/agreement has occurred between VDOT and the citizens. Why not? If anything is to change with regard to VDOT's way of doing business, they have to buy into the process too. I have seen no indication that they intend to follow the committee's recommendations. Unless VDOT comes on as a full player, this process will not have any impact."

Comment following "5": "When points of view are as far apart as in this case. Without the "third party neutral" involved, we would never have gotten past the first meeting. With mediators' we finished friends, not enemies."

Process Outcomes

10. **Did your trust of:**

Members of BPIAC:	Increase (8)	Decrease	Stay at the same level (5)
VDOT:	Increase (3)	Decrease (3)	Stay at the same level (7)

- ***Comment following "Increase":*** "But still not 100%"

Michael Baker, Jr. Inc.:	Increase (7)	Decrease (1)	Stay at the same level (5)

Mediators: Increase (7) Decrease Stay at the same level (6)

11. Would you participate in another similar public participation process?

1	2	3 (5)	4 (2)	5 (6)
No		Unsure		Yes

Why or Why not?

Following "5":

- "After I recover from this one! We developed enough trust in each other to really listen to the other viewpoints, be willing to really try to compromise. Sometimes the compromise was better than my original thoughts on the problem."
- "I believe in involving as many citizens as possible in solving our problems."
- "I appreciate meeting others, learning new things, discussing important issues, and, hopefully, influencing decisions for the betterment of the community."
- "It is necessary to continue to try to improve VDOT's integration of public participation into planning process."
- "Very positive experience."

Following "4":

- "If the format could be revised so that the purpose could be accomplished without so much waste of time."
- "Because the public should be consulted. Long-time residents of the area sometimes have knowledge that is not known by the experts."

Following "3":

- "Time."
- "Not sure whether VDOT will respect findings."
- Very draining and long process – but if it was an issue I felt passionate about, probably."
- "Very time consuming. Am doubtful VDOT takes citizen participation seriously."

12. Would you recommend this kind of public participation process for other issues in the future?

1	2 (1)	3 (1)	4 (2)	5 (9)
No		Unsure		Yes

If not, why not? And what recommendations do you have?

Following "5":

- "If some way could be developed to limit the members of the group to people actually involved in the situation, it would help. For example, if roads are the subject under discussion, members should drive on the roads at least occasionally."
- "An evaluation at 1/2 point to allow those people who have not kept up to drop out and to make sure everyone makes a verbal statement why consensus and why (sic)."
- "If possible, yes. I think the approach could be improved and shortened."
- "Yes, very strongly."

Following "4": "Yes, if all parties genuinely buy into process – not sure VDOT does."

Following "3": "Remains to be seen whether VDOT follows committee's recommendations."

Following "2": "Too extended a time frame."

13. Do you feel the Committee achieved its objectives?

1	2	3 (4)	4 (5)	5 (4)
No		Unsure		Yes

Following "5": "Yes, but I'm not sure if it will make any difference."

Following "4": "With the exception of 11B."

Following "3": "We don't know the outcome."

- "Much remains to be seen."

- "The BPIAC met some of them but had little influence on alternatives recommended by BAKER."

14. Do you feel the Committee influenced the outcome of the Bryan Park study?

1	2 (2)	3 (6)	4 (1)	5 (4)
No		Unsure		Yes

Following "3": "Only time will tell."

- "We cannot have that assurance until it goes before board."
- "We don't know the outcome."

Following "2": "Somewhat, but there are 2 reports, with too little in common."

<u>Participant Satisfaction</u>

15. Did you feel heard by:

Other members of the committee?	No	Sometimes (3)	Yes (10)	Not Sure
By city and regional representatives?	No (2)	Sometimes (4)	Yes (5)	Not Sure (2)
By VDOT?	No (2)	Sometimes (3)	Yes (6)	Not Sure (2)
By Michael Baker, Jr., Inc.?	No	Sometimes (2)	Yes (10)	Not Sure (1)
By the mediators?	No	Sometimes (1)	Yes (11)	Not Sure (1)

16. Did you contribute to the discussion as much as you wanted?

No	Sometimes (2)	Yes (10)	Not Sure

If not, why not?

- "I was usually interrupted in the middle of a sentence."
- "Some of my views were not popular with many of the group and they were not interested in listening."
- "Often not able to attend meetings due to conflicting pressures."

17. How satisfied are you with this final BPIAC report?

1	2 (1)	3	4 (9)	5 (3)
Very dissatisfied	Somewhat dissatisfied	Unsure	Somewhat satisfied	Very satisfied

If dissatisfied, why are you dissatisfied?

- "Not really dissatisfied, but do wish we could have reached real consensus."
- "Local objections to engineering decisions were given too much weight. I think it is a step in the right direction, if not considered the final word (work?)"
- "Not sure VDOT will heed/use report."
- "Because consensus was not reached between BPIAC and Baker – VDOT."
- "While I am not fully satisfied with each individual piece of the report, I am very pleased that we came up with a consensus report."

18. Can you identify aspects of this process that went particularly well?

- "It was gratifying when we could come to agreement on a point on which we started at opposite ends."
- "The open discussion that allowed us to understand each neighborhood's problems and the willingness to compromise."
- "The consensus process. The suppers."
- ."The presentations by the Michael Baker representatives."

- "The mediators (in my opinion) made all the difference in facilitating the meetings and kept us on track most of the time."
- "Information and education."
- "The finding of common ground."
- "Finding a solution: relocating the on-off ramp."
- "To be honest, I think things really started to move when the citizens held their own meetings and began reaching consensus on important issues."
- "The coming together of the local interests represented."
- "Support materials were thorough and provided in a timely manner when requested."

19. What got in the way of progress? What would you have done differently?

- "Inability of someone who never drives on the interstate system to comprehend the problems of those who do use it. I don't know that anything could have been done differently."
- "Members who were unable to attend regularly and who failed to study and understand their material and caused us to repeat steps."
- "Too much talk about irrelevant subjects. I think the process would have been more effective, more efficient, and less time consuming if the engineering study had been done first and then the committee formed to critique it. This would also make it easier to keep discussion on track. I also think good engineering should take precedent over local self-serving objections."
- "A stubborn member. I think we tried everything possible."
- "Too many people."
- "I think the process ran a normal course."
- "Getting bogged down by process."
- "Process was slow because of distrust among stakeholders – I don't believe anything could have speeded up this process."
- "Stick-in-the-mud policies in city!"

20. What follow-up would you like to see to ensure that BPIAC recommendations are given a maximum likelihood of implementation?

- "We will have to keep up with the study as it moves through the "process" – another education for us."
- "In Richmond go through North Team Process – in Henrico request Board of Supervisors for their endorsement. have the four political figures review it together."
- "We should have a voice at the next level of planning."
- "Representatives of the committee should have an opportunity to be heard at the state of final planning for the various phases of the overall program."
- "To be notified of meetings concerning this – I just have a bad feeling that all our work and recommendations will not be given serious consideration."
- "Intense political lobbying will be necessary – probably unsuccessful – because VDOT will do what it wants."
- "Unsure – any progress made."
- "Political support, serious consideration of BPIAC recommendations from CTB and Richmond VDOT."
- "Continuation of the advisory committee to ensure proper implementation of recommendations."
- "I would like VDOT to accept and promote our recommendations. I feel their acceptance would be the most important factor in getting the recommendations implemented."
- "Publicity and political interest."
- "Follow-up is now the responsibility of the participants and community organizations."

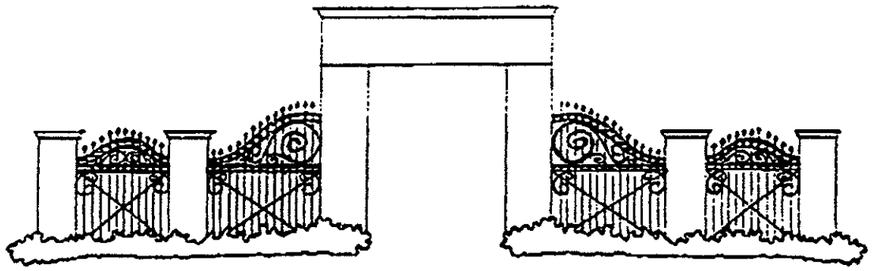
Appendix I: Meeting Summaries and Additional Copies of This Report

Meeting summaries and additional copies of this report are available upon request from the VDOT. Please contact

Patsy Napier
Virginia Department of Transportation (VDOT)
1401 East Broad Street
Richmond, VA 23219
Tel: 804/ 786-2566
Fax: 804/ 786-5157
Email: napier_pg@vdot.state.va.us

Appendix J: Letters of Support

Letters of support from citizen organizations. are attached. Additional letters of support will be forwarded as they are received.



FRIENDS OF BRYAN PARK

1210 Warren Avenue, Richmond, VA 23227 (804)261-4182

October 28, 1999

Dear Commonwealth Transportation Board,

The Friends of Bryan Park endorse the report and recommendations made by the Bryan Park Interchange Advisory Committee (BPIAC). After working in close cooperation with the Virginia Department of Transportation (VDOT) and their consulting engineers for over two years, the citizens' recommendations represent a strong and united position on how to best manage the Bryan Park Interchange Area. The citizens who made up BPIAC represented a wide variety of business and community organizations, and we strongly believe their recommendations, which were made by consensus, should now be carried out. Therefore, we urge VDOT, the Commonwealth Transportation Board, and public officials to follow the recommendations made by BPIAC.

Sincerely,

The Board of Directors, Friends of Bryan Park

Signatures of the Board Members:

Elizabeth Barrett

~~William~~ Britton

Brenda Gruver

Irene Jennings

Donna Lacy

Mary Zayde Rennolds

John Zeugner

Dedicated to the Preservation and Improvement of Bryan Park

GINTER PARK RESIDENTS ASSOCIATION

November 9, 1999

To Whom It May Concern:

The Ginter Park Residents Association (GPRA) unanimously endorses the Consensus Recommendations and the Principles of Transportation Planning put forth by ht Bryan Park Interchange Advisory Committee (BPIAC).

The Ginter Park Residents Association had had the continuous involvement of two of our GPRA Board members throughout the two-year BPIAC process. The members, A A. Pelling and Isaac Regelson, have kept the GPRA Board informed through regular meetings. They kept the GPRA membership informed through our general meetings and newsletter.

It is the intent of the Ginter Park Residents Association to remain involved in issues of transportation planning and to help implement the Recommendations and Principles of the Bryan Park Interchange Advisory Committee.

The Virginia Department of Transportation deserves praise for affording communities the opportunity to be involved in the public process in manner such as BPIAC and we look forward to being involved in the future.

Sincerely,

Norma Murdoch-Kitt, Ph D.

President, Ginter Park Residents Association

3217 CHAMBERLAYNE AVENUE, RICHMOND, VIRGINIA 23227
FAX 804-321-8690

BELLEVUE
CIVIC ASSOCIATION

November 9, 1999

The Executive Board of the Bellevue Civic Association has reviewed the report and recommendations of the Bryan Park Interchange Advisory Committee (BPIAC). On behalf of the 1,400 households represented by the Bellevue Civic Association, the Board endorses BPIAC's recommendations and urges local public officials, the Virginia Department of Transportation and the Commonwealth Transportation Board to support the recommendations.

Sincerely,

Chuck Epes
President, Bellevue Civic Association

HATCHER CIVIC ASSOCIATION
2200 Dumbarton Road
Richmond, VA 23228

October 18, 1999

Mr. Charles D. Nottingham
Acting Commissioner
Commonwealth Transportation Board
Virginia Department of Highways
1401 East Broad Street
Richmond, VA 23219

Dear Mr. Nottingham:

The Hatcher Civic Association at its regular meeting on October 18, 1999, reviewed the Report and Recommendations of the Bryan Park Interchange Advisory Committee. The Association offers its appreciation to Committee citizen and resource members for their hard work, to the Feasibility Study consultants Michael Baker Jr., Inc., for their analysis of traffic conditions, and to the Virginia Department of Transportation for convening the Committee.

The Hatcher Civic Association endorses the recommendations contained within the Report. The Association further urges local public officials, the Virginia Department of Transportation, and the Commonwealth Transportation Board to support the recommendations contained within.

Sincerely,

Gretchen P. Carreras
President, Hatcher Civic Association

CITY OF RICHMOND
PARKS, RECREATION
& COMMUNITY FACILITIES

900 E.Broad Street
Richmond, VA 23219

Ph.- (804) 646-5733
Fax- (804) 646-6931

November 1, 1999

Institute For Environmental Negotiation
Campbell Hall
University of Virginia
Charlottesville, VA 22903

Dear Sirs:

The Department of Parks, Recreation and Community Facilities' Advisory Board has reviewed the Report and Recommendations of the Bryan Park Interchange Advisory Committee. The Advisory Board offers its appreciation to Committee, citizen, and resource members for their hard work; to the Feasibility Study consultants Michael Baker, Jr., Inc. for their analysis of traffic conditions; and to the Virginia Department of Transportation for convening the Committee.

The Advisory Board endorses the recommendations contained within the Report. The Advisory Board further urges local public officials, the Virginia Department of Transportation, and the Commonwealth Transportation Board to support the recommendations contained within.

Sincerely,

Sherwood Tyrone White

Sherwood Tyrone White
Chairman, Recreation & Parks Advisory Board

APPENDIX B: FIGURES

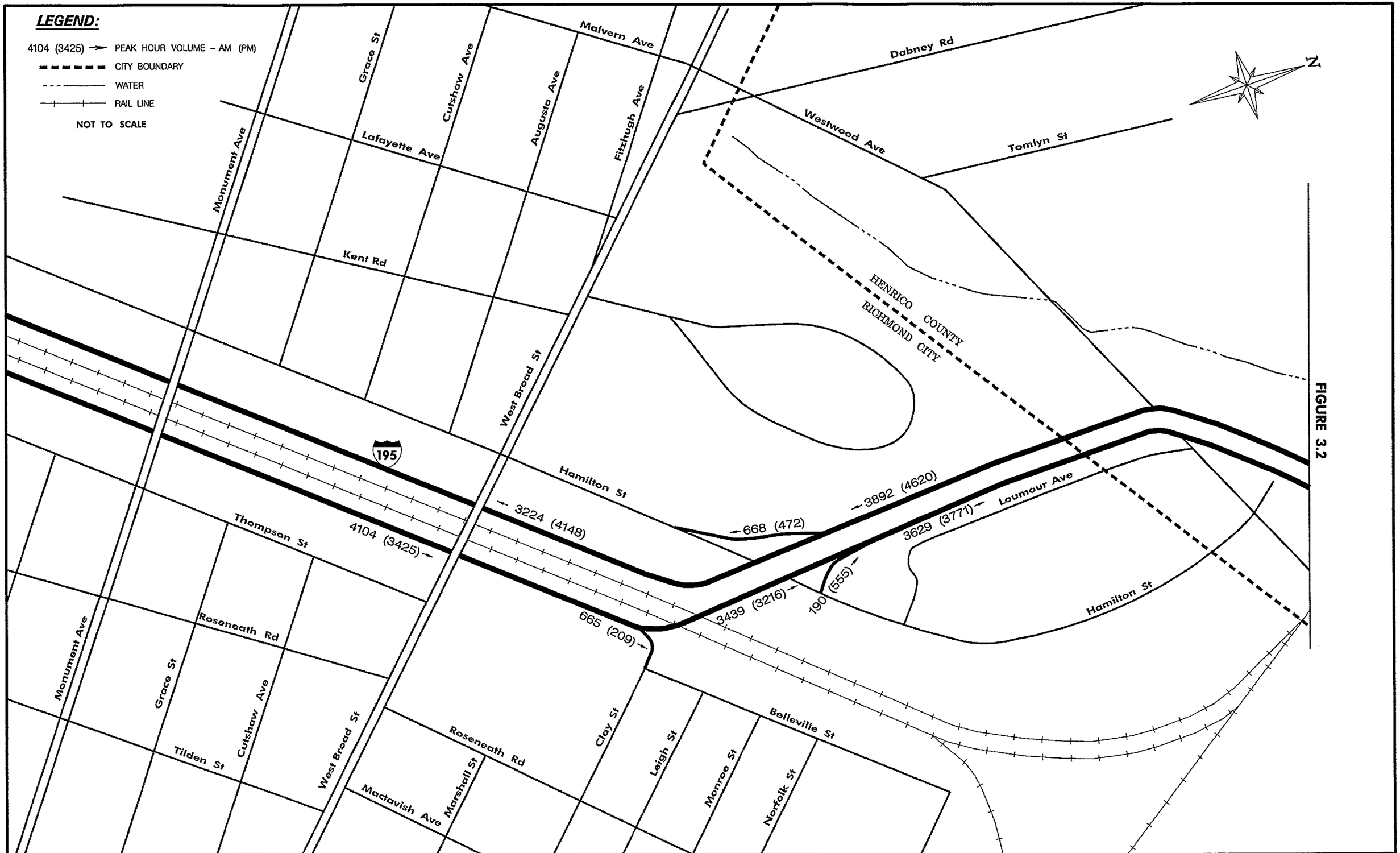


FIGURE 3.2

I-95 / I-64 / I-195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR TRAFFIC VOLUMES	FIGURE 3.1	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

3892 (4620) → PEAK HOUR VOLUME – AM (PM)

CITY BOUNDARY

PARK BOUNDARY

WATER

RAIL LINE

NOT TO SCALE

FIGURE 3.7

FIGURE 3.1

FIGURE 3.3

FIGURE 3.9

N

HENRICO COUNTY
RICHMOND CITY

BRYAN PARK

64

195

95

2034 (2299)
5039 (4373)
295 (345)
1739 (1954)
1859 (2348)
1416 (1347)
707 (618)
294 (316)
3598 (4302)
1381 (1641)
1554 (1476)
1794 (1797)
4434 (2230)
605 (2143)
443 (1001)
1453 (3843)
3453 (3843)
240 (321)
3175 (3438)
454 (333)
3892 (4620)
3629 (3771)
2123 (1965)
3107 (1727)
5230 (3692)
2159 (3619)
4674 (2551)
1010 (1632)
7781 (4278)
3341 (4323)
555 (521)

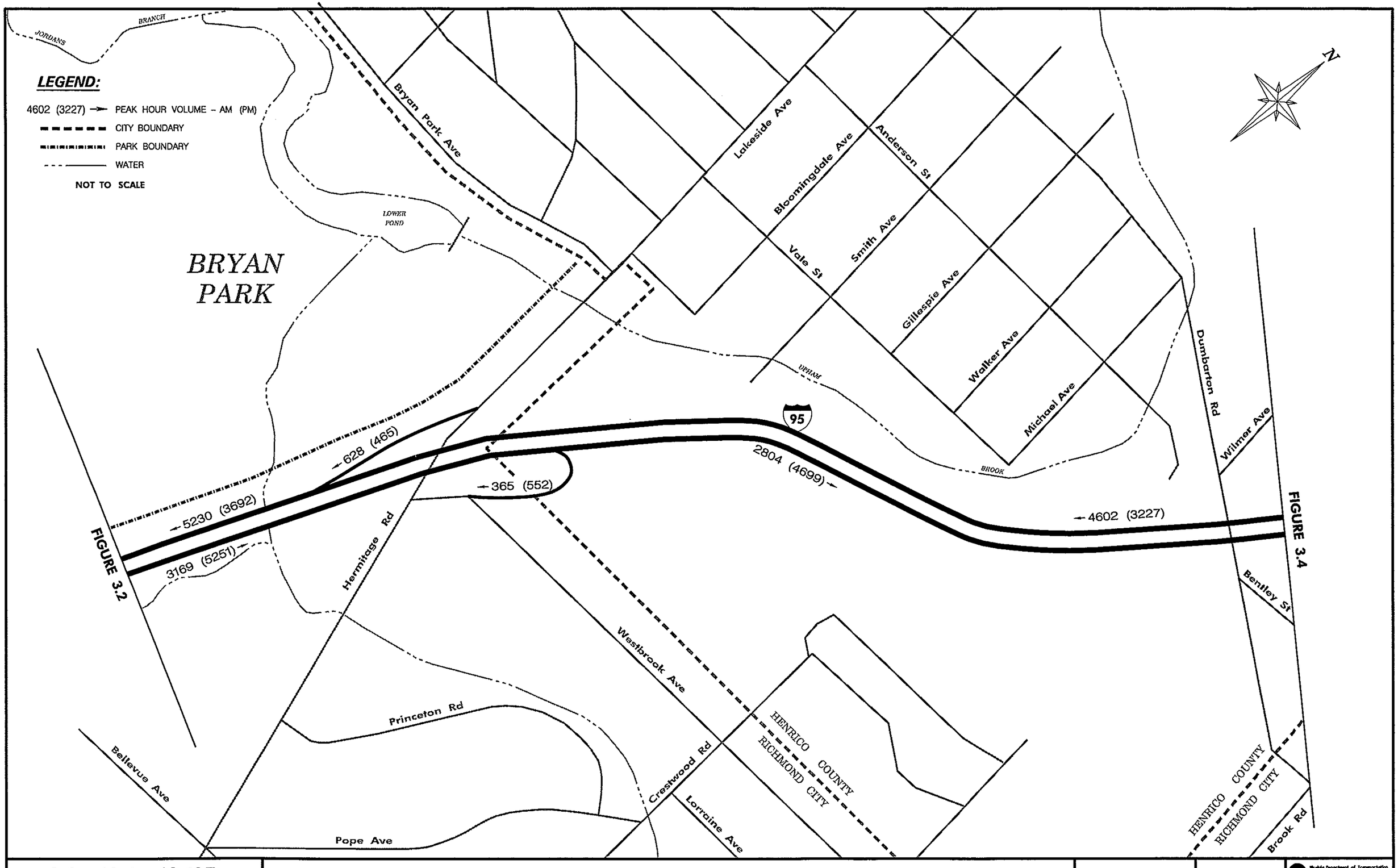
Laburnum Ave

Bellevue Ave

Westwood Ave

Hermitage Rd

I–95 / I–64 / I–195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR TRAFFIC VOLUMES	FIGURE 3.2	NOVEMBER 1999	Virginia Department of Transportation



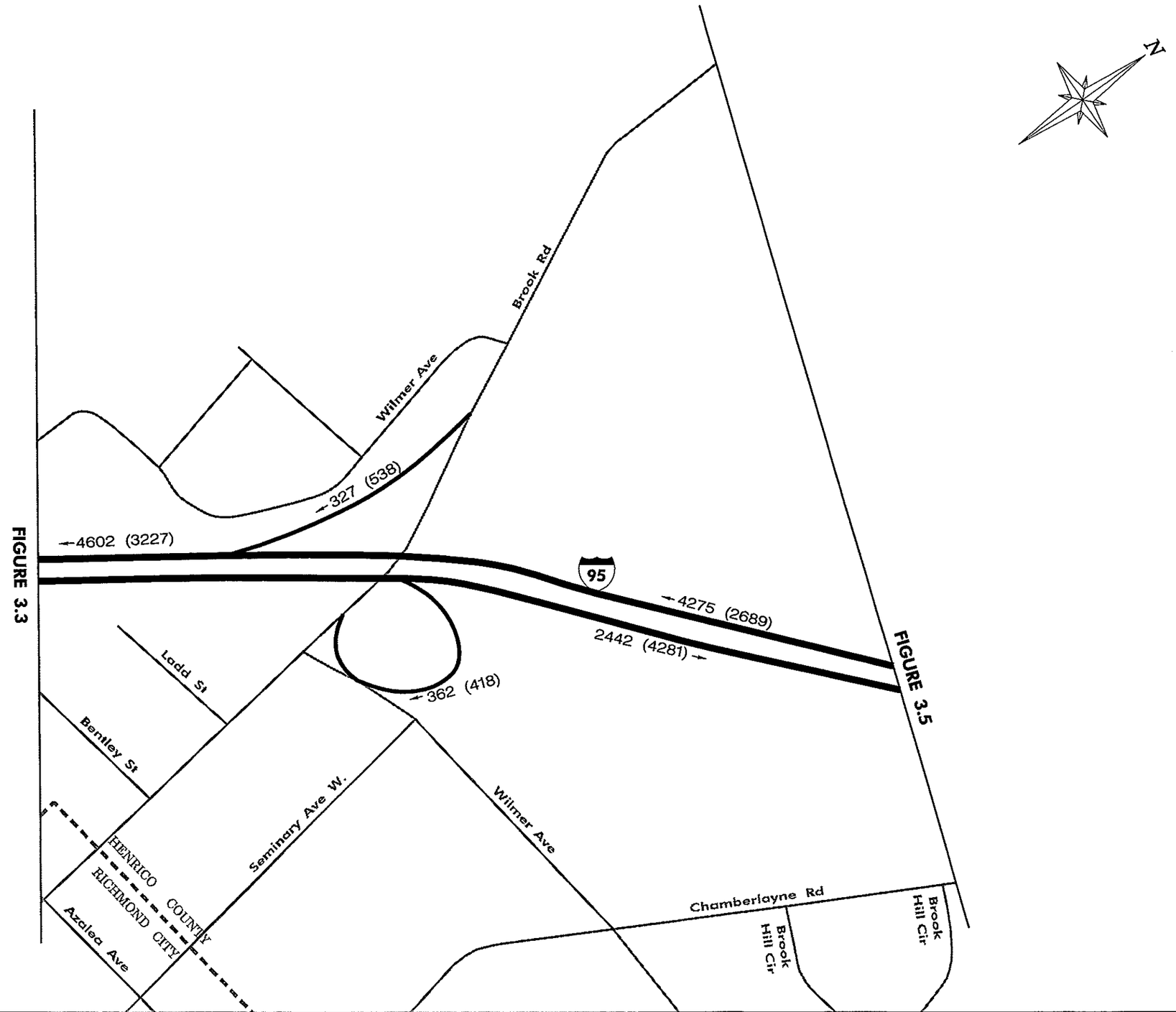
I-95 / I-64 / I-195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR TRAFFIC VOLUMES	FIGURE 3.3	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

946 (299) → PEAK HOUR VOLUME – AM (PM)

▬ ▬ ▬ ▬ CITY BOUNDARY

NOT TO SCALE



I–95 / I–64 / I–195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR TRAFFIC VOLUMES	FIGURE 3.4	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

3597 (4978) → PEAK HOUR VOLUME – AM (PM)

WATER

NOT TO SCALE

Hawthorne Ave
Noble Ave
Moss Side Ave
Edgewood Ave
Hilliard Rd
Sibley Ave
Fendall Ave
Lakeside Blvd
FIGURE 3.6
FIGURE 3.4
4275 (2689)
95
99 (80)
946 (299)
Chamberlayne Rd Southbound
317 (243)
3329 (2390)
2343 (4201)
2558 (4347)
215 (146)
Chamberlayne Rd Northbound
301 Access Rd
3646 (2633)
3597 (4978)
1039 (631)
Upham Dr
Old Orchard Rd
Brookfield Rd
Upham Rd
Danray Dr
Grammarcy Ct
Grammarcy Cir
Arywell Ct
Shagbary Ct
Crenshaw Rd
UPHAM BROOK
FLIPPEN CREEK

I-95 / I-64 / I-195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR TRAFFIC VOLUMES	FIGURE 3.5	NOVEMBER 1999	Virginia Department of Transportation VDOT

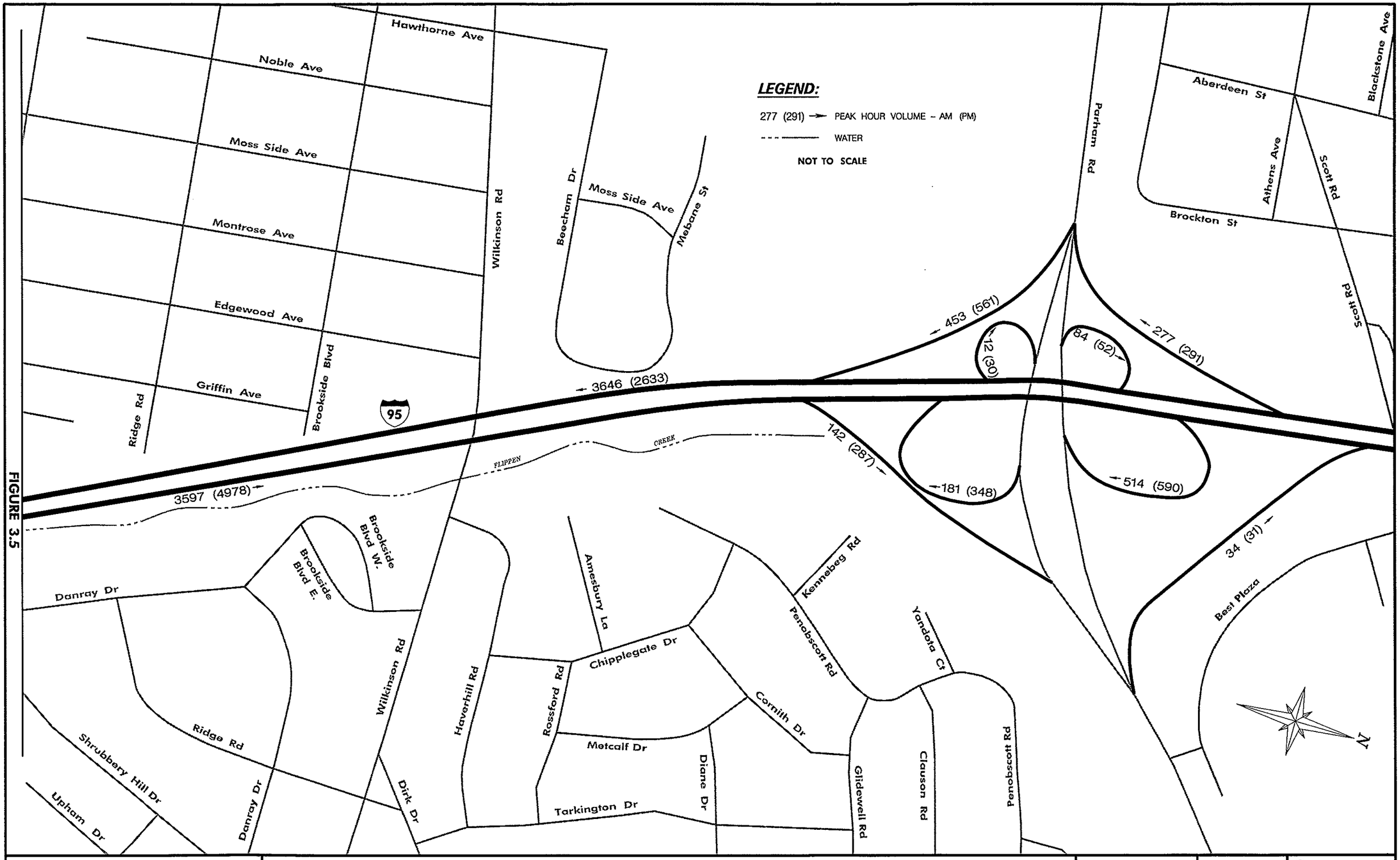


FIGURE 3.5

I–95 / I–64 / I–195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR TRAFFIC VOLUMES	FIGURE 3.6	NOVEMBER 1999	Virginia Department of Transportation

LEGEND:

4081 (5253) → PEAK HOUR VOLUME – AM (PM)

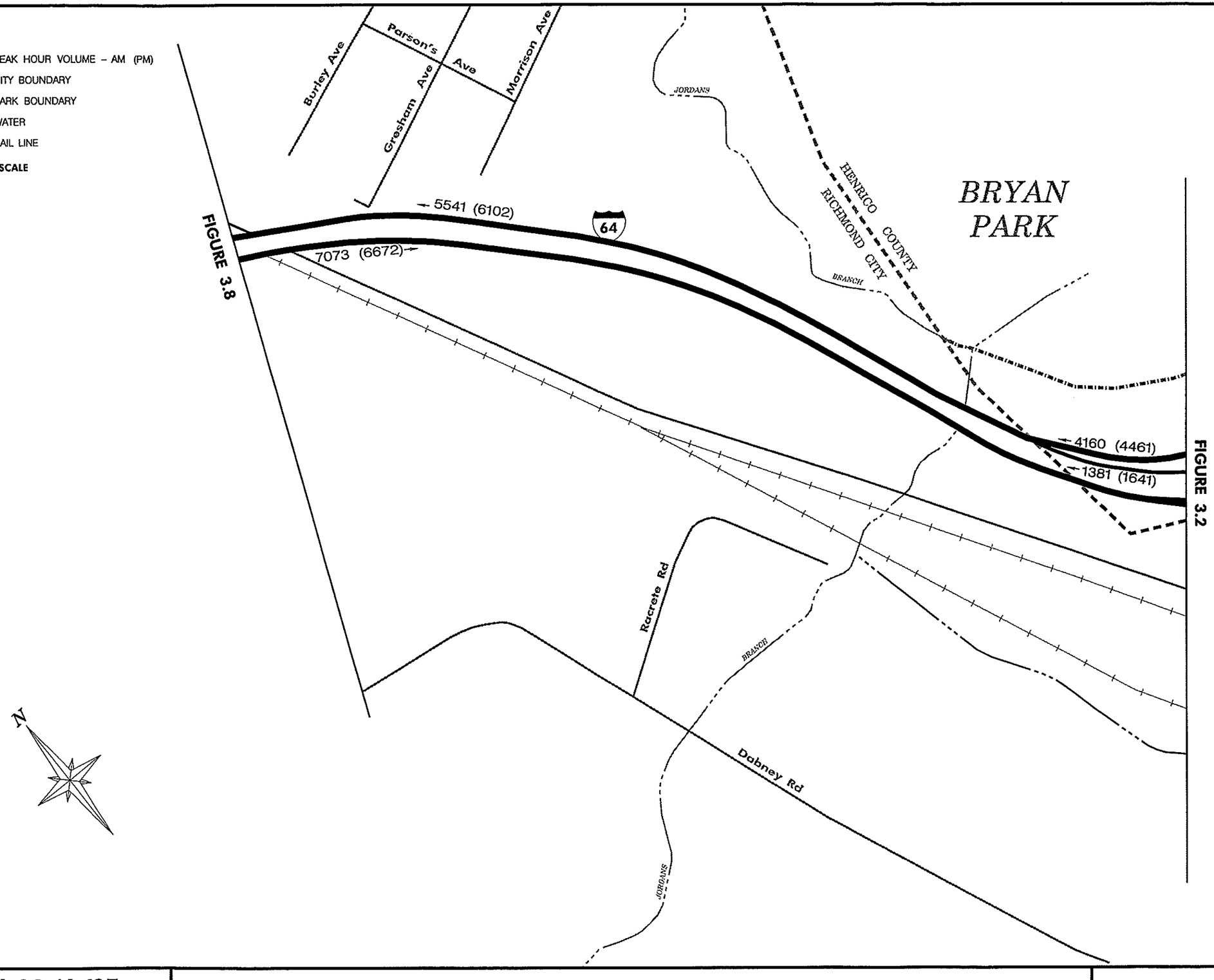
CITY BOUNDARY

PARK BOUNDARY

WATER

RAIL LINE

NOT TO SCALE



I–95 / I–64 / I–195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR TRAFFIC VOLUMES	FIGURE 3.7	NOVEMBER 1999	Virginia Department of Transportation VDOT

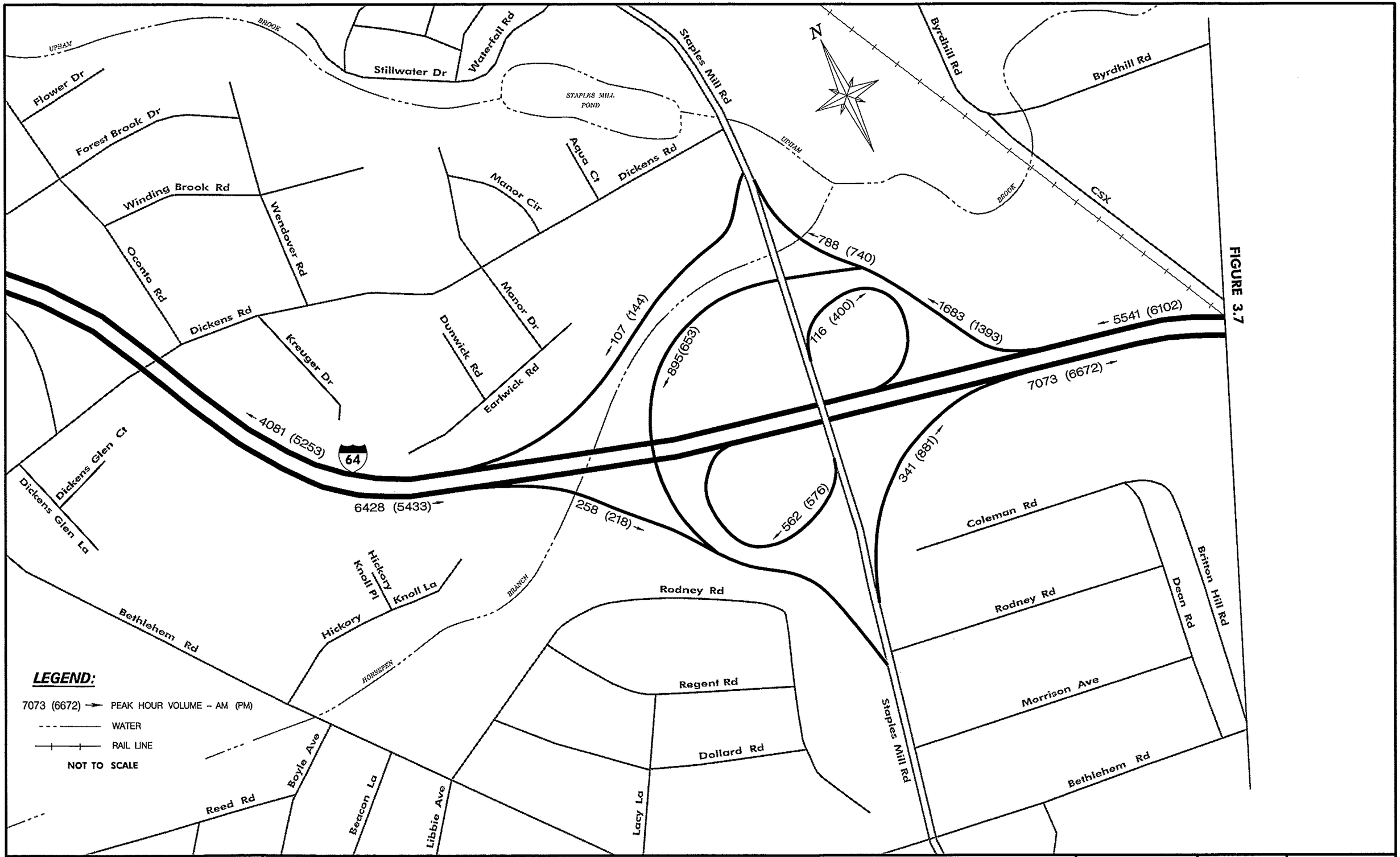


FIGURE 3.7

I-95 / I-64 / I-195 FEASIBILITY STUDY	**1998 EXISTING PEAK HOUR TRAFFIC VOLUMES**	FIGURE 3.8	NOVEMBER 1999	Virginia Department of Transportation

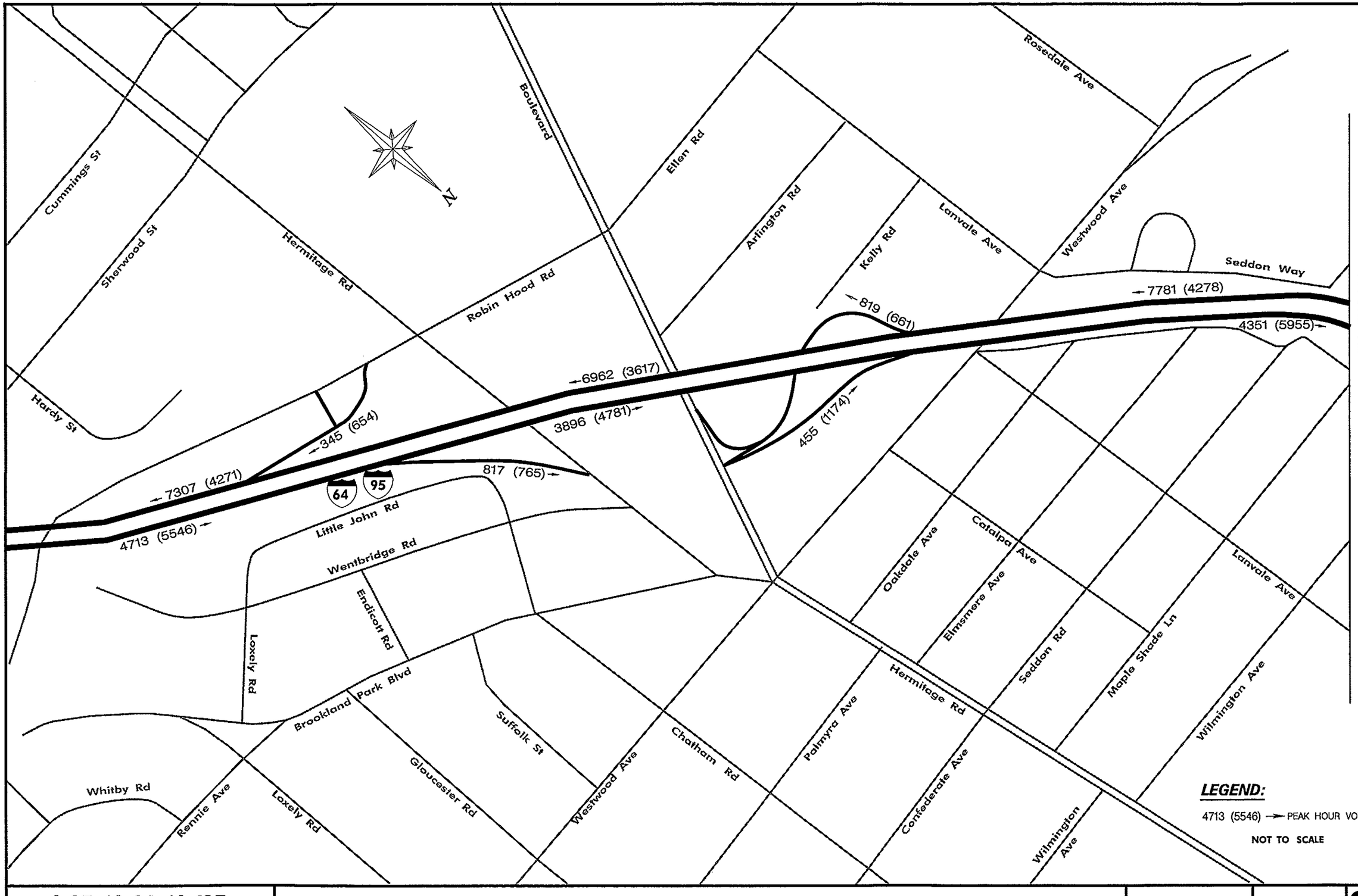
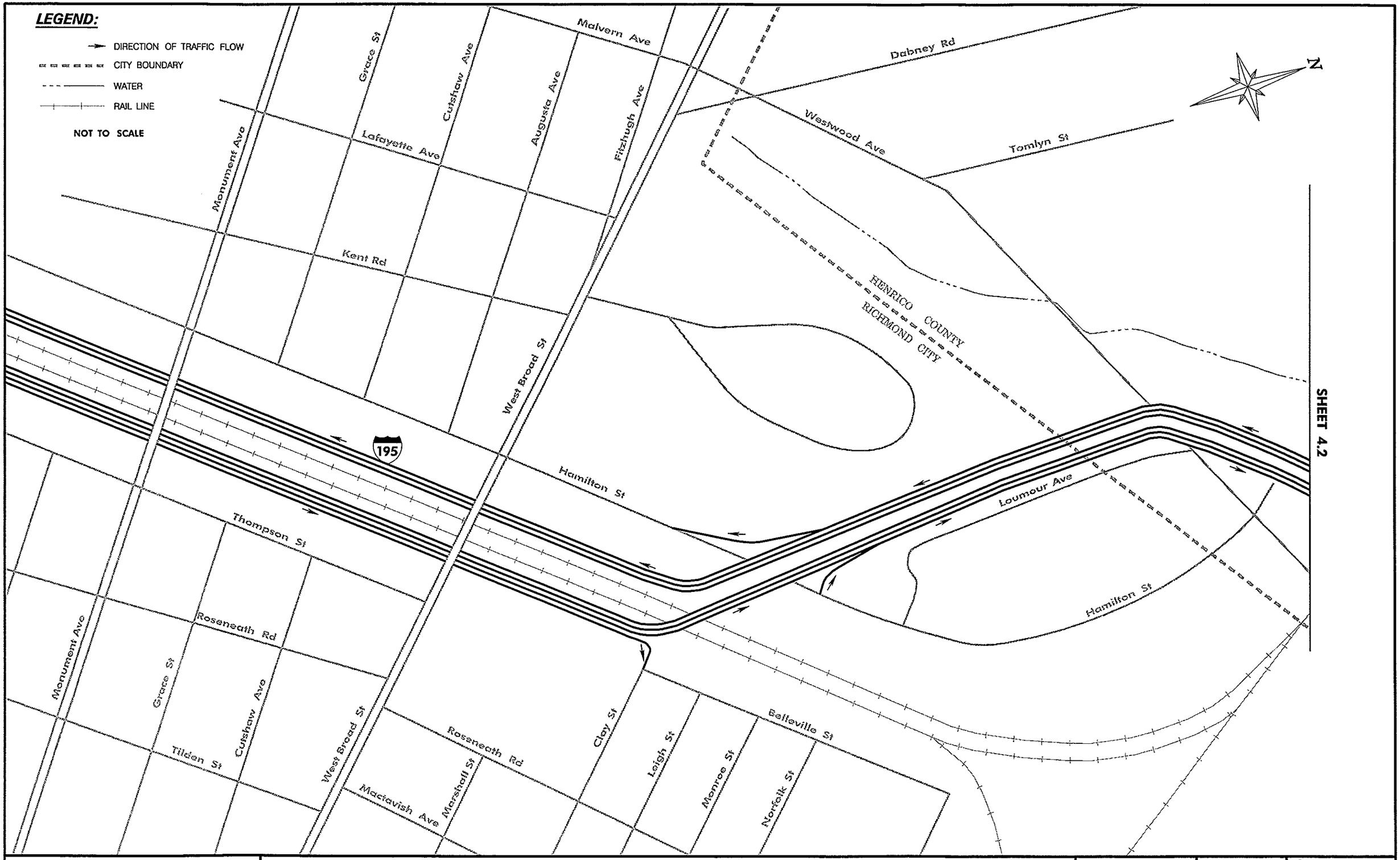


FIGURE 3.2

I-95 / I-64 / I-195 FEASIBILITY STUDY	**1998 EXISTING PEAK HOUR TRAFFIC VOLUMES**	FIGURE 3.9	NOVEMBER 1999	Virginia Department of Transportation VDOT



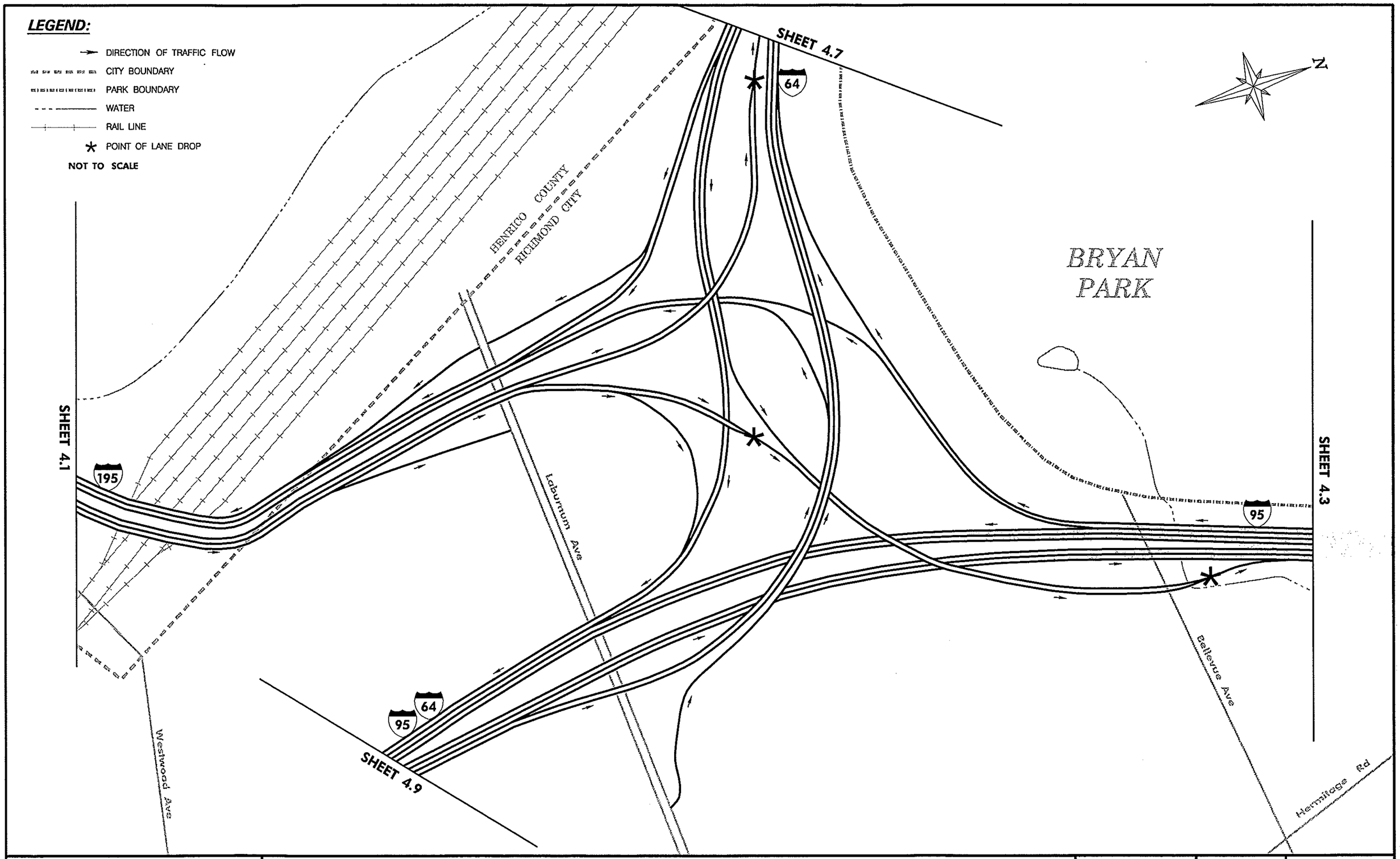
SHEET 4.2

I-95 / I-64 / I-195 FEASIBILITY STUDY	1998 EXISTING LANE CONFIGURATIONS	FIGURE 4.1	NOVEMBER 1999	Virginia Department of Transportation VDOT

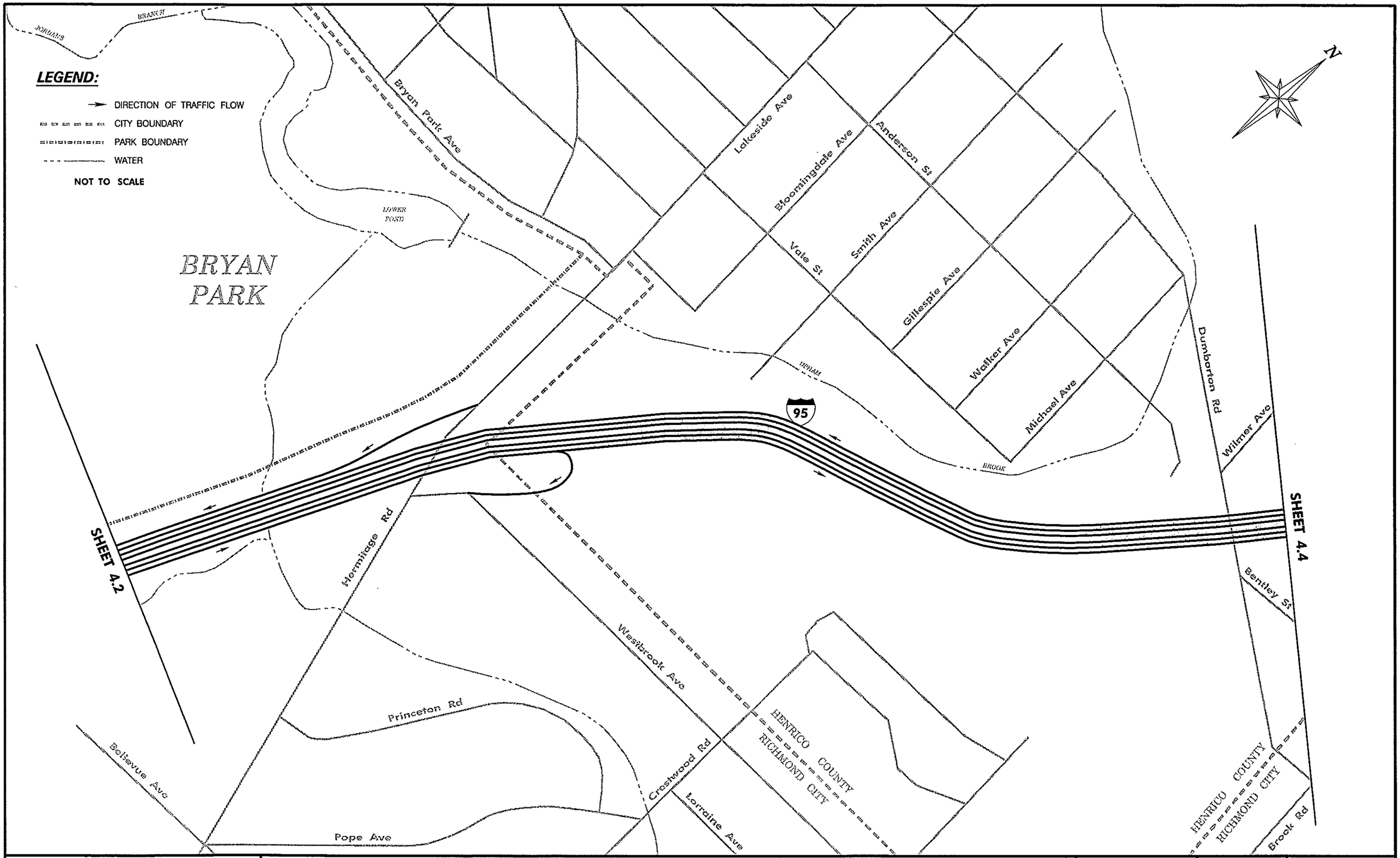
LEGEND:

- DIRECTION OF TRAFFIC FLOW
- CITY BOUNDARY
- PARK BOUNDARY
- WATER
- RAIL LINE
- POINT OF LANE DROP

NOT TO SCALE



I-95 / I-64 / I-195 FEASIBILITY STUDY	1998 EXISTING LANE CONFIGURATIONS	FIGURE 4.2	NOVEMBER 1999	Virginia Department of Transportation



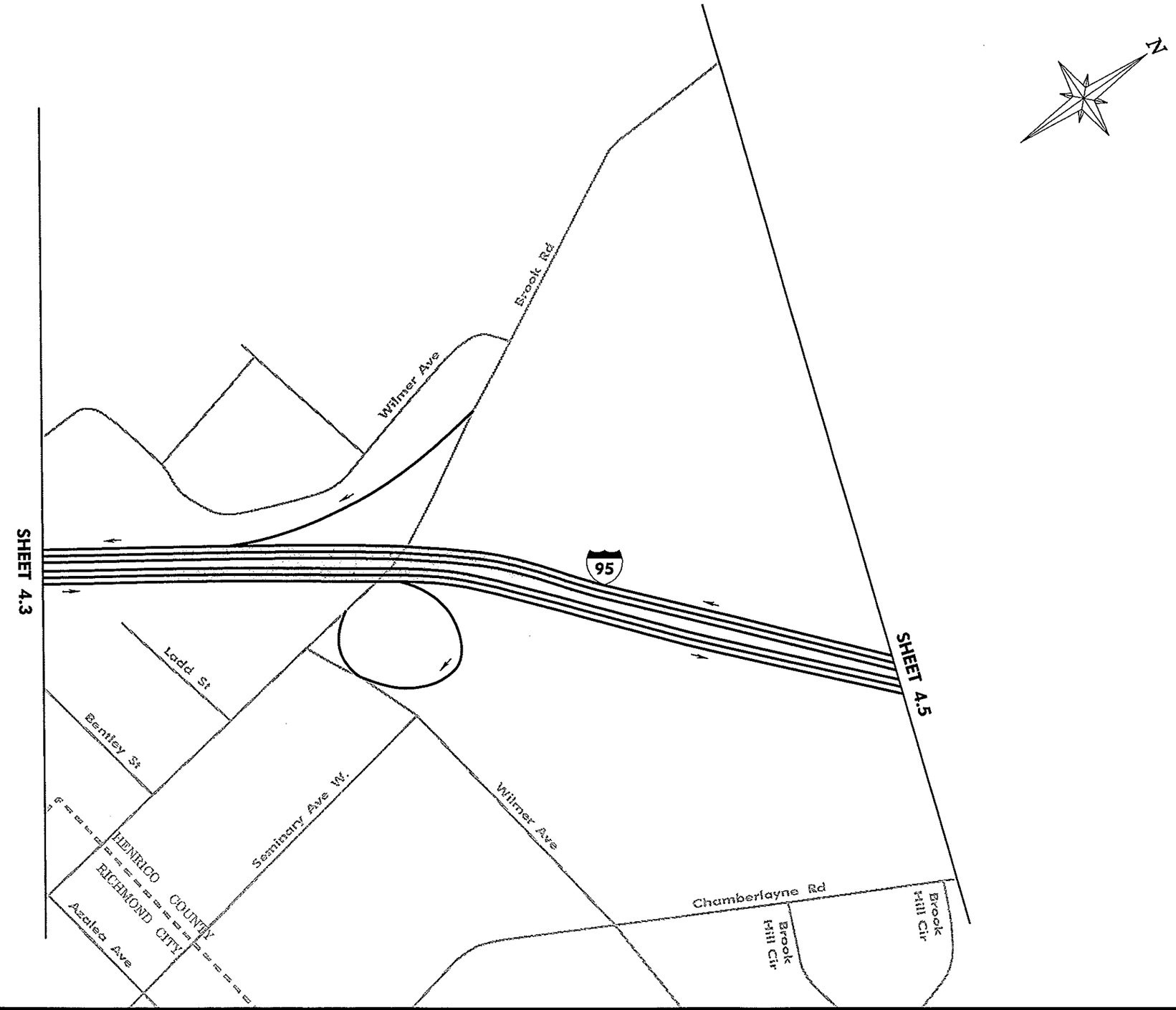
I-95 / I-64 / I-195 FEASIBILITY STUDY	1998 EXISTING LANE CONFIGURATIONS	FIGURE 4.3	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

→ DIRECTION OF TRAFFIC FLOW

CITY BOUNDARY

NOT TO SCALE



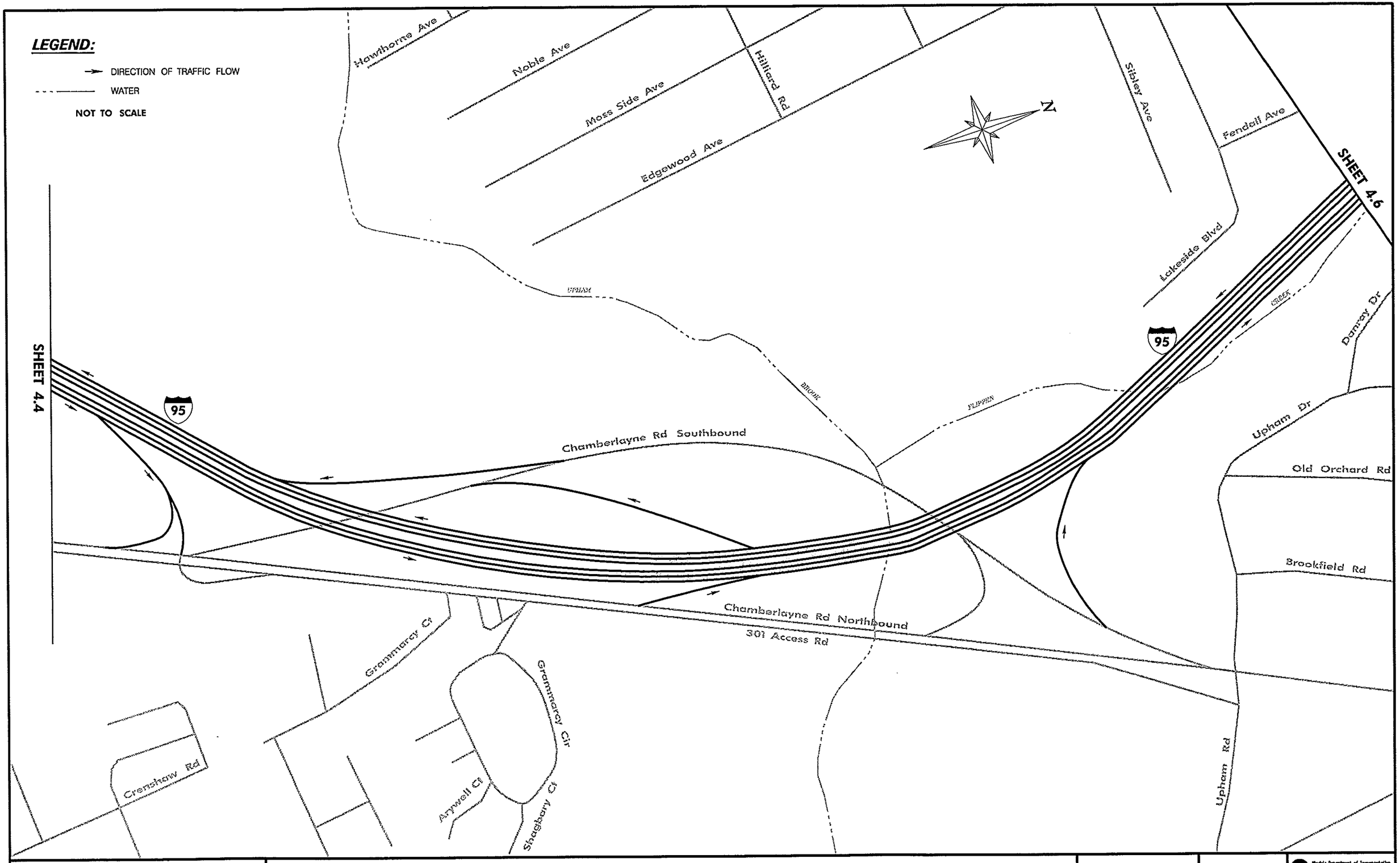
I–95 / I–64 / I–195 FEASIBILITY STUDY	**1998 EXISTING LANE CONFIGURATIONS**	FIGURE 4.4	NOVEMBER 1999	Virginia Department of Transportation

LEGEND:

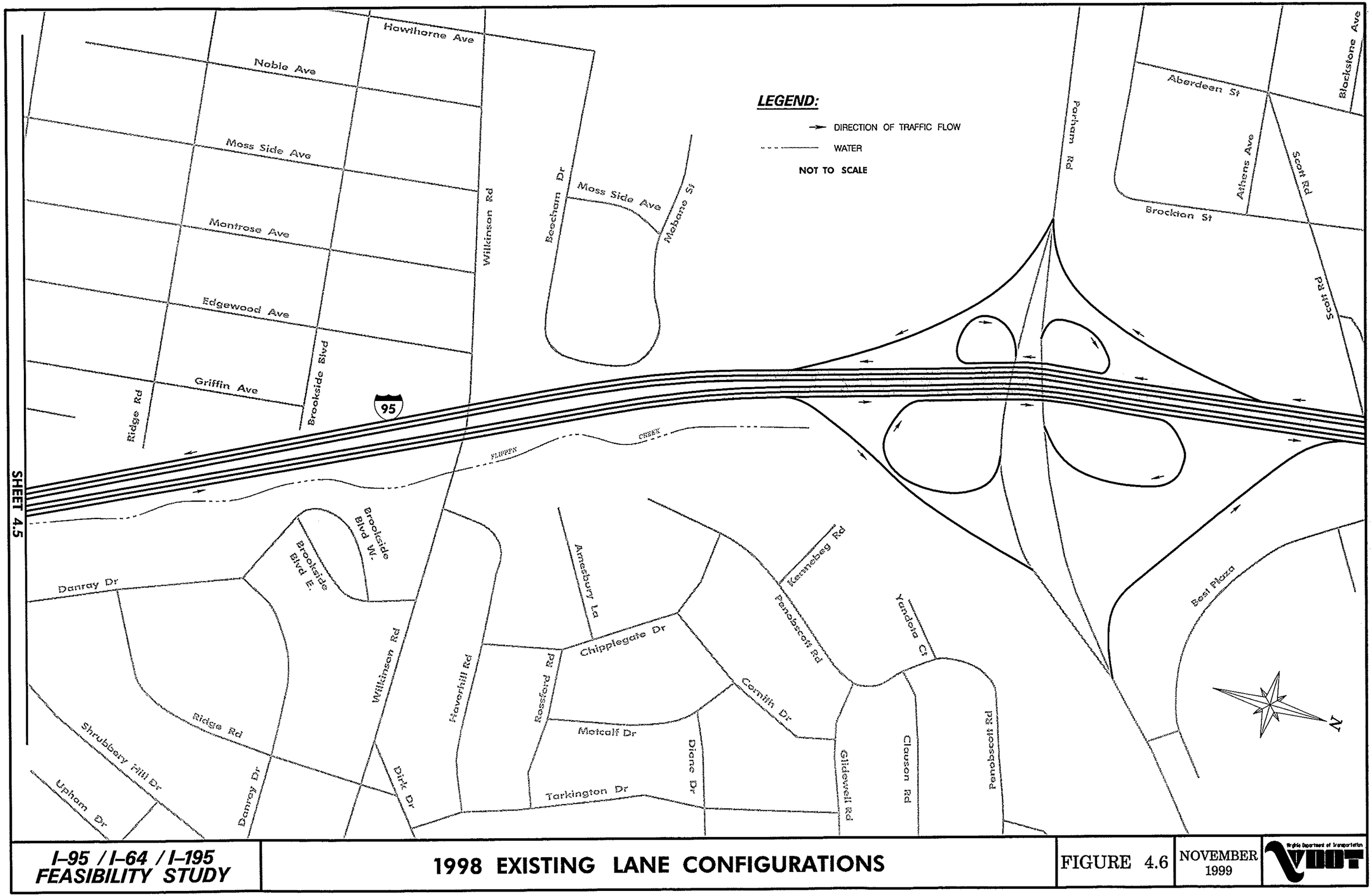
→ DIRECTION OF TRAFFIC FLOW

WATER

NOT TO SCALE



I–95 / I–64 / I–195 FEASIBILITY STUDY	1998 EXISTING LANE CONFIGURATIONS	FIGURE 4.5	NOVEMBER 1999	Virginia Department of Transportation VDOT



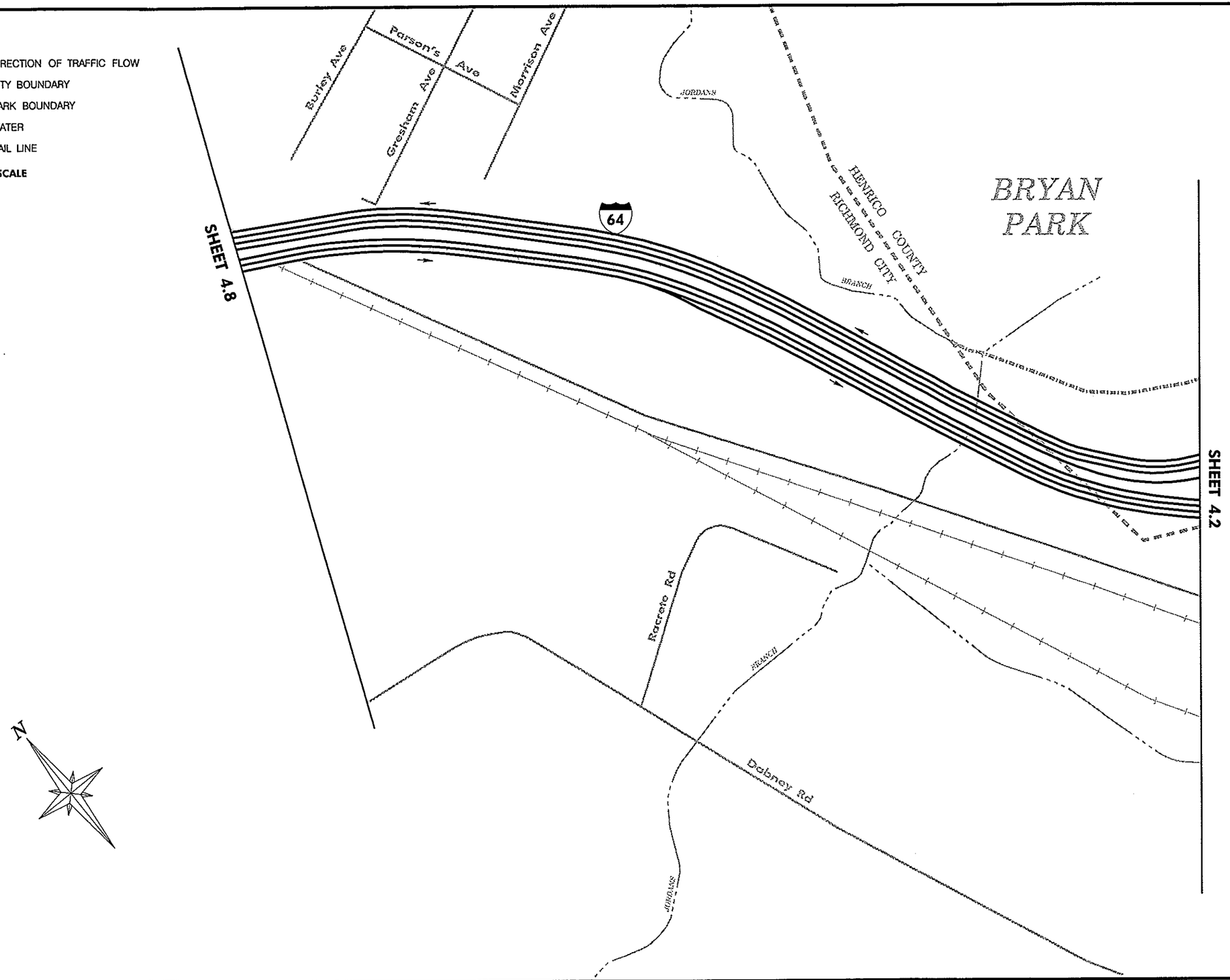
SHEET 4.5

I–95 / I–64 / I–195 FEASIBILITY STUDY	1998 EXISTING LANE CONFIGURATIONS	FIGURE 4.6	NOVEMBER 1999	Virginia Department of Transportation

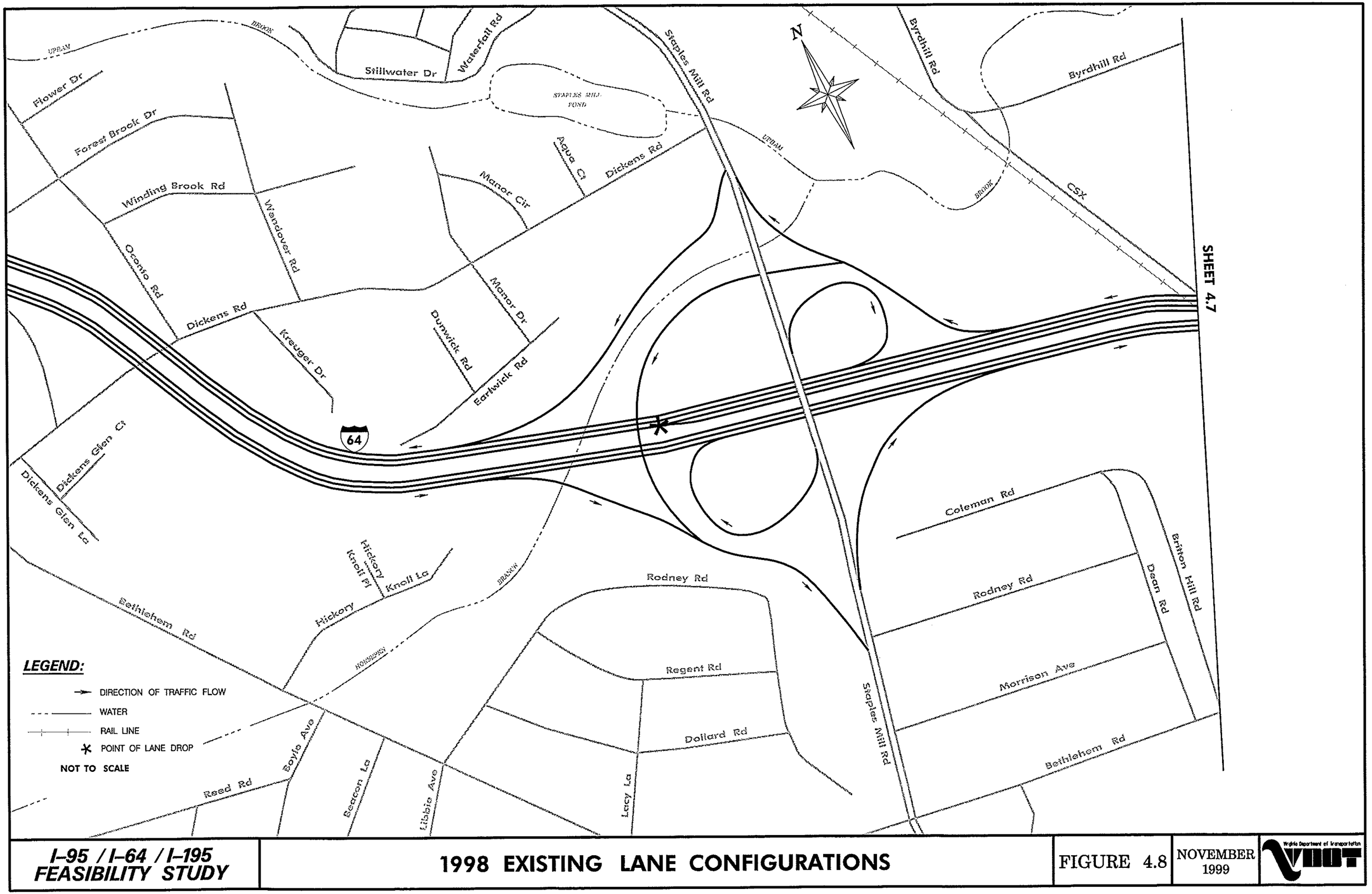
LEGEND:

- DIRECTION OF TRAFFIC FLOW
- CITY BOUNDARY
- PARK BOUNDARY
- WATER
- RAIL LINE

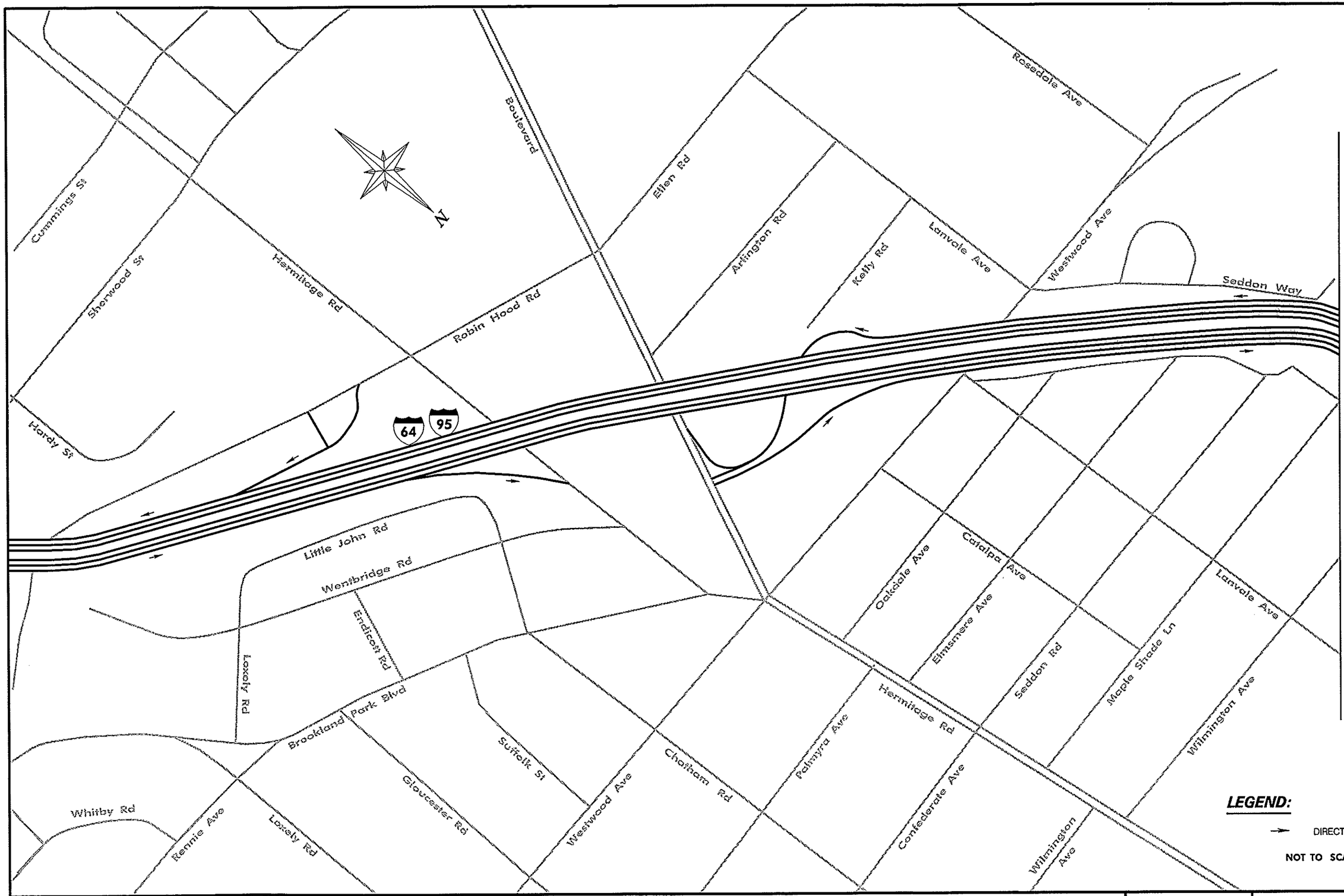
NOT TO SCALE



I-95 / I-64 / I-195 FEASIBILITY STUDY	1998 EXISTING LANE CONFIGURATIONS	FIGURE 4.7	NOVEMBER 1999	Virginia Department of Transportation



I-95 / I-64 / I-195 FEASIBILITY STUDY	**1998 EXISTING LANE CONFIGURATIONS**	FIGURE 4.8	NOVEMBER 1999	Virginia Department of Transportation



SHEET 4.2

I-95 / I-64 / I-195 FEASIBILITY STUDY	1998 EXISTING LANE CONFIGURATIONS	FIGURE 4.9	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

C (C) → LEVEL OF SERVICE – AM (PM)

CITY BOUNDARY

WATER

RAIL LINE

NOT TO SCALE

N

Malvern Ave
Dabney Rd
Grace St
Cutshaw Ave
Augusta Ave
Fitzhugh Ave
Westwood Ave
Tomlyn St
Monument Ave
Lafayette Ave
Kent Rd
West Broad St
HENRICO COUNTY
RICHMOND CITY
195
Hamilton St
D (D)
D (D) Laumour Ave
C (D)
C (C)
Thompson St
Roseneath Rd
B (A)
Belleville St
Clay St
Leigh St
Monroe St
Norfolk St
Tilden St
Mactavish Ave
Marshall St

FIGURE 5.2

I–95 / I–64 / I–195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR LEVEL OF SERVICE	FIGURE 5.1	NOVEMBER 1999	Virginia Department of Transportation

LEGEND:

B (B) → LEVEL OF SERVICE - AM (PM)

E/D (D/D) → WEAVING VEHICLES / NON-WEAVING VEHICLES

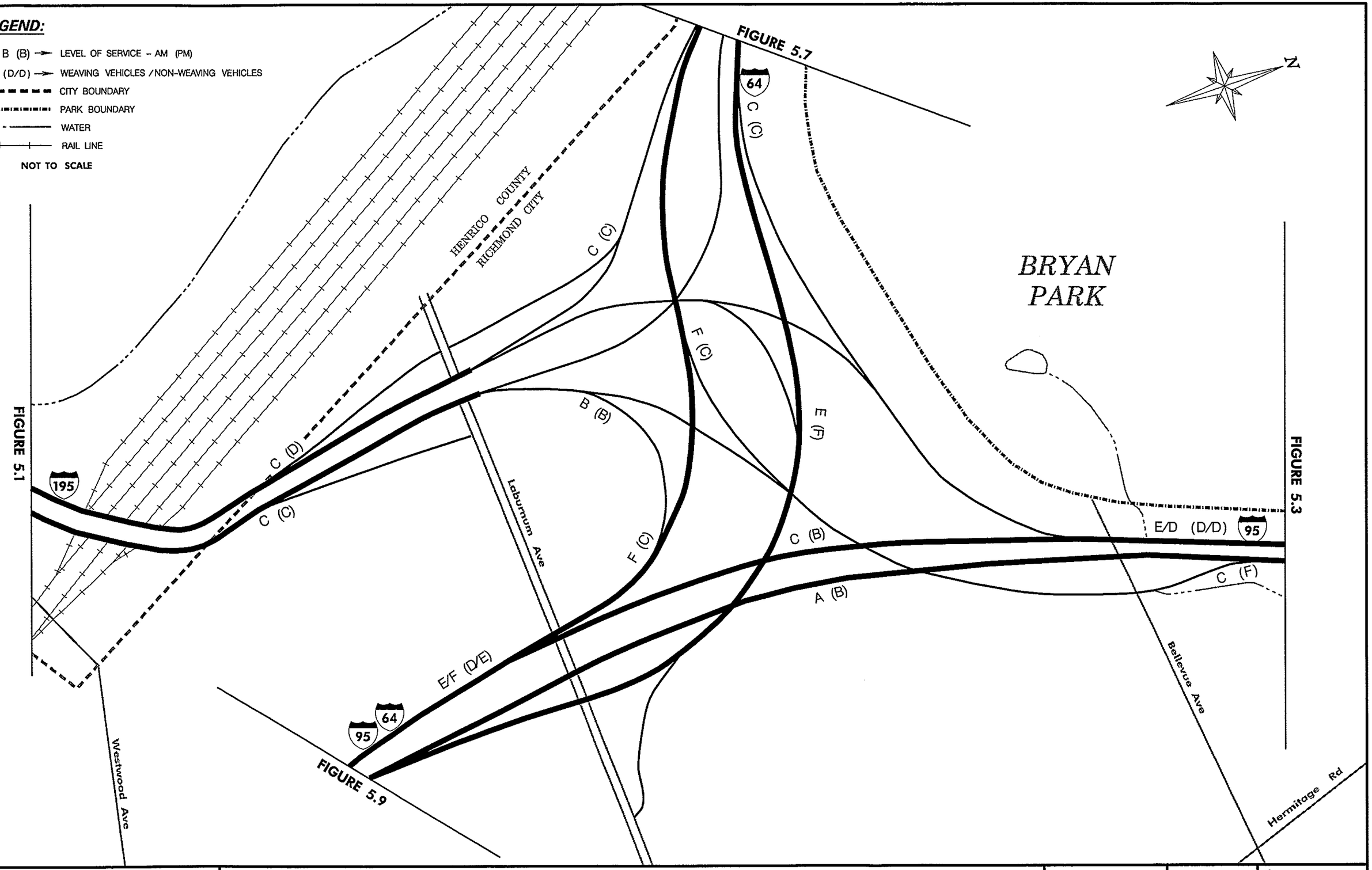
CITY BOUNDARY

PARK BOUNDARY

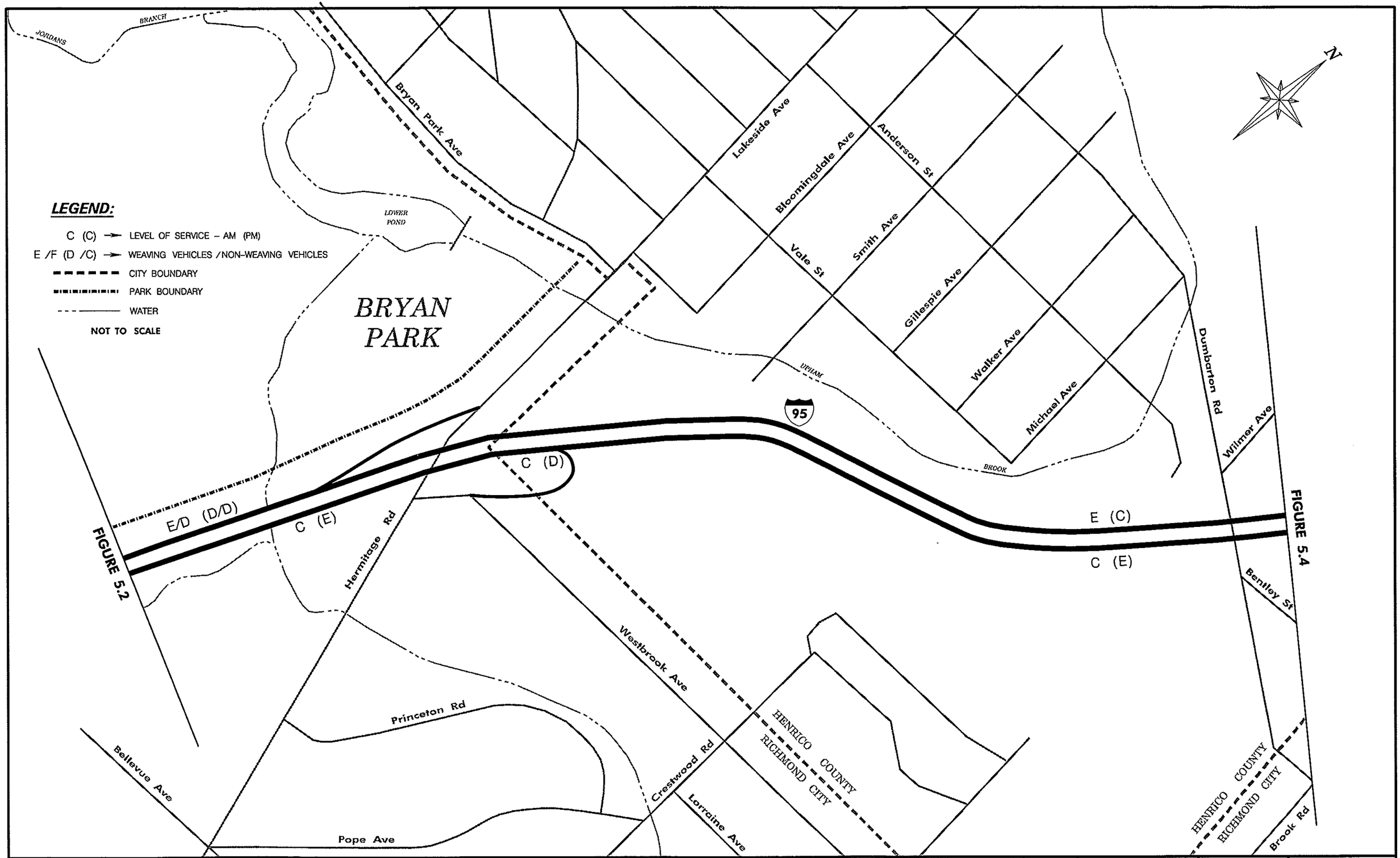
WATER

RAIL LINE

NOT TO SCALE



I-95 / I-64 / I-195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR LEVEL OF SERVICE	FIGURE 5.2	NOVEMBER 1999	Virginia Department of Transportation



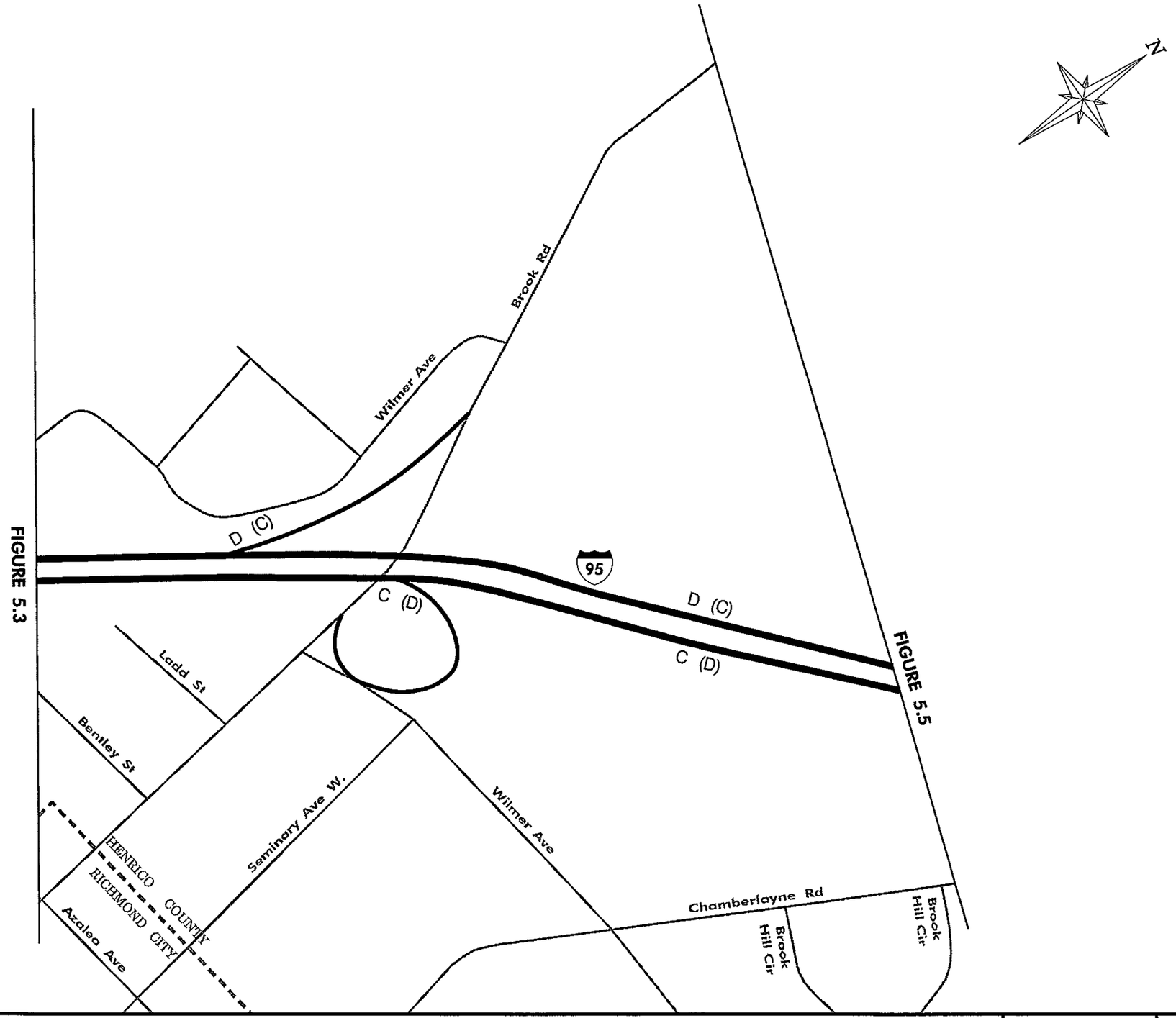
I-95 / I-64 / I-195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR LEVEL OF SERVICE	FIGURE 5.3	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

C (C) LEVEL OF SERVICE – AM (PM)

CITY BOUNDARY

NOT TO SCALE



I–95 / I–64 / I–195 FEASIBILITY STUDY	**1998 EXISTING PEAK HOUR LEVEL OF SERVICE**	FIGURE 5.4	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

C (D) → LEVEL OF SERVICE – AM (PM)

WATER

NOT TO SCALE

Hawthorne Ave

Noble Ave

Moss Side Ave

Hilliard Rd

Edgewood Ave

Sibley Ave

Fendall Ave

Lakeside Blvd

SHEET 5.6

SHEET 5.4

95

UPHAM BROOK

FLIPPEN CREEK

Chamberlayne Rd Southbound

Chamberlayne Rd Northbound

301 Access Rd

B (C)

C (B)

C (C)

C (D)

D (C)

B (D)

Damray Dr

Upham Dr

Old Orchard Rd

Brookfield Rd

Upham Rd

Grammarcy Ct

Grammarcy Cir

Crenshaw Rd

Arywell Ct

Shagbary Ct

I–95 / I–64 / I–195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR LEVEL OF SERVICE	FIGURE 5.5	NOVEMBER 1999	Virginia Department of Transportation VDOT

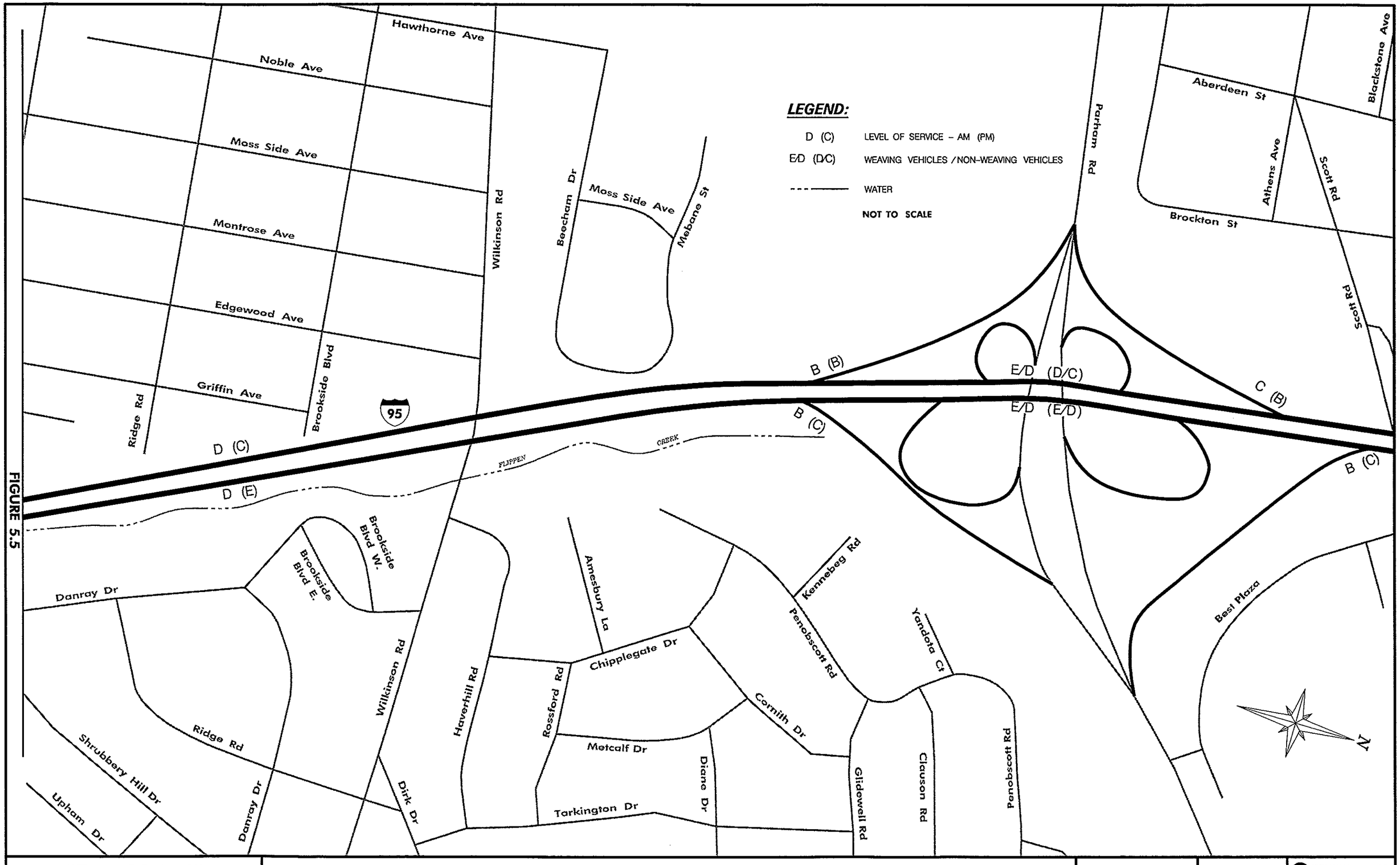


FIGURE 5.5

I-95 / I-64 / I-195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR LEVEL OF SERVICE	FIGURE 5.6	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

D (E) LEVEL OF SERVICE – AM (PM)

CITY BOUNDARY

PARK BOUNDARY

WATER

RAIL LINE

NOT TO SCALE

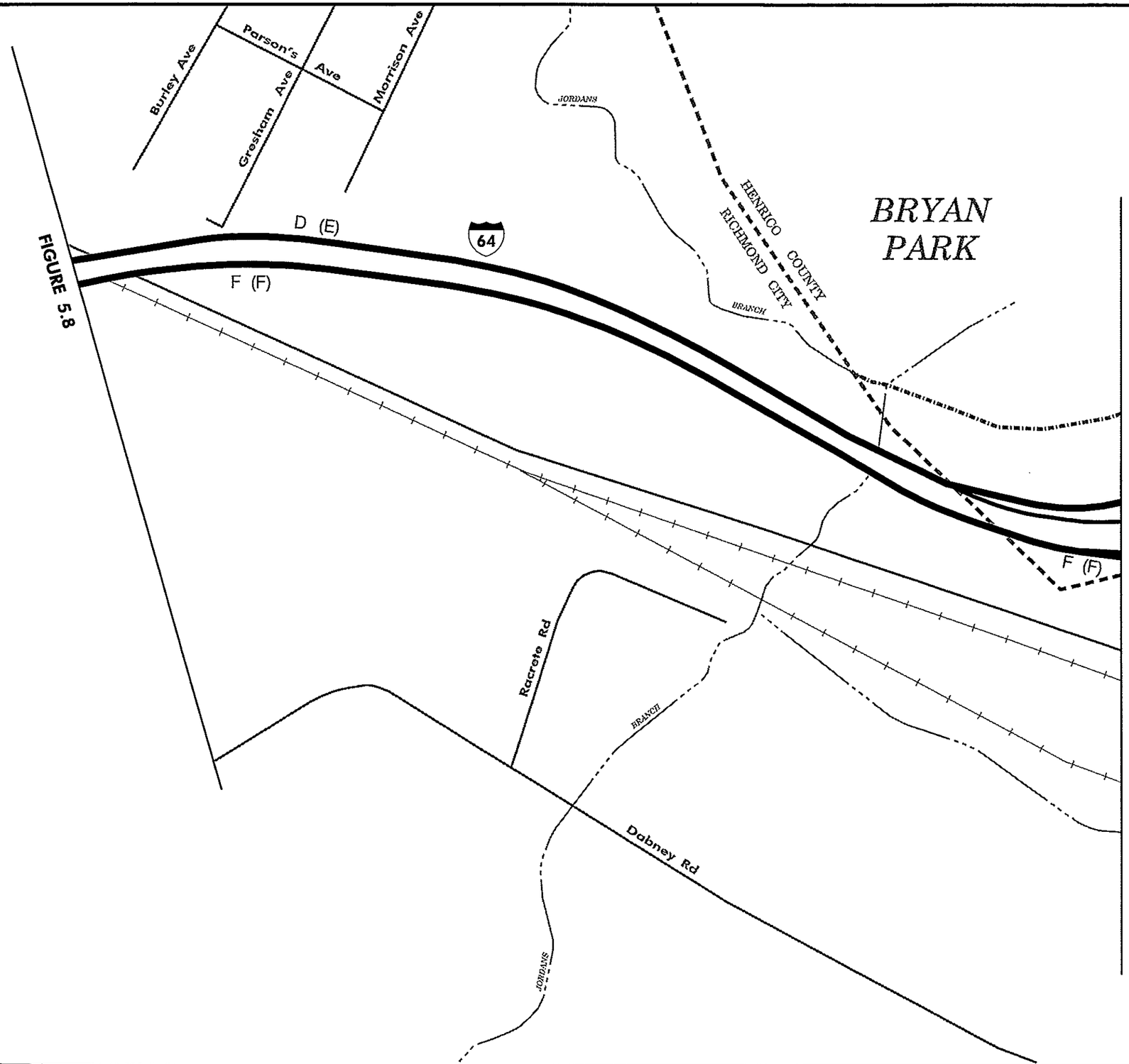


FIGURE 5.2

I–95 / I–64 / I–195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR LEVEL OF SERVICE	FIGURE 5.7	NOVEMBER 1999	Virginia Department of Transportation VDOT

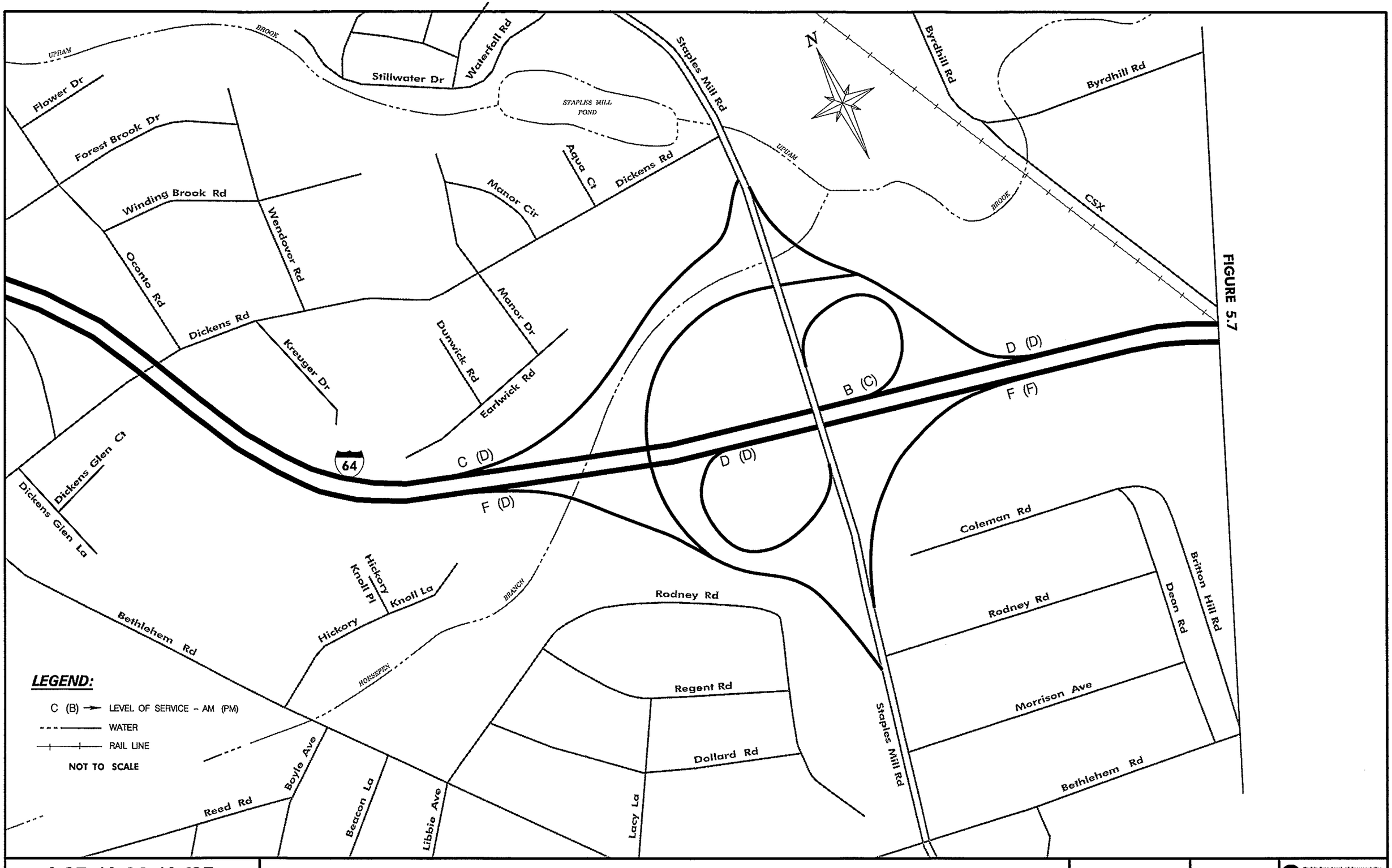


FIGURE 5.7

I-95 / I-64 / I-195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR LEVEL OF SERVICE	FIGURE 5.8	NOVEMBER 1999	Virginia Department of Transportation VDOT

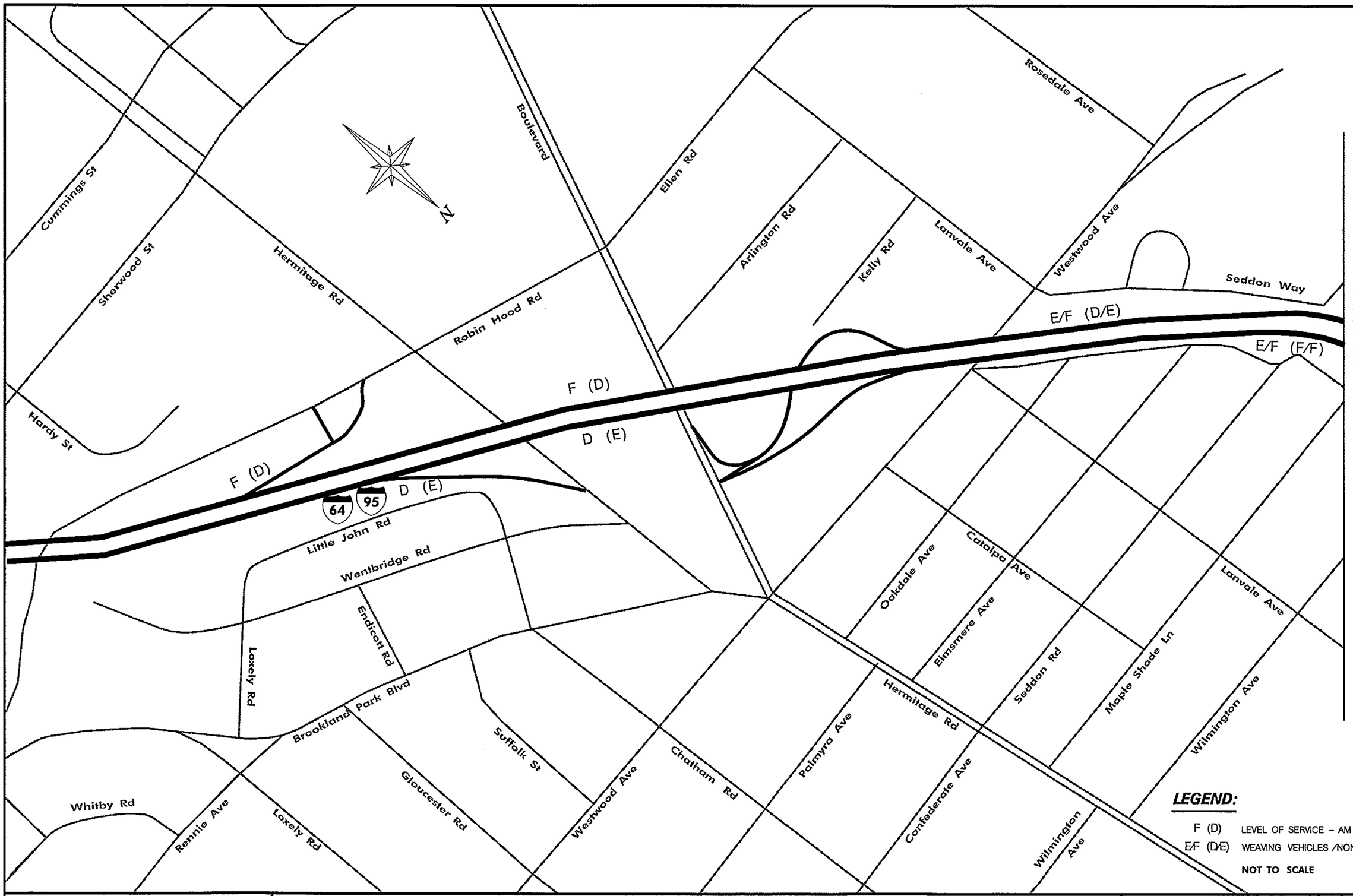


FIGURE 5.2

I-95 / I-64 / I-195 FEASIBILITY STUDY	1998 EXISTING PEAK HOUR LEVEL OF SERVICE	FIGURE 5.9	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

45 (0) [0%] CRASH RATE (FATALITY RATE)
[% OF CRASHES CAUSED BY CONGESTION]

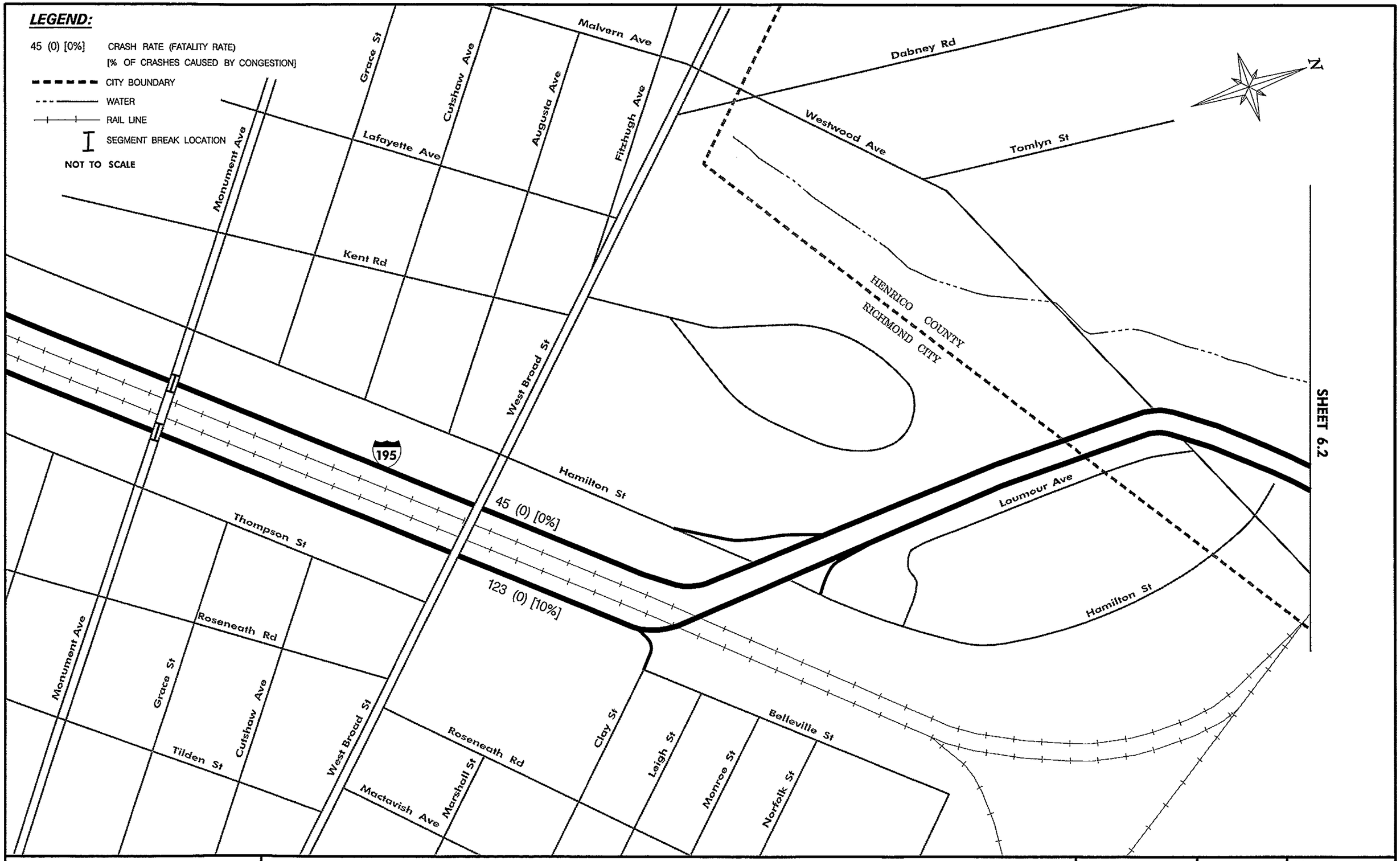
CITY BOUNDARY

WATER

RAIL LINE

SEGMENT BREAK LOCATION

NOT TO SCALE



SHEET 6.2

I-95 / I-64 / I-195 FEASIBILITY STUDY	**1994 – 1996 CRASH DATA**	FIGURE 6.1	NOVEMBER 1999	Virginia Department of Transportation

LEGEND:

123 (0) [10%] CRASH RATE (FATALITY RATES)
[% OF CRASHES CAUSED BY CONGESTION]

CITY BOUNDARY

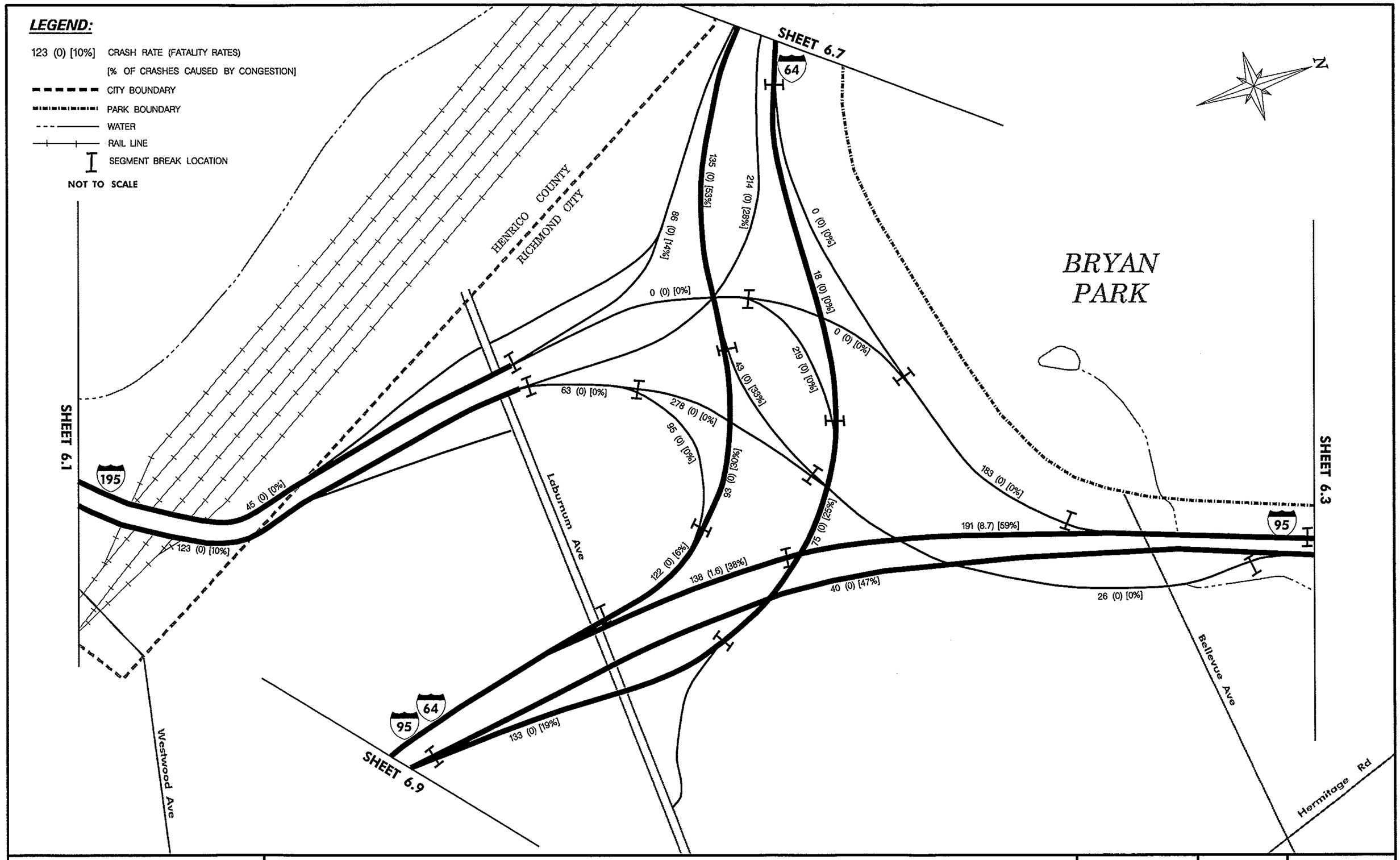
PARK BOUNDARY

WATER

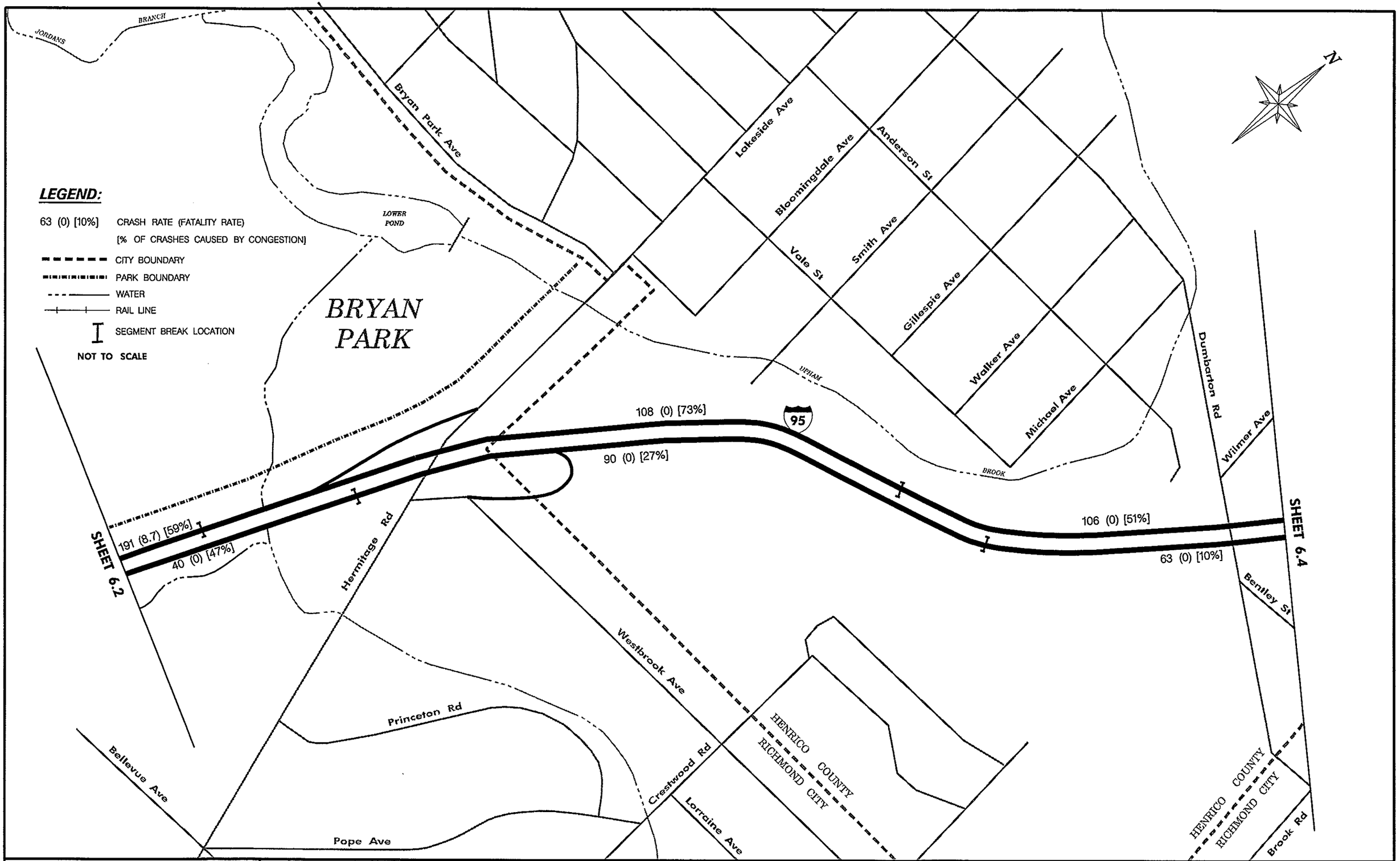
RAIL LINE

SEGMENT BREAK LOCATION

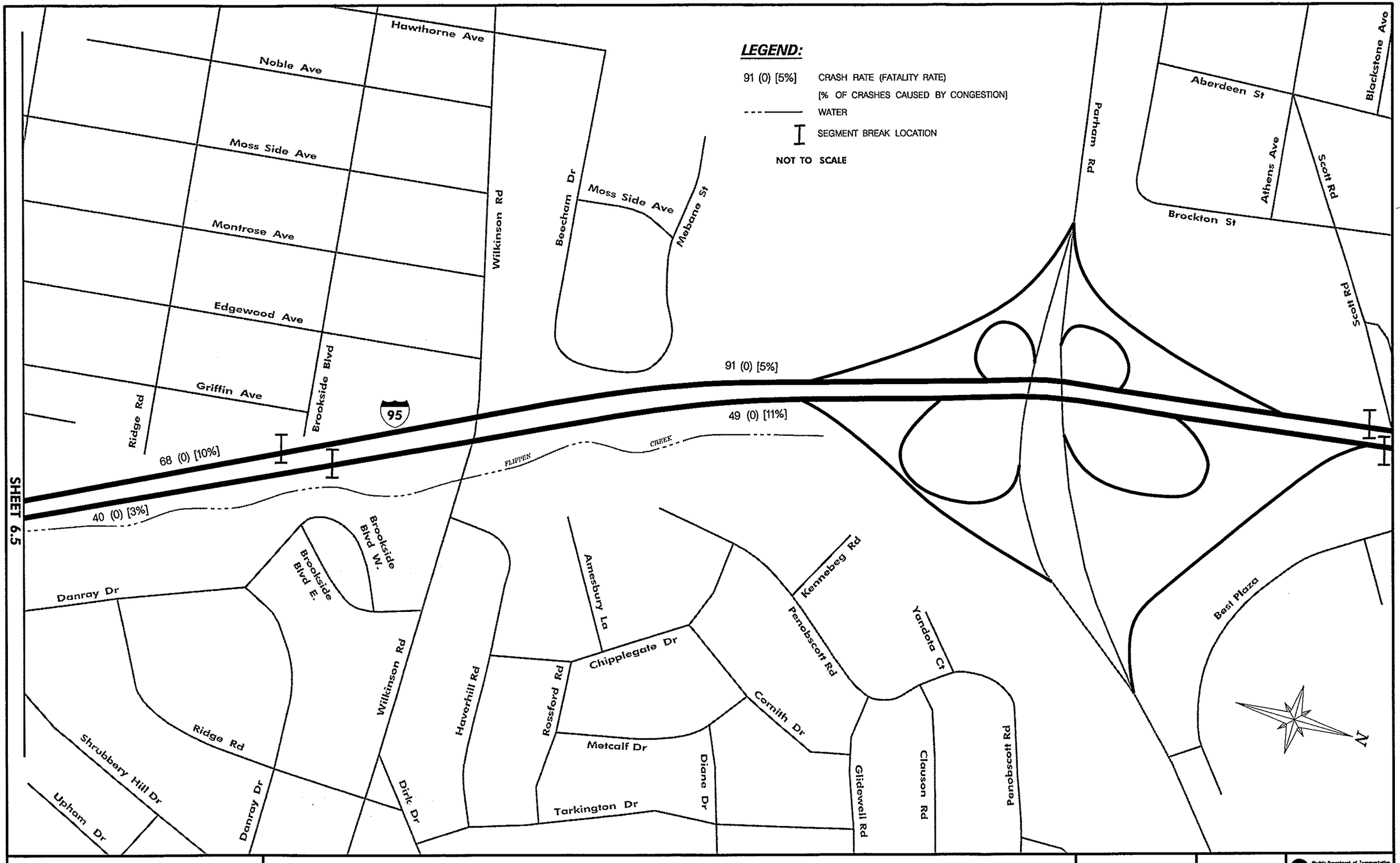
NOT TO SCALE



I–95 / I–64 / I–195 FEASIBILITY STUDY	1994 – 1996 CRASH DATA	FIGURE 6.2	NOVEMBER 1999	Virginia Department of Transportation VDOT



I-95 / I-64 / I-195 FEASIBILITY STUDY	**1994 – 1996 CRASH DATA**	FIGURE 6.3	NOVEMBER 1999	Virginia Department of Transportation VDOT



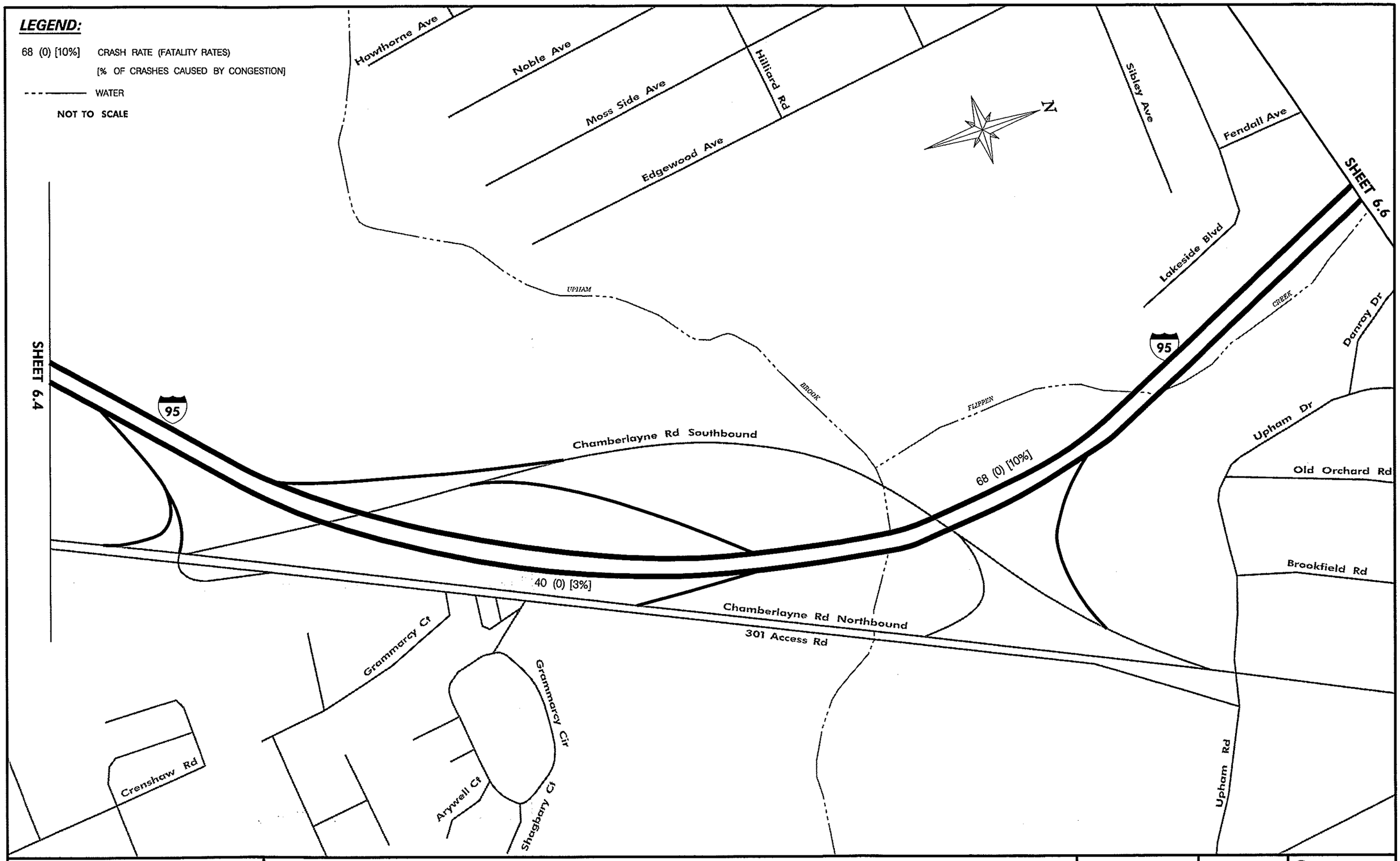
I-95 / I-64 / I-195 FEASIBILITY STUDY	**1994 – 1996 CRASH DATA**	FIGURE 6.6	NOVEMBER 1999	Virginia Department of Transportation

LEGEND:

68 (0) [10%] CRASH RATE (FATALITY RATES)
[% OF CRASHES CAUSED BY CONGESTION]

WATER

NOT TO SCALE



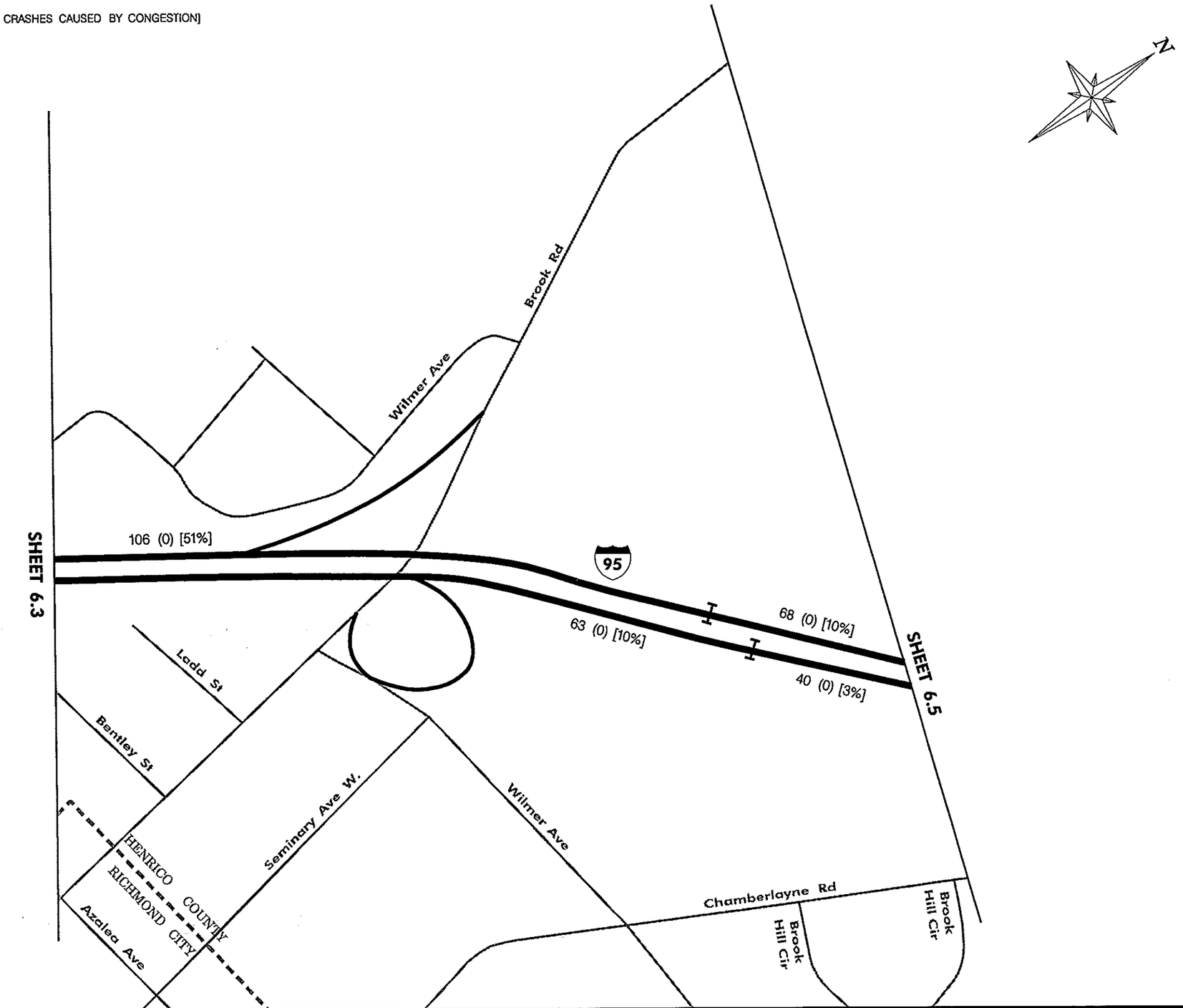
I–95 / I–64 / I–195 FEASIBILITY STUDY	**1994 – 1996 CRASH DATA**	FIGURE 6.5	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

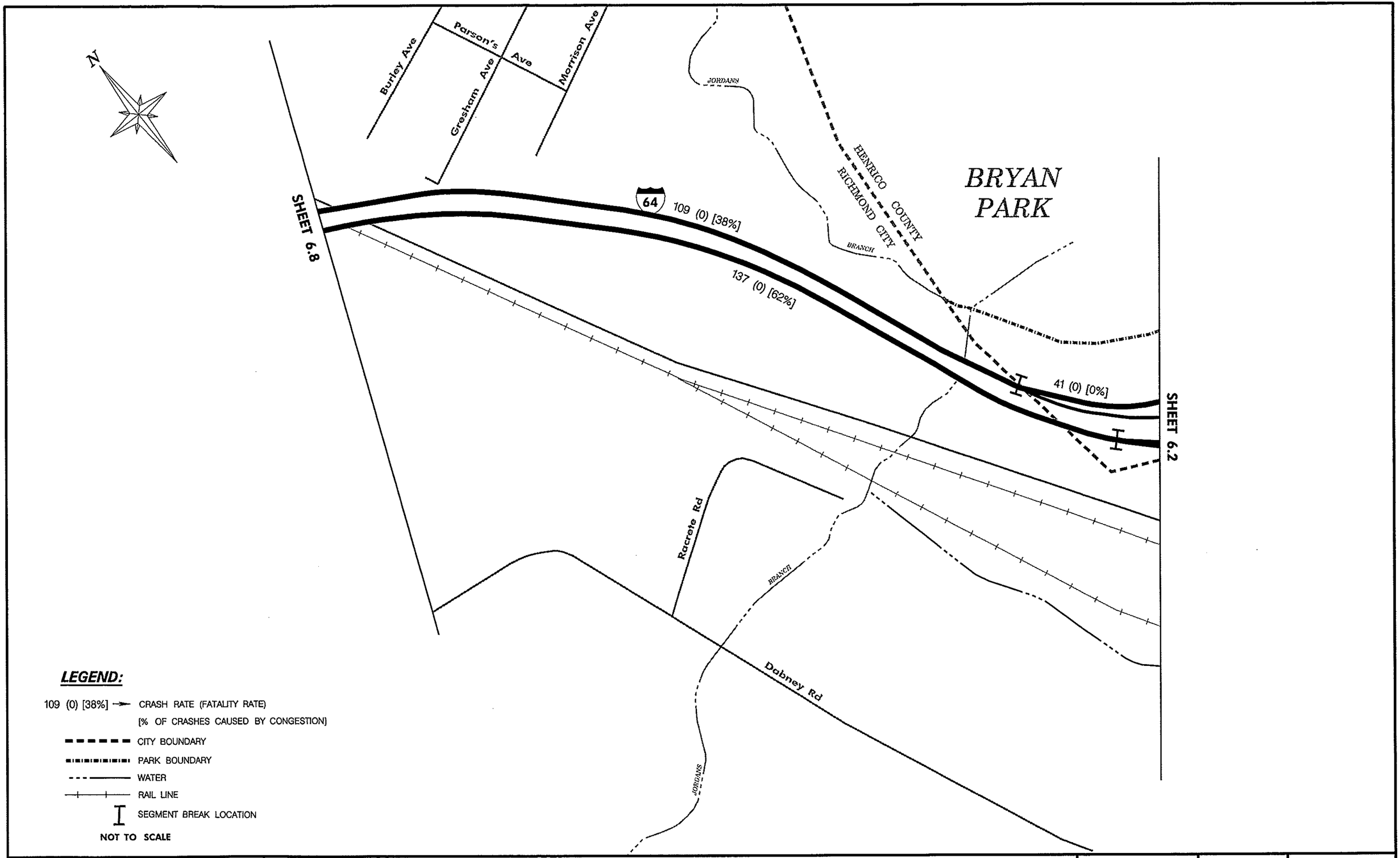
63 (0) [10%] CRASH RATE (FATALITY RATE) [% OF CRASHES CAUSED BY CONGESTION]

I SEGMENT BREAK LOCATION

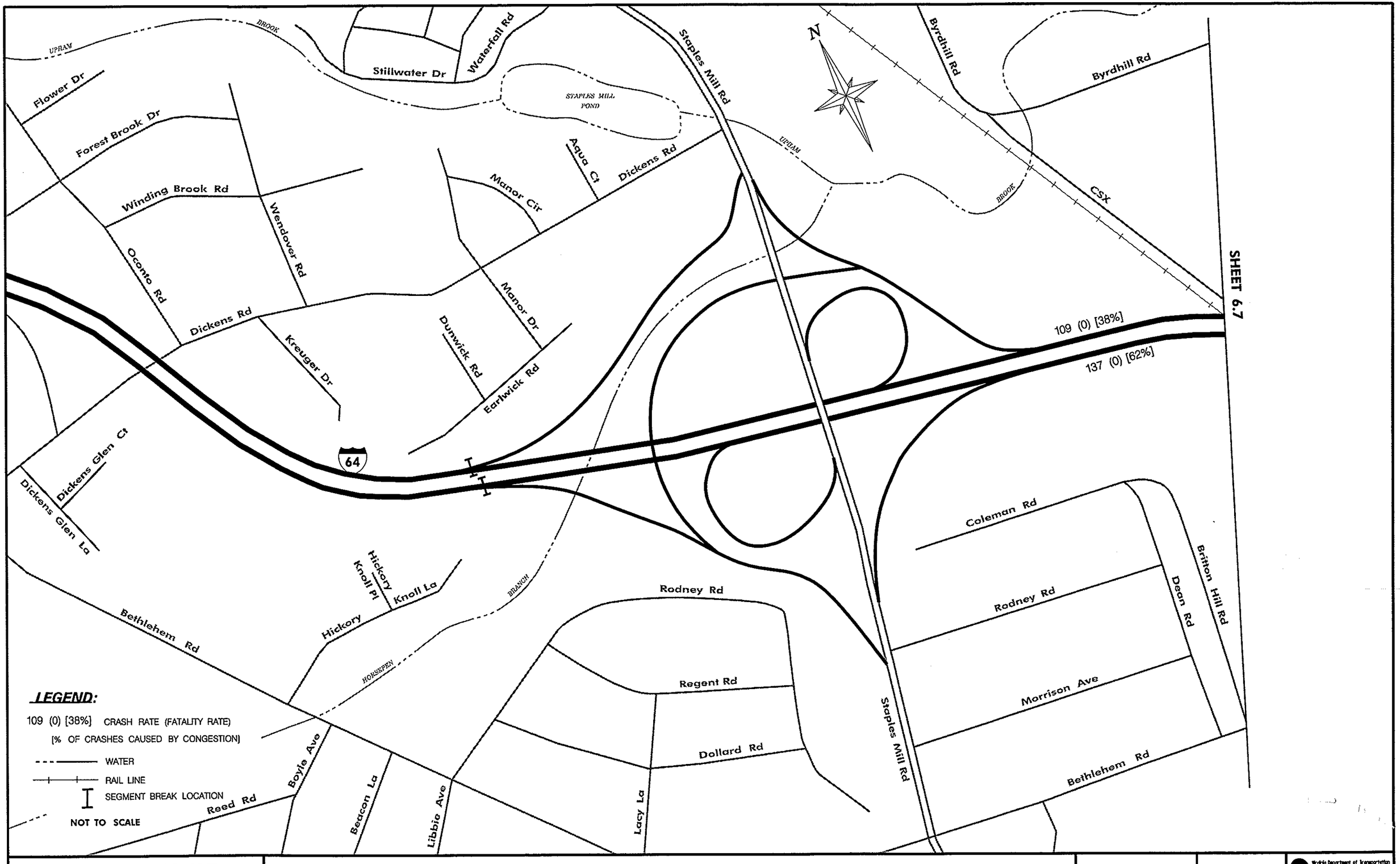
NOT TO SCALE



I–95 / I–64 / I–195 FEASIBILITY STUDY	**1994 – 1996 CRASH DATA**	FIGURE 6.4	NOVEMBER 1999	Virginia Department of Transportation VDOT



I–95 / I–64 / I–195 FEASIBILITY STUDY	1994 – 1996 CRASH DATA	FIGURE 6.7	NOVEMBER 1999	Virginia Department of Transportation

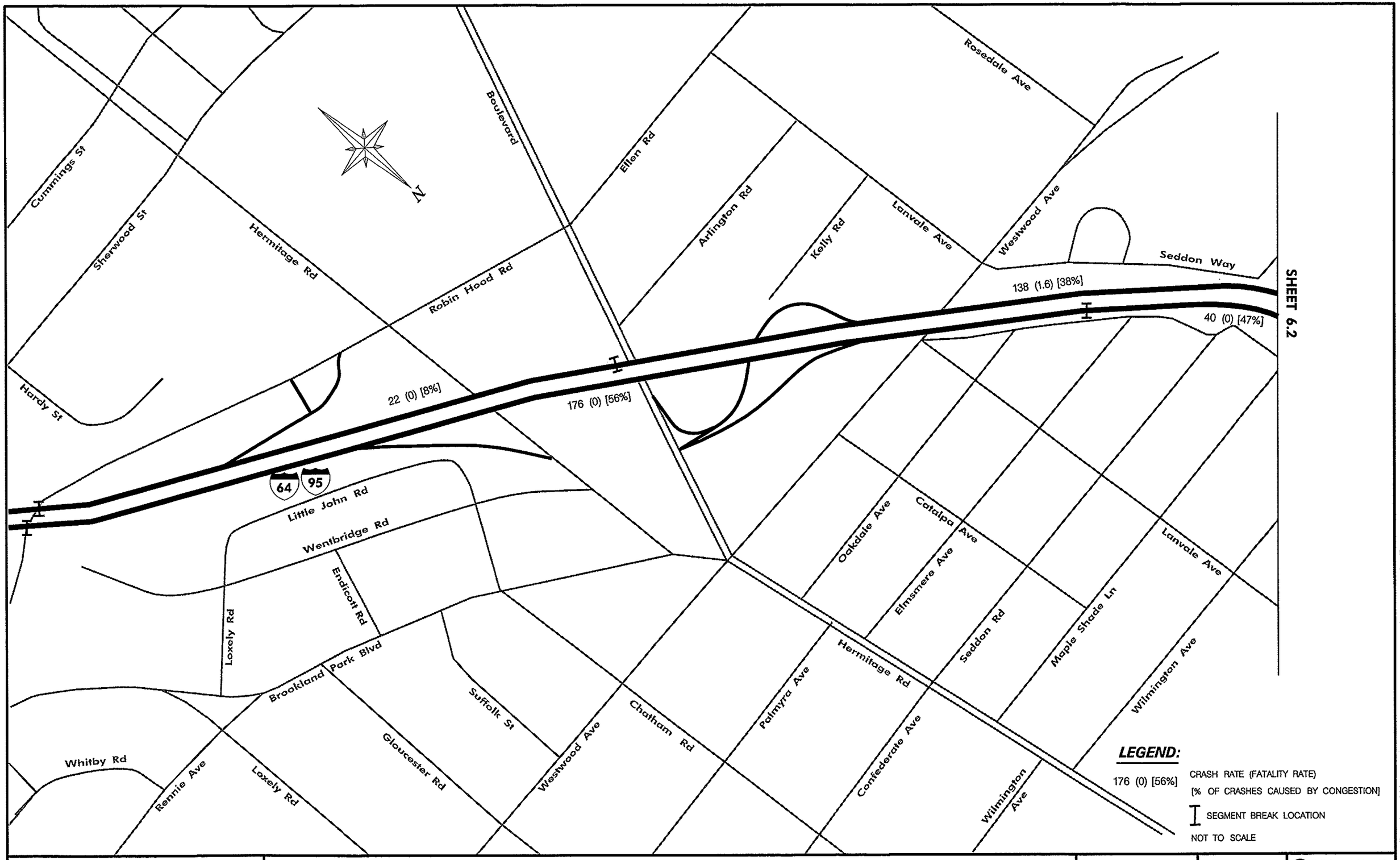


I-95 / I-64 / I-195 FEASIBILITY STUDY

1994 – 1996 CRASH DATA

FIGURE 6.8 | NOVEMBER 1999

Virginia Department of Transportation

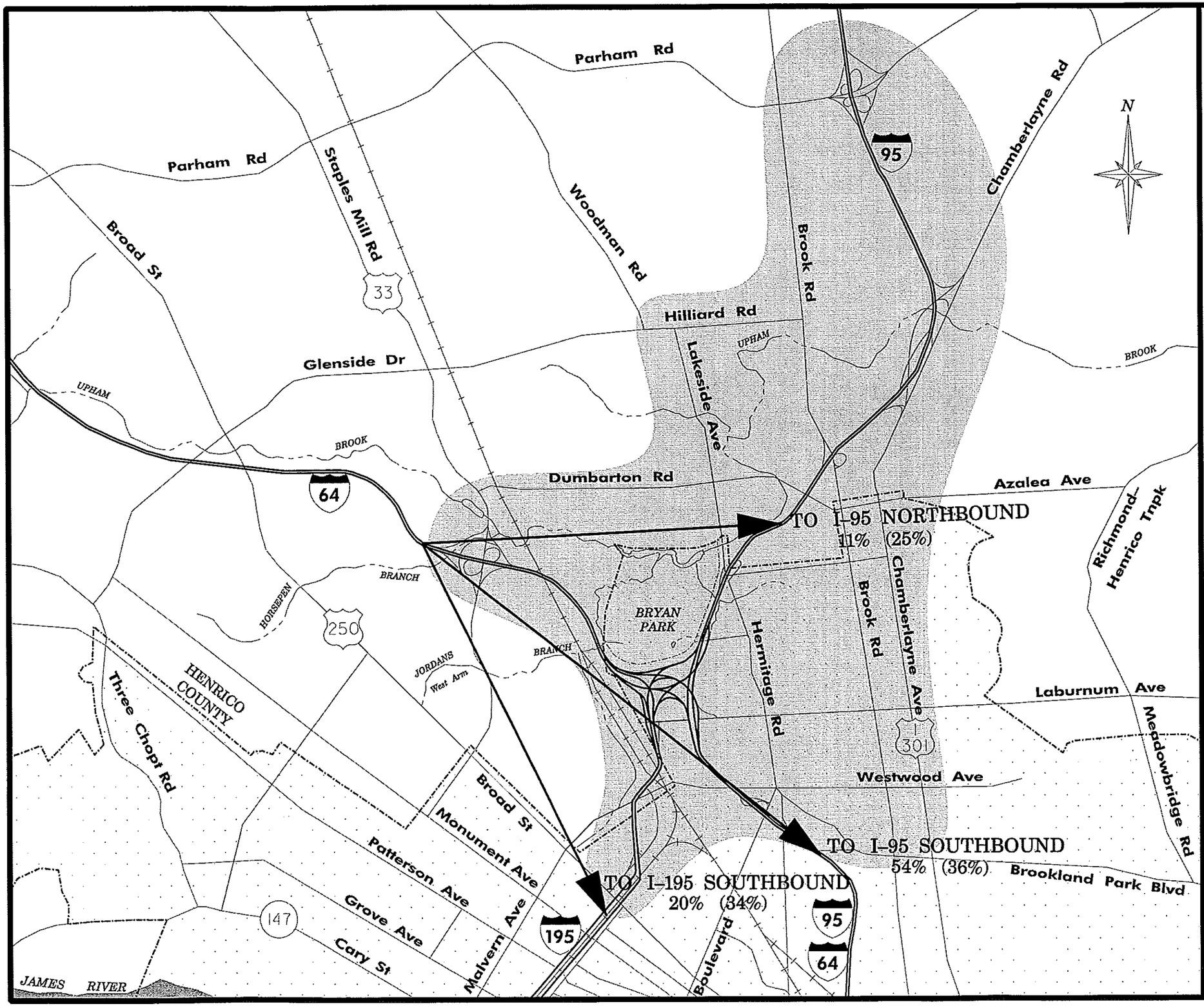


SHEET 6.2

I–95 / I–64 / I–195 FEASIBILITY STUDY	1994 – 1996 CRASH DATA	FIGURE 6.9	NOVEMBER 1999	Virginia Department of Transportation

I–95 / I–64 / I–195 FEASIBILITY STUDY

FIGURE 7.1
ORIGIN–DESTINATIONS FROM I–64 EASTBOUND



LEGEND:

- RAIL LINES
- PARK BOUNDARY
- WATER
- CITY OF RICHMOND
- STUDY AREA

TRAFFIC DESTINATION PATTERNS

- ↓ 54% (36%) – AM (PM)
- 15% EXITING WITHIN STUDY AREA – AM
- 5% EXITING WITHIN STUDY AREA – PM

NOVEMBER 1999

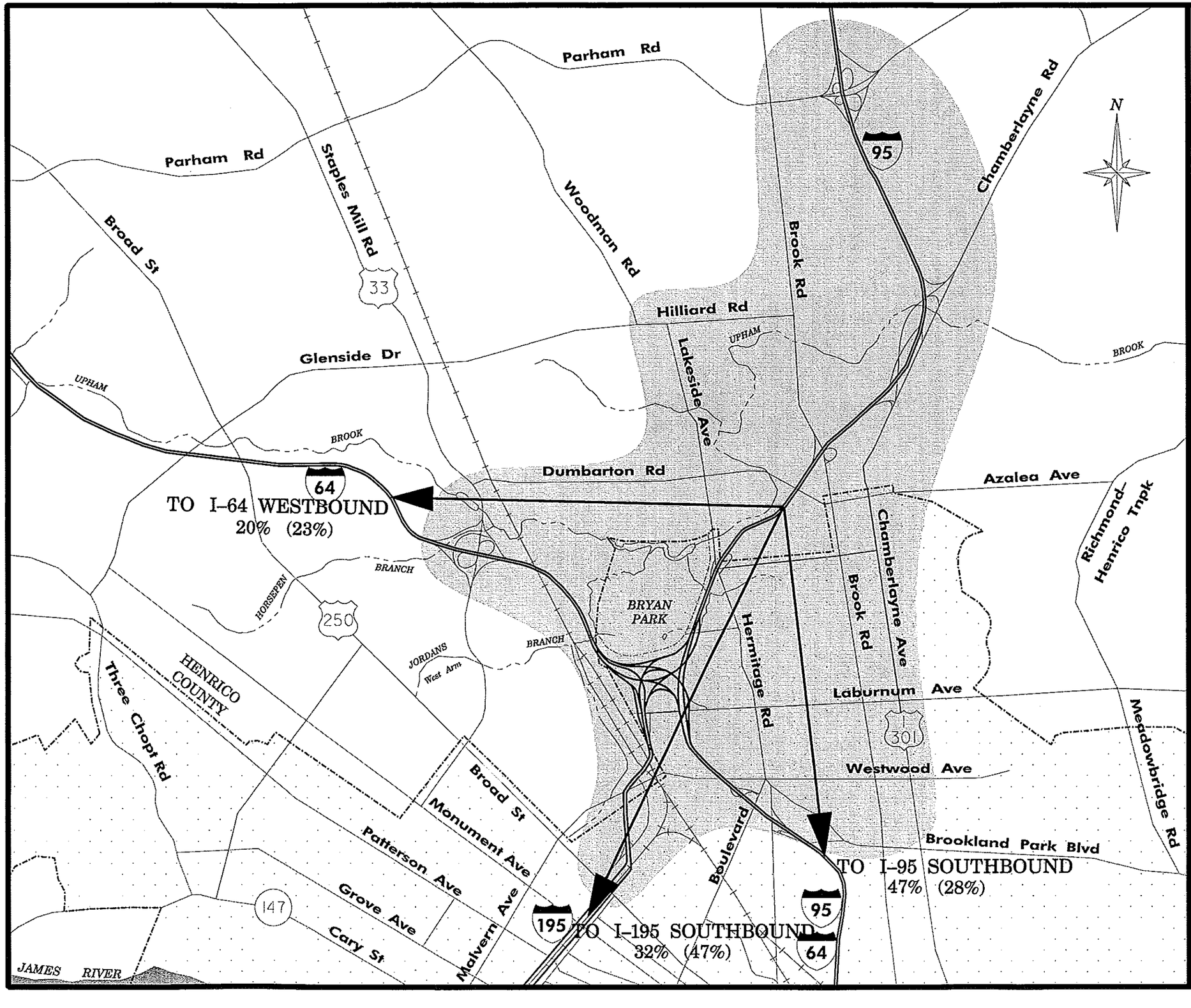
Scale
2000' 1000' 0 2000'

Virginia Department of Transportation

I–95 / I–64 / I–195 FEASIBILITY STUDY

FIGURE 7.2

ORIGIN–DESTINATIONS FROM I–95 SOUTHBOUND



LEGEND:

- RAIL LINES
- PARK BOUNDARY
- WATER
- CITY OF RICHMOND
- STUDY AREA

TRAFFIC DESTINATION PATTERNS

- ↓ 47% (28%) – AM (PM)
- 1% EXITING WITHIN STUDY AREA – AM
- 2% EXITING WITHIN STUDY AREA – PM

NOVEMBER 1999

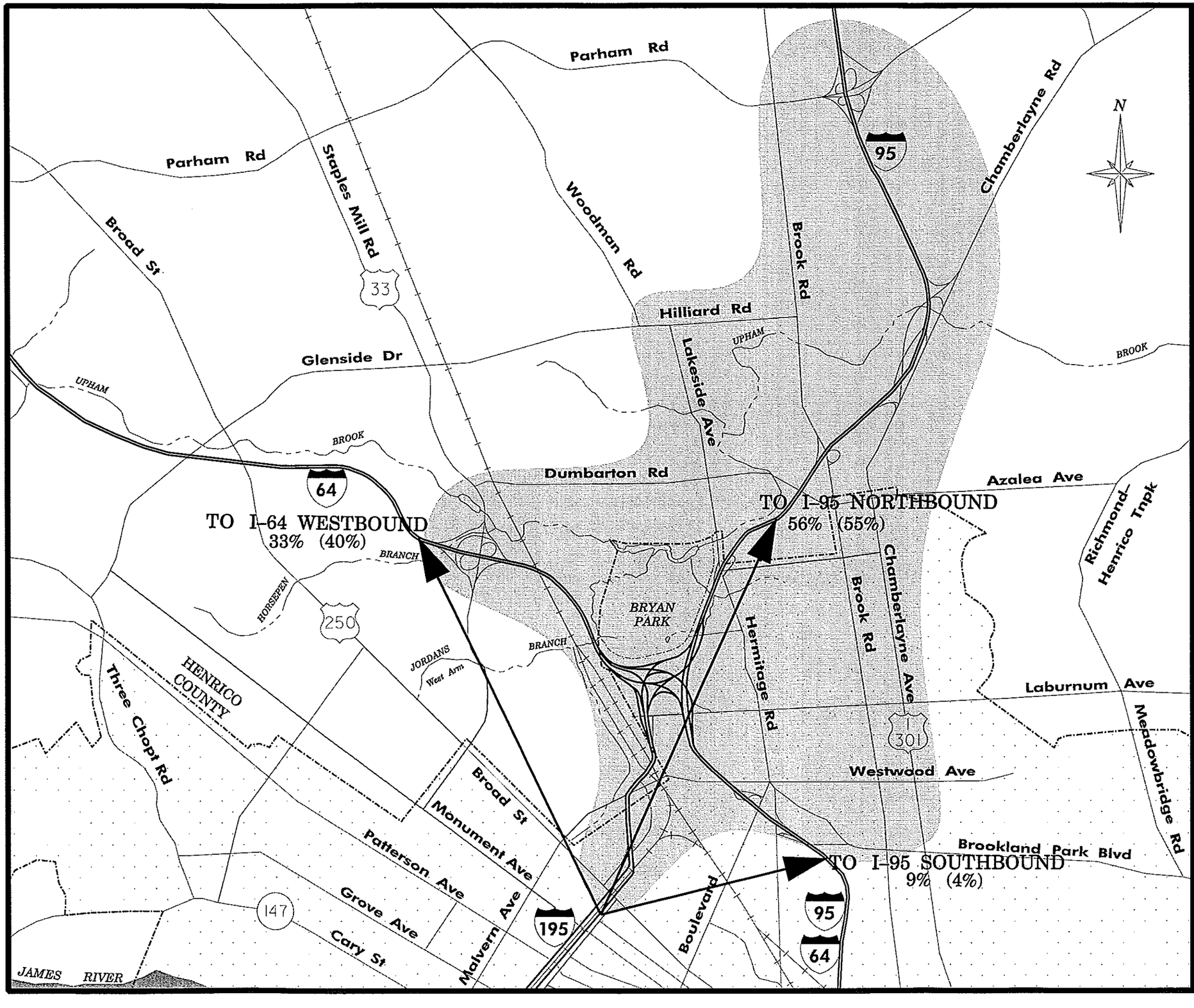
Scale
2000' 1000' 0 2000'

Virginia Department of Transportation

I–95 / I–64 / I–195 FEASIBILITY STUDY

FIGURE 7.3

ORIGIN–DESTINATIONS FROM I–195 NORTHBOUND



LEGEND:

- RAIL LINES
- PARK BOUNDARY
- WATER
- CITY OF RICHMOND
- STUDY AREA

TRAFFIC DESTINATION PATTERNS

- ↓ 55% (56%) – AM (PM)
- 2% EXITING WITHIN STUDY AREA – AM
- 1% EXITING WITHIN STUDY AREA – PM

NOVEMBER 1999

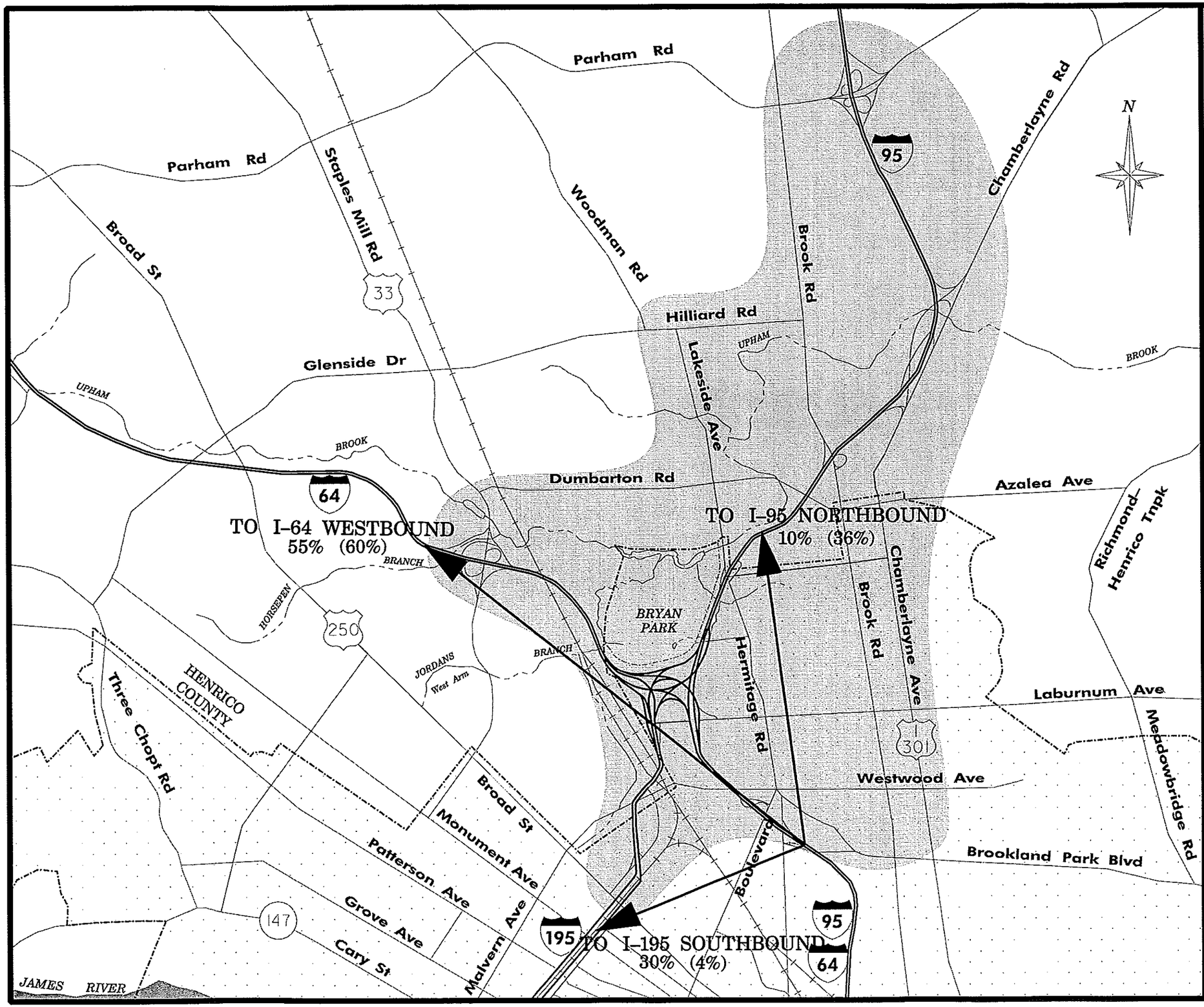
Scale
2000' 1000' 0 2000'

Virginia Department of Transportation

I–95 / I–64 / I–195 FEASIBILITY STUDY

FIGURE 7.4

ORIGIN–DESTINATIONS FROM I–95 NORTHBOUND



LEGEND:

- RAIL LINES
- PARK BOUNDARY
- WATER
- CITY OF RICHMOND
- STUDY AREA

TRAFFIC DESTINATION PATTERNS

↓ 11% (37%) – AM (PM)

5% EXITING WITHIN STUDY AREA – AM

0% EXITING WITHIN STUDY AREA – PM

NOVEMBER 1999

Scale
2000' 1000' 0 2000'

Virginia Department of Transportation

LEGEND:

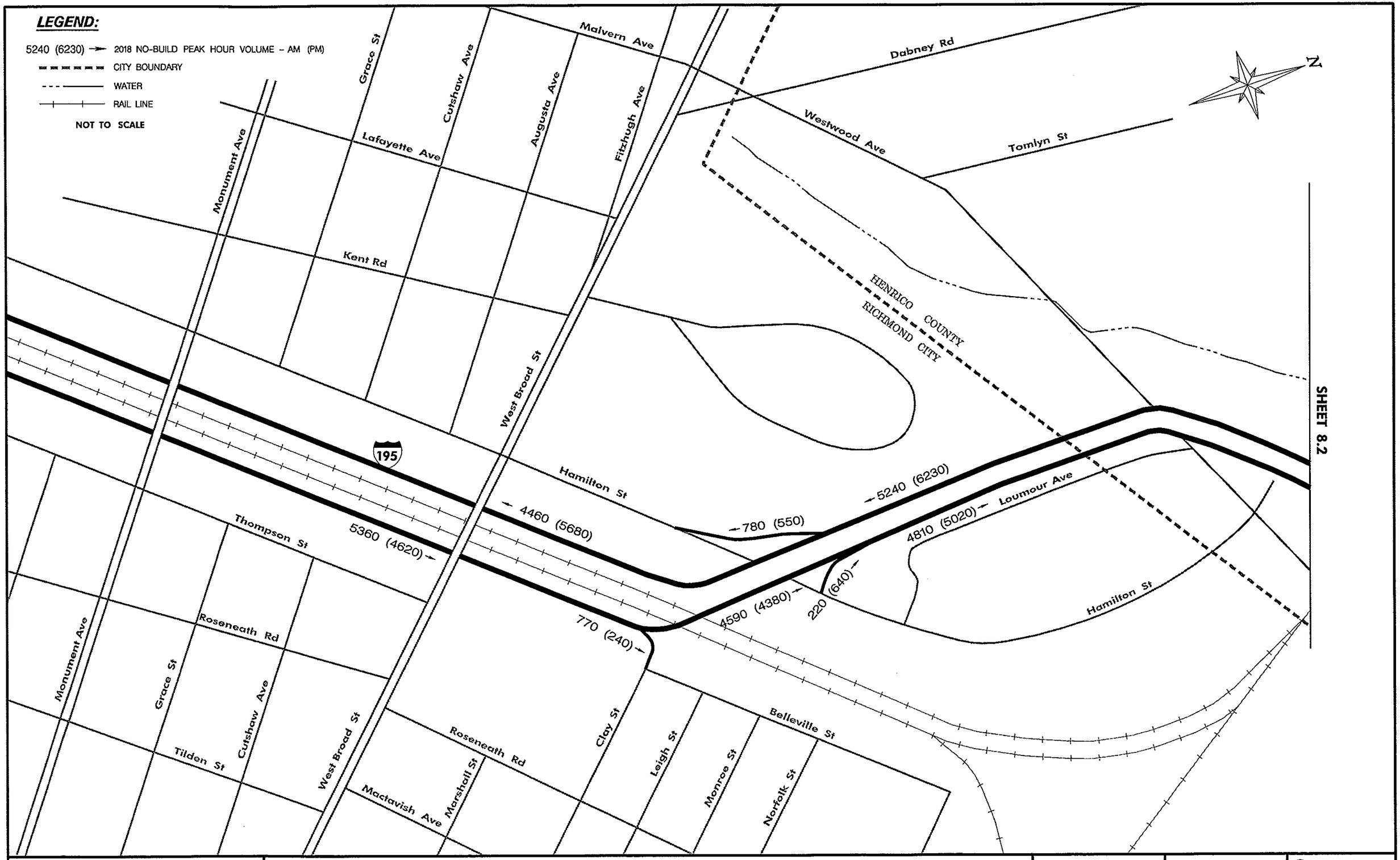
5240 (6230) → 2018 NO-BUILD PEAK HOUR VOLUME - AM (PM)

CITY BOUNDARY

WATER

RAIL LINE

NOT TO SCALE



SHEET 8.2

I-95 / I-64 / I-195 FEASIBILITY STUDY	2018 NO-BUILD PEAK HOUR TRAFFIC VOLUMES	FIGURE 8.1	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

2740 (3100) → 2018 NO-BUILD PEAK HOUR VOLUME – AM (PM)

CITY BOUNDARY

PARK BOUNDARY

WATER

RAIL LINE

NOT TO SCALE

N

SHEET 8.7

SHEET 8.1

SHEET 8.3

SHEET 8.9

HENRICO COUNTY
RICHMOND CITY

BRYAN PARK

64

195

95

2740 (3100)
6790 (5890)
340 (400)
2400 (2700)
2500 (3160)
1860 (2210)
340 (370)
4900 (5860)
2090 (1990)
2420 (2420)
4280 (4630)
530 (390)
5240 (6230)
4810 (5020)
5970 (3000)
820 (2890)
390 (450)
600 (1350)
4650 (5180)
1900 (1810)
950 (830)
2850 (2640)
4180 (2330)
7030 (4970)
2910 (4880)
6300 (3430)
10480 (5760)
1360 (2200)
4610 (5930)
640 (600)

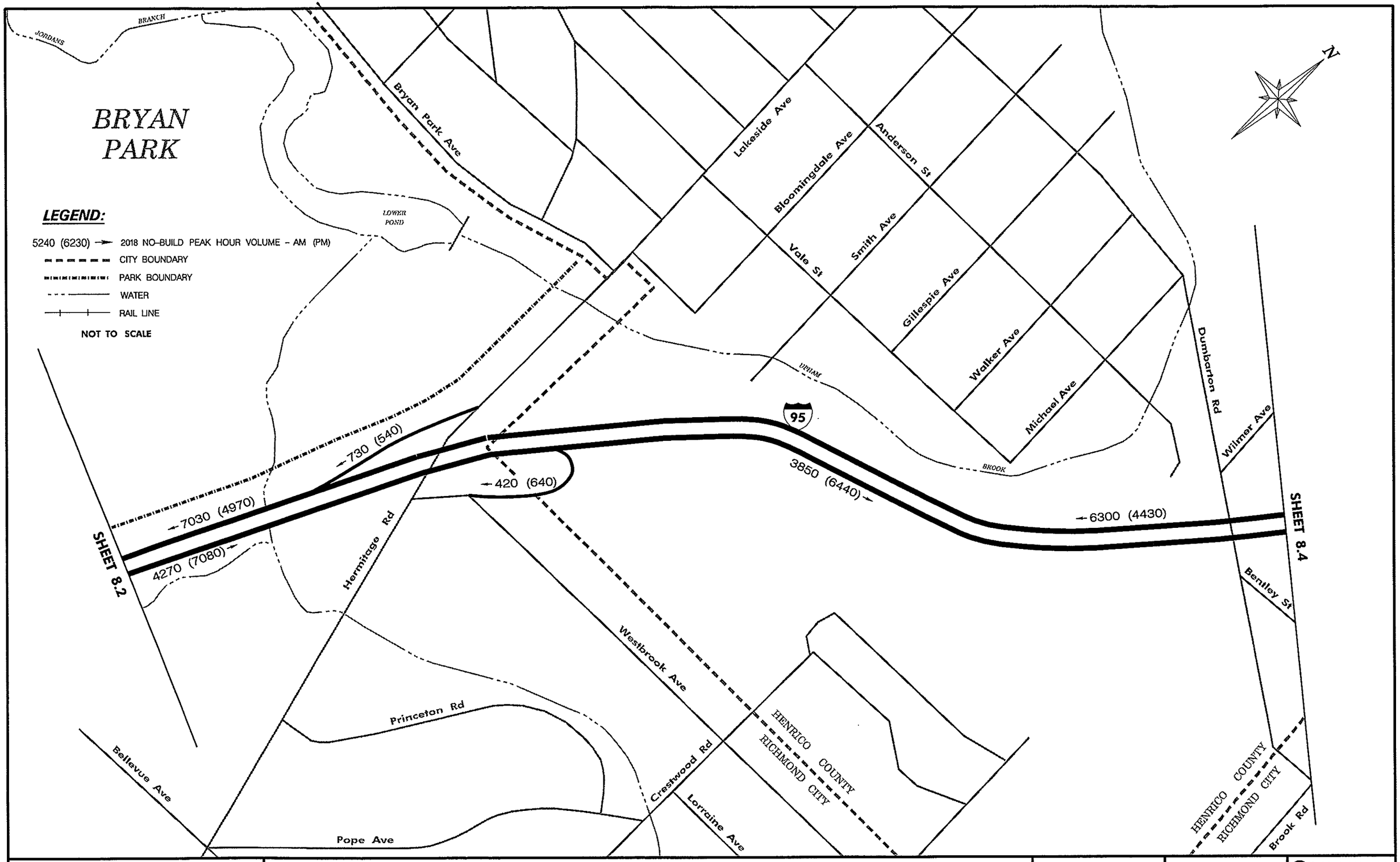
Laburnum Ave

Bellevue Ave

Westwood Ave

Hermitage Rd

I-95 / I-64 / I-195 FEASIBILITY STUDY	2018 NO-BUILD PEAK HOUR TRAFFIC VOLUMES	FIGURE 8.2	NOVEMBER 1999	Virginia Department of Transportation



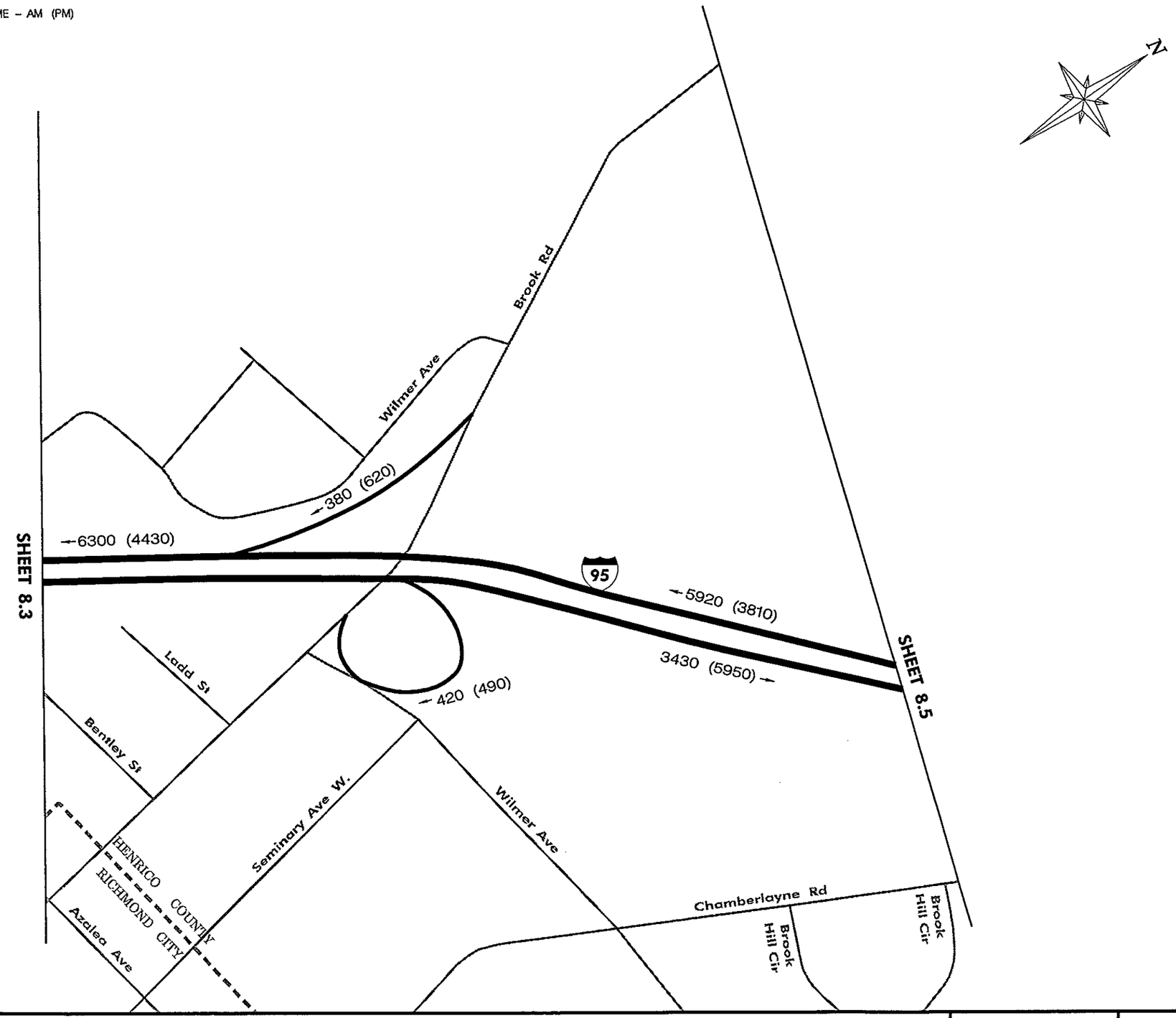
I-95 / I-64 / I-195 FEASIBILITY STUDY	2018 NO-BUILD PEAK HOUR TRAFFIC VOLUMES	FIGURE 8.3	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

5240 (6230) → 2018 NO-BUILD PEAK HOUR VOLUME – AM (PM)

– – – – – – CITY BOUNDARY

NOT TO SCALE



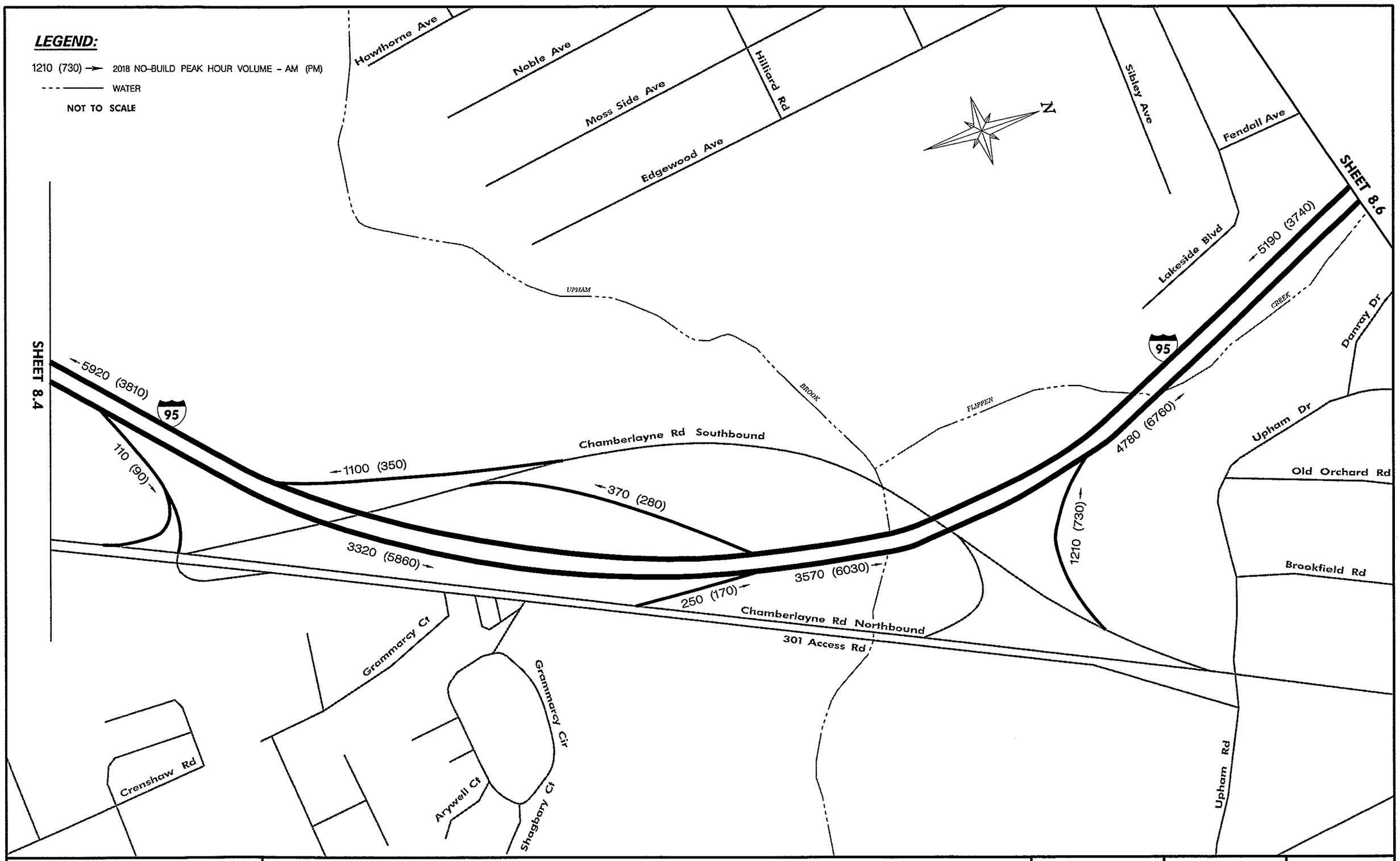
I–95 / I–64 / I–195 FEASIBILITY STUDY	**2018 NO–BUILD PEAK HOUR TRAFFIC VOLUMES**	FIGURE 8.4	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

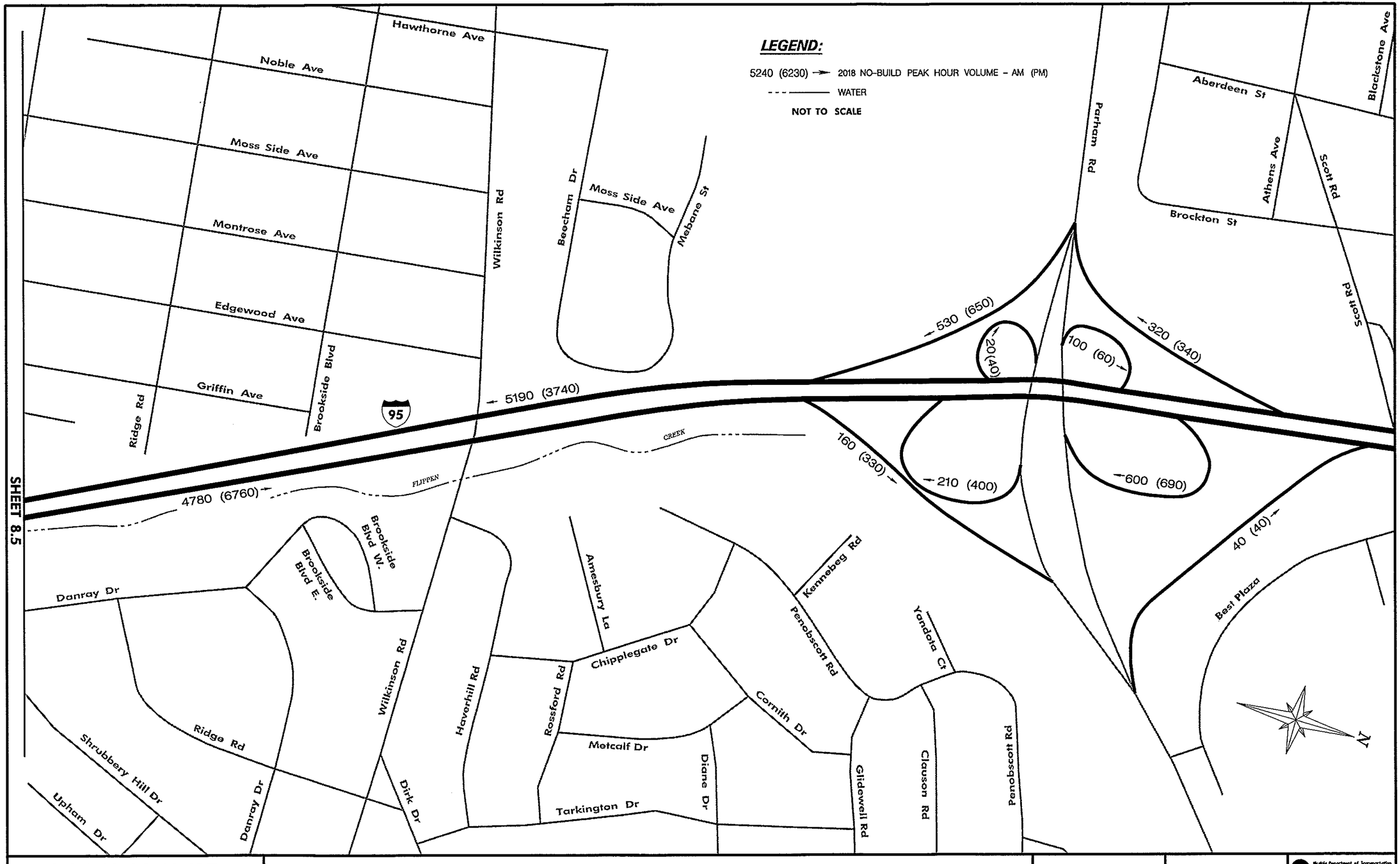
1210 (730) → 2018 NO-BUILD PEAK HOUR VOLUME - AM (PM)

WATER

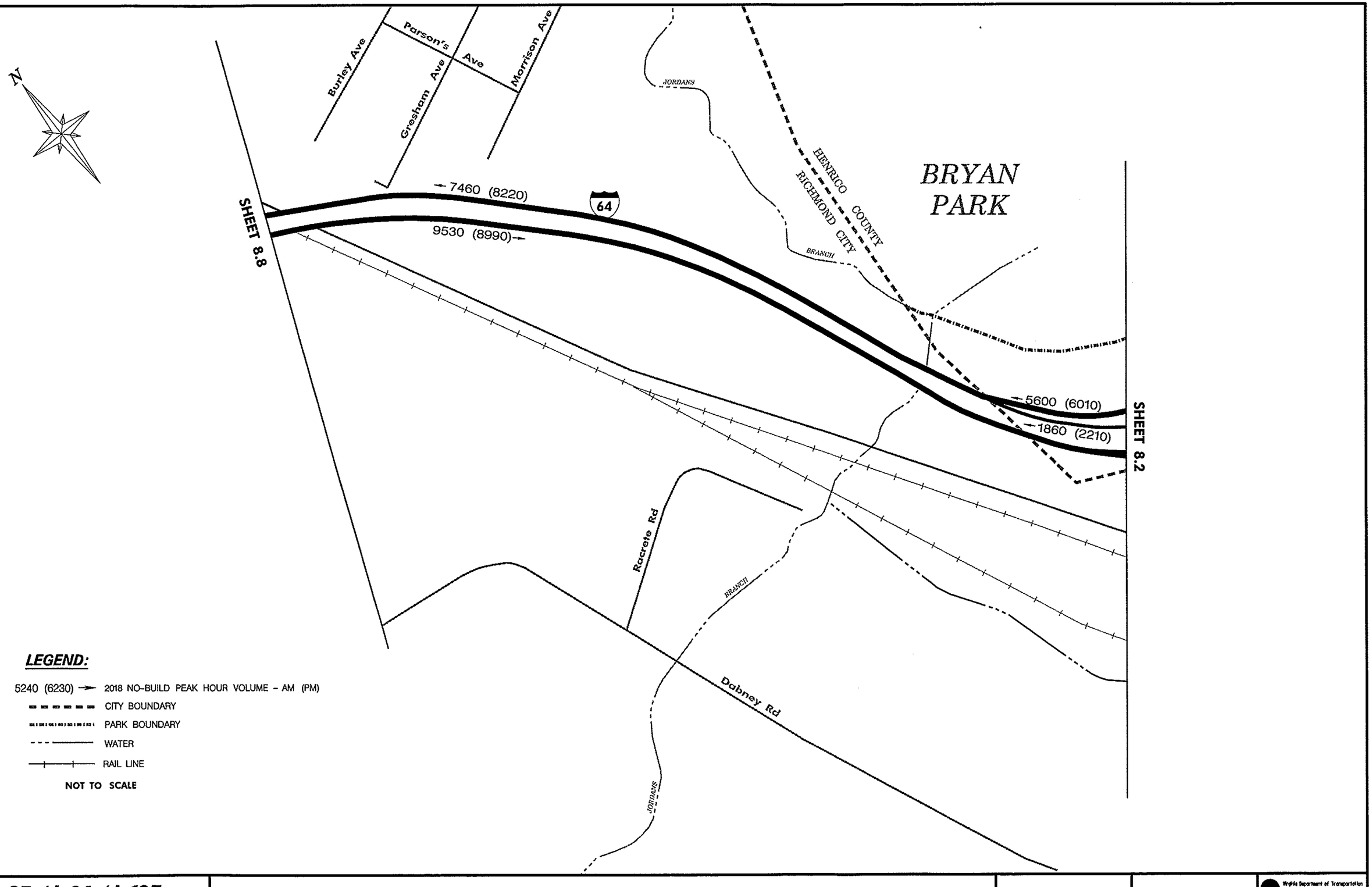
NOT TO SCALE



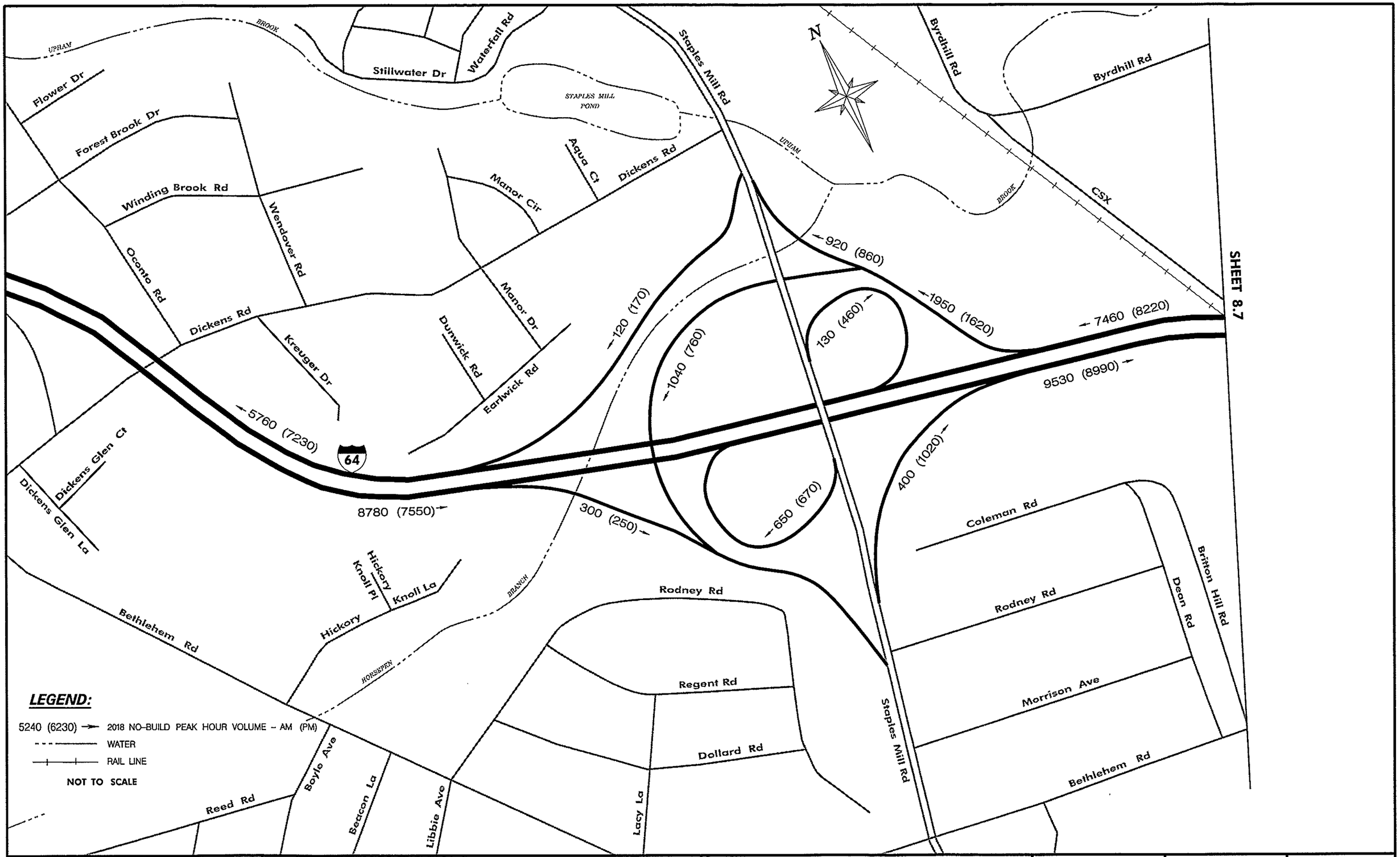
I-95 / I-64 / I-195 FEASIBILITY STUDY	2018 NO-BUILD PEAK HOUR TRAFFIC VOLUMES	FIGURE 8.5	NOVEMBER 1999	Virginia Department of Transportation VDOT



I-95 / I-64 / I-195 FEASIBILITY STUDY	2018 NO-BUILD PEAK HOUR TRAFFIC VOLUMES	FIGURE 8.6	NOVEMBER 1999	Virginia Department of Transportation VDOT



I-95 / I-64 / I-195 FEASIBILITY STUDY	2018 NO-BUILD PEAK HOUR TRAFFIC VOLUMES	FIGURE 8.7	NOVEMBER 1999	Virginia Department of Transportation VDOT

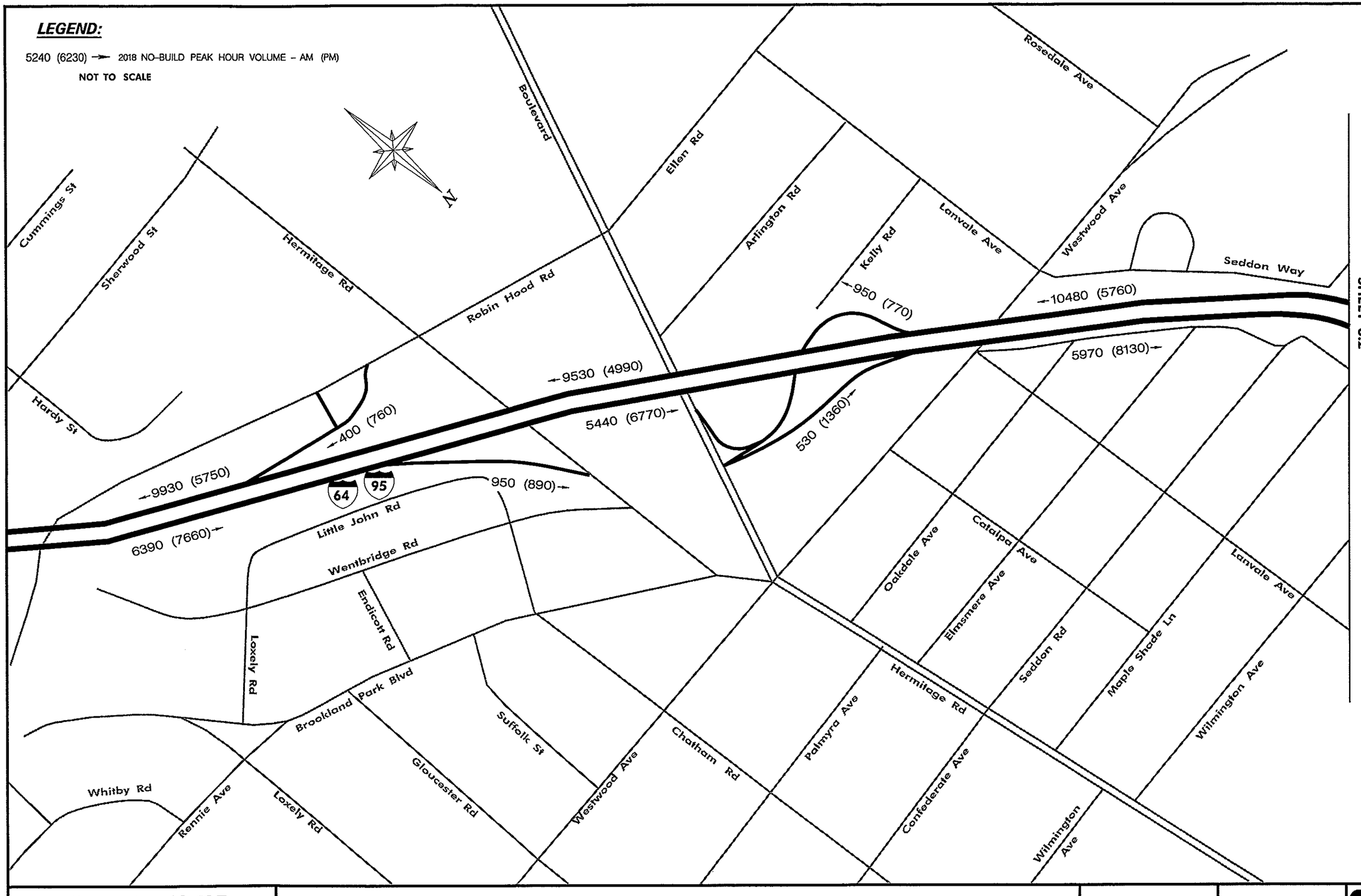


I-95 / I-64 / I-195 FEASIBILITY STUDY	2018 NO-BUILD PEAK HOUR TRAFFIC VOLUMES	FIGURE 8.8	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

5240 (6230) → 2018 NO-BUILD PEAK HOUR VOLUME - AM (PM)

NOT TO SCALE



SHEET 8.2

I-95 / I-64 / I-195 FEASIBILITY STUDY	2018 NO-BUILD PEAK HOUR TRAFFIC VOLUMES	FIGURE 8.9	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

F (D) 2018 NO-BUILD LEVEL OF SERVICE – AM (PM)

E (D) 1998 LEVEL OF SERVICE – AM (PM)

CITY BOUNDARY

WATER

RAIL LINE

NOT TO SCALE

Malvern Ave
Dabney Rd
Grace St
Cutshaw Ave
Augusta Ave
Fitzhugh Ave
Westwood Ave
Tomlyn St
Monument Ave
Lafayette Ave
Kent Rd
West Broad St
HENRICO COUNTY
RICHMOND CITY
195
Hamilton St
E (F)
D (D)
D (E)
C (D)
D (D) Laumour Ave
E (E)
C (C)
C (D)
B (A)
B (B)
Thompson St
Roseneath Rd
Clay St
Leigh St
Monroe St
Norfolk St
Belleville St
Tilden St
Mactavish Ave
Marshall St

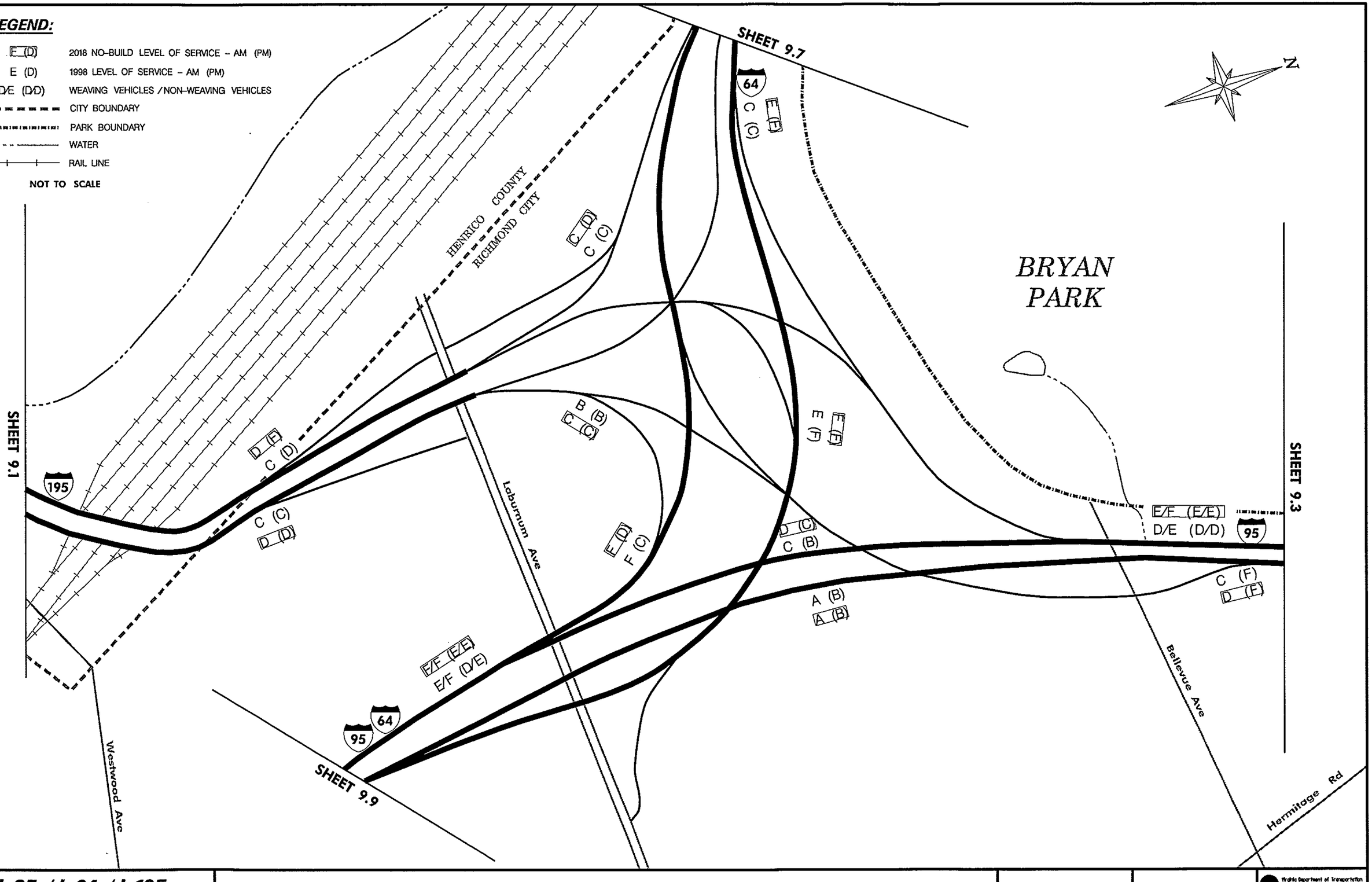
SHEET 9.2

I-95 / I-64 / I-195 FEASIBILITY STUDY	PEAK HOUR LEVEL OF SERVICE	FIGURE 9.1	NOVEMBER 1999	Virginia Department of Transportation

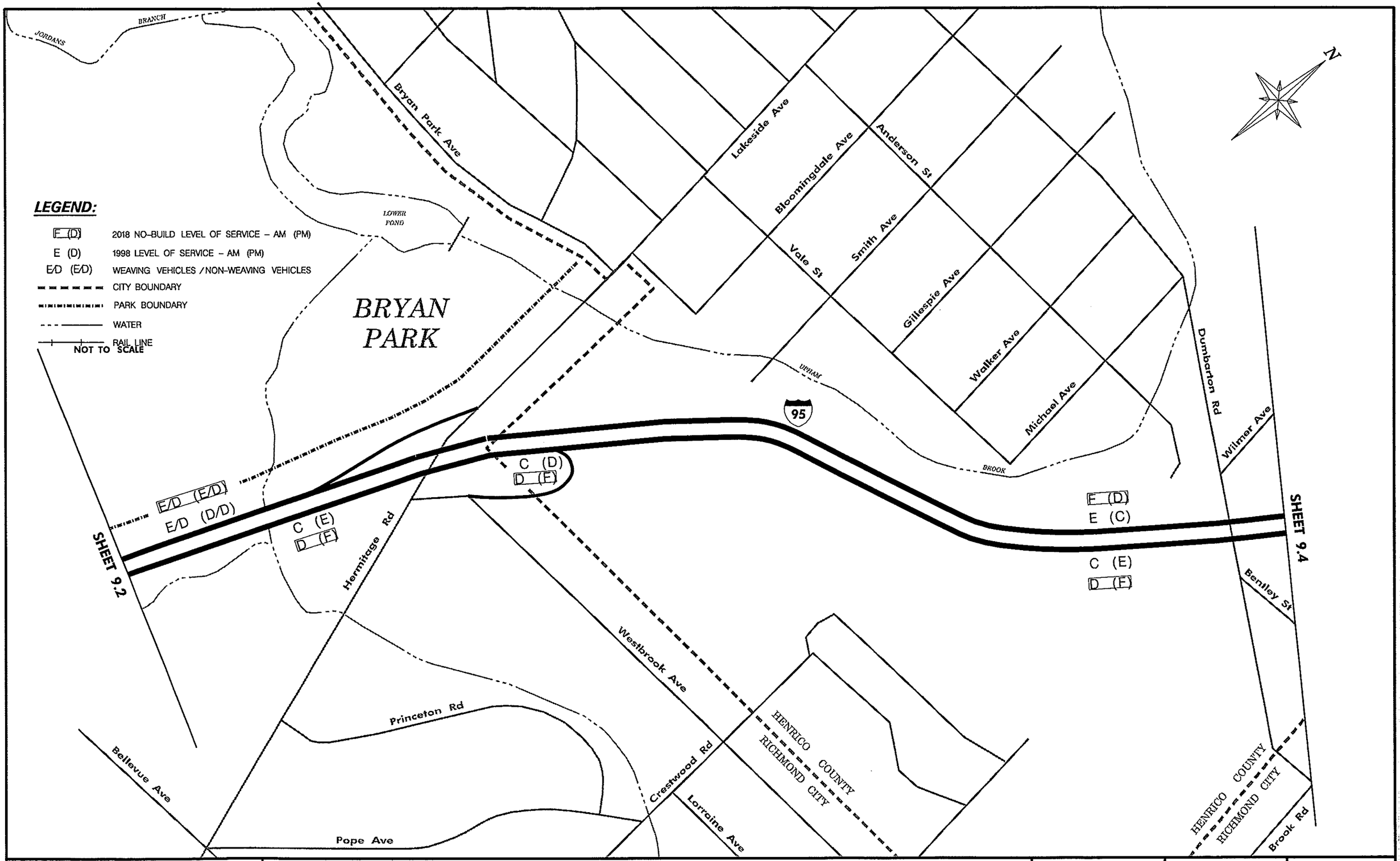
LEGEND:

- E (D) — 2018 NO-BUILD LEVEL OF SERVICE – AM (PM)
- E (D) — 1998 LEVEL OF SERVICE – AM (PM)
- D/E (D/D) — WEAVING VEHICLES / NON-WEAVING VEHICLES
- CITY BOUNDARY
- PARK BOUNDARY
- WATER
- RAIL LINE

NOT TO SCALE



I-95 / I-64 / I-195 FEASIBILITY STUDY	**PEAK HOUR LEVEL OF SERVICE**	FIGURE 9.2	NOVEMBER 1999	Virginia Department of Transportation VDOT



I–95 / I–64 / I–195 FEASIBILITY STUDY	PEAK HOUR LEVEL OF SERVICE	FIGURE 9.3	NOVEMBER 1999	Virginia Department of Transportation

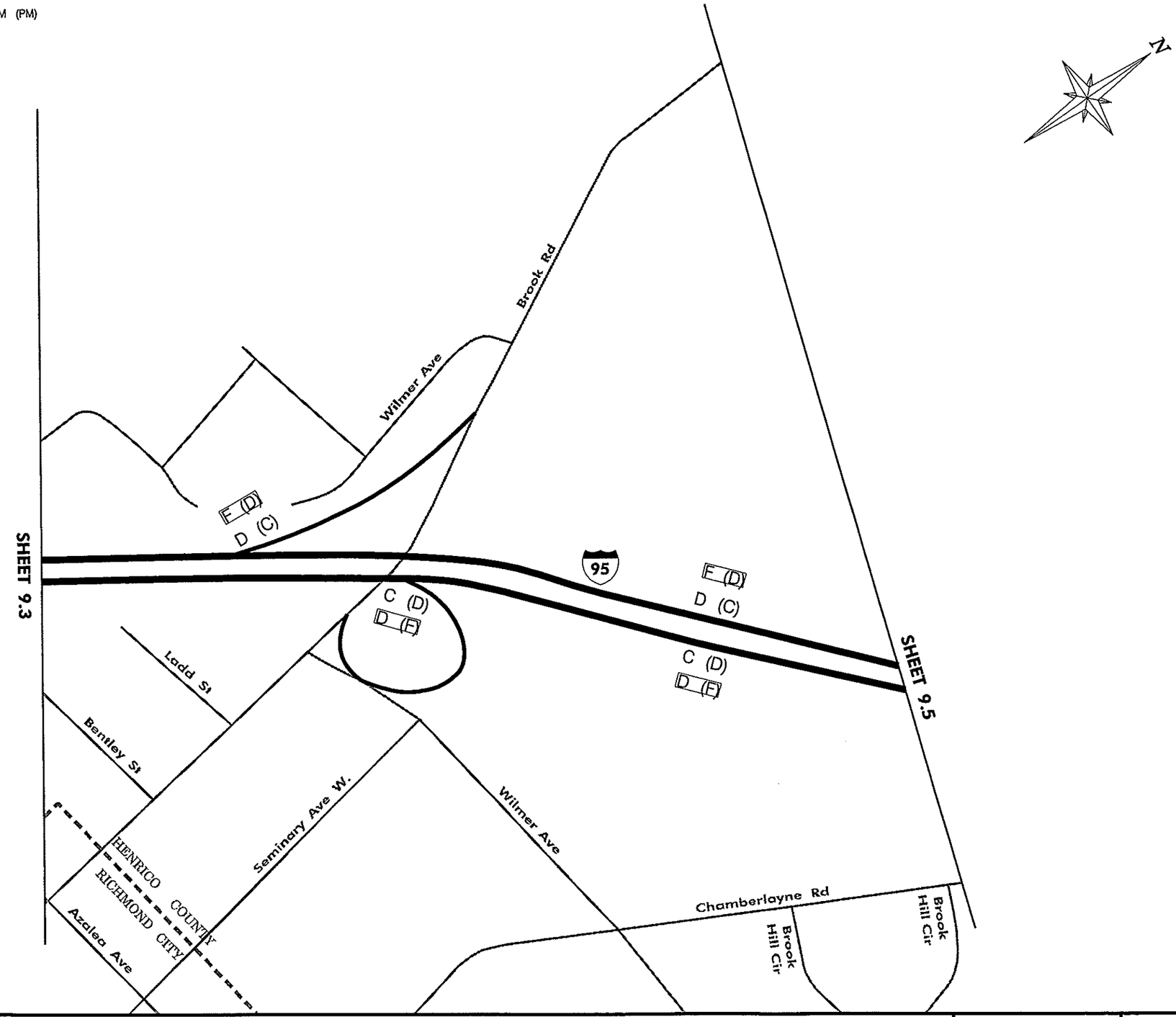
LEGEND:

E (D) 2018 NO-BUILD LEVEL OF SERVICE – AM (PM)

E (D) 1998 LEVEL OF SERVICE – AM (PM)

CITY BOUNDARY

NOT TO SCALE



I-95 / I-64 / I-195 FEASIBILITY STUDY	**PEAK HOUR LEVEL OF SERVICE**	FIGURE 9.4	NOVEMBER 1999	Virginia Department of Transportation VDOT

LEGEND:

E (D) 2018 NO-BUILD LEVEL OF SERVICE – AM (PM)

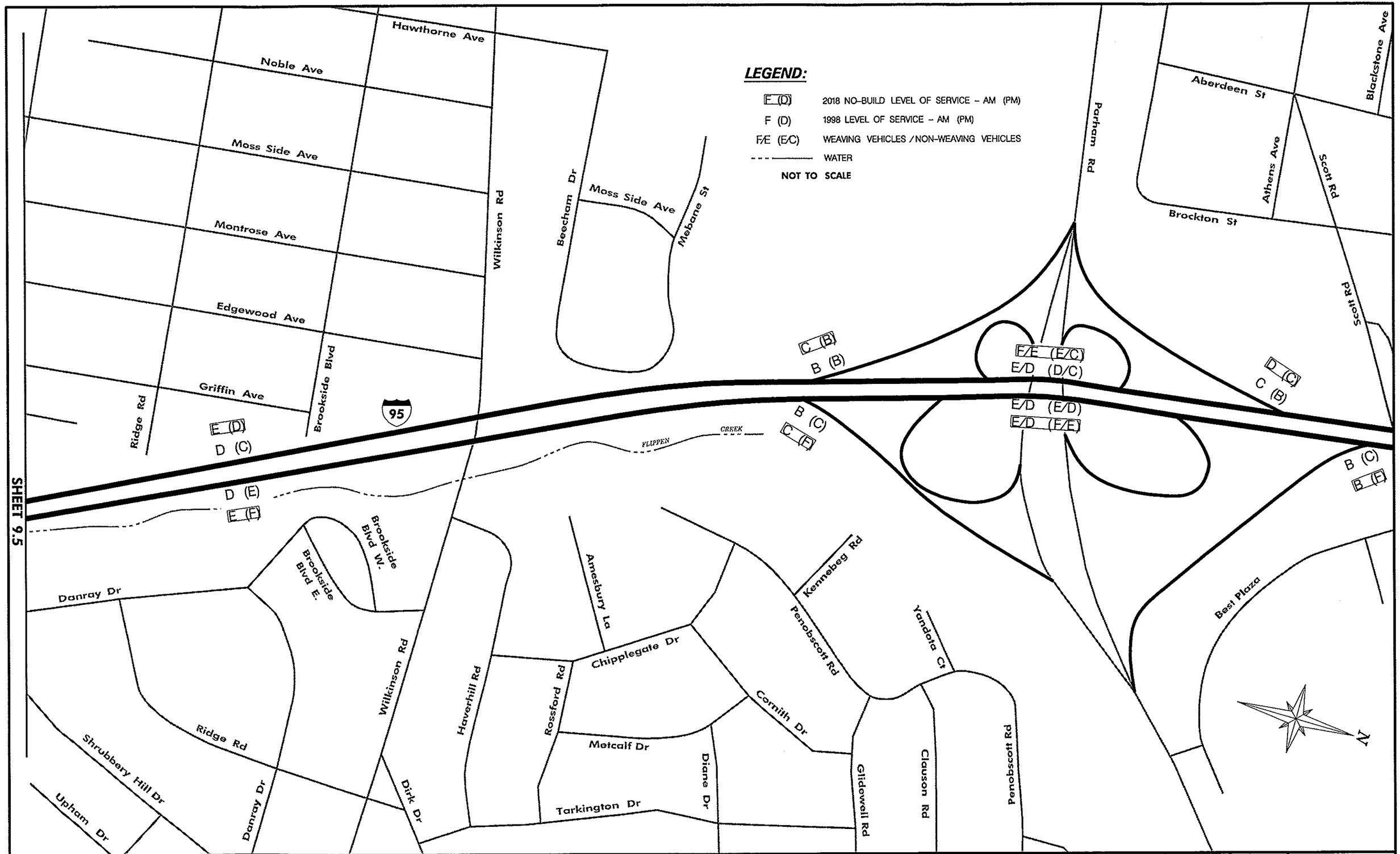
E (E) 1998 LEVEL OF SERVICE – AM (PM)

WATER

NOT TO SCALE

Hawthorne Ave
Noble Ave
Moss Side Ave
Edgewood Ave
Hilliard Rd
Sibley Ave
Fendall Ave
Lakeside Blvd
SHEET 9.6
SHEET 9.4
UPHAM
BROOK
CREEK
FLIPPEN
95
Danray Dr
Upham Dr
Old Orchard Rd
Brookfield Rd
Upham Rd
Chamberlayne Rd Southbound
Chamberlayne Rd Northbound
301 Access Rd
B (C)
B (D)
E (B)
C (B)
E (C)
C (C)
C (B)
B (B)
C (D)
C (E)
B (C)
B (D)
C (D)
D (E)
E (D)
D (C)
B (C)
C (E)
Grammarcy Ct
Grammarcy Cir
Crenshaw Rd
Arywell Ct
Shagbary Ct

I-95 / I-64 / I-195 FEASIBILITY STUDY	**PEAK HOUR LEVEL OF SERVICE**	FIGURE 9.5	NOVEMBER 1999	Virginia Department of Transportation VDOT

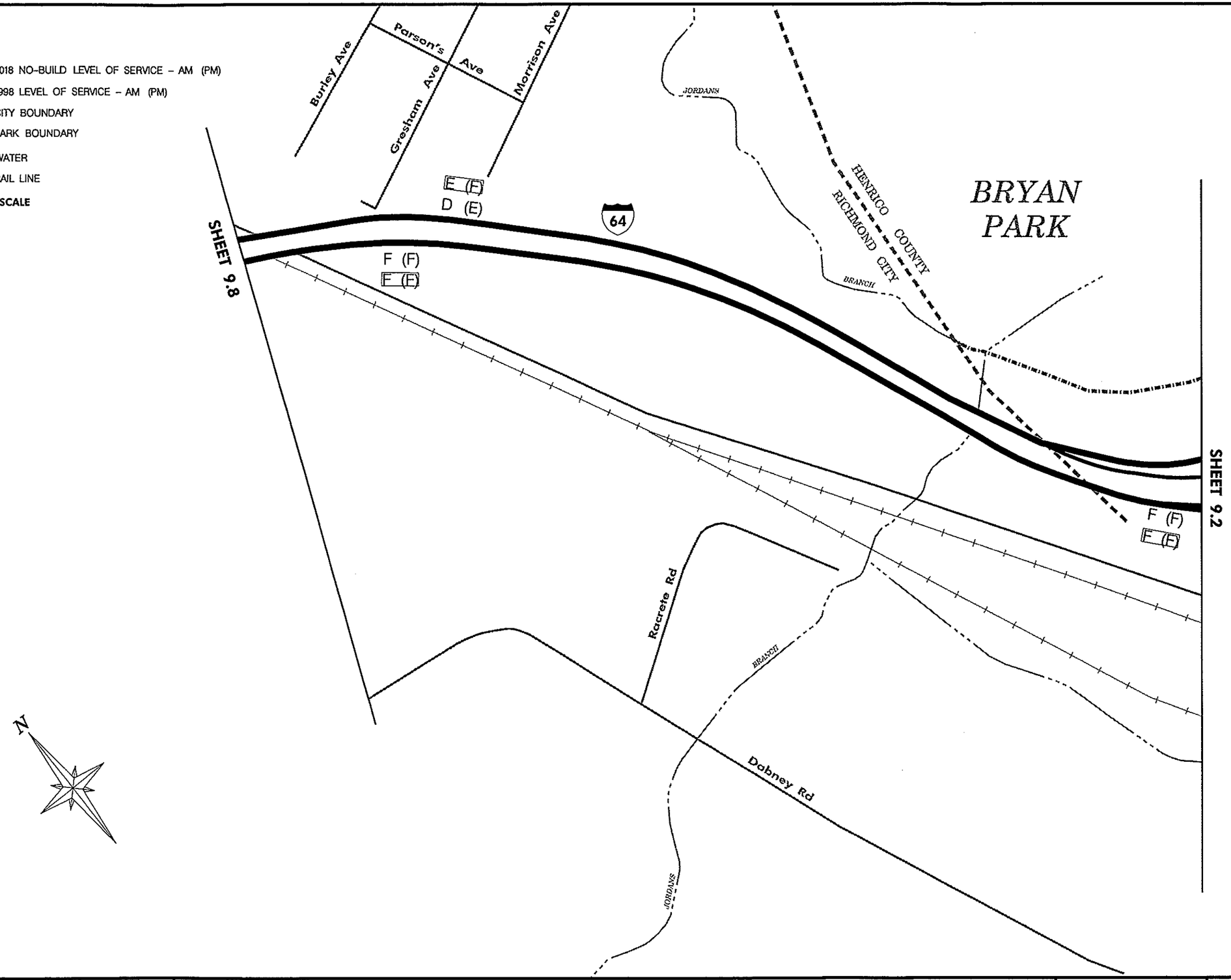


I-95 / I-64 / I-195 FEASIBILITY STUDY	PEAK HOUR LEVEL OF SERVICE	FIGURE 9.6	NOVEMBER 1999	Virginia Department of Transportation VDOT

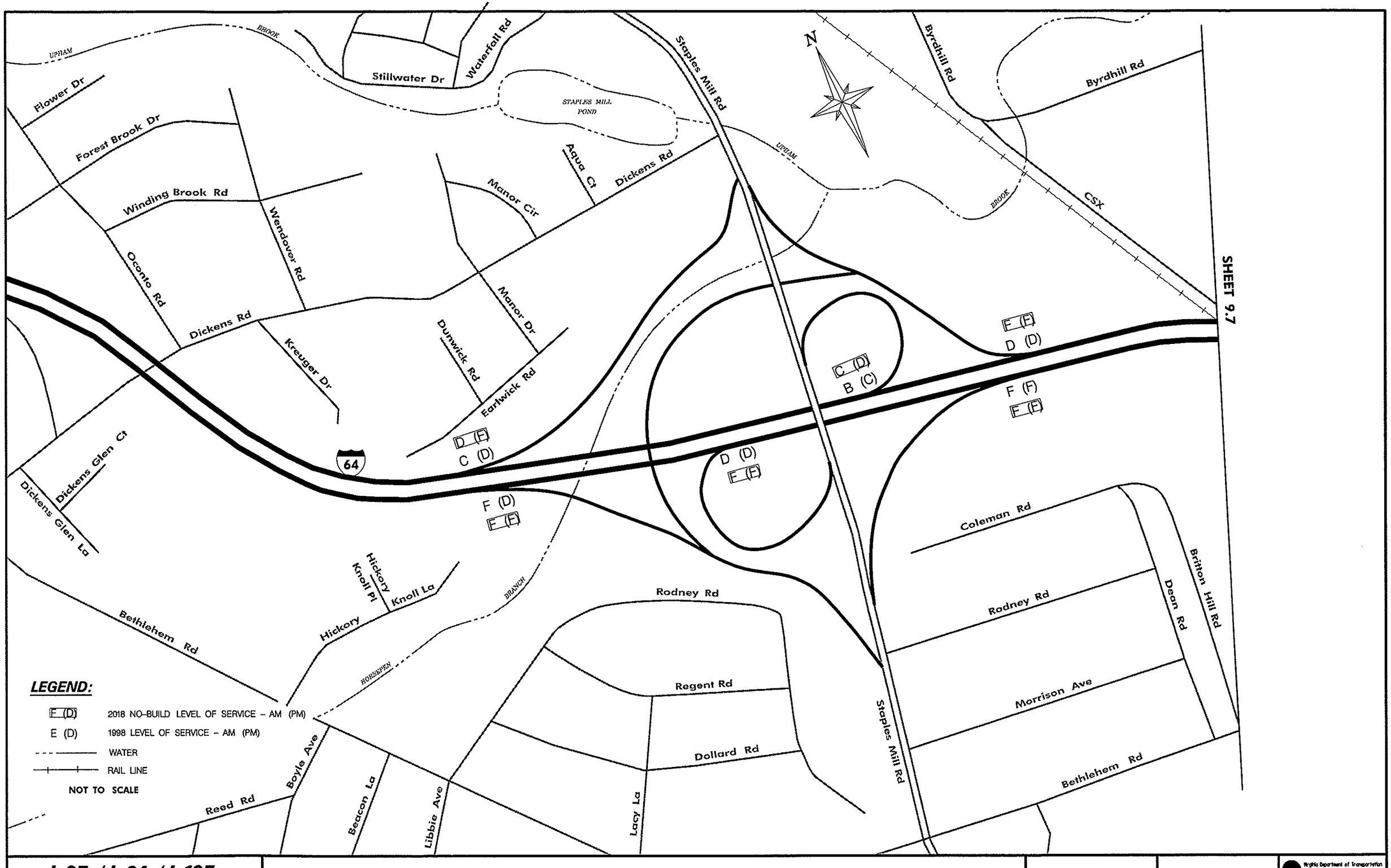
LEGEND:

- F (D) — 2018 NO-BUILD LEVEL OF SERVICE – AM (PM)
- E (E) — 1998 LEVEL OF SERVICE – AM (PM)
- CITY BOUNDARY
- PARK BOUNDARY
- WATER
- RAIL LINE

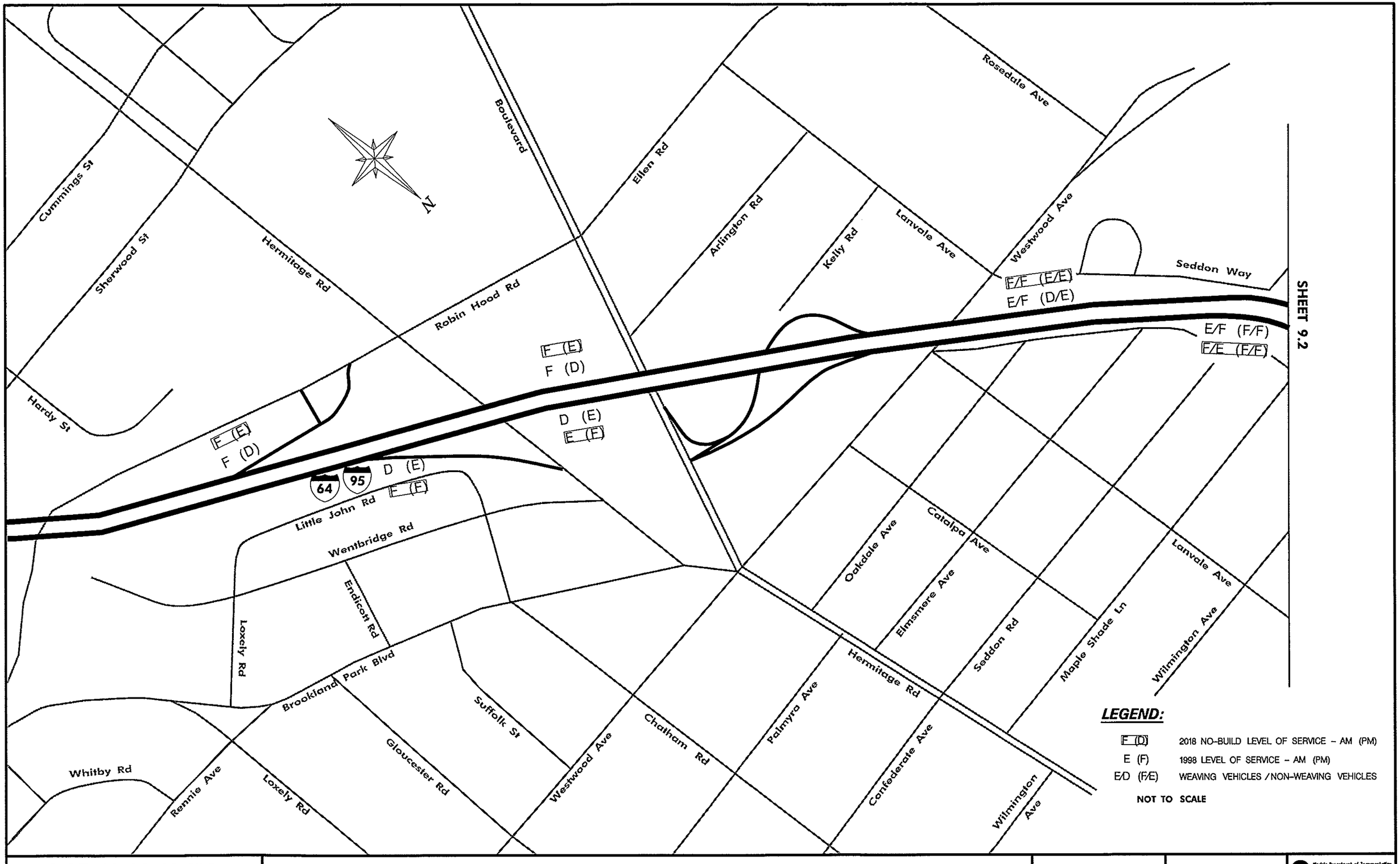
NOT TO SCALE



I-95 / I-64 / I-195 FEASIBILITY STUDY	PEAK HOUR LEVEL OF SERVICE	FIGURE 9.7	NOVEMBER 1999	Virginia Department of Transportation VDOT



I-95 / I-64 / I-195 FEASIBILITY STUDY	PEAK HOUR LEVEL OF SERVICE	FIGURE 9.8	NOVEMBER 1999	Virginia Department of Transportation



SHEET 9.2

I-95 / I-64 / I-195 FEASIBILITY STUDY	PEAK HOUR LEVEL OF SERVICE	FIGURE 9.9	NOVEMBER 1999	Virginia Department of Transportation VDOT

APPENDIX C: ENVIRONMENTAL OVERVIEW ANALYSIS

Table 17
Environmental Overview Analysis

AREA OF ANALYSIS	CONCEPT 20	CONCEPT 24	CONCEPT 29	CONCEPT 30	CONCEPT 31	CONCEPT 39b	CONCEPT 11b	COMMENTS / NOTES
RELOCATION RESIDENTIAL	No	No	Yes	No	No	Yes	No	
RELOCATION COMMERCIAL	No	No	No	No	No	Yes	Yes	
STREAM CROSSINGS	Yes	***	Yes	No	Yes	No	Yes	*** Unable to determine at this time.
NW PERMITS	**	**	**	**	**	**	**	** The nationwide permits are in the process of being revised. Therefore it would be too speculative to say that any of these projects would qualify for a NW - permit.
GENERAL PERMITS	Yes	***	Yes	No	***	***	Yes	*** Unable to determine at this time.
COAST GUARD PERMITS	No	No	No	No	No	No	No	
ENDANGERED SPEC.	No	No	No	No	No	No	No	
THREATENED SPEC.	No	No	No	No	No	No	No	
FLOODPLAIN IMPACTS	Yes	***	***	***	***	***	***	*** Unable to determine at this time.
WETLAND IMPACTS	Yes	Maybe Minimal	Yes	Maybe Minimal Isolated	Yes	Maybe Minimal	Yes	
PUBLIC REC AREAS	No	No	Yes	No	Yes	Yes	No	
NATIONAL FOREST	No	No	No	No	No	Yes	No	
ARCHEOLOGICAL SITES	1 Site	No Sites	3 Sites	No Sites	No Sites	No Sites	2 Sites	It is unlikely that any of these known sites would constitute 4(f) properties. Some locations have already been impacted by highway construction.
HISTORIC STRUCTURES	No	No	Yes**	No	Yes**	No	No*	There is an extant Historic Marker at Westbrook & Hermitage Rd. *This assumes that the Hermitage/Lakeside bridge work will not encroach on the National Register boundary of Bryan Park. **A National Register nomination is currently being prepared for Bryan Park (43-5677). If found National Register eligible, the park will constitute a 4(f) resource.
HISTORIC DISTRICTS	No	No	No	No	No	No	No	
POTENTIAL HAZMAT SITES	No	Yes	Yes	Yes	Yes	Yes	Yes	Some alternatives involve hazmat issues rather than sites - such as possibility of contaminated gw and/or soil pertinent for deep inground work on structures
AIR QUALITY IMPACTS	No	No	Yes	No	No	Yes	Yes	
NOISE IMPACTS	Yes	Yes	Yes	Yes	No	Yes	Yes	Will need detailed noise/air analyses.
ENVIRONMENTAL JUSTICE IMPACTS	No	No	No	No	No	No	No	
UTILITY RELOCATIONS	No	No	No	No	No	Yes	No	
AESTHETIC IMPACTS	Yes	No	Yes	No	No	Yes	Yes	
SOCIO-ECONOMIC IMPACTS	Yes	Yes	Yes	No	No	Yes	Yes	

Virginia Department of Transportation

VDOT

Baker

Pedestrian Road Safety Audit

Broad Street
(Between College Street and 17th Street)

Richmond, Virginia

UPC 91799

Berger Project: CA218 E

April 2011

Prepared for:
City of Richmond Department of Public Works – Transportation Engineering Division
Richmond, Virginia

By:
The Louis Berger Group, Inc.
Richmond, Virginia

The Louis Berger Group, Inc.
801 East Main Street, Suite 500
Richmond, Virginia 23219

The Louis Berger Group, Inc.
801 East Main Street, Suite 500
Richmond, Virginia 23219

1 Executive Summary

A Roadside Safety Audit (RSA) is defined by the Federal Highway Administration's (FHWA) document, ***Pedestrian Road Safety Audit Guidelines and Prompt Lists***, as a formal safety examination of a future roadway plan or project or an in-service facility that is conducted by an independent, experienced interdisciplinary team.

The Louis Berger Group, Inc. (LBG) has completed a pedestrian oriented RSA for highly pedestrian travelled section of Broad Street, between College Street and 17th Street.

The major aspects of the RSA process included:

- Review of traffic incident data.
- Assessing the condition and functionality of existing infrastructure.
- Observing behavioral characteristics of pedestrians and vehicles.
- Administering pedestrian counts at peak hours of travel.
- Holding an interdisciplinary team meeting to solicit information and concerns regarding pedestrian safety from a variety of professional sources.
- Developing a formal document that addresses and evaluates the project area, drawing conclusions and identifying safety issues with regards to pedestrians.

The RSA was performed per the guidelines and prompt lists provided by the FHWA. Taking into consideration pedestrian behavior, existing infrastructure and field data, this RSA concludes the area does not meet ADA standards, pedestrian facilities are not provided along desired routes and the free flow conditions of the I-95 interchange combined with high pedestrian and vehicle traffic present a multitude of pedestrian/vehicle conflicts and potential safety issues.

Upon completion of the RSA, LBG developed a separate document entitled, ***Potential Candidate Alternatives***, that uses the findings of this RSA to develop a range of proposed potential candidate projects that may improve the pedestrian safety aspects of the project area.

2 Background Information

The City of Richmond's Department of Public Works Transportation Engineering Division is focusing on pedestrian facilities and improving safety throughout crucial pedestrian travel areas of the city. As part of this effort, The Louis Berger Group, Inc. (LBG) performed a pedestrian oriented RSA for the specified area: Broad Street, between College Street and 17th Street.

Per FHWA guidelines the following steps were included in the development of this RSA:

- **Conducting a Start Up Meeting:** The City of Richmond (CITY) held a meeting with LBG. The meeting resulted in the CITY requesting that LBG perform an RSA for the project area. CITY personnel identified the study boundary, general scope of the RSA, and identified City personnel to participate in interdisciplinary meeting.

- **Perform Field Reviews Under Various Conditions:** LBG performed a series of three field visits during peak hours of pedestrian travel to observe traffic, pedestrian behavior and existing infrastructure.

- **Hold Interdisciplinary Team Meeting:** LBG hosted an interdisciplinary team meeting to solicit concerns, input and ideas with respect to safety issues within the project area. The meeting was held on March 22, 2011 in the 2nd floor conference room of 801 East Main Street. The meeting lasted from approximately 10AM to 1130AM. Members of the interdisciplinary team included:

    - Jian Xu with the City of Richmond Department of Public Works
    - Torrence Robinson with the City of Richmond Department of Public Works
    - Travis Bridewell With Richmond City Traffic Engineering
    - Manouchehr Nosrati with Richmond City Department of Public Works
    - Tyler Potterfield with Richmond City Planning and Development Review
    - Tracy Turpin with VDOT Traffic Engineering
    - Jonathon Siok with the VCU Police Department
    - Rebecca Ellison with the VCU Police Department
    - Robert Marland with the Richmond City Police Department.

- **Prepare a Formal Response:** LBG developed this formal document that incorporates the findings from the RSA.

3 Introduction

The RSA study location along Broad Street became a focus area for pedestrian safety due to several key features. East of the I-95 interchange there is the Main Street AMTRAK Station as well as six large parking lots servicing everyday commuters. Along the study area, Broad Street contains pedestrian sidewalks on both sides of the road encouraging people to walk. The area is known to experience high pedestrian and vehicle volumes, especially during peak hours of travel, which are observed to be the morning peak hour 7:00AM to 8:00AM, the afternoon peak hour 11:00AM to 12:00PM, and the evening peak hour 4:00PM to 5:00PM.

Unique features of the project area are the challenges pedestrians undergo while travelling the pedestrian route available to them. I-95 acts a barrier for pedestrians who make use the Broad Street parking lots. The only route pedestrians have available to access the central areas of the city include the crossing the I-95 interchange. The existing pedestrian crossings through this I-95 interchange present a number pedestrian/vehicle conflicts and was a driving factor for an RSA to be performed.

This RSA assesses the existing pedestrian infrastructure, analyzes current pedestrian and vehicle activity in the area, and identifies pedestrian safety issues.

3.1 Pedestrian Roadside Safety Audit Goals

The intent of this Roadside Safety Audit is to achieve the following:

- ***Assess/Analyze-*** To provide an accurate assessment of the pedestrian infrastructure in service and the current pedestrian activity as well as how pedestrians and motorists interact within the study area based on field visits and crash data analysis.

- ***Identify-*** To identify pedestrian safety issues and deficiencies and potential areas where the CITY may wish to implement pedestrian facility upgrades/improvements that would improve the overall safety of those who travel Broad Street, both pedestrians and vehicles.

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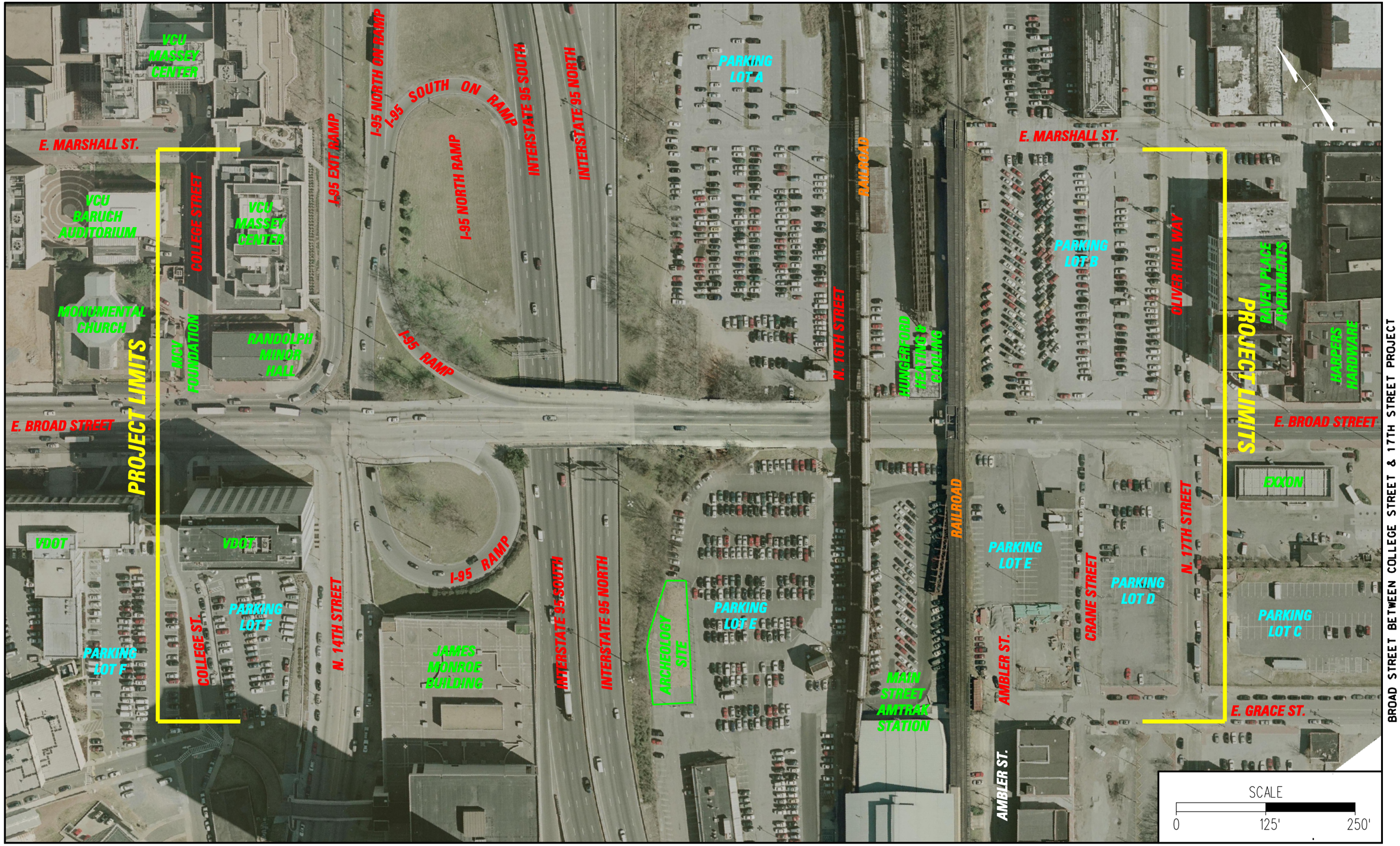
3.2 Location Map

Figure 3.2 presents a location map of the study area (Broad Street between 17th Street and College Street). Parking lots, streets, buildings and project limits have been labeled for reference.

FIGURE 3.2: PROJECT LOCATION MAP



BROAD STREET BETWEEN COLLEGE STREET & 17TH STREET PROJECT

BROAD STREET BETWEEN COLLEGE STREET & 17TH STREET PROJECT

3.3 RSA Approach

- **Start-Up Meeting**

  A project start up meeting was held to discuss the pedestrian safety issues observed and experienced in the project area (Broad Street from College Street to 17th Street). The key conclusions of the meeting were that interdisciplinary team was identified, the CITY personnel shared concerns and safety issues in the project area and that the next step is that LBG was to proceed with an RSA.

- **Field visits**

  A series of field visits were conducted on different days during peak hour time periods to collect pedestrian counts, investigate the existing infrastructure, signage and pavement markings, and identify common pedestrian route patterns and safety issues. The peak hour time periods are defined as the AM (7:00AM-8:00AM), PM afternoon (11:00AM-12:00PM) and PM evening (4:00PM-5:00PM).

- **Crash Data Analysis**

  Crash data was provided by the City of Richmond for the project area to aid in identifying locations that have a propensity for incidents to occur. This information was taken into consideration when identifying and highlighting areas that fail to meet pedestrian ADA standards and would benefit from improvements. Refer to Appendix B to review the crash data for the project area.

- **Interdisciplinary RSA Team Meeting**

  An interdisciplinary RSA team is selected with the intention of representing a group of individuals who when combined, possess a set of skills to identify the most critical aspects (with respect to pedestrian safety) of the project area. An interdisciplinary team meeting was held on March 22, 2011 to solicit information, further define pedestrian concerns and suggestions regarding the project area.

- **RSA Document Development**

  LBG developed the RSA document in accordance with the Federal Highway Administration guidelines, compiling information from the field visits, crash data and the RSA interdisciplinary team meeting. The intent of the document is to present the data collected and formally identify the pedestrian safety issues.

4 Field Observations

Field visits were conducted and observations for the RSA project area were noted based on the prompt lists provided by the FHWA. Field notes were taken according to the FHWA prompt lists for street crossings. Refer to appendix C for the prompt list used to evaluate the RSA project area.

4.1 Initial Project Walk Through

Prior to observing pedestrian activity, an initial project walk through of the project area was completed. LBG reviewed the existing conditions of the pedestrian facilities and noted key characteristics, safety deficiencies and the overall appearance of the infrastructure as it exists today.

Upon completing the walk through, the steep grade of Broad Street was noted. The VDOT Road Design Manual, as well as the Americans with Disabilities Act Accessibility Guidelines (ADAAG) recommends that a pedestrian route not exceed a 5% (20:1) grade. If excessively steep grades cannot be avoided, the ADAAG suggests inserting landing areas at periodic locations along the pedestrian route; however it cautions the designer that insertion of these landing areas will result in the sidewalk grade being steeper than the roadway grade, which is not desirable. The ADAAG allows a maximum sidewalk grade of 8.33% to span over 30' before a landing area is required. The grade of the roadway and adjacent sidewalk appears to be steep and therefore the insertion of landing areas will likely cause the sidewalk grade to exceed the maximum. Additionally, many of the crossings were not equipped with pedestrian ramps and truncated domes.

Conclusions from the initial project walk through were that much of the project does not meet both VDOT and ADA standards with regards to the pedestrian facilities. The sidewalk grade along the pedestrian access routes is very steep and the insertion of landing areas would cause the sidewalk grade to be steeper than the grade of Broad Street. The lack of pedestrian ramps was noted, however, the RSA team was informed that portions of a City of Richmond Project (reference CIP: 040-291-8142) that has been approved for construction includes the construction of ADA ramps with truncated dome, sidewalk improvements, lighting and other features to improve the aesthetics of the area.

The following sections review observations categorized by the FHWA's Pedestrian Road Safety Audit Guidelines and Prompt Lists. These field observations are organized by pedestrian/vehicle activity (per field visit), presence design and placement, quality control and obstructions, continuity and connectivity, lighting, visibility, traffic characteristics, signs and pavement markings and signals.

4.2 Presence, Design & Placement

Presence, design and placement of all aspects of the pedestrian accommodations along Broad Street from 17th Street to College Street were investigated. This investigation included design elements of the sidewalks, crosswalks and pavement markings, as well as how the design of the road correlates with the pedestrian facilities.

The I-95 interchange at Broad Street creates major pedestrian/vehicle conflicts because it is a major access point for vehicles travelling in and out of the City and creates a boundary between several large pedestrian traffic generators and pedestrian destinations (as noted in Figure 3.2). Pedestrians in the project area tend to park east of I-95 and are forced to cross I-95 and the interchange to arrive at their destinations west of I-95, there is no other alternate route in the City to cross I-95 without using Broad Street.

There are sidewalks along both sides of Broad Street within the study area. The sidewalk widths appear to accommodate the volumes of pedestrian traffic that Broad Street generates during all peak hours. Large parking lots, located on either side of Broad Street, as well as available on-street parking serve as major pedestrian generators for the area.

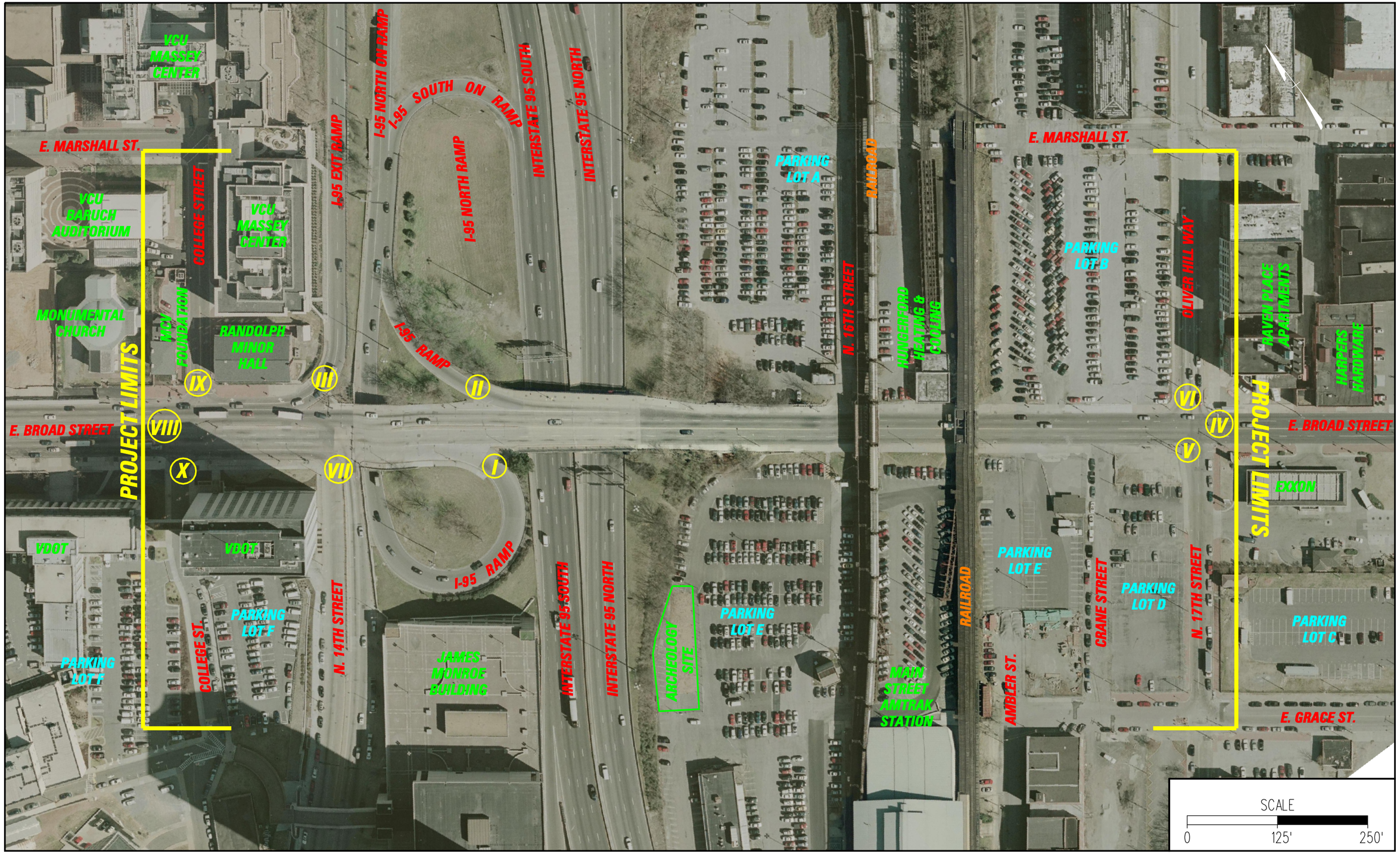
Existing striped crosswalks in the project area are identified and labeled on Figure 4.2 and are listed below.

- **I**: I-95 On-Ramp Crossing (south side of Broad Street)
- **II**: I-95 On-Ramp Crossing (north side of Broad Street)
- **III**: I-95 Exit Ramp Crossing (north side of Broad Street)
- **IV**: Broad Street Crossing (eastern side of 17th Street)
- **V**: 17th Street Crossing @ Broad Street
- **VI**: Oliver Hill Way Crossing @ Broad Street
- **VII**: 14th Street Crossing @ Broad Street
- **VIII**: Broad Street Crossing (west of College Street)
- **IX**: College Street Crossing (north side of Broad Street)
- **X**: College Street Crossing (south side of Broad Street)

(Note: crossings will be referred to by their respective Roman numeral label throughout the remainder of the document.)

Figure 4.2 presents a map of the project area and labels all striped crosswalk within the project area.

FIGURE 4.2: EXISTING CROSSWALKS



BROAD STREET BETWEEN COLLEGE STREET & 17TH STREET PROJECT

BROAD STREET BETWEEN COLLEGE STREET & 17TH STREET PROJECT

Striped crosswalks I, II and III were observed to experience a multitude of pedestrian safety issues. The crosswalks appear to be striped at a minimal width, when large groups of pedestrians cross, several pedestrians are forced to walk outside the striped area. Furthermore, none of these crosswalks are equipped with curb ramps, rendering them incompliant with ADA standards.

The placement of the crosswalks involving the I-95 interchange (I, II and III) also present potential safety issues with respect to how they correlate with vehicular traffic. Crosswalk III is placed at the end of a sharp curve, making it difficult for drivers to see pedestrians crossing far enough in advance. All three crossings related to the interchange also force pedestrians using the crosswalks to cross vehicle traffic that is travelling in a free flow turning condition, which generally allows drivers to accelerate as they prepare to enter the interstate.

Based on field observations, the locations of crosswalks I and II are not located along pedestrian desire lines. The crosswalk placements direct pedestrians to use unsignalized crossings where there is high vehicular traffic activity. Pedestrian behavior observed during the visits demonstrates the crosswalks are not striped where pedestrians feel comfortable crossing, the majority of pedestrian make the decision to cross Broad Street illegally and utilize a narrow median strip as a “walkway” and avoid using the existing crosswalks.

4.3 Pedestrian Activity: Field Visit #1 March 2, 2011 AM Peak

The majority of the AM peak hour pedestrian traffic is generated from the several large parking lots located near the AMTRAK station near 16th Street and 17th Street,and the available on street parking along the side streets in the area. Pedestrians travelling during this time consist of morning commuters heading to their respective jobs and college students from east of I-95 locations to west of I-95.

Throughout the AM peak hour, most pedestrians walking along Broad Street begin near the parking lots along 16th Street and 17th Street and head west towards 14th Street. Due to the parking availability and sidewalks along both sides of Broad Street, pedestrian traffic was evenly distributed onto both sidewalks up through crossing the I-95 overpass. Pedestrians appeared to walk along the sidewalk that was closest to where they parked.

Upon crossing the I-95 overpass, walking routes began to change primarily because of the challenge posed to pedestrians when faced with the decision of crossing via crosswalks I and II during the busy morning rush hour commute or choosing an alternate route.

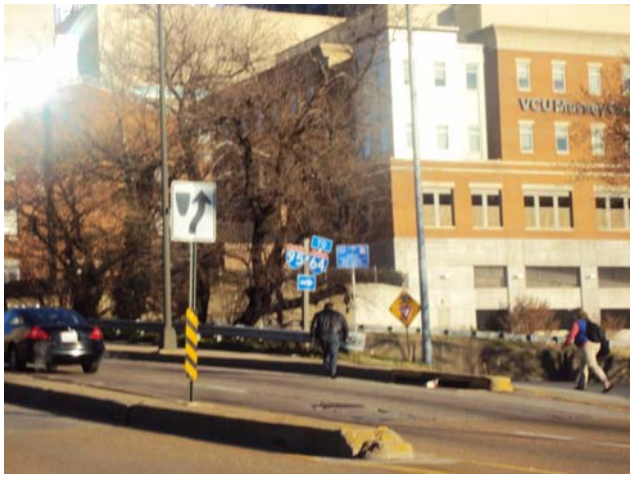
The following photos and descriptions provide a visual representation of the most common pedestrian route observed during the AM peak hour.

1. Pedestrian begins route in parking lot E and uses the provided stairs to access Broad Street.

2. Pedestrian proceeds to walk along the Broad Street south sidewalk which allows him to cross I-95 and portions of the I-95 ramps.

3. Pedestrian completes crossing the I-95 overpass and is presented with the decision of crossing Crosswalk I, which directions him across an I-95 on-ramp intersection, or to cross Broad Street illegally, using a narrow median strip as an intermediate crossing point. This photo shows the pedestrian opted to cross Broad Street.

4. The pedestrian completes crossing Broad Street and enters the north Broad Street sidewalk west of Crosswalk II.



This is one of the common routes pedestrians took during the AM peak hour. A key conclusion drawn from the common pedestrian route observed is that when posed with the decision of using striped crosswalks I and II, pedestrians chose to take the alternate route of crossing Broad Street using the median strip as an intermediate crossing point and sometimes a walkway. By using the Broad Street route, pedestrian can avoid using crosswalks I and II, which are located across the I-95 on-ramps on both sides of Broad Street.

Another challenge presented to pedestrians is crossing the crosswalk III (I-95 exit ramp) which experiences high traffic volumes in the morning. While observations indicate that a high percentage of pedestrians do use the cross walk provided, few vehicles yield to pedestrians in this area, which results in pedestrians waiting for long periods of time for an adequate interval to cross quickly. Many pedestrians voiced their discontent with this crosswalk specifically.

Pedestrian counts were held from 7:10AM to 8:10AM from the I-95 overpass on the morning of March 2, 2011. The counts were organized according to which sidewalk pedestrians were observed to be walking. Additionally, the number of pedestrians that chose to cross Broad Street illegally was also recorded. Table 4.3.1 summarizes the results of those counts.

Table 4.3.1 Broad Street Pedestrian Counts: AM Peak Hour

		Pedestrian Crossings near I-95 Ramps (illegal crossings)	
Beginning Sidewalk		**Crossed North to South**	**Crossed South to North**
North Side of Broad Street	57	11	N/A
South Side of Broad Street	77	N/A	37
TOTAL	**134**	**11**	**37**
*** TOTAL PED COUNT WAS CONDUCTED FROM I-95 OVERPASS FROM 7:15 AM TO 8:15 AM**			

4.4 Pedestrian Activity: Field Visit #2 March 3, 2011 PM Peak

The second field visit conducted was on Thursday March 3, 2011 during the hour of 11:10AM to 12:10PM. This field visit time period was selected to coincide with the PM Afternoon Peak Hour. The expectation was that a large amount of pedestrians would be travelling the area during what is a common lunch hour for many workplaces.

During this hour, the general direction of pedestrian traffic shifted west of I-95 to east of I-95. Pedestrians appeared to be walking down Broad Street toward 17th Street, most likely returning to their vehicles.

Pedestrian travel patterns were generally the same as they were during the AM peak hour, except in the reverse direction. Pedestrians used the available sidewalk space until they reached the Crosswalks I and II (I-95 on ramps), at this point, a high percentage of pedestrians chose to illegally cross Broad Street until they reached the narrow median strip, walk along the median and then cross Broad Street again once they have walked past the ramp crossings. It was noted that during this time period, vehicular traffic was lighter than that of the morning, which accounts for the trend of an increase of pedestrians crossing Broad Street illegally. Pedestrians tend to cross when traffic is lighter. Pictured below are two photos that depict pedestrians using the same route line, heading east across I-95.

The counts were organized according to which sidewalk pedestrians were observed to be walking. Additionally, the number of pedestrians that chose to cross Broad Street illegally was also recorded. Table 4.4.1 summarizes the results of those counts.

Table 4.4.1 Broad Street Pedestrian Counts: PM Afternoon Peak Hour			
		Pedestrian Crossings near I-95 Ramps (illegal crossings)	
Beginning Sidewalk		**Crossed North to South**	**Crossed South to North**
North Side of Broad Street	75	49	N/A
South Side of Broad Street	34	N/A	14
TOTAL	**109**	**49**	**14**
*** TOTAL PED COUNT WAS CONDUCTED FROM I-95 OVERPASS FROM 11:10 AM TO 12:10 PM**			

4.5 Pedestrian Activity: Field Visit #3 March 11, 2011 PM Evening Peak

The third field visit conducted was on Thursday March 11, 2011 during the hour of 4:10PM to 5:10PM. This field visit time period was chosen to coincide with the end of the regular business day. The expectation was to observe large numbers of pedestrians and vehicles travelling the area on the way to their post work/school destinations.

During this hour, the general direction of pedestrian traffic shifted to pedestrians walking the opposite direct than they were in the morning peak and is consistent with that of the afternoon peak hour. Most pedestrians appeared to be walking east along Broad Street toward 17th Street, possibly returning to their vehicles.

Pedestrian travel patterns were generally the same as they were during the AM peak hour, except in the reverse direction. Pedestrians used the available sidewalk space until they reached crosswalks I and II (I-95 on ramps), at this point, most pedestrians chose to illegally cross Broad Street until they reached the narrow median strip, walk along the median and then cross Broad Street again once they have walked past the ramp crossings.

The counts were organized according to which sidewalk pedestrians were observed to be walking. Additionally, the number of pedestrians that chose to cross Broad Street illegally was also recorded. Table 4.5.1 summarizes the results of those counts.

Table 4.5.1: Broad Street Pedestrian Counts: PM Peak Hour

		Pedestrian Crossings near I-95 Ramps (illegal crossings)	
Beginning Sidewalk		**Crossed North to South**	**Crossed South to North**
North Side of Broad Street	113	41	N/A
South Side of Broad Street	40	N/A	12
TOTAL	**153**	**41**	**12**
*** TOTAL PED COUNT WAS CONDUCTED FROM I-95 OVERPASS FROM 4:10 PM TO 5:10 PM**			

4.6 Quality, Conditions, and Obstructions

The sidewalks along Broad Street within the project area are in fair condition. The sidewalks are wide enough to service the volume of pedestrians using them; they have a few bumps and minimal cracking. It was noticed that the walking area is of noticeably steep, making ADA compliance with respect to grade difficult to achieve. With regard to the crosswalks, the pavement marking are faded and in some places very difficult to see, especially for drivers. Curb ramps are absent from the crosswalks involving the I-95 interchange (Crosswalks I, II & II) and in some cases the step from the sidewalk to the crossing pavement exceeds six inches. The picture above shows an inlet on the receiving end of crosswalk III, the significant bifurcation of the roadway versus the sidewalk, and a pedestrian walking outside the striped crosswalk area.

4.7 Continuity and Connectivity

Continuous sidewalks are provided along both sides of Broad Street for the entire assessment area. Pedestrian access to the sidewalks is adequately provided from the large parking lots located near 16th Street and 17th Street (the main generators of pedestrian traffic). The sidewalks provide direct pedestrian walkways through the project area with the exception of the I-95 interchange.

The I-95 on-ramp crosswalk located on the south side of Broad Street, Crosswalk I, requires the pedestrian to actually walk slightly down the on-ramp before reaching the striped crosswalk, no signage exists to encourage pedestrians to do so and field observations showed that this crosswalk is rarely used.

The project area includes only two striped crosswalks across Broad Street, one at 17th Street and the other at 14th Street, which are both signalized. Field observations included high volumes of pedestrian traffic crossing Broad Street illegally between those two crossings. Pedestrian connectivity and continuity has the potential to be improved by providing pedestrians an additional striped crossing so that they can cross Broad Street within the project area.

4.8 Lighting

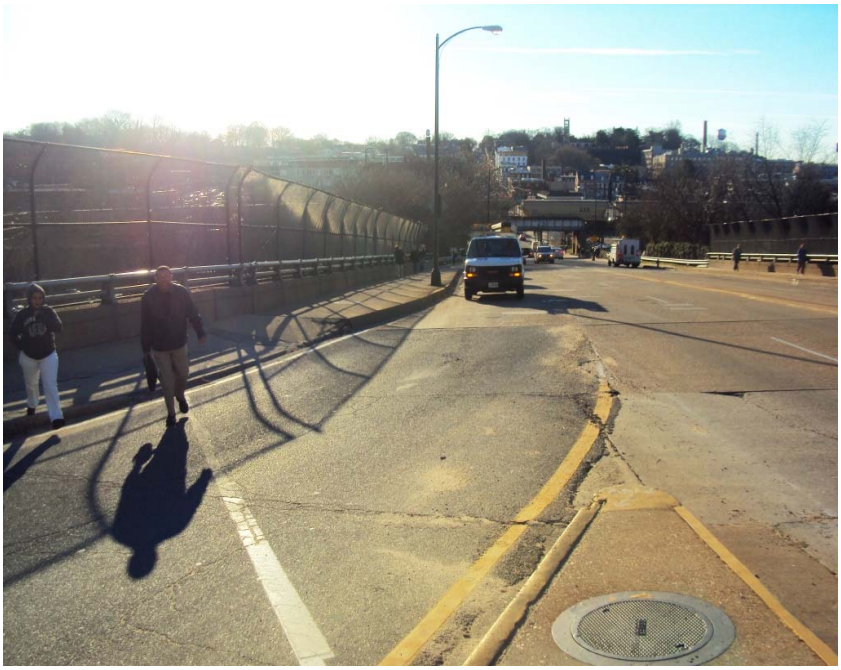
With respect to street and sidewalk lighting, the street lights adequately light the street and sidewalks. Nighttime visibility was not determined to be a major pedestrian safety issue.

4.9 Visibility

Visibility issues were identified at crosswalk II and crosswalk III.

The exit ramp crossing, Crosswalk III, is located near the end of a sharp turn making it difficult for vehicles to view the crosswalk in advance. In addition to the sharp curve, Randolph Minor Hall and the VCU Massey Center provide further visual obstructions, making it difficult to view pedestrians preparing to cross the street.

Crosswalk II (pictured below), causes a visibility issue for pedestrians walking west, towards 14th Street. Due to the angle the crosswalk is placed, and the direction of vehicle traffic, pedestrians must physically turn their bodies 180 degrees to check for approaching vehicles and then turn around and walk the opposite direction to cross the I-95 on-ramp. The approaching vehicles are in a free-flow condition and accelerating as they prepare to enter onto the interstate thus resulting in a challenging crossing condition for pedestrians.



4.10 Traffic Characteristics

The project area experiences high vehicular and pedestrian traffic. The I-95 interchange serves as a major access point from the interstate to the city, thus attracting high volumes of drivers.

The amount of available parking combined with its close proximity to locations such as VCU facilities and the VDOT buildings cause high volumes of pedestrians to travel throughout the assessment area as well.

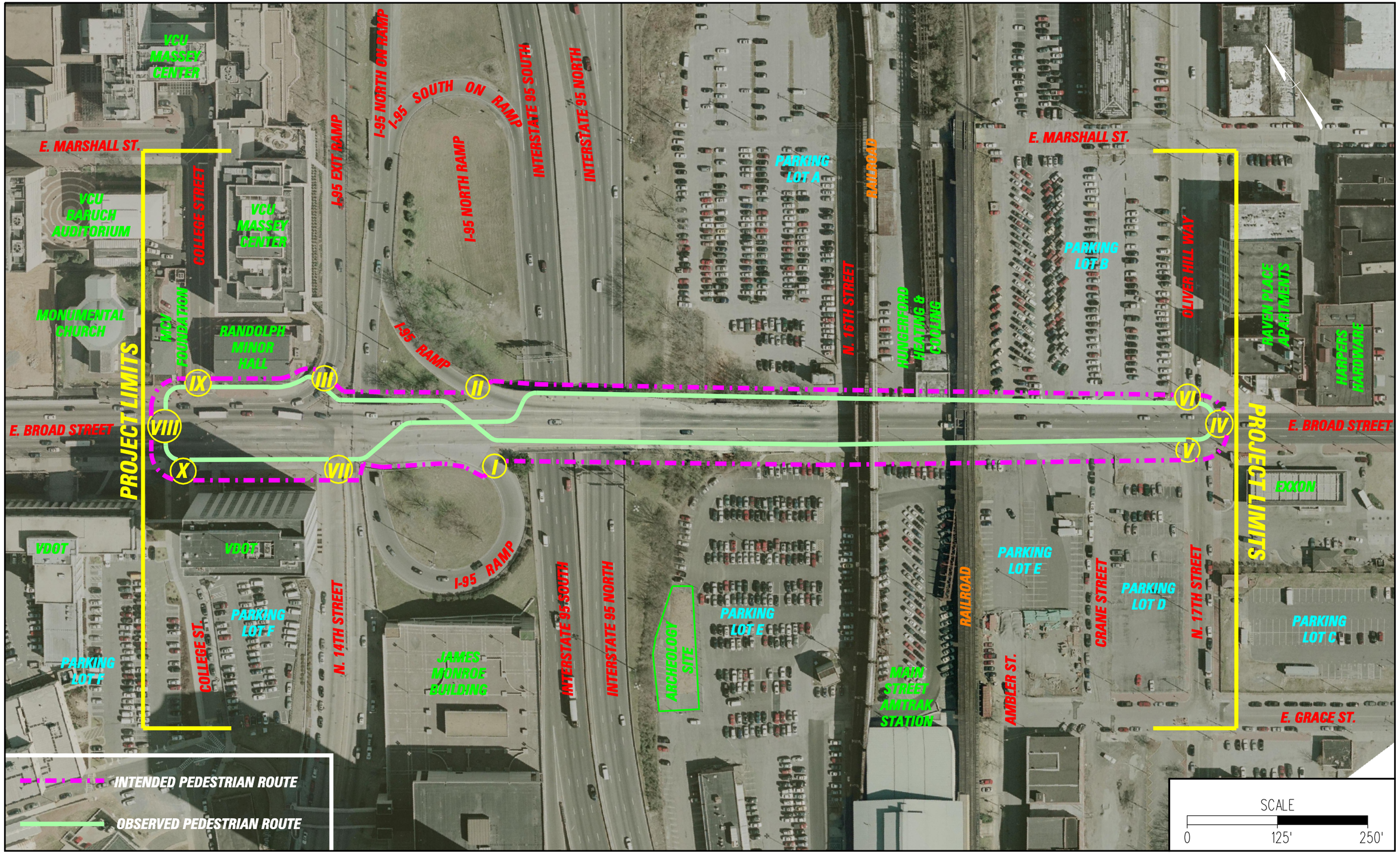
The three field visits conducted were completed during hours to coincide with the time periods that traffic would be at its highest for vehicles and pedestrians, commonly refereed to as peak hours. These peak hours have been defined as the AM peak hour (7:00AM-8:00AM), the PM afternoon peak hour (11:00AM-12:00PM) and the PM evening peak hour (4:00PM-5:00PM).

Vehicular and pedestrian traffic was extremely heavy during the AM and PM evening peak hours making it very difficult to use the crosswalks in the project area, particularly crosswalks I, II and III. The free flow conditions at these crosswalks encourage vehicles to travel at higher speeds. Pedestrians were observed to avoid using the crossings and opt to cross Broad Street illegally and utilize the median strip as a walkway. Conditions were similar during the PM afternoon peak hour; however vehicle traffic was slightly lighter than that of the AM and PM evening hours.

Figure 4.10.1 is a map of the project area and contrasts the intended pedestrian route (where striped crosswalks exist) versus the observed pedestrian route. Note that the intended pedestrian route only crosses Broad Street in two places, 17th Street and College Street. Pedestrians travelling the area prefer to cross near the I-95 interchange. This location attracts pedestrians to cross for several reasons, it allows them to avoid crosswalks I and II, it provides the shortest crossing distance, the narrow median strip acts as an intermediate crossing point and it allows pedestrians to reach their destinations without having to travel to the project limits to cross Broad Street and then backtrack.

Figure 4.10.1 presents a map of the project area with the observed pedestrian route and intended pedestrian route depicted.

FIGURE 4.10.1: PEDESTRIAN TRAVEL ROUTES



BROAD STREET BETWEEN COLLEGE STREET & 17TH STREET PROJECT

BROAD STREET BETWEEN COLLEGE STREET & 17TH STREET PROJECT

4.11 Signs and Pavement Markings

With the exception of crosswalks IV, V, VI and VIII, the crosswalk striping within the project area is faded and in some places almost completely worn away. The striping is extremely difficult to view from a driver's perspective. Both drivers and pedestrians would benefit from more defined cross walk striping.

The I-95 on ramps and exit ramps experience high speed vehicle traffic, but have minimal warning signs informing drivers that they are approaching a pedestrian crosswalks I, II and III. Crosswalks I and II have pedestrian warning signs located extremely close to the actually crossing; there is virtually no advance warning.

Crosswalk III has several signs located further north along the I-95 Exit ramp; however, drivers exiting the interstate are traveling at higher speeds and may not always see the signs.

4.12 Traffic Signals

The project area contains only three signalized intersections, which include Broad Street @ 17th Street, Broad Street @ 14th Street and Broad Street @ College Street.

Pedestrian signal heads are only provided for crosswalks IV, VII and VII, all other crosswalks are unsignalized and pedestrians cross at their own discretion. Due to such high traffic volumes and the configuration of the I-95 interchange these unsignalized crosswalks are very difficult for pedestrians to use and sometimes cause lengthy

delays as they wait for adequate gaps in traffic to cross the street; as a result many pedestrians choose to cross via the narrow median strip.

5 Traffic Incident Analysis

The City of Richmond provided accident report information dating from December 2007 to December 2010. While no pedestrian-vehicular accidents were reported in the area within that time frame, a number of side-swipe, rear end, angle and other collisions were reported in the area. The number and variety of collisions that have occurred within the assessment area over the past three years demonstrates the high number of vehicle conflict points that exist due to the different traffic movements drivers experience. The observed pedestrian route patterns of people crossing Broad Street increases the number of conflict points, causing safety concerns for all users of the facility, drivers and pedestrians alike. Although no pedestrian vehicular accidents were reported, Virginia Commonwealth University Police Officers stated that their department receives many complaints from pedestrians that travel the area and voiced concerns of the unsafe conditions during the multidisciplinary team meeting. Refer to Appendix B for the accident reports and an accident location map that illustrates the number of, type, and approximate locations of accidents within the assessment area.

6 Pedestrian Roadside Safety Audit Interdisciplinary Team Meeting

The Federal Highway Administration provides guidelines and prompts for conducting an RSA through their published a document entitled ***Pedestrian Road Safety Audit Guidelines and Prompt Lists***. The document describes the importance of selecting an interdisciplinary team to help identify pedestrian safety issues and provide input for candidate improvement locations. An interdisciplinary RSA team is selected with the intention of representing a group of individuals who when combined, possess a set of skills to identify the most critical aspects (with respect to pedestrian safety) of the project area.

On March 22, 2011 from 10:00AM until approximately 11:30AM, LBG hosted the RSA Interdisciplinary Team (IDT) Meeting. LBG did not propose any recommendations for candidate projects during the meeting. The intention of the IDT meeting was to solicit information, pedestrian safety concerns and candidate projects locations and/or recommendations from the team members. LBG provided the IDT with background information such as pedestrian counts during peak hours, observed pedestrian traffic paths and an overview of the existing infrastructure. The meeting was held in an open discussion format and the IDT weighed the pros and cons of potential improvements and identified the major faults with regard to the pedestrian facilities in the project area.

Interdisciplinary Team Members (IDT) in attendance included:

- Jian Xu with the City of Richmond Department of Public Works (CITY)
- Torrence Robinson with the City of Richmond Department of Public Works (CITY)
- Travis Bridewell With Richmond City Traffic Engineering (CITY)
- Manouchehr Nosrati with Richmond City Department of Public Works(CITY)
- Tyler Potterfield with Richmond City Planning and Development Review (DEV)
- Tracy Turpin with VDOT Traffic Engineering (VDOT)
- Jonathon Siok with the VCU Police Department (VCU PD)
- Rebecca Ellison with the VCU Police Department (VCU PD)
- Robert Marland with the Richmond City Police Department. (RPD)

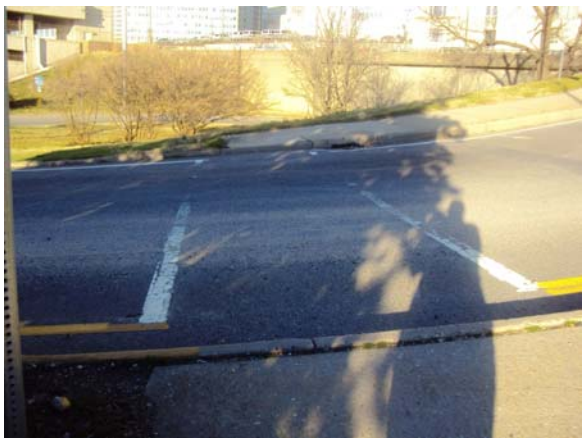
6.1 IDT Meeting Key Points

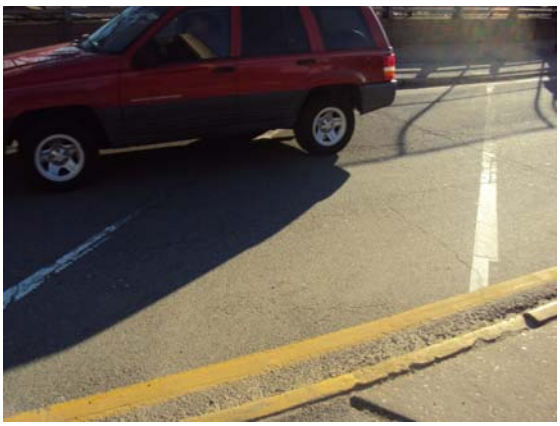
The following section outlines the key items that were discussed during the March 22, 2011 IDT Meeting. Items regarding potential pedestrian facility improvement recommendations are discussed in further detail in a separate document entitled, ***Potential Candidate Alternatives.***

1. IDT members reached consensus that project area is in the top 5 highest pedestrian travelled locations in the City of Richmond.

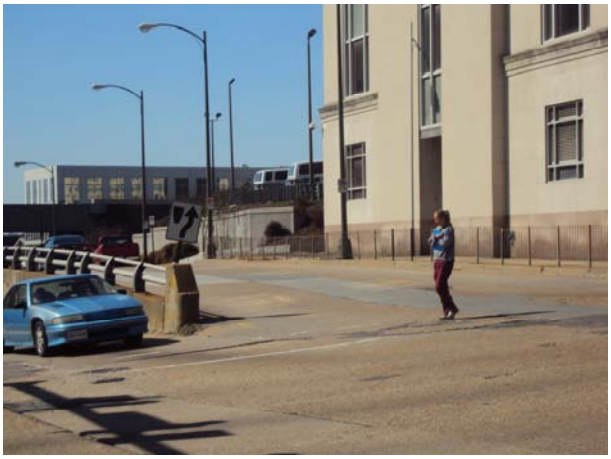
2. IDT members reached consensus that pedestrian traffic will increase in the project area over the next 5 years. VCU PD informed team that in addition to the available parking, many students are living in apartments along East Broad Street, east of I-95.

3. IDT members agreed that crosswalk striping in the project area is faded and very difficult to see. Pictured below are two examples of the faded pavement markings on crosswalks I and II. Ladder bar crosswalk striping was proposed for existing crosswalks along the entire project.





4. IDT members agreed that the project area lacks basic pedestrian features, such as ramps. IDT noted that the bifurcation of the sidewalk and the road appears to be very significant is some places. VCU PD informed the IDT that they have received complaints with respect to that issue. Pictured below is an example at 14th Street.



5. VCU PD informed IDT of an existing shuttle service that is available to VCU students travelling the project area. VCU PD observed that pedestrian traffic decreased after the shuttle service was initiated.

6. VCU PD informed the IDT members that their department receives a large number of complaints from pedestrians regarding the difficulty they experience when travelling the project area. The IDT was also informed that tractor trailers have had difficulty travelling the area especially when using the I-95 interchange ramps.

7. VCU PD suggested a pedestrian activated signal at crosswalk III; as a result, VDOT personnel voiced concern of vehicles queuing onto I-95 during peak travel times. VCU PD suggested a traffic signal coordinated with the College Street signal to help alleviate the risk the traffic queuing onto I-95.

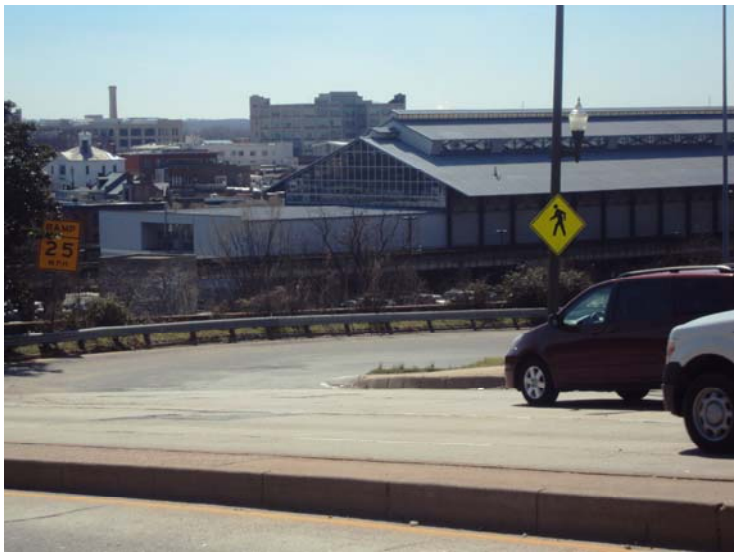
8. IDT concurred that there is a sight distance concern at crosswalk III. The crosswalk is located on the opposite end of a "blind curve." The VCU Massey Building and Randolph Minor Hall's close proximity to the road contribute the sight distance issue. The IDT discussed the addition of pedestrian warning signs beginning on I-95 and continuing up the exit ramp. The addition of rumble strips was also discussed as a potential improvement, rumble strips would warn vehicles and allow pedestrians to hear vehicles approaching

9. VDOT proposed including Robert Vilak, The Richmond District Traffic Engineer to the IDT to discuss the installation of pedestrian warning measures on I-95 for crosswalk III.

10. VCU PD proposed the use of traffic calming measures within the project area to slow vehicles down. Raised crosswalks were suggested by the IDT as a possible candidate project.

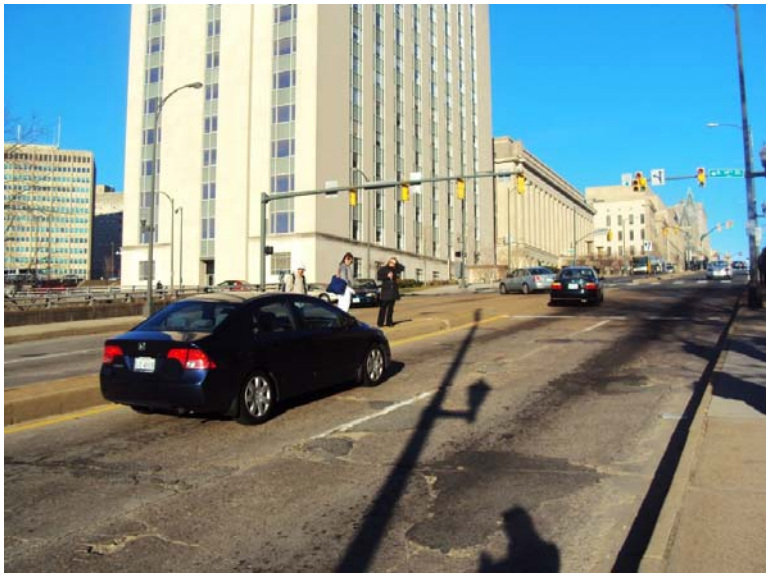
11. VCU PD informed IDT that all officers are required to be educated about the pedestrian facilities and safety throughout the City of Richmond. The IDT discussed the potential of an educational component with regards to VCU students and pedestrian safety.

12. RPD proposed advance warning for crosswalks I, II, III (the crosswalks associated with the I-95 interchange). Existing advance warning for the crosswalks is minimal, pictured below is the advance warning measures used for crosswalk I. Signing, flashing lights and pavement markings were the advance warning measures discussed.



13. Upon learning of the pedestrians tendency to walk along the narrow median strip, CITY personnel suggested decorative fencing around the median to discourage its use a walkway. Pictured below are pedestrians utilizing the median strip as an intermediate point as they cross Broad Street. DEV agreed however, they

suggested improving existing pedestrian facilities before restricting access to the median.



14. DEV proposed allowing pedestrian access to the tunnel underneath Broad Street that connects Parking Lot E and Parking Lot A.

15. DEV and CITY agreed that removing the free flow traffic conditions from the crosswalks associated with the I-95 Interchange would be a benefit to pedestrian safety. VDOT responded with concerns about the vehicle queues that would result along Broad Street and the possibility of other areas, such as Main Street experiencing major congestion problems due to drivers choosing alternative routes.

16. Manouchehr Nosrati (CITY) informed the IDT of a CITY project under his management that has been approved for construction (reference CIP: 040-291-8142) that includes the RSA project area. The project entails pedestrian ramp upgrades, sidewalk upgrades, lighting and landscaping. It was noted that the goal of this separate project was not a safety oriented project, but a project that is focused on enhancing the overall aesthetics of the area.

17. IDT members discussed concerns that potential pedestrian improvements in the project area may cause drivers to alter their travel routes and possibly cause congestion problems in other parts of the City.

7 Conclusions

The project area experiences high pedestrian and vehicle traffic volumes, especially during peak hours of travel which generally include, the AM Peak Hour (7AM-8AM), the PM Afternoon Peak Hour (11AM-12PM) and the PM Peak Hour (4PM-5PM).

Through a series of field visits, LBG observed the project area does not contain a crossing of Broad Street along a pedestrian desire line. The only striped Broad Street crossings are located at the project limits, College Street and 17th Street. Pedestrians were observed to cross Broad Street near the I-95 interchange, where crossing distance is short and a narrow raised median strip acts as an intermediate crossing point and walkway that allows them to avoid crosswalks I and II. Crosswalk III, the I-95 Exit Ramp crossing experiences the highest volume of pedestrians and consistently high vehicle volumes. Crosswalk III experiences the largest number of conflict points as it attracts the highest number of pedestrian and vehicle conflicts.

The RSA was performed per the guidelines and prompt lists provided by the FHWA. Conclusions were drawn from pedestrian behavior, existing infrastructure and field data. This RSA concludes the area does not meet ADA standards, pedestrian sidewalks and crossings are not provided continuously along desired routes and the free flow conditions of the I-95 interchange combined with high pedestrian and vehicle traffic present a multitude of pedestrian/vehicle conflicts and potential safety issues. Pedestrian facility improvements would aid in alleviating safety issues in the RSA project area. LBG developed a separate document entitled, ***Potential Candidate Alternatives***, which includes a series of potential alternatives that may improve pedestrian safety in the project area.

The Louis Berger Group, Inc.
801 East Main Street, Suite 500
Richmond, Virginia 23219

8 Appendix A: Technical Documents Referenced

- **Virginia Department of Transportation's Road Design Manual**

  http://www.extranet.vdot.state.va.us/locdes/Electronic%20Pubs/2005%20RDM/RoadDesignCoverVol.1.pdf

- **FHWA Pedestrian Road Safety Audit Guidelines and Prompt Lists (July 2007)**

  http://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_rsa/

- **ADA Accessibility Guidelines for Buildings and Facilities (September 2002)**

  http://www.access-board.gov/adaag/html/adaag.htm

9 Appendix B: Accident Report Data

City of Richmond Virginia

Motor Vehicle Accident File

Period: 12/1/2007 thru 12/28/2010

Street of interest : Broad St

Street of interest : 14th St

Accident ID	Date	Time	Officer	No of Vehicles	Type of Accident		Total damage	Fatalities	Incapacitated	Non-incapacitated	No visible injuries	No Injury	Possible injury	Non-Traff Fatality	Beat
INTERSECTION															
*****14TH ST & BROAD ST**															
200805280109	05/28/2008	0740	2908	2	ANGLE		$1,200.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	OTHER				W	OTHER								
Driver: 2	Action:	NO IMPROPER ACTION				W	OTHER								
200811040251	11/04/2008	1101	2531	2	SIDESWIPE - SAME DIRECTION		$2,400.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	OTHER IMPROPER TURN					MAKING RIGHT TURN								
Driver: 2	Action:	IMPROPER PASSING					GOING STRAIGHT AHEAD								
200901190633	01/19/2009	2120	3583	2	ANGLE		$6,000.00	0	0	0	1	0	0	0	413
Driver: 1	Action:	DID NOT HAVE RIGHT-OF-WAY				W	MAKING LEFT TURN								
Driver: 2	Action:	NO IMPROPER ACTION				E	GOING STRAIGHT AHEAD								
200907160818	07/16/2009	2145	3174	2	ANGLE		$5,000.00	0	1	0	0	0	0	0	413
Driver: 1	Action:	DISREGARDED TRAFFIC SIGNAL				E	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				N	MAKING LEFT TURN								
200908030811	08/03/2009	2303	2908	2	REAR END		$2,000.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	FOLLOWING TOO CLOSE				E	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				E	GOING STRAIGHT AHEAD								
200910020331	10/02/2009	1244	2239	2	ANGLE		$520.00	0	0	1	0	0	0	0	413
Driver: 1	Action:	DISREGARDED TRAFFIC SIGNAL				E	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				N	MAKING LEFT TURN								
200910220611	10/22/2009	1842	1774	2	ANGLE		$5,500.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	DISREGARDED TRAFFIC SIGNAL				E	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				N	MAKING LEFT TURN								

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Street of interest : 14th St

Accident ID	Date	Time	Officer	No of Vehicles	Type of Accident		Total damage	Fatalities	Incapacitated	Non-incapacitated	No visible injuries	No Injury	Possible injury	Non-Traff Fatality	Beat
201002020304	02/02/2010	1343	2239	2	BACKED INTO		$4,500.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	IMPROPER TURN - WIDE RIGHT TURN				S	BACKING								
Driver: 2	Action:	NO IMPROPER ACTION				W	MAKING LEFT TURN								
201006170382	06/17/2010	0758	3115	2	ANGLE		$6,000.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	OTHER				S	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				E	MAKING LEFT TURN								
201009160294	09/16/2010	1248	5404	2	ANGLE		$0.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	DID NOT HAVE RIGHT-OF-WAY				W	MAKING LEFT TURN								
Driver: 2	Action:	NO IMPROPER ACTION				E	GOING STRAIGHT AHEAD								
201009280220	09/28/2010	1214	2239	3	REAR END		$3,200.00	0	0	0	2	0	0	0	413
Driver: 1	Action:	FAIL TO MAINTAIN PROPER CONTROL				E	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				E	STOPPED IN TRAFFIC LANE								
Driver: 3	Action:	NO IMPROPER ACTION				E	STOPPED IN TRAFFIC LANE								
201011100563	11/10/2010	1800	2889	2	REAR END		$4,000.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	FOLLOWING TOO CLOSE				E	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				E	STOPPED IN TRAFFIC LANE								
201011120683	11/12/2010	1926	3289	2	ANGLE		$20,000.00	0	0	1	0	0	0	0	413
Driver: 1	Action:	DISREGARDED TRAFFIC SIGNAL				S	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				S	MAKING LEFT TURN								
200801230154	01/23/2008	0810	3454	2	ANGLE		$1,600.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	DID NOT HAVE RIGHT-OF-WAY				S	MAKING LEFT TURN								
Driver: 2	Action:	NO IMPROPER ACTION				E	GOING STRAIGHT AHEAD								
200803120427	03/12/2008	1510	1774	2	REAR END		$2,400.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	FOLLOWING TOO CLOSE				E	SLOWING OR STOPPING								
Driver: 2	Action:	NO IMPROPER ACTION				E	STARTING IN TRAFFIC LAN								

NON-INTERSECTION

*******14TH ST & 50 FEET S OF BROAD ST**

200806290110	06/29/2008	0200	3522	2	REAR END		$9,000.00	0	0	0	0	0	0	0	413

Street of interest : 14th St

Accident ID	Date	Time	Officer	No of Vehicles	Type of Accident		Total damage	Fatalities	Incapacitated	Non-incapacitated	No visible injuries	No Injury	Possible injury	Non-Traff Fatality	Beat
Driver: 1	Action:	EXCEEDED SPEED LIMIT				N	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				N	SLOWING OR STOPPING								
*******BROAD ST & 125 FEET E OF 14TH ST**															
200911190242	11/19/2009	1145	2874	2	REAR END		$1,600.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	HIT AND RUN				E	MAKING RIGHT TURN								
Driver: 2	Action:	NO IMPROPER ACTION				E	STOPPED IN TRAFFIC LANE								
*******BROAD ST & 200 FEET E OF 14TH ST**															
200805010239	05/01/2008	1047	2177	2	REAR END		$2,000.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	FOLLOWING TOO CLOSE				W	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				W	GOING STRAIGHT AHEAD								
200809290136	09/29/2008	0714	3262	2	REAR END		$1,600.00	0	0	0	2	0	0	0	413
Driver: 1	Action:	FOLLOWING TOO CLOSE				W	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				W	GOING STRAIGHT AHEAD								
*******BROAD ST & 30 FEET E OF 14TH ST**															
200906250437	06/25/2009	1440	2239	2	ANGLE		$1,200.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	IMPROPER OR UNSAFE LANE CHANGE				N	MAKING U-TURN								
Driver: 2	Action:	NO IMPROPER ACTION				E	GOING STRAIGHT AHEAD								
*******BROAD ST & 30 FEET W OF 14TH ST**															
200806050589	06/05/2008	1734	1931	2	ANGLE		$1,000.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	HIT AND RUN				E	OTHER								
Driver: 2	Action:	NO IMPROPER ACTION				E	STOPPED IN TRAFFIC LANE								
*******BROAD ST & 300 FEET E OF 14TH ST**															
200810280121	10/28/2008	0700	2908	2	REAR END		$2,000.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	OTHER				W	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				W	GOING STRAIGHT AHEAD								
*******BROAD ST & 35 FEET E OF 14TH ST**															

Street of interest : 14th St

Accident ID	Date	Time	Officer	No of Vehicles	Type of Accident		Total damage	Fatalities	Incapacitated	Non-incapacitated	No visible injuries	No Injury	Possible injury	Non-Traff Fatality	Beat
201008310556	08/31/2010	1603	1931	2	ANGLE		$300.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	NO IMPROPER ACTION				W	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				W	GOING STRAIGHT AHEAD								
*******BROAD ST & 50 FEET E OF 14TH ST**															
200804120536	04/12/2008	1451	3454	1	FIXED OBJECT - OFF ROAD		$1,000.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	NO IMPROPER ACTION				E	MAKING RIGHT TURN								
200806080768	06/08/2008	2250	2690	1	NON-COLLISION		$1,000.00	0	0	2	0	0	0	0	413
Driver: 1	Action:	NO IMPROPER ACTION				E	GOING STRAIGHT AHEAD								

Accidents reported at BROAD ST and 14TH ST **25**

City of Richmond Virginia

Motor Vehicle Accident File

Period: 12/1/2007 thru 12/28/2010

Street of interest : Broad St

Street of interest : 16th St

Accident ID	Date	Time	Officer	No of Vehicles	Type of Accident	Total damage	Fatalities	Incapacitated	Non-incapacitated	No visible injuries	No Injury	Possible injury	Non-Traff Fatality	Beat
INTERSECTION														
*****16TH ST & BROAD ST**														
201007300796	07/30/2010	2206	3080	2	REAR END	$3,000.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	FOLLOWING TOO CLOSE		W	GOING STRAIGHT AHEAD									
Driver: 2	Action:	NO IMPROPER ACTION		W	SLOWING OR STOPPING									
NON-INTERSECTION														
*****BROAD ST & 10 FEET E OF 16TH ST**														
200712030186	12/03/2007	0904	3133	3	REAR END	$1,400.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	FOLLOWING TOO CLOSE		W	SLOWING OR STOPPING									
Driver: 2	Action:	FOLLOWING TOO CLOSE		W	SLOWING OR STOPPING									
Driver: 3	Action:	EXCEEDED SPEED LIMIT		W	SLOWING OR STOPPING									
*****BROAD ST & 100 FEET W OF 16TH ST**														
201004050558	04/05/2010	1728	2919	4	REAR END	$2,000.00	0	0	0	1	0	0	0	111
Driver: 1	Action:	FOLLOWING TOO CLOSE		E	GOING STRAIGHT AHEAD									
Driver: 2	Action:	NO IMPROPER ACTION		E	GOING STRAIGHT AHEAD									
Driver: 3	Action:	NO IMPROPER ACTION		E	STOPPED IN TRAFFIC LANE									
Driver: 4	Action:	NO IMPROPER ACTION		E	STOPPED IN TRAFFIC LANE									
*****BROAD ST & 20 FEET E OF 16TH ST**														
200906020291	06/02/2009	1029	2920	2	ANGLE	$4,000.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	DID NOT HAVE RIGHT-OF-WAY		E	MAKING LEFT TURN									
Driver: 2	Action:	NO IMPROPER ACTION		W	GOING STRAIGHT AHEAD									

Rev 08/15/08

Street of interest : 16th St

Accident ID	Date	Time	Officer	No of Vehicles	Type of Accident		Total damage	Fatalities	Incapacitated	Non-incapacitated	No visible injuries	No Injury	Possible injury	Non-Traff Fatality	Beat
200906050335	06/05/2009	1247	2920	3	REAR END		$5,800.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	FOLLOWING TOO CLOSE				E	GOING STRAIGHT AHEAD								
Driver: 2	Action:	FOLLOWING TOO CLOSE				E	GOING STRAIGHT AHEAD								
Driver: 3	Action:	NO IMPROPER ACTION				E	STOPPED IN TRAFFIC LANE								
*******BROAD ST & 25 FEET N OF 16TH ST**															
201009120169	09/12/2010	0316	3426	1	FIXED OBJECT - OFF ROAD		$5,000.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	FAIL TO MAINTAIN PROPER CONTROL				W	GOING STRAIGHT AHEAD								
*******BROAD ST & 30 FEET W OF 16TH ST**															
200801250247	01/25/2008	0920	2259	2	REAR END		$0.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	NO IMPROPER ACTION				E	SLOWING OR STOPPING								
Driver: 2	Action:	NO IMPROPER ACTION				E	SLOWING OR STOPPING								
*******BROAD ST & 450 FEET W OF 16TH ST**															
200904270148	04/27/2009	0800	2793	2	REAR END		$5,500.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	FOLLOWING TOO CLOSE				W	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NOT APPLICABLE				W	GOING STRAIGHT AHEAD								
BROAD ST & MILES OF 16TH ST															
201012150160	12/15/2010	0842	3207	2	REAR END		$4,500.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	FOLLOWING TOO CLOSE				E	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				E	GOING STRAIGHT AHEAD								

Accidents reported at BROAD ST and 16TH ST **9**

City of Richmond Virginia

Motor Vehicle Accident File

Period: 12/1/2007 thru 12/28/2010

Street of interest : Broad St

Street of interest : 17th St

Accident ID	Date	Time	Officer	No of Vehicles	Type of Accident		Total damage	Fatalities	Incapacitated	Non-incapacitated	No visible injuries	No Injury	Possible injury	Non-Traff Fatality	Beat
INTERSECTION															
*****17TH ST & BROAD ST**															
200810100477	10/10/2008	1440	1931	3	ANGLE		$600.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	IMPROPER TURN - WIDE RIGHT TURN				S	MAKING LEFT TURN								
Driver: 2	Action:	NO IMPROPER ACTION				W	STOPPED IN TRAFFIC LANE								
Driver: 3	Action:	OTHER				W	STOPPED IN TRAFFIC LANE								
200901240462	01/24/2009	1553	2177	4	ANGLE		$10,800.00	0	0	1	0	0	0	0	111
Driver: 1	Action:	DISREGARDED TRAFFIC SIGNAL				S	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				W	GOING STRAIGHT AHEAD								
Driver: 3	Action:	NO IMPROPER ACTION				W	GOING STRAIGHT AHEAD								
Driver: 4	Action:	NO IMPROPER ACTION				E	STOPPED IN TRAFFIC LANE								
200904280136	04/28/2009	0808	1919	3	REAR END		$2,050.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	FOLLOWING TOO CLOSE				W	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				W	STOPPED IN TRAFFIC LANE								
Driver: 3	Action:	NO IMPROPER ACTION				W	STOPPED IN TRAFFIC LANE								
201001170500	01/17/2010	1814	3541	2	HEAD ON		$1,700.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	IMPROPER BACKING				E	BACKING								
Driver: 2	Action:	NO IMPROPER ACTION					OTHER								
201004090640	04/06/2010	1829	1985	3	ANGLE		$10,000.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	DISREGARDED TRAFFIC SIGNAL				W	GOING STRAIGHT AHEAD								
Driver: 2	Action:	NO IMPROPER ACTION				S	GOING STRAIGHT AHEAD								
Driver: 3	Action:	NO IMPROPER ACTION				E	STOPPED IN TRAFFIC LANE								
201009110721	09/11/2010	1950	3540	2	SIDESWIPE - SAME DIRECTION		$1,900.00	0	0	0	1	0	0	0	111
Driver: 1	Action:	IMPROPER OR UNSAFE LANE CHANGE				S	CHANGING LANES								
Driver: 2	Action:	NO IMPROPER ACTION				S	GOING STRAIGHT AHEAD								

Rev 08/15/08

Street of interest : 17th St

Accident ID	Date	Time	Officer	No of Vehicles	Type of Accident	Total damage	Fatalities	Incapacitated	Non-incapacitated	No visible injuries	No Injury	Possible injury	Non-Traff Fatality	Beat
201011060609	11/06/2010	2002	3034	2	ANGLE	$2,700.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	DID NOT HAVE RIGHT-OF-WAY		E	GOING STRAIGHT AHEAD									
Driver: 2	Action:	NO IMPROPER ACTION		E	MAKING RIGHT TURN									
200803310685	03/31/2008	2130	3349	2	SIDESWIPE - OPPOSITE DIRECTION	$1,200.00	0	0	0	0	0	0	0	111
Driver: 2	Action:	NO IMPROPER ACTION		E	GOING STRAIGHT AHEAD									
200807300736	07/31/2008	2155	1931	2	ANGLE	$6,000.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	DID NOT HAVE RIGHT-OF-WAY		W	MAKING LEFT TURN									
Driver: 2	Action:	NO IMPROPER ACTION		E	GOING STRAIGHT AHEAD									

NON-INTERSECTION

*******17TH ST & 20 FEET N OF BROAD ST**

201008030653	08/03/2010	2115	5191	3	REAR END	$1,100.00	0	2	0	0	0	0	0	111
Driver: 1	Action:	HIT AND RUN		S	GOING STRAIGHT AHEAD									
Driver: 2	Action:	NO IMPROPER ACTION		S	STOPPED IN TRAFFIC LANE									
Driver: 3	Action:	NO IMPROPER ACTION		S	STOPPED IN TRAFFIC LANE									

*******BROAD ST & 116 FEET E OF 17TH ST**

201003250590	03/25/2010	1720	3447	2	ANGLE	$7,000.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	DID NOT HAVE RIGHT-OF-WAY		N	MAKING LEFT TURN									
Driver: 2	Action:	NO IMPROPER ACTION		E	GOING STRAIGHT AHEAD									

*******BROAD ST & 200 FEET W OF 17TH ST**

201001300099	01/30/2010	0200	3400	2	REAR END	$4,000.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	FOLLOWING TOO CLOSE		W	GOING STRAIGHT AHEAD									
Driver: 2	Action:	OTHER		W	GOING STRAIGHT AHEAD									

*******BROAD ST & 50 FEET W OF 17TH ST**

201009250149	09/25/2010	0245	2272	2	SIDESWIPE - SAME DIRECTION	$2,000.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	HIT AND RUN		W	GOING STRAIGHT AHEAD									
Driver: 2	Action:	NO IMPROPER ACTION		W	GOING STRAIGHT AHEAD									

Street of interest : 17th St

Accident ID	Date	Time	Officer	No of Vehicles	Type of Accident		Total damage	Fatalities	Incapacitated	Non-incapacitated	No visible injuries	No Injury	Possible injury	Non-Traff Fatality	Beat
*******BROAD ST & 70 FEET OF 17TH ST**															
200908150172	08/15/2009	0252	3426	2	ANGLE		$3,700.00	0	0	0	1	0	0	0	111
Driver: 1	Action:	DID NOT HAVE RIGHT-OF-WAY					MAKING LEFT TURN								
Driver: 2	Action:	NO IMPROPER ACTION				E	GOING STRAIGHT AHEAD								
*******BROAD ST & 75 FEET W OF 17TH ST**															
200810100381	10/10/2008	1245	1931	2	ANGLE		$2,850.00	0	0	0	0	0	0	0	111
Driver: 1	Action:	IMPROPER TURN - WIDE RIGHT TURN				W	MAKING RIGHT TURN								
Driver: 2	Action:	NO IMPROPER ACTION				W	GOING STRAIGHT AHEAD								

Accidents reported at BROAD ST and 17TH ST **15**

City of Richmond Virginia

Motor Vehicle Accident File

Period: 12/1/2007 thru 12/28/2010

Street of interest : Broad St

Street of interest : College St

Accident ID	Date	Time	Officer	No of Vehicles	Type of Accident	Total damage	Fatalities	Incapacitated	Non-incapacitated	No visible injuries	No Injury	Possible injury	Non-Traff Fatality	Beat
INTERSECTION														
********BROAD ST & COLLEGE ST**														
200805010437	05/01/2008	1420	3454	2	SIDESWIPE - SAME DIRECTION	$2,200.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	NO IMPROPER ACTION		W	CHANGING LANES									
Driver: 2	Action:	NO IMPROPER ACTION		W	CHANGING LANES									
200809270391	09/27/2008	1200	3454	2	SIDESWIPE - SAME DIRECTION	$600.00	0	0	0	2	0	0	0	413
Driver: 1	Action:	CUTTING IN		W	STARTING IN TRAFFIC LAN									
Driver: 2	Action:	NO IMPROPER ACTION		W	GOING STRAIGHT AHEAD									
200901090179	01/09/2009	0856	2151	2	REAR END	$3,500.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	FOLLOWING TOO CLOSE		W	GOING STRAIGHT AHEAD									
Driver: 2	Action:	NO IMPROPER ACTION		W	STOPPED IN TRAFFIC LANE									
200907240225	07/24/2009	0830	2694	1	ANGLE	$0.00	0	0	0	1	0	0	0	413
Driver: 1	Action:	OTHER		E	MAKING LEFT TURN									
200712150535	12/15/2007	1650	3355	2	SIDESWIPE - SAME DIRECTION	$100.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	IMPROPER OR UNSAFE LANE CHANGE		E	CHANGING LANES									
Driver: 2	Action:	NO IMPROPER ACTION		E	SLOWING OR STOPPING									
NON-INTERSECTION														
********BROAD ST & 20 FEET E OF COLLEGE ST**														
200908100354	08/10/2009	1320	2157	2	ANGLE	$3,100.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	IMPROPER PASSING		E	GOING STRAIGHT AHEAD									
Driver: 2	Action:	NO IMPROPER ACTION		E	CHANGING LANES									
********BROAD ST & 3 FEET E OF COLLEGE ST**														

Rev 08/15/08

Street of interest : College St

Accident ID	Date	Time	Officer	No of Vehicles	Type of Accident		Total damage	Fatalities	Incapacitated	Non-incapacitated	No visible injuries	No Injury	Possible injury	Non-Traff Fatality	Beat
200908010352	08/01/2009	1230	2157	2	ANGLE		$3,500.00	0	0	0	1	0	0	0	413
Driver: 1	Action:	IMPROPER TURN FROM WRONG LANE				W	MAKING RIGHT TURN								
Driver: 2	Action:	NO IMPROPER ACTION				W	GOING STRAIGHT AHEAD								
*******BROAD ST & 50 FEET E OF COLLEGE ST**															
200804080498	04/08/2008	1427	2925	2	ANGLE		$10,000.00	0	0	0	0	0	0	0	413
Driver: 1	Action:	IMPROPER OR UNSAFE LANE CHANGE				W	MAKING LEFT TURN								
Driver: 2	Action:	NO IMPROPER ACTION				W	OTHER								
Accidents reported at	**BROAD ST and COLLEGE ST**											**8**			

City of Richmond Virginia

Motor Vehicle Accident File

Period: 12/1/2007 thru 12/28/2010

Street of interest : Broad St

Street of interest : Crane St

Accident ID	Date	Time	Officer	No of Vehicles	Type of Accident	Total damage	Fatalities	Incapacitated	Non-incapacitated	No visible injuries	No Injury	Possible injury	Non-Traff Fatality	Beat

Accidents reported at BROAD ST and CRANE ST

Rev 08/15/08

10 Appendix C: FHWA Street Crossing Prompt List

Attached is the prompt list that LBG used when conducting field visits and taking field notes.

STREET CROSSINGS			
Master Prompt	**Detailed Prompt**		**Comments**
B.1 Presence, Design, and Placement	**B.1.1**	Do wide curb radii lengthen pedestrian crossing distances and encourage high-speed right turns?	
	B.1.2	Do channelized right turn lanes minimize conflicts with pedestrians?	
	B.1.3	Does a skewed intersection direct drivers' focus away from crossing pedestrians?	
	B.1.4	Are pedestrian crossings located in areas where sight distance may be a problem?	
	B.1.5	Do raised medians provide a safe waiting area (refuge) for pedestrians?	
	B.1.6	Are supervised crossings adequately staffed by qualified crossing guards?	
	B.1.7	Are marked crosswalks wide enough?	
	B.1.8	Do at-grade railroad crossings accommodate pedestrians safely?	
	B.1.9	Are crosswalks sited along pedestrian desire lines?	
	B.1.10	Are corners and curb ramps appropriately planned and designed at each approach to the crossing?	
B.2 Quality, Condition, and Obstructions			
	B.2.1	Is the crossing pavement adequate and well maintained?	
	B.2.2	Is the crossing pavement flush with the roadway surface?	
B.3 Continuity and Connectivity	**B.3.1**	Does pedestrian network connectivity continue through crossings by means of adequate, waiting areas at corners, curb ramps and marked crosswalks?	
	B.3.2	Are pedestrians clearly directed to crossing points and pedestrian access ways?	
B.4 Lighting	**B.4.1**	Is the pedestrian crossing adequately lit?	
B.5 Visibility	**B.5.1**	Can pedestrians see approaching vehicles at all legs of the intersection/crossing and vice versa?	
	B.5.2	Is the distance from the stop (or yield) line to a crosswalk sufficient for drivers to see pedestrians?	
	B.5.3	Do other conditions exist where stopped vehicles may obstruct visibility of pedestrians?	
B.6 Access Management	**B.6.1**	Are driveways placed close to crossings?	

STREET CROSSINGS			
Master Prompt	**Detailed Prompt**		**Comments**
B.7 Traffic Characteristics	**B.7.1**	Do turning vehicles pose a hazard to pedestrians?	
	B.7.2	Are there sufficient gaps in the traffic to allow pedestrians to cross the road?	
	B.7.3	Do traffic operations (especially during peak periods) create a safety concern for pedestrains?	
B.8 Signs and Pavement Markings	**B.8.1**	Is paint on stop bars and crosswalks worn, or are signs worn, missing, or damaged?	
	B.8.2	Are crossing points for pedestrians properly signed and/or marked?	
B.9 Signals	**B.9.1**	Are pedestrian signal heads provided and adequate?	
	B.9.2	Are traffic and pedestrian signals timed so that wait times and crossing times are reasonable?	
	B.9.3	Is there a problem because of an inconsistency in pedestrian actuation (or detection) types?	
	B.9.4	Are all pedestrian signals and push buttons functioning correctly and safely?	
	B.9.5	Are ADA accessible push buttons provided and properly located?	