INTERSTATE I-81 IMPROVEMENT STUDY

STUDY AREA #9 REPORT
SHENANDOAH, WARREN, AND FREDERICK COUNTIES

MILEPOST 264 - MILEPOST 305

November 1998

Prepared for
Virginia Department of Transportation
Location and Design Division

by

WR&A
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1 Meter =
3.28 ft.
To get feet:
Meters ÷ .3048
.3048

Scale
1 cm = 25 meters

(3.28' in a meter)

ACKNOWLEDGMENT

This document was prepared by Whitman, Requardt and Associates, LLP for the Virginia Department of Transportation (Location and Design Division). The contents reflect the views of the authors who are responsible for the facts and the accuracy of the data presented herein. Any conclusions, opinions, or recommendations found herein do not necessarily reflect the official position of the Commonwealth Transportation Board.

Whitman, Requardt and Associates, LLP was assisted in the preparation of this report by the following subconsultant team:

Saeed Associates Chartered Springfield, Virginia	Subconsultant Engineering
O. R. George and Associates, Inc. Silver Spring, Maryland	Subconsultant Traffic Data Collection
Air Survey Corporation Sterling, Virginia	Subconsultant Topographic Mapping and Digital Orthophotographs

The information in the Environmental Summary was collected by the Virginia Department of Transportation – Staunton District.

Interstate 81 Improvement Study

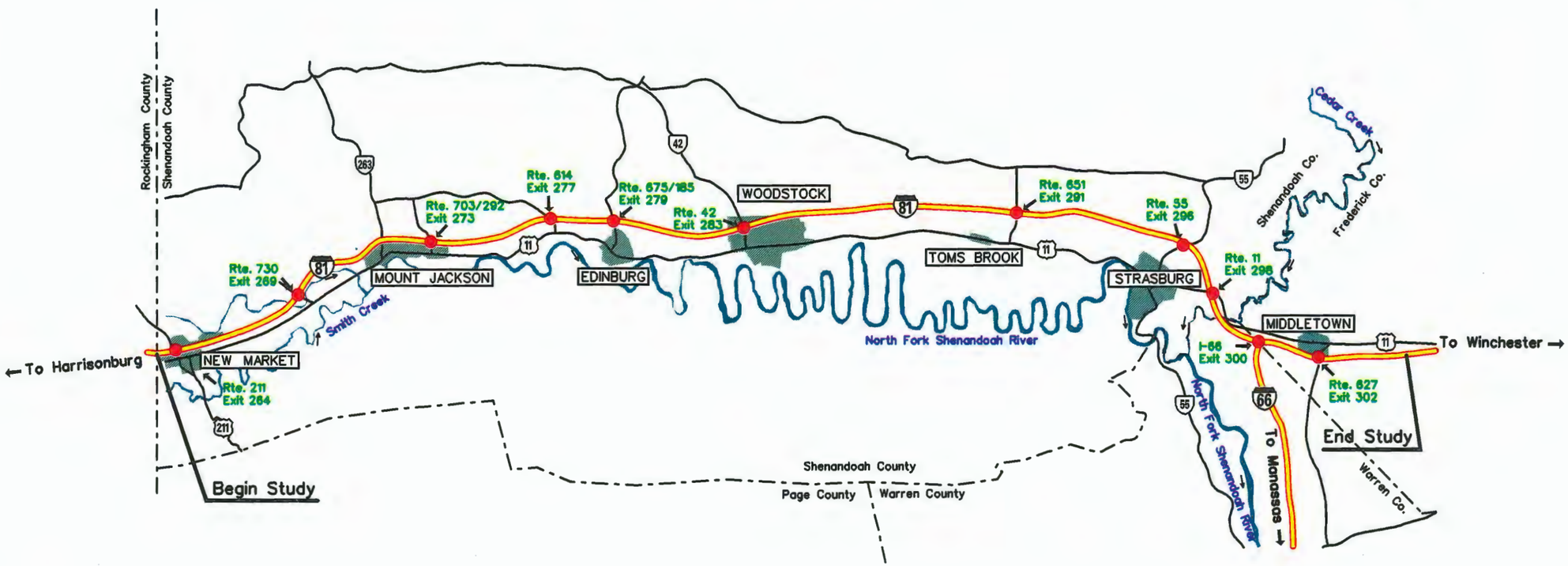
Shenandoah, Warren, and Frederick Counties

State Project Number: 0081-968-113, PE 101

From: 1.0 Mile (1.6 km) south of Route 211 at New Market
(MP 264 Shenandoah County)

To: 2.1 Miles (3.4 km) south of Route 277 at Stephens City
(MP 305 Frederick County)

Length: 41.2 Miles (66.3 km)



Virginia Department of Transportation VDOT	**LOCATION MAP**	**Date: November 1998**	**Interstate 81** **Improvement Study** Project Number: 0081–968–113, PE–101 Shenandoah, Warren and Frederick Counties	Sheet No. **3**

File: MVr4521D\locmap.dgn
Date: 11/10/98

2.0 TRAFFIC DATA

This project required an extensive traffic data collection process to accurately forecast and analyze the existing and future traffic operations on I-81. Data were collected during the period from July 21, 1997 to August 18, 1997, a total of 171 tube counts and numerous turning movement counts were performed along the project. The collected traffic data is summarized in the Base Year Traffic Report, February 1998, which is available in the VDOT's Transportation Planning Division located in Richmond, Virginia.

The existing and future conditions of this segment of I-81 are briefly summarized below.

2.1 Existing Conditions

The existing traffic on this section of I-81 varies from a low of 34,100 to 43,100 vehicles per day. The peak hour volumes range from 2,350 to 2,940 vehicles per hour. (See Figures F-2.1 through F-2.4, Sheets 6-9 for AADT, A.M., mid-day, and P.M. peak hours.)

Truck percentages range from 22 to 29 percent during a 24 hour period. The peak hour percentage of trucks is between 16 and 22 percent for this segment of I-81. The Virginia Department of Transportation has developed a report summarizing trucking trends along the entire corridor of I-81 in Virginia. The Base Year Traffic Report, January 1998 is available in the Department's Transportation Planning Division located in Richmond, Virginia.

Currently during the peak hour, I-81 operates at level of service "B" and the ramps operate at level of service "A" except the northbound off ramp to I-66 that operates at level of service "B." (See Figures F-2.9 through F-2.19, Sheets 14-24 for truck percentages, simulated speeds, and levels of service.)

2.2 Future Year 2010 No Build Analysis

The Average Daily Traffic for the year 2010 is projected to be between 55,620 and 68,740 vehicles on this segment of I-81. The peak hour volumes range from 4,090 to 5,100 vehicles (See Figures F-2.5 and F-2.6, Sheets 10-11). The level of service is "C" approximately halfway through the study limits from milepost 264 to Exit 283. At Exit 283 (Route 42), a level of service "F" occurs on the northbound and southbound off ramps and the southbound I-81 mainline. The CORSIM model shows traffic queuing from the southbound ramp terminal onto I-81 causing the low level of service on I-81. The ramp terminals are currently signalized; therefore, further improvements are needed to reduce the queuing and allow traffic exiting I-81 to efficiently access Route 42. These improvements are indicated under Section 2.4 in the recommended modification to interchanges.

From Exit 283 to milepost 305, the level of service for the I-81 mainline varies between "C" and "D." Other undesirable or low level of service occurs at the Exit 291 northbound off ramp terminal at Route 651 (LOS "F") and at the Exit 298 southbound off ramp terminal at Route 11 (LOS "D"). The ramp terminals were analyzed as unsignalized intersections. The level of service could be improved by signalizing the ramp terminals. (See Figures F-2.20 through F-2.30, Sheets 25-35 for simulated speed and levels of service.)

2.3 Future Year 2020 No Build Analysis

The Forecast Average Daily Traffic for the year 2020 ranges from 69,600 to 86,000 vehicles on this segment of I-81. During the design hour in the year 2020, the traffic volume will range between 5,120 and 6,370 vehicles. The increase in traffic will cause the level of service to become unacceptable on I-81 (less than level of service "C") during the design hour throughout the corridor. Ramps will continue to operate acceptably except at Exits 283 and 300. At Exit 283, the northbound and southbound off ramps will operate at level of service "F." As with Year 2010, the CORSIM model shows traffic queuing from the ramp terminals causing these levels of service. The queue extends onto I-81 from the southbound off ramp resulting in a speed of 9 mph on I-81 southbound.

As the ramp terminals at Exit 283 are signalized other improvements would be needed here. At Exit 300, the on ramp from I-66 to I-81 southbound would operate at level of service "D."

At Exit 291, the northbound off ramp terminal will operate at a level of service "F," and Exit 298, the southbound off ramp terminal, will operate at level of service "F." Once again, the level of service could be improved by signalizing the ramp terminals to allow traffic exiting I-81 to efficiently access the connecting roadways.

Average operating speed throughout the corridor will be 59 mph northbound and 53 mph southbound. The existing average operating speed is 66 mph for northbound and southbound.

2.4 Future Year 2020 Build Analysis

The build alternative was developed to handle the future year projected traffic at a level of service "C" or better throughout this segment of I-81. This required I-81 to be improved to a six lane interstate facility and the reconstruction of the 11 existing interchanges. (See Figures F-2.31 through F-2.41, Sheets 36-46 for simulated speed and levels of service.) Auxiliary lanes are provided between Exit 298 (Route 11) and Exit 300 both northbound and southbound and between Exit 300 and Exit 302 (Route 627) southbound.

Forecast Average Daily Traffic and the peak hour traffic in the year 2020 are shown assigned to the build network in Figures F-2.7 and F-2.8, Sheets 12 and 13.

The recommended modification to the interchanges are briefly described below:

Exit 277 (Route 614) - The existing half diamond interchange is proposed to be reconstructed as a full diamond interchange to provide access to/from I-81 to the north. This will create maximum use of the interchange and eliminate circuitous travel patterns. The future traffic volumes can be accommodated at an acceptable level of service. The above interchange improvements must be approved by the Federal Highway Administration, and the Department may investigate the elimination of the interchange in the future.

Exit 283 (Route 42) – Route 42 is proposed to be widened to 4 through lanes with left turn storage lanes and separate right turn lanes. The northbound and southbound ramps are proposed to be widened to 2 lanes each. With these improvements, future traffic volumes can be accommodated at an acceptable level of service "B."

Exit 291 (Route 651) - The increased traffic requires the addition of signals at the ramp terminals to operate acceptably.

Exit 298 (Route 11) - The increased traffic requires the addition of signals at the ramp terminals to operate acceptably.

Exit 300 (Route I-66) - The left off ramp from I-81 southbound to I-66 was redesigned for a right off ramp. The left on ramp from I-66 to I-81 southbound was redesigned to enter I-81 from the right. These improvements provide the more traditional driver expectancy "right" off/on ramp design and are less confusing. Also, the beginning of the deceleration lane from I-81 northbound to I-66 eastbound was extended to the beginning of the 4% grade.

The need for truck climbing lanes was analyzed throughout the entire project. It was determined that the facility operated at level of service "C" throughout most of the project; however, it was necessary to add additional lanes in both directions between Exits 298 and 300 to obtain an overall level of service "C." An additional lane was added northbound beginning at the northbound on ramp at Exit 298 and ending prior to the northbound on ramp at Exit 300. An additional lane was added southbound by connecting the southbound off ramp at Exit 298 to the southbound on ramp at Exit 300. The lanes are not intended to be exclusive truck climbing lanes, but would allow trucks an additional lane for use.

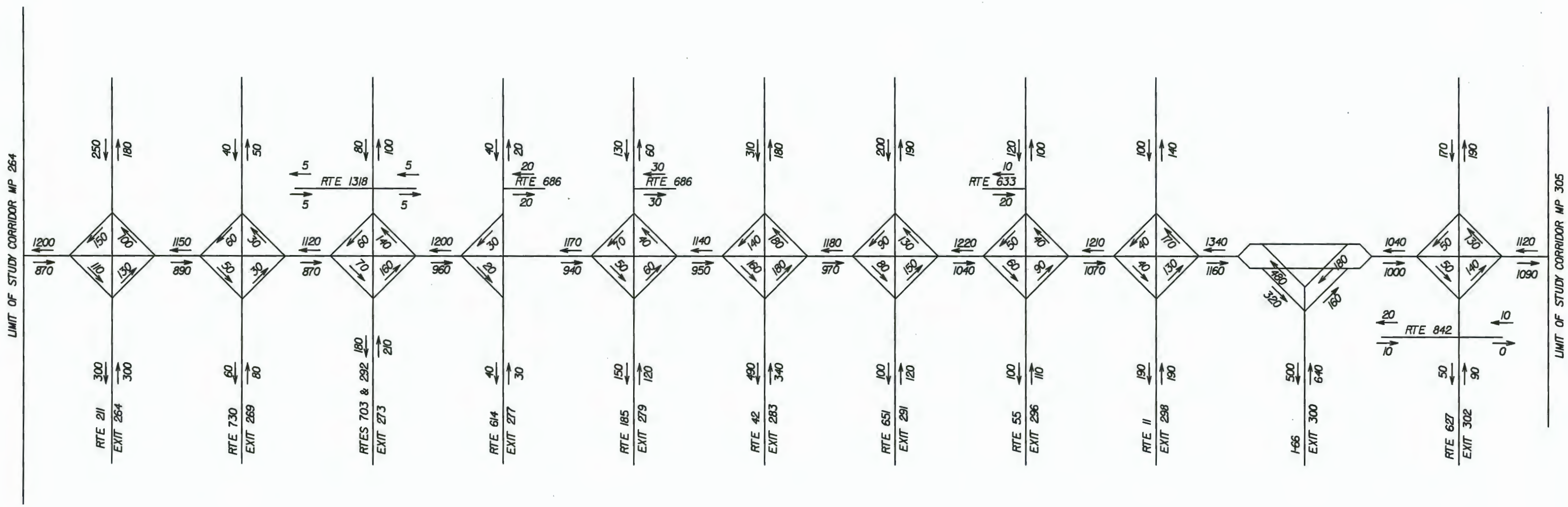
Although, the overall level of service would be "C," two individual lanes southbound would operate at level of service "D" for a distance of approximately 610 meters between the exits. See the Mainline Traffic Summary on page 47. This area should be carefully analyzed in the final design stage.

2.5 Impact of Legislated Truck Restrictions

A CORSIM analysis of the corridor with and without truck restrictions under build conditions was made. In three segments northbound and one southbound, the overall level of service under build conditions with truck restrictions would be "C" and build without truck restrictions for these same segments would be "B." Also in the individual lane analysis, without the truck restrictions the levels of service "D" mentioned above would become "C." The Mainline Traffic Summary, Figure F-2.42, Sheet 47, shows the level of service for the Year 2020 with and without truck restrictions.

2.6 Summary

Traffic volumes on this segment of I-81 will increase approximately 100 percent (or double) by the year 2020. This increase in traffic will cause the level of service to drop from the present day level of service "B" to unacceptable levels of service under a no build condition. The improvements proposed by this study will allow I-81 to operate at an acceptable level of service throughout the corridor. A summary of volumes, truck percentages, and levels of service for the Base Year, Year 2010, and Year 2020 can be found in Figure F-2.42, Sheet 47. Turning movement summaries for the Base Year, Year 2010, and Year 2020 are shown in Figures F-2.43 through F-2.62, Sheets 48-67.



Virginia Department of Transportation	**BASE YEAR 1997 AM PEAK HOUR**	**Date:** November 1998 **Figure:** F-2.1	**Interstate 81** **Improvement Study** Project Number: 0081–968–113, PE–101 Shenandoah, Warren and Frederick Counties

Sheet No.
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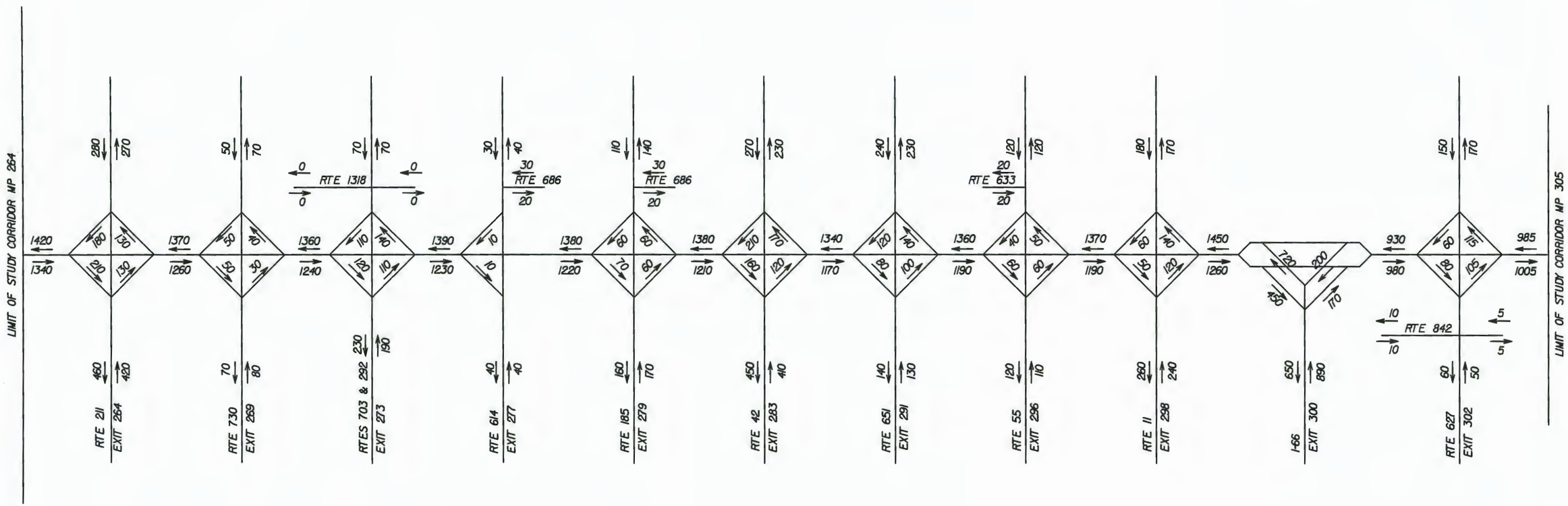
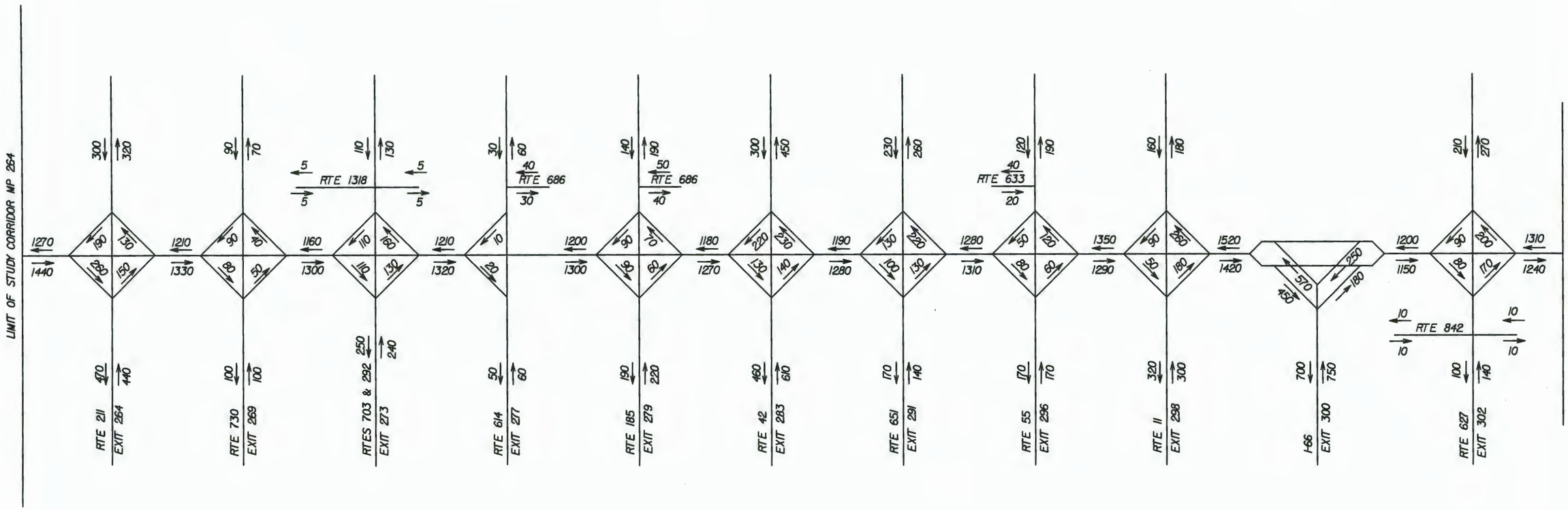


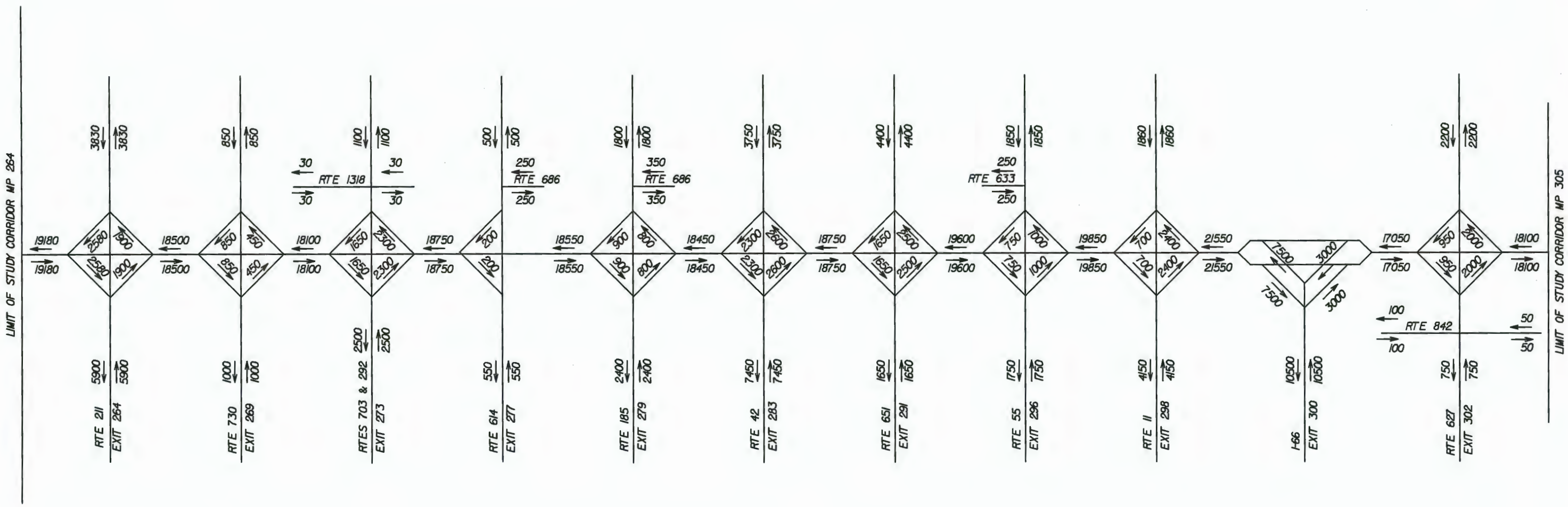
Virginia Department of Transportation VDOT	**BASE YEAR 1997 MIDDAY PEAK HOUR**	**Date: November 1998** **Figure: F-2.2**	**Interstate 81** **Improvement Study** Project Number: 0081–968–113, PE–101 Shenandoah, Warren and Frederick Counties

Sheet No.
7



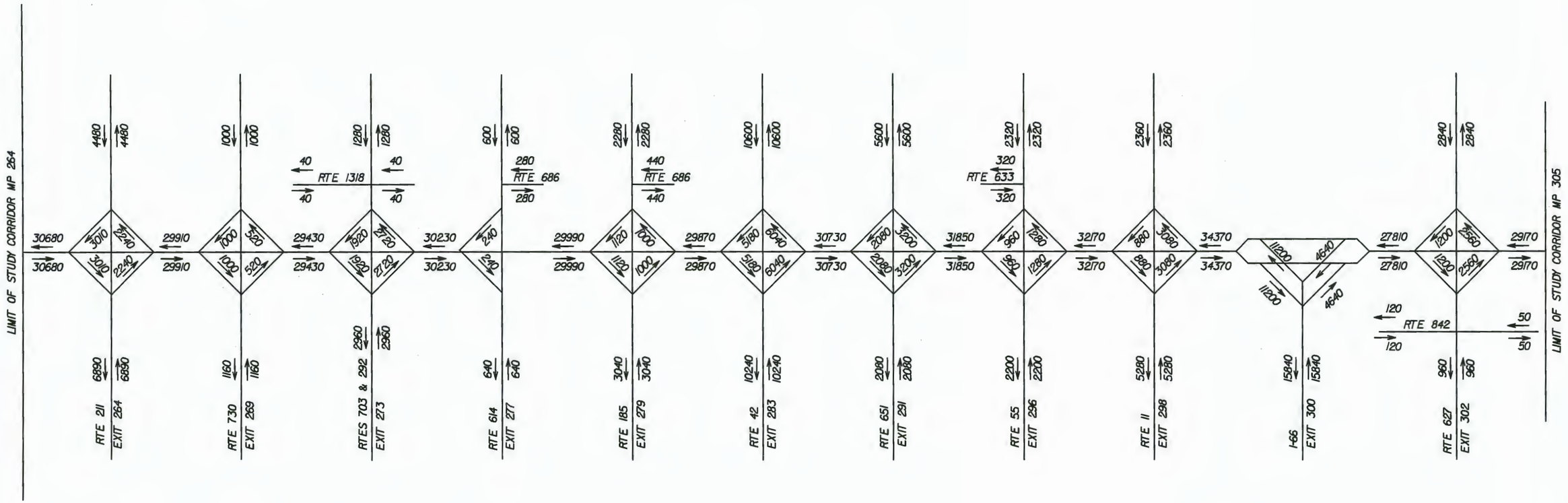
Virginia Department of Transportation VDOT	**BASE YEAR 1997 PM PEAK HOUR**	**Date: November 1998** **Figure: F-2.3**	**Interstate 81** **Improvement Study** Project Number: 0081–968–113, PE–101 Shenandoah, Warren and Frederick Counties

Sheet No.
8

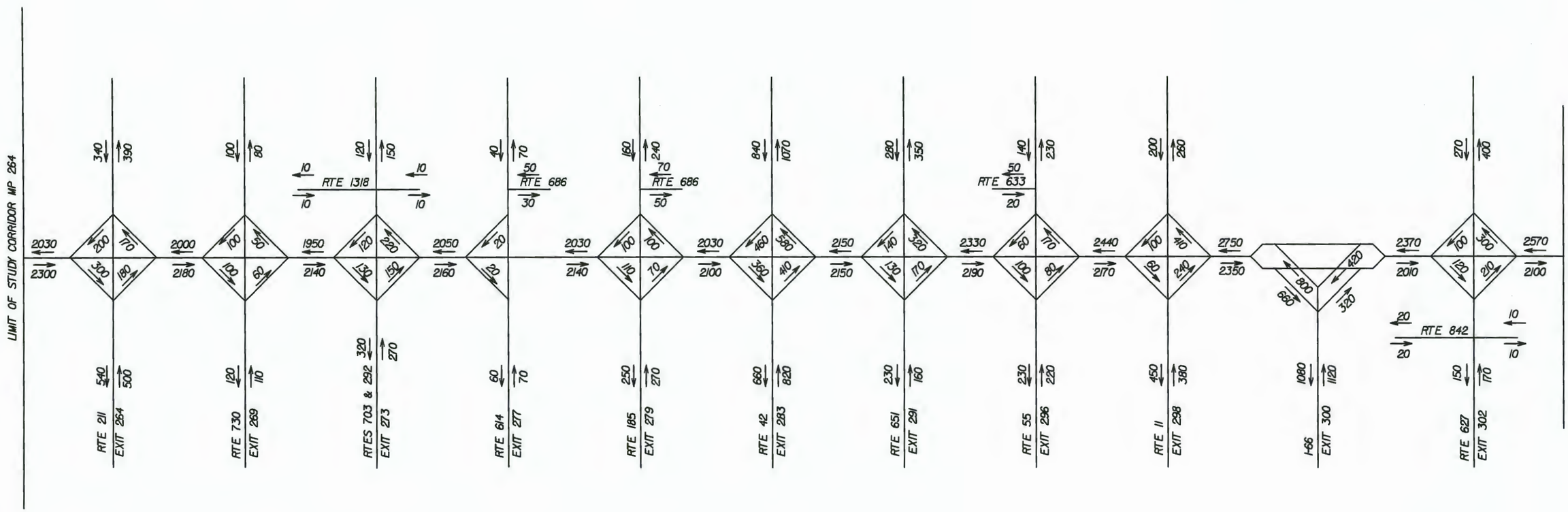


Virginia Department of Transportation	**SMOOTHED BASE YEAR 1997 AADT**	**Date:** November 1998 **Figure:** F-2.4	**Interstate 81** **Improvement Study** Project Number: 0081-968-113, PE-101 Shenandoah, Warren and Frederick Counties

Sheet No.
9



Virginia Department of Transportation VDOT	**YEAR 2010 DAILY TRAFFIC FORECAST**	**Date:** November 1998 **Figure:** F-2.5	**Interstate 81** **Improvement Study** Project Number: 0081–968–113, PE–101 Shenandoah, Warren and Frederick Counties	Sheet No. *10*



Virginia Department of Transportation

YEAR 2010 PM PEAK HOUR TRAFFIC FORECAST

Date: November 1998

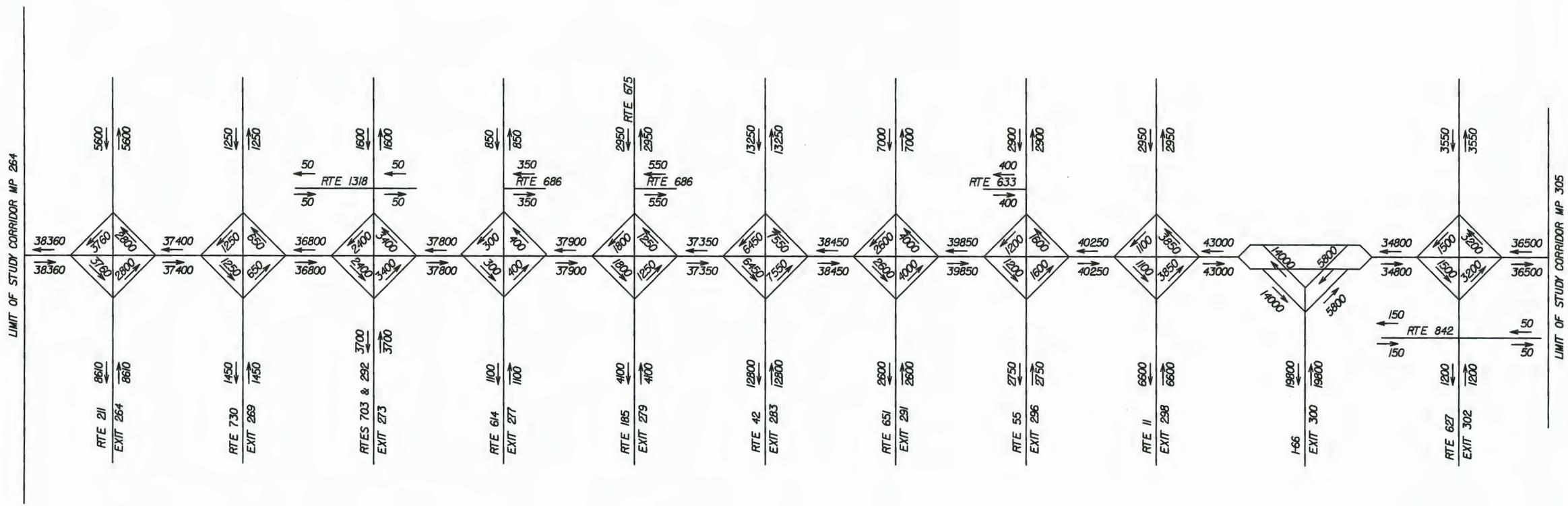
Figure: F-2.6

Interstate 81
Improvement Study

Project Number: 0081–968–113, PE–101

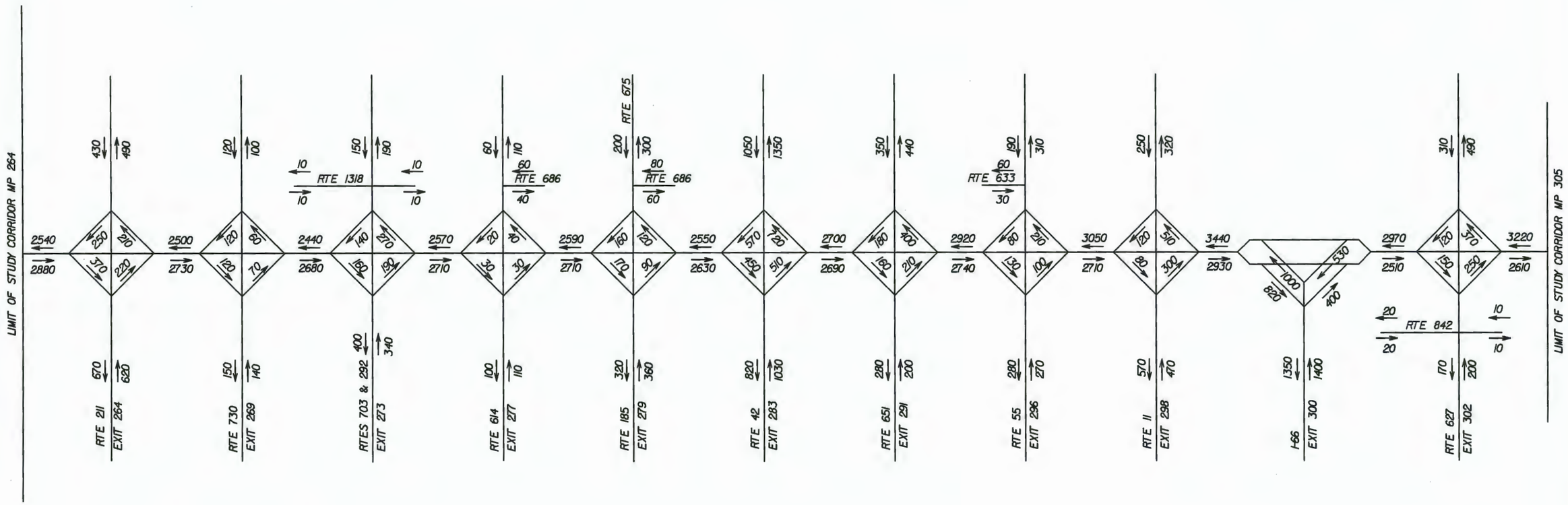
Shenandoah, Warren and Frederick Counties

Sheet No. 11



Virginia Department of Transportation VDOT	**YEAR 2020 DAILY TRAFFIC FORECAST BUILD**	**Date:** November 1998 **Figure:** F-2.7	**Interstate 81 Improvement Study** Project Number: 0081-968-113, PE-101 Shenandoah, Warren and Frederick Counties

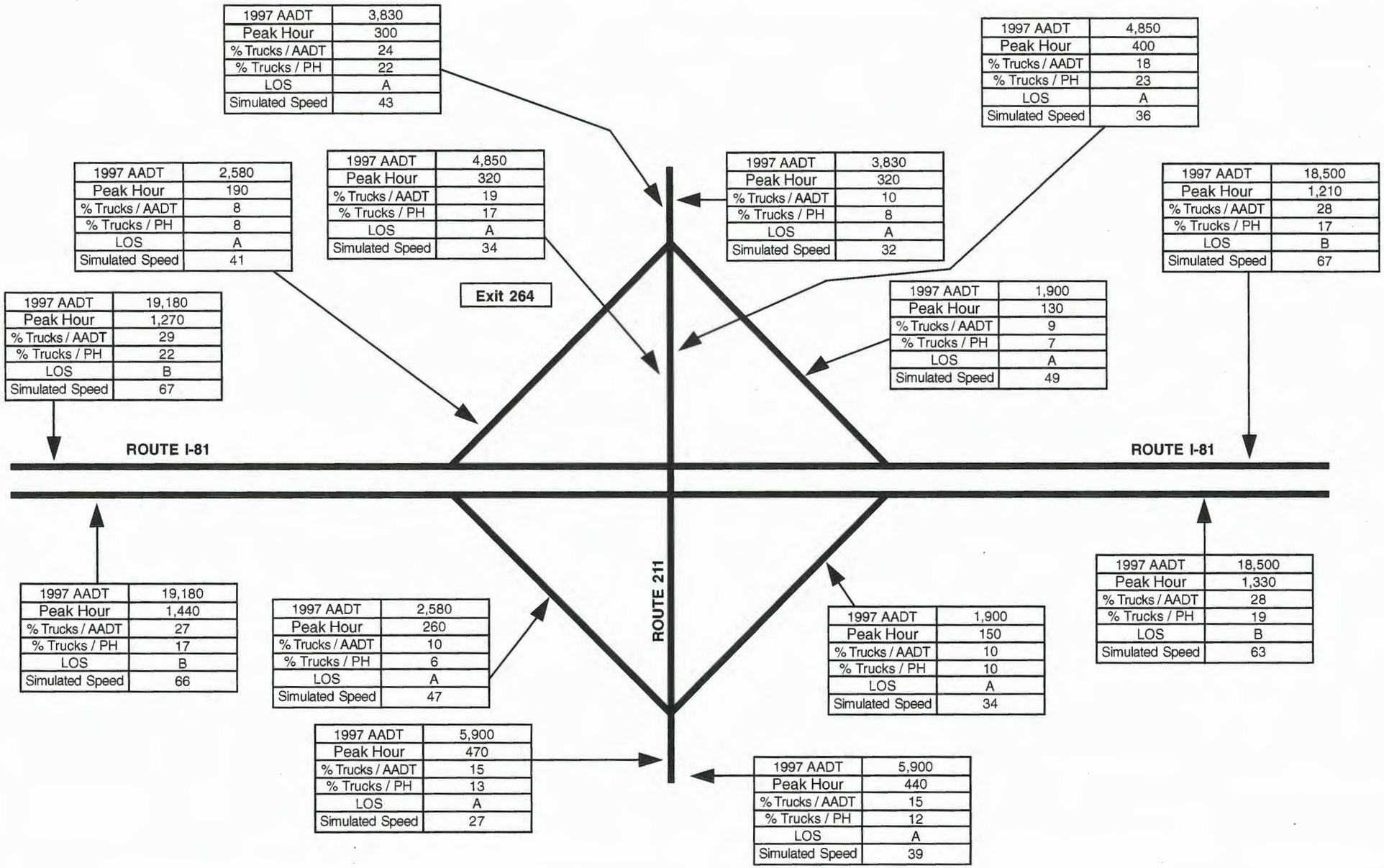
Sheet No. **12**



Virginia Department of Transportation VDOT	**YEAR 2020 PM PEAK HOUR TRAFFIC FORECAST - BUILD**	**Date: November 1998** **Figure: F-2.8**	**Interstate 81 Improvement Study** Project Number: 0081-968-113, PE-101 Shenandoah, Warren and Frederick Counties
			Sheet No. **13**

MILEPOST 264

N



1997 AADT	3,830
Peak Hour	300
% Trucks / AADT	24
% Trucks / PH	22
LOS	A
Simulated Speed	43

1997 AADT	4,850
Peak Hour	400
% Trucks / AADT	18
% Trucks / PH	23
LOS	A
Simulated Speed	36

1997 AADT	2,580
Peak Hour	190
% Trucks / AADT	8
% Trucks / PH	8
LOS	A
Simulated Speed	41

1997 AADT	4,850
Peak Hour	320
% Trucks / AADT	19
% Trucks / PH	17
LOS	A
Simulated Speed	34

1997 AADT	3,830
Peak Hour	320
% Trucks / AADT	10
% Trucks / PH	8
LOS	A
Simulated Speed	32

1997 AADT	18,500
Peak Hour	1,210
% Trucks / AADT	28
% Trucks / PH	17
LOS	B
Simulated Speed	67

1997 AADT	19,180
Peak Hour	1,270
% Trucks / AADT	29
% Trucks / PH	22
LOS	B
Simulated Speed	67

1997 AADT	1,900
Peak Hour	130
% Trucks / AADT	9
% Trucks / PH	7
LOS	A
Simulated Speed	49

1997 AADT	19,180
Peak Hour	1,440
% Trucks / AADT	27
% Trucks / PH	17
LOS	B
Simulated Speed	66

1997 AADT	2,580
Peak Hour	260
% Trucks / AADT	10
% Trucks / PH	6
LOS	A
Simulated Speed	47

1997 AADT	1,900
Peak Hour	150
% Trucks / AADT	10
% Trucks / PH	10
LOS	A
Simulated Speed	34

1997 AADT	18,500
Peak Hour	1,330
% Trucks / AADT	28
% Trucks / PH	19
LOS	B
Simulated Speed	63

1997 AADT	5,900
Peak Hour	470
% Trucks / AADT	15
% Trucks / PH	13
LOS	A
Simulated Speed	27

1997 AADT	5,900
Peak Hour	440
% Trucks / AADT	15
% Trucks / PH	12
LOS	A
Simulated Speed	39

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 211 (Exit 264)
BASE YEAR 1997 SMOOTHED TRAFFIC DATA

Date: November 1998

Figure: F-2.9

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

Shenandoah, Warren, and Frederick Counties

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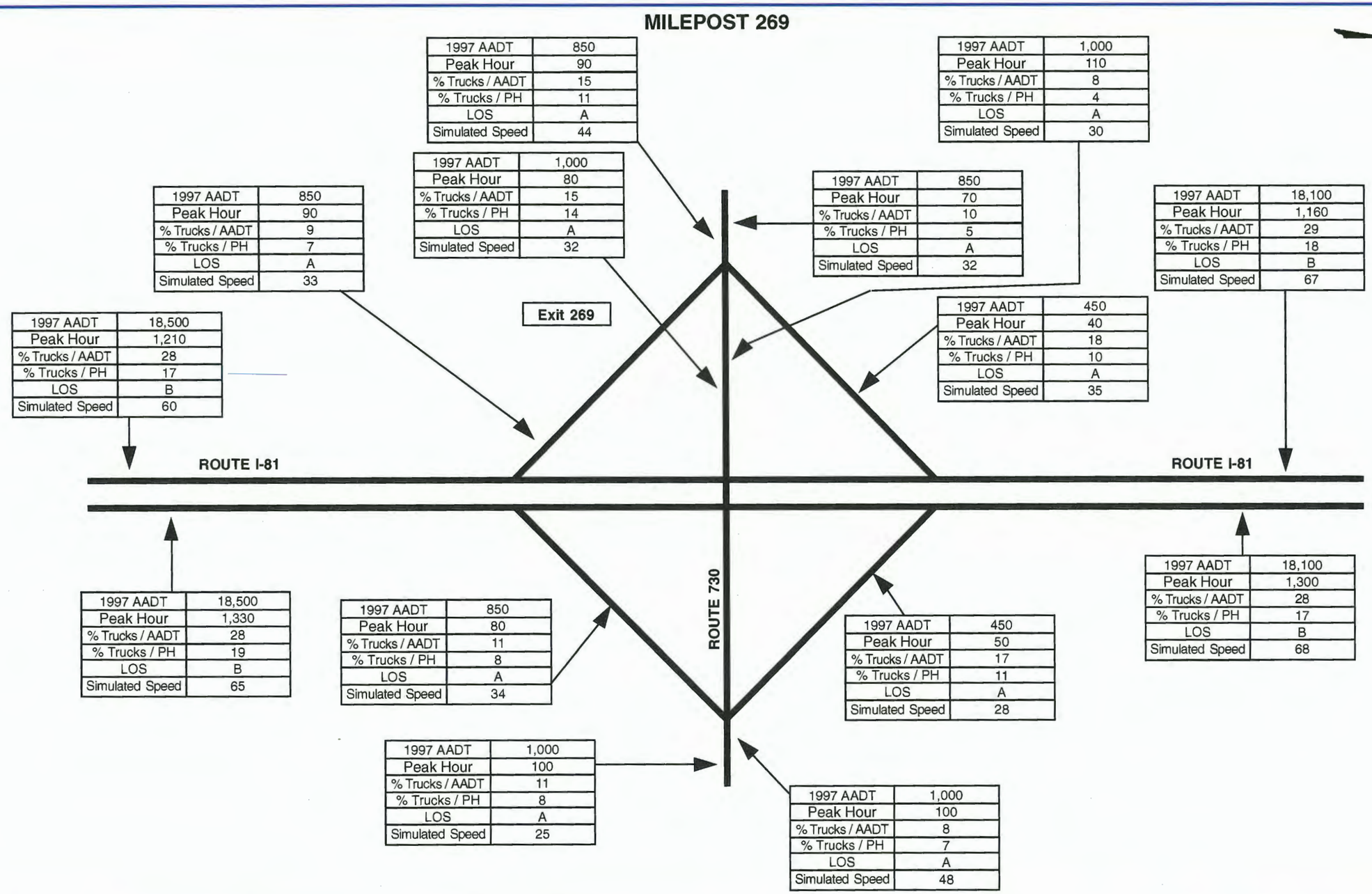
MILEPOST 269



1997 AADT	850
Peak Hour	90
% Trucks / AADT	15
% Trucks / PH	11
LOS	A
Simulated Speed	44

1997 AADT	1,000
Peak Hour	110
% Trucks / AADT	8
% Trucks / PH	4
LOS	A
Simulated Speed	30

1997 AADT	1,000
Peak Hour	80
% Trucks / AADT	15
% Trucks / PH	14
LOS	A
Simulated Speed	32

1997 AADT	850
Peak Hour	70
% Trucks / AADT	10
% Trucks / PH	5
LOS	A
Simulated Speed	32

1997 AADT	850
Peak Hour	90
% Trucks / AADT	9
% Trucks / PH	7
LOS	A
Simulated Speed	33

1997 AADT	18,100
Peak Hour	1,160
% Trucks / AADT	29
% Trucks / PH	18
LOS	B
Simulated Speed	67

1997 AADT	18,500
Peak Hour	1,210
% Trucks / AADT	28
% Trucks / PH	17
LOS	B
Simulated Speed	60

1997 AADT	450
Peak Hour	40
% Trucks / AADT	18
% Trucks / PH	10
LOS	A
Simulated Speed	35

1997 AADT	18,500
Peak Hour	1,330
% Trucks / AADT	28
% Trucks / PH	19
LOS	B
Simulated Speed	65

1997 AADT	850
Peak Hour	80
% Trucks / AADT	11
% Trucks / PH	8
LOS	A
Simulated Speed	34

1997 AADT	18,100
Peak Hour	1,300
% Trucks / AADT	28
% Trucks / PH	17
LOS	B
Simulated Speed	68

1997 AADT	450
Peak Hour	50
% Trucks / AADT	17
% Trucks / PH	11
LOS	A
Simulated Speed	28

1997 AADT	1,000
Peak Hour	100
% Trucks / AADT	11
% Trucks / PH	8
LOS	A
Simulated Speed	25

1997 AADT	1,000
Peak Hour	100
% Trucks / AADT	8
% Trucks / PH	7
LOS	A
Simulated Speed	48

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 730 (Exit 269)
BASE YEAR 1997 SMOOTHED TRAFFIC DATA

Date: November 1998

Figure: F-2.10

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

Shenandoah, Warren, and Frederick Counties

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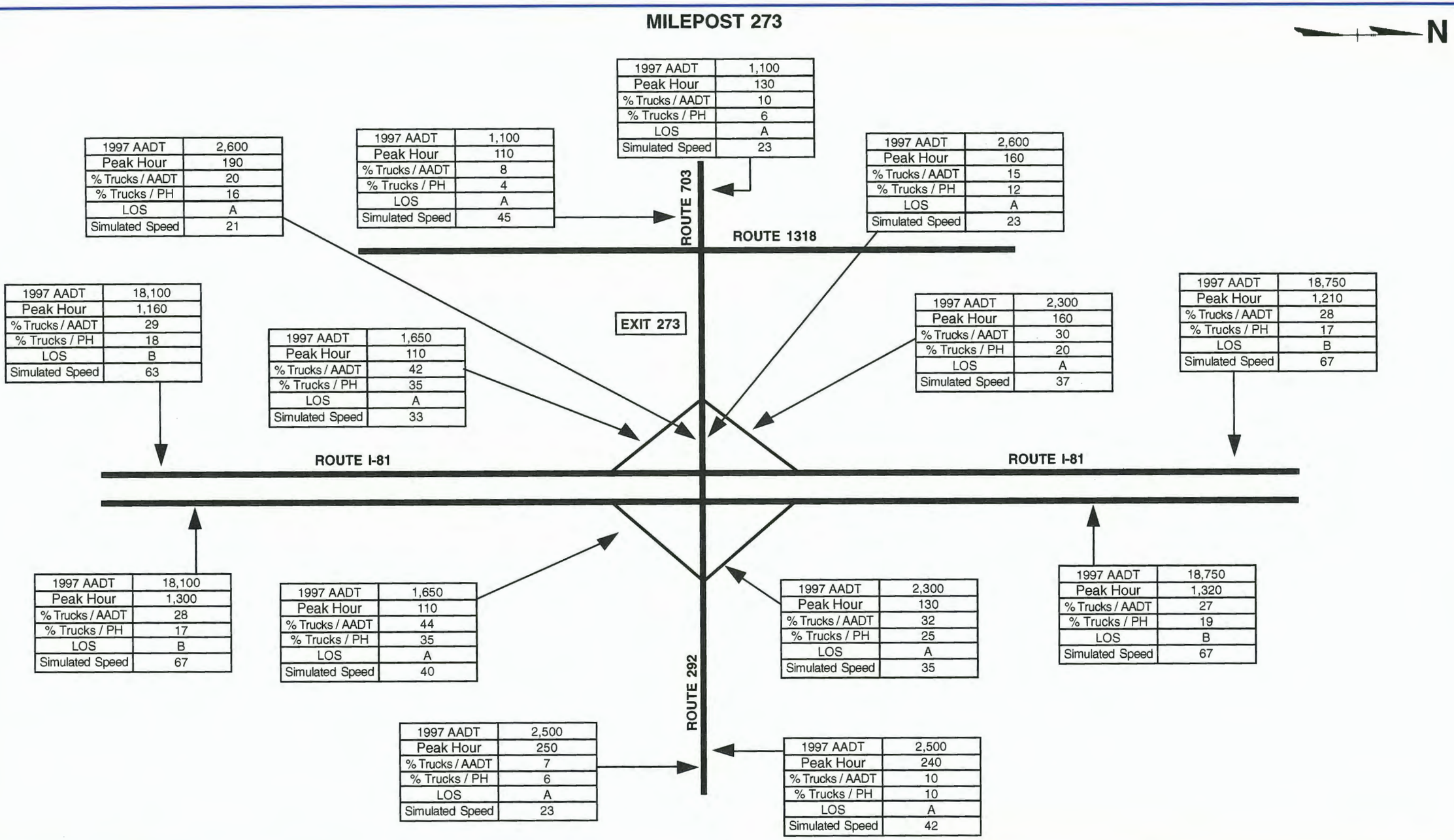
MILEPOST 273



1997 AADT	1,100
Peak Hour	130
% Trucks / AADT	10
% Trucks / PH	6
LOS	A
Simulated Speed	23

1997 AADT	2,600
Peak Hour	190
% Trucks / AADT	20
% Trucks / PH	16
LOS	A
Simulated Speed	21

1997 AADT	1,100
Peak Hour	110
% Trucks / AADT	8
% Trucks / PH	4
LOS	A
Simulated Speed	45

1997 AADT	2,600
Peak Hour	160
% Trucks / AADT	15
% Trucks / PH	12
LOS	A
Simulated Speed	23

1997 AADT	18,100
Peak Hour	1,160
% Trucks / AADT	29
% Trucks / PH	18
LOS	B
Simulated Speed	63

1997 AADT	1,650
Peak Hour	110
% Trucks / AADT	42
% Trucks / PH	35
LOS	A
Simulated Speed	33

1997 AADT	2,300
Peak Hour	160
% Trucks / AADT	30
% Trucks / PH	20
LOS	A
Simulated Speed	37

1997 AADT	18,750
Peak Hour	1,210
% Trucks / AADT	28
% Trucks / PH	17
LOS	B
Simulated Speed	67

1997 AADT	18,100
Peak Hour	1,300
% Trucks / AADT	28
% Trucks / PH	17
LOS	B
Simulated Speed	67

1997 AADT	1,650
Peak Hour	110
% Trucks / AADT	44
% Trucks / PH	35
LOS	A
Simulated Speed	40

1997 AADT	2,300
Peak Hour	130
% Trucks / AADT	32
% Trucks / PH	25
LOS	A
Simulated Speed	35

1997 AADT	18,750
Peak Hour	1,320
% Trucks / AADT	27
% Trucks / PH	19
LOS	B
Simulated Speed	67

1997 AADT	2,500
Peak Hour	250
% Trucks / AADT	7
% Trucks / PH	6
LOS	A
Simulated Speed	23

1997 AADT	2,500
Peak Hour	240
% Trucks / AADT	10
% Trucks / PH	10
LOS	A
Simulated Speed	42

INTERSECTION OF:

I-81 Ramps at Routes 703 & 292 (Exit 273)
BASE YEAR 1997 SMOOTHED TRAFFIC DATA

Date: November 1998

Figure: F-2.11

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

Shenandoah, Warren, and Frederick Counties

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MILEPOST 277

N

1997 AADT	500
Peak Hour	30
% Trucks / AADT	7
% Trucks / PH	8
LOS	A
Simulated Speed	46

1997 AADT	500
Peak Hour	60
% Trucks / AADT	7
% Trucks / PH	4
LOS	A
Simulated Speed	38

1997 AADT	500
Peak Hour	40
% Trucks / AADT	8
% Trucks / PH	9
LOS	A
Simulated Speed	42

1997 AADT	250
Peak Hour	40
% Trucks / AADT	7
% Trucks / PH	5
LOS	A
Simulated Speed	30

1997 AADT	250
Peak Hour	30
% Trucks / AADT	7
% Trucks / PH	7
LOS	A
Simulated Speed	29

ROUTE 686

1997 AADT	200
Peak Hour	10
% Trucks / AADT	14
% Trucks / PH	7
LOS	A
Simulated Speed	26

EXIT 277

1997 AADT	18,750
Peak Hour	1,210
% Trucks / AADT	28
% Trucks / PH	17
LOS	B
Simulated Speed	68

1997 AADT	500
Peak Hour	70
% Trucks / AADT	9
% Trucks / PH	15
LOS	A
Simulated Speed	30

1997 AADT	18,550
Peak Hour	1,200
% Trucks / AADT	28
% Trucks / PH	17
LOS	B
Simulated Speed	65

ROUTE I-81

ROUTE I-81

1997 AADT	18,750
Peak Hour	1,320
% Trucks / AADT	27
% Trucks / PH	19
LOS	B
Simulated Speed	66

1997 AADT	200
Peak Hour	20
% Trucks / AADT	20
% Trucks / PH	18
LOS	A
Simulated Speed	29

1997 AADT	18,550
Peak Hour	1,300
% Trucks / AADT	27
% Trucks / PH	18
LOS	B
Simulated Speed	67

ROUTE 614

1997 AADT	550
Peak Hour	60
% Trucks / AADT	9
% Trucks / PH	12
LOS	A
Simulated Speed	50

1997 AADT	550
Peak Hour	50
% Trucks / AADT	22
% Trucks / PH	22
LOS	A
Simulated Speed	38

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 614 (Exit 277)
BASE YEAR 1997 SMOOTHED TRAFFIC DATA

Date: November 1998

Figure: F-2.12

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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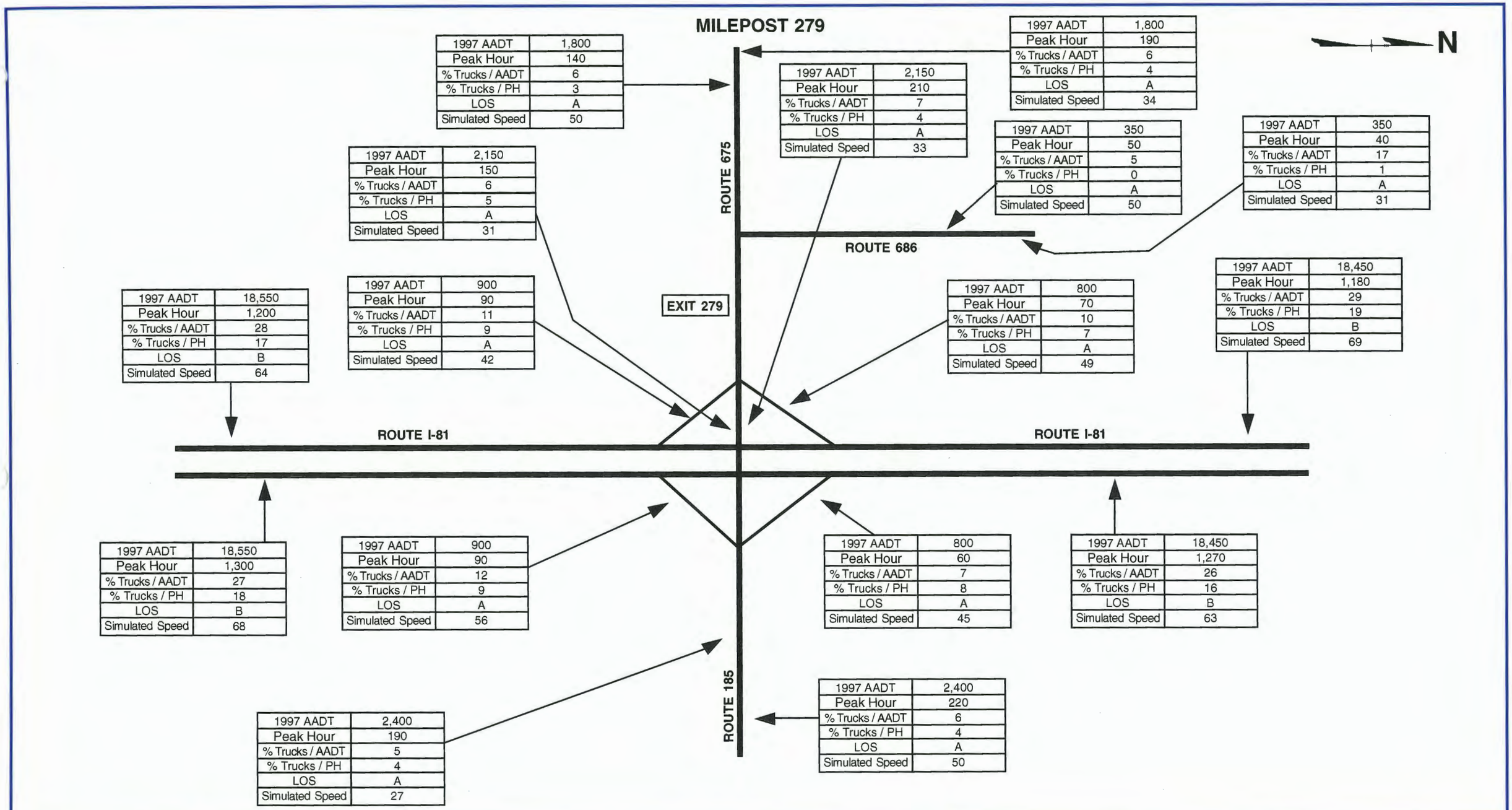

INTERSECTION OF:

I-81 Ramps at Route 185 (Exit 279)
BASE YEAR 1997 SMOOTHED TRAFFIC DATA

Date: November 1998

Figure: F-2.13

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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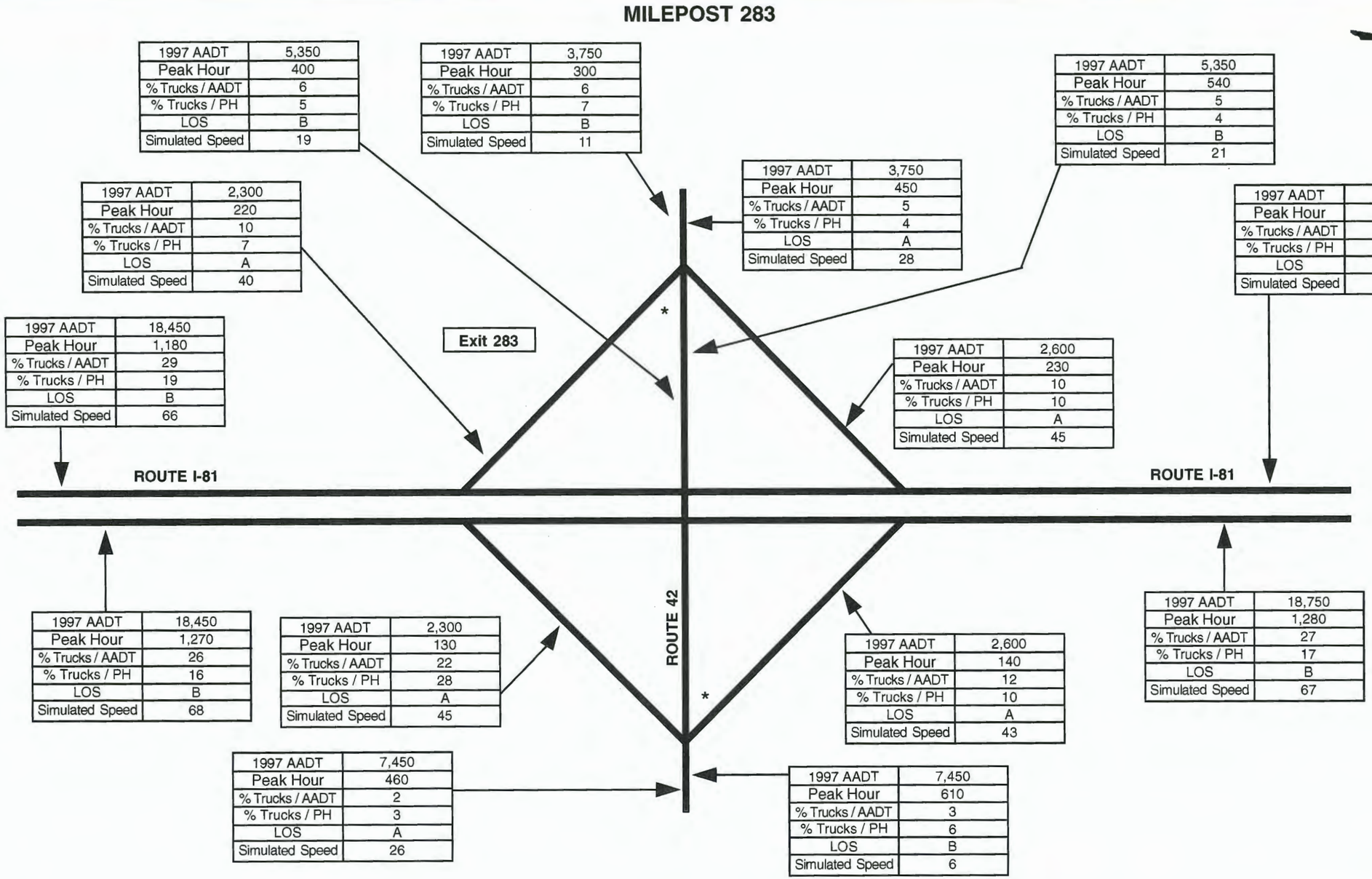
MILEPOST 283



1997 AADT	5,350
Peak Hour	400
% Trucks / AADT	6
% Trucks / PH	5
LOS	B
Simulated Speed	19

1997 AADT	3,750
Peak Hour	300
% Trucks / AADT	6
% Trucks / PH	7
LOS	B
Simulated Speed	11

1997 AADT	5,350
Peak Hour	540
% Trucks / AADT	5
% Trucks / PH	4
LOS	B
Simulated Speed	21

1997 AADT	2,300
Peak Hour	220
% Trucks / AADT	10
% Trucks / PH	7
LOS	A
Simulated Speed	40

1997 AADT	3,750
Peak Hour	450
% Trucks / AADT	5
% Trucks / PH	4
LOS	A
Simulated Speed	28

1997 AADT	18,750
Peak Hour	1,190
% Trucks / AADT	29
% Trucks / PH	17
LOS	B
Simulated Speed	67

1997 AADT	18,450
Peak Hour	1,180
% Trucks / AADT	29
% Trucks / PH	19
LOS	B
Simulated Speed	66

1997 AADT	2,600
Peak Hour	230
% Trucks / AADT	10
% Trucks / PH	10
LOS	A
Simulated Speed	45

1997 AADT	18,450
Peak Hour	1,270
% Trucks / AADT	26
% Trucks / PH	16
LOS	B
Simulated Speed	68

1997 AADT	2,300
Peak Hour	130
% Trucks / AADT	22
% Trucks / PH	28
LOS	A
Simulated Speed	45

1997 AADT	2,600
Peak Hour	140
% Trucks / AADT	12
% Trucks / PH	10
LOS	A
Simulated Speed	43

1997 AADT	18,750
Peak Hour	1,280
% Trucks / AADT	27
% Trucks / PH	17
LOS	B
Simulated Speed	67

1997 AADT	7,450
Peak Hour	460
% Trucks / AADT	2
% Trucks / PH	3
LOS	A
Simulated Speed	26

1997 AADT	7,450
Peak Hour	610
% Trucks / AADT	3
% Trucks / PH	6
LOS	B
Simulated Speed	6

Note: *Signalized Intersection

INTERSECTION OF:

I-81 Ramps at Route 42 (Exit 283)
BASE YEAR 1997 SMOOTHED TRAFFIC DATA

Date: November 1998

Figure: F-2.14

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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MILEPOST 291

N

1997 AADT	4,400
Peak Hour	230
% Trucks / AADT	31
% Trucks / PH	19
LOS	A
Simulated Speed	46

1997 AADT	4,400
Peak Hour	260
% Trucks / AADT	37
% Trucks / PH	24
LOS	A
Simulated Speed	23

1997 AADT	2,200
Peak Hour	160
% Trucks / AADT	36
% Trucks / PH	47
LOS	A
Simulated Speed	28

1997 AADT	1,650
Peak Hour	130
% Trucks / AADT	44
% Trucks / PH	40
LOS	A
Simulated Speed	38

1997 AADT	2,200
Peak Hour	220
% Trucks / AADT	29
% Trucks / PH	18
LOS	B
Simulated Speed	24

1997 AADT	19,600
Peak Hour	1,280
% Trucks / AADT	22
% Trucks / PH	17
LOS	B
Simulated Speed	67

Exit 291

1997 AADT	18,750
Peak Hour	1,190
% Trucks / AADT	29
% Trucks / PH	17
LOS	B
Simulated Speed	67

1997 AADT	2,500
Peak Hour	220
% Trucks / AADT	43
% Trucks / PH	31
LOS	A
Simulated Speed	43

ROUTE I-81

ROUTE I-81

ROUTE 651

1997 AADT	18,750
Peak Hour	1,280
% Trucks / AADT	27
% Trucks / PH	17
LOS	B
Simulated Speed	67

1997 AADT	1,650
Peak Hour	100
% Trucks / AADT	47
% Trucks / PH	43
LOS	A
Simulated Speed	45

1997 AADT	2,500
Peak Hour	130
% Trucks / AADT	38
% Trucks / PH	27
LOS	A
Simulated Speed	40

1997 AADT	19,600
Peak Hour	1,310
% Trucks / AADT	26
% Trucks / PH	16
LOS	B
Simulated Speed	67

1997 AADT	1,650
Peak Hour	170
% Trucks / AADT	5
% Trucks / PH	3
LOS	A
Simulated Speed	27

1997 AADT	1,650
Peak Hour	140
% Trucks / AADT	6
% Trucks / PH	6
LOS	B
Simulated Speed	41

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 651 (Exit 291)
BASE YEAR 1997 SMOOTHED TRAFFIC DATA

Date: November 1998

Figure: F-2.15

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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MILEPOST 296

N

1997 AADT	1,850
Peak Hour	170
% Trucks / AADT	9
% Trucks / PH	7
LOS	A
Simulated Speed	20

1997 AADT	1,850
Peak Hour	190
% Trucks / AADT	7
% Trucks / PH	10
LOS	A
Simulated Speed	29

1997 AADT	1,850
Peak Hour	120
% Trucks / AADT	6
% Trucks / PH	3
LOS	A
Simulated Speed	50

1997 AADT	250
Peak Hour	40
% Trucks / AADT	4
% Trucks / PH	3
LOS	A
Simulated Speed	34

1997 AADT	250
Peak Hour	20
% Trucks / AADT	3
% Trucks / PH	0
LOS	A
Simulated Speed	45

1997 AADT	1,850
Peak Hour	190
% Trucks / AADT	7
% Trucks / PH	3
LOS	A
Simulated Speed	32

ROUTE 633

EXIT 296

ROUTE 55

1997 AADT	19,600
Peak Hour	1,280
% Trucks / AADT	22
% Trucks / PH	17
LOS	B
Simulated Speed	64

1997 AADT	750
Peak Hour	50
% Trucks / AADT	19
% Trucks / PH	20
LOS	A
Simulated Speed	41

1997 AADT	1,000
Peak Hour	120
% Trucks / AADT	10
% Trucks / PH	5
LOS	A
Simulated Speed	44

1997 AADT	19,850
Peak Hour	1,350
% Trucks / AADT	29
% Trucks / PH	17
LOS	B
Simulated Speed	68

ROUTE I-81

ROUTE I-81

1997 AADT	19,600
Peak Hour	1,310
% Trucks / AADT	26
% Trucks / PH	16
LOS	B
Simulated Speed	67

1997 AADT	750
Peak Hour	80
% Trucks / AADT	15
% Trucks / PH	15
LOS	A
Simulated Speed	44

1997 AADT	19,850
Peak Hour	1,290
% Trucks / AADT	25
% Trucks / PH	17
LOS	B
Simulated Speed	67

1997 AADT	1,000
Peak Hour	60
% Trucks / AADT	11
% Trucks / PH	13
LOS	A
Simulated Speed	34

ROUTE 55

1997 AADT	1,750
Peak Hour	170
% Trucks / AADT	7
% Trucks / PH	8
LOS	A
Simulated Speed	22

1997 AADT	1,750
Peak Hour	170
% Trucks / AADT	7
% Trucks / PH	4
LOS	A
Simulated Speed	50

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 55 (Exit 296)
BASE YEAR 1997 SMOOTHED TRAFFIC DATA

Date: November 1998

Figure: F-2.16

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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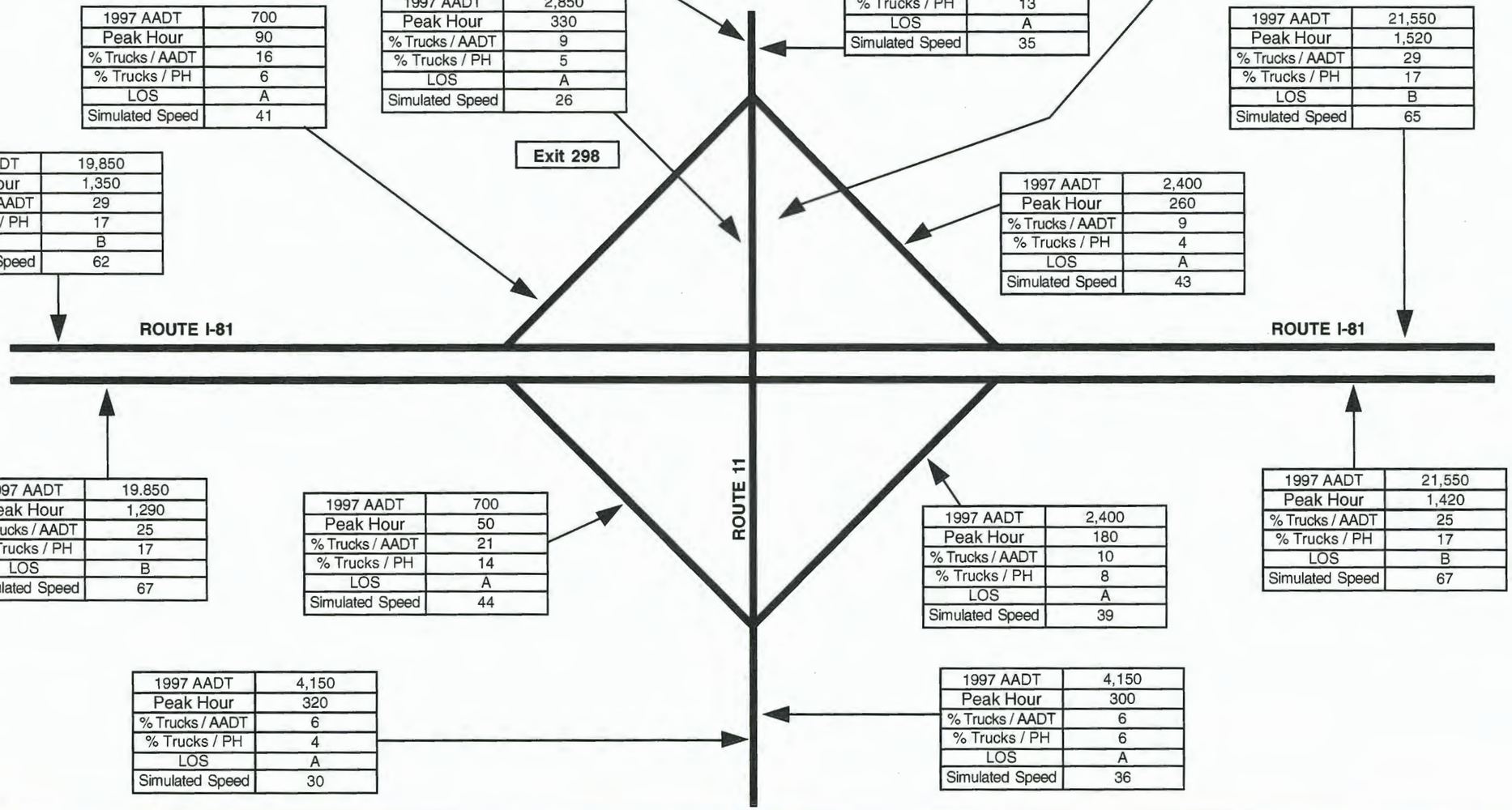
MILEPOST 298

N



1997 AADT	1,850
Peak Hour	160
% Trucks / AADT	11
% Trucks / PH	13
LOS	A
Simulated Speed	40

1997 AADT	2,850
Peak Hour	180
% Trucks / AADT	12
% Trucks / PH	8
LOS	A
Simulated Speed	42

1997 AADT	1,850
Peak Hour	180
% Trucks / AADT	16
% Trucks / PH	13
LOS	A
Simulated Speed	35

1997 AADT	700
Peak Hour	90
% Trucks / AADT	16
% Trucks / PH	6
LOS	A
Simulated Speed	41

1997 AADT	2,850
Peak Hour	330
% Trucks / AADT	9
% Trucks / PH	5
LOS	A
Simulated Speed	26

1997 AADT	21,550
Peak Hour	1,520
% Trucks / AADT	29
% Trucks / PH	17
LOS	B
Simulated Speed	65

1997 AADT	19,850
Peak Hour	1,350
% Trucks / AADT	29
% Trucks / PH	17
LOS	B
Simulated Speed	62

1997 AADT	2,400
Peak Hour	260
% Trucks / AADT	9
% Trucks / PH	4
LOS	A
Simulated Speed	43

1997 AADT	19.850
Peak Hour	1,290
% Trucks / AADT	25
% Trucks / PH	17
LOS	B
Simulated Speed	67

1997 AADT	700
Peak Hour	50
% Trucks / AADT	21
% Trucks / PH	14
LOS	A
Simulated Speed	44

1997 AADT	2,400
Peak Hour	180
% Trucks / AADT	10
% Trucks / PH	8
LOS	A
Simulated Speed	39

1997 AADT	21,550
Peak Hour	1,420
% Trucks / AADT	25
% Trucks / PH	17
LOS	B
Simulated Speed	67

1997 AADT	4,150
Peak Hour	320
% Trucks / AADT	6
% Trucks / PH	4
LOS	A
Simulated Speed	30

1997 AADT	4,150
Peak Hour	300
% Trucks / AADT	6
% Trucks / PH	6
LOS	A
Simulated Speed	36

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 11 (Exit 298)
BASE YEAR 1997 SMOOTHED TRAFFIC DATA

Date: November 1998

Figure: F-2.17

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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MILEPOST 300

N

1997 AADT	21,550
Peak Hour	1,520
% Trucks / AADT	29
% Trucks / PH	17
LOS	B
Simulated Speed	61

1997 AADT	17,050
Peak Hour	1,200
% Trucks / AADT	22
% Trucks / PH	16
LOS	B
Simulated Speed	67

Exit 300

ROUTE I-81

ROUTE I-81

ROUTE I-66

1997 AADT	21,550
Peak Hour	1,420
% Trucks / AADT	25
% Trucks / PH	17
LOS	B
Simulated Speed	57

1997 AADT	7,500
Peak Hour	570
% Trucks / AADT	21
% Trucks / PH	12
LOS	A
Simulated Speed	53

1997 AADT	3,000
Peak Hour	250
% Trucks / AADT	10
% Trucks / PH	4
LOS	A
Simulated Speed	55

1997 AADT	17,050
Peak Hour	1,150
% Trucks / AADT	26
% Trucks / PH	19
LOS	B
Simulated Speed	61

1997 AADT	7,500
Peak Hour	450
% Trucks / AADT	15
% Trucks / PH	12
LOS	B
Simulated Speed	52

1997 AADT	3,000
Peak Hour	180
% Trucks / AADT	7
% Trucks / PH	10
LOS	A
Simulated Speed	51

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route I-66 (Exit 300)
BASE YEAR 1997 SMOOTHED TRAFFIC DATA

Date: November 1998

Figure: F-2.18

Interstate 81
Improvement Study

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MILEPOST 302

N

EXIT 302

ROUTE I-81

ROUTE I-81

ROUTE 842

ROUTE 627

1997 AADT	1,000
Peak Hour	200
% Trucks / AADT	11
% Trucks / PH	5
LOS	A
Simulated Speed	25

1997 AADT	2,200
Peak Hour	210
% Trucks / AADT	3
% Trucks / PH	2
LOS	A
Simulated Speed	28

1997 AADT	2,200
Peak Hour	270
% Trucks / AADT	5
% Trucks / PH	3
LOS	A
Simulated Speed	19

1997 AADT	2,000
Peak Hour	200
% Trucks / AADT	10
% Trucks / PH	6
LOS	A
Simulated Speed	34

1997 AADT	17,050
Peak Hour	1,200
% Trucks / AADT	22
% Trucks / PH	16
LOS	B
Simulated Speed	66

1997 AADT	950
Peak Hour	90
% Trucks / AADT	22
% Trucks / PH	15
LOS	A
Simulated Speed	31

1997 AADT	1,000
Peak Hour	150
% Trucks / AADT	16
% Trucks / PH	6
LOS	A
Simulated Speed	24

1997 AADT	18,100
Peak Hour	1,310
% Trucks / AADT	26
% Trucks / PH	17
LOS	B
Simulated Speed	68

1997 AADT	17,050
Peak Hour	1,150
% Trucks / AADT	26
% Trucks / PH	19
LOS	B
Simulated Speed	66

1997 AADT	950
Peak Hour	80
% Trucks / AADT	16
% Trucks / PH	14
LOS	A
Simulated Speed	34

1997 AADT	2,000
Peak Hour	170
% Trucks / AADT	7
% Trucks / PH	4
LOS	A
Simulated Speed	32

1997 AADT	18,100
Peak Hour	1,240
% Trucks / AADT	27
% Trucks / PH	20
LOS	B
Simulated Speed	62

1997 AADT	750
Peak Hour	140
% Trucks / AADT	4
% Trucks / PH	3
LOS	A
Simulated Speed	35

1997 AADT	750
Peak Hour	100
% Trucks / AADT	7
% Trucks / PH	1
LOS	A
Simulated Speed	28

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 627 (Exit 302)
BASE YEAR 1997 SMOOTHED TRAFFIC DATA

Date: November 1998

Figure: F-2.19

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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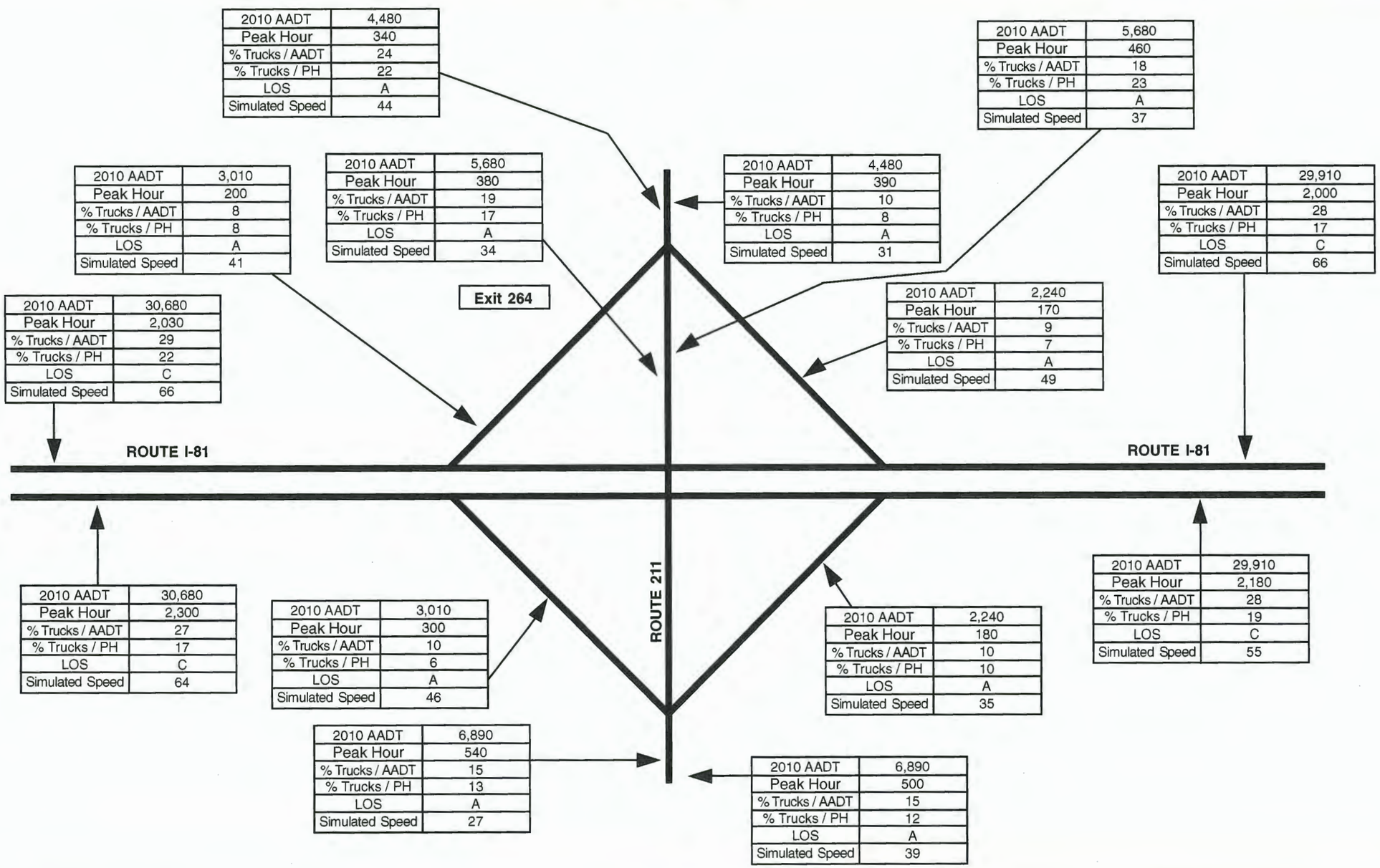
MILEPOST 264

N



2010 AADT	4,480
Peak Hour	340
% Trucks / AADT	24
% Trucks / PH	22
LOS	A
Simulated Speed	44

2010 AADT	5,680
Peak Hour	460
% Trucks / AADT	18
% Trucks / PH	23
LOS	A
Simulated Speed	37

2010 AADT	3,010
Peak Hour	200
% Trucks / AADT	8
% Trucks / PH	8
LOS	A
Simulated Speed	41

2010 AADT	5,680
Peak Hour	380
% Trucks / AADT	19
% Trucks / PH	17
LOS	A
Simulated Speed	34

2010 AADT	4,480
Peak Hour	390
% Trucks / AADT	10
% Trucks / PH	8
LOS	A
Simulated Speed	31

2010 AADT	29,910
Peak Hour	2,000
% Trucks / AADT	28
% Trucks / PH	17
LOS	C
Simulated Speed	66

2010 AADT	30,680
Peak Hour	2,030
% Trucks / AADT	29
% Trucks / PH	22
LOS	C
Simulated Speed	66

2010 AADT	2,240
Peak Hour	170
% Trucks / AADT	9
% Trucks / PH	7
LOS	A
Simulated Speed	49

2010 AADT	30,680
Peak Hour	2,300
% Trucks / AADT	27
% Trucks / PH	17
LOS	C
Simulated Speed	64

2010 AADT	3,010
Peak Hour	300
% Trucks / AADT	10
% Trucks / PH	6
LOS	A
Simulated Speed	46

2010 AADT	2,240
Peak Hour	180
% Trucks / AADT	10
% Trucks / PH	10
LOS	A
Simulated Speed	35

2010 AADT	29,910
Peak Hour	2,180
% Trucks / AADT	28
% Trucks / PH	19
LOS	C
Simulated Speed	55

2010 AADT	6,890
Peak Hour	540
% Trucks / AADT	15
% Trucks / PH	13
LOS	A
Simulated Speed	27

2010 AADT	6,890
Peak Hour	500
% Trucks / AADT	15
% Trucks / PH	12
LOS	A
Simulated Speed	39

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 211 (Exit 264)
FUTURE YEAR 2010 NO BUILD TRAFFIC DATA

Date: November 1998

Figure: F-2.20

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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MILEPOST 269

N

2010 AADT	1,000
Peak Hour	100
% Trucks / AADT	15
% Trucks / PH	11
LOS	A
Simulated Speed	44

2010 AADT	1,160
Peak Hour	120
% Trucks / AADT	8
% Trucks / PH	4
LOS	A
Simulated Speed	27

2010 AADT	1,160
Peak Hour	90
% Trucks / AADT	15
% Trucks / PH	14
LOS	A
Simulated Speed	29

2010 AADT	1,000
Peak Hour	80
% Trucks / AADT	10
% Trucks / PH	5
LOS	A
Simulated Speed	29

2010 AADT	1,000
Peak Hour	100
% Trucks / AADT	9
% Trucks / PH	7
LOS	A
Simulated Speed	32

2010 AADT	29,430
Peak Hour	1,950
% Trucks / AADT	29
% Trucks / PH	18
LOS	C
Simulated Speed	66

Exit 269

2010 AADT	520
Peak Hour	50
% Trucks / AADT	18
% Trucks / PH	10
LOS	A
Simulated Speed	34

2010 AADT	29,910
Peak Hour	2,000
% Trucks / AADT	28
% Trucks / PH	17
LOS	C
Simulated Speed	59

ROUTE I-81

ROUTE I-81

ROUTE 730

2010 AADT	29,910
Peak Hour	2,180
% Trucks / AADT	28
% Trucks / PH	19
LOS	C
Simulated Speed	63

2010 AADT	1,000
Peak Hour	100
% Trucks / AADT	11
% Trucks / PH	8
LOS	A
Simulated Speed	34

2010 AADT	520
Peak Hour	60
% Trucks / AADT	17
% Trucks / PH	11
LOS	A
Simulated Speed	27

2010 AADT	29,430
Peak Hour	2,140
% Trucks / AADT	28
% Trucks / PH	17
LOS	C
Simulated Speed	65

2010 AADT	1,160
Peak Hour	120
% Trucks / AADT	11
% Trucks / PH	8
LOS	A
Simulated Speed	24

2010 AADT	1,160
Peak Hour	110
% Trucks / AADT	8
% Trucks / PH	7
LOS	A
Simulated Speed	47

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 730 (Exit 269)
FUTURE YEAR 2010 NO BUILD TRAFFIC DATA

Date: November 1998

Figure: F-2.21

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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MILEPOST 273

N

2010 AADT	1,280
Peak Hour	150
% Trucks / AADT	10
% Trucks / PH	6
LOS	A
Simulated Speed	24

2010 AADT	3,040
Peak Hour	270
% Trucks / AADT	20
% Trucks / PH	16
LOS	A
Simulated Speed	19

2010 AADT	1,280
Peak Hour	120
% Trucks / AADT	8
% Trucks / PH	4
LOS	A
Simulated Speed	45

2010 AADT	3,040
Peak Hour	200
% Trucks / AADT	15
% Trucks / PH	12
LOS	A
Simulated Speed	29

ROUTE 703

ROUTE 1318

2010 AADT	29,430
Peak Hour	1,950
% Trucks / AADT	29
% Trucks / PH	18
LOS	C
Simulated Speed	62

2010 AADT	1,920
Peak Hour	120
% Trucks / AADT	42
% Trucks / PH	35
LOS	A
Simulated Speed	36

EXIT 273

2010 AADT	2,720
Peak Hour	220
% Trucks / AADT	30
% Trucks / PH	20
LOS	A
Simulated Speed	39

2010 AADT	30,230
Peak Hour	2,050
% Trucks / AADT	28
% Trucks / PH	17
LOS	C
Simulated Speed	66

ROUTE I-81

ROUTE I-81

2010 AADT	29,430
Peak Hour	2,140
% Trucks / AADT	28
% Trucks / PH	17
LOS	C
Simulated Speed	66

2010 AADT	1,920
Peak Hour	130
% Trucks / AADT	44
% Trucks / PH	35
LOS	A
Simulated Speed	39

2010 AADT	2,720
Peak Hour	150
% Trucks / AADT	32
% Trucks / PH	25
LOS	A
Simulated Speed	34

2010 AADT	30,230
Peak Hour	2,160
% Trucks / AADT	27
% Trucks / PH	19
LOS	C
Simulated Speed	66

ROUTE 292

2010 AADT	2,960
Peak Hour	320
% Trucks / AADT	7
% Trucks / PH	6
LOS	A
Simulated Speed	20

2010 AADT	2,960
Peak Hour	270
% Trucks / AADT	10
% Trucks / PH	10
LOS	A
Simulated Speed	41

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Routes 703 & 292 (Exit 273)
FUTURE YEAR 2010 NO BUILD TRAFFIC DATA

Date: November 1998

Figure: F-2.22

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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Sheet No.

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MILEPOST 277

N

2010 AADT	600
Peak Hour	40
% Trucks / AADT	7
% Trucks / PH	8
LOS	A
Simulated Speed	45

2010 AADT	600
Peak Hour	70
% Trucks / AADT	7
% Trucks / PH	4
LOS	A
Simulated Speed	38

2010 AADT	600
Peak Hour	50
% Trucks / AADT	8
% Trucks / PH	9
LOS	A
Simulated Speed	43

2010 AADT	280
Peak Hour	50
% Trucks / AADT	7
% Trucks / PH	5
LOS	A
Simulated Speed	30

2010 AADT	280
Peak Hour	30
% Trucks / AADT	7
% Trucks / PH	7
LOS	A
Simulated Speed	28

ROUTE 686

2010 AADT	240
Peak Hour	20
% Trucks / AADT	14
% Trucks / PH	7
LOS	A
Simulated Speed	27

2010 AADT	30,230
Peak Hour	2,050
% Trucks / AADT	28
% Trucks / PH	17
LOS	C
Simulated Speed	66

EXIT 277

2010 AADT	29,990
Peak Hour	2,030
% Trucks / AADT	28
% Trucks / PH	17
LOS	C
Simulated Speed	68

2010 AADT	600
Peak Hour	80
% Trucks / AADT	9
% Trucks / PH	15
LOS	A
Simulated Speed	30

ROUTE I-81

ROUTE I-81

2010 AADT	30,230
Peak Hour	2,160
% Trucks / AADT	27
% Trucks / PH	19
LOS	C
Simulated Speed	65

2010 AADT	240
Peak Hour	20
% Trucks / AADT	20
% Trucks / PH	18
LOS	A
Simulated Speed	30

2010 AADT	29,990
Peak Hour	2,140
% Trucks / AADT	27
% Trucks / PH	18
LOS	C
Simulated Speed	64

ROUTE 614

2010 AADT	640
Peak Hour	60
% Trucks / AADT	22
% Trucks / PH	22
LOS	A
Simulated Speed	42

2010 AADT	640
Peak Hour	70
% Trucks / AADT	9
% Trucks / PH	12
LOS	A
Simulated Speed	50

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 614 (Exit 277)
FUTURE YEAR 2010 NO BUILD TRAFFIC DATA

Date: November 1998

Figure: F-2.23

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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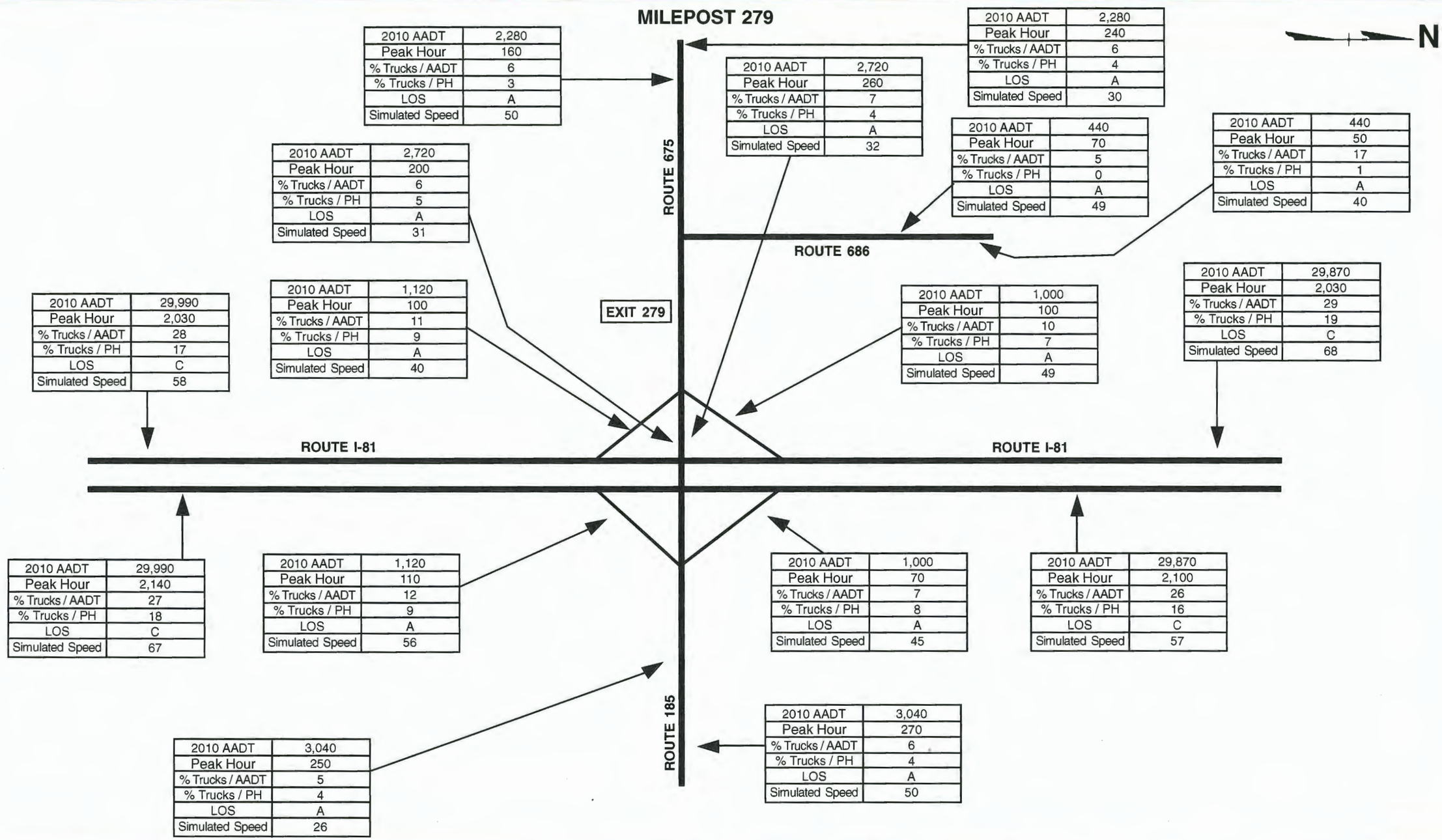

INTERSECTION OF:

I-81 Ramps at Route 185 (Exit 279)
FUTURE YEAR 2010 NO BUILD TRAFFIC DATA

Date: November 1998

Figure: F-2.24

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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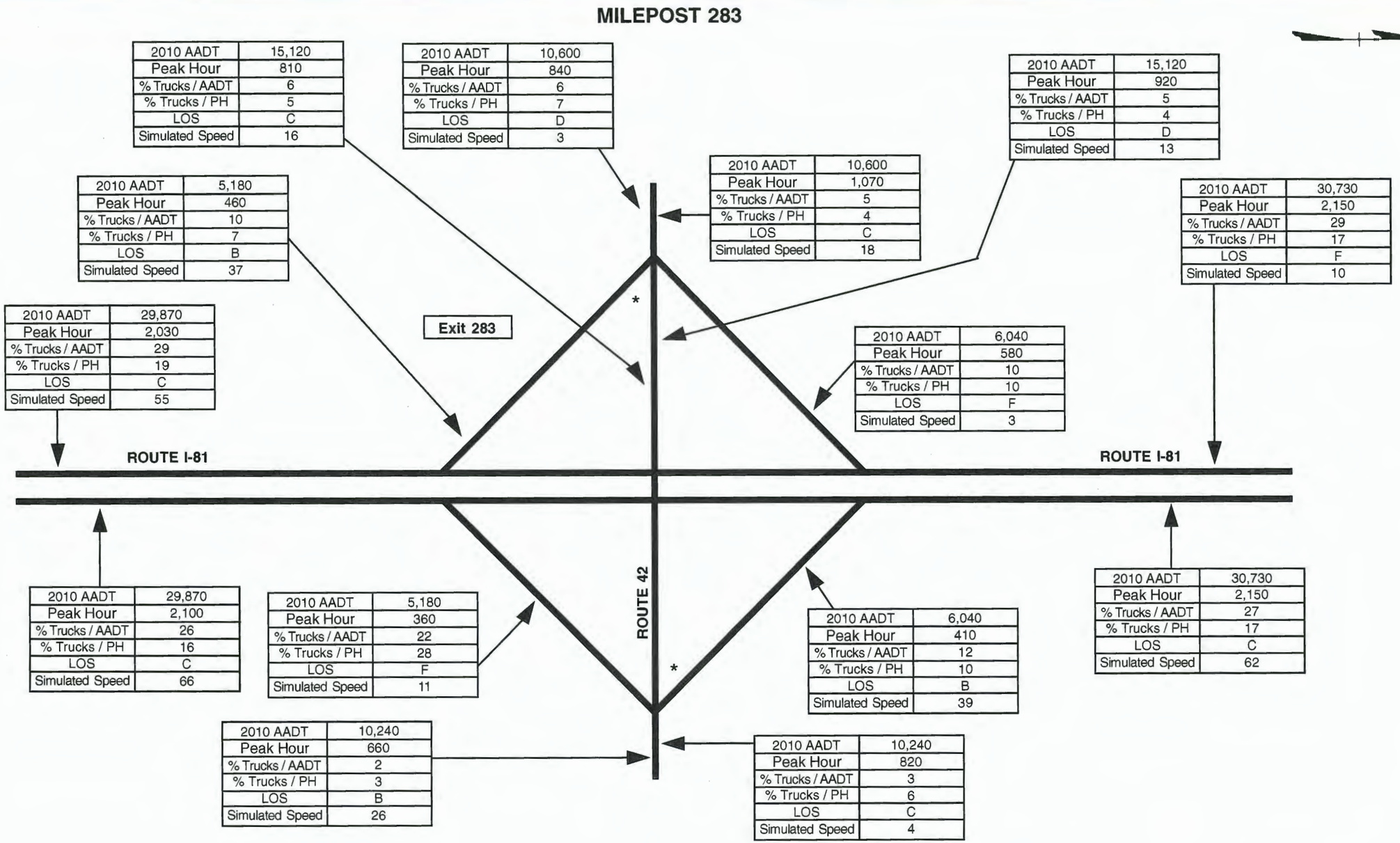
MILEPOST 283



2010 AADT	15,120
Peak Hour	810
% Trucks / AADT	6
% Trucks / PH	5
LOS	C
Simulated Speed	16

2010 AADT	10,600
Peak Hour	840
% Trucks / AADT	6
% Trucks / PH	7
LOS	D
Simulated Speed	3

2010 AADT	15,120
Peak Hour	920
% Trucks / AADT	5
% Trucks / PH	4
LOS	D
Simulated Speed	13

2010 AADT	10,600
Peak Hour	1,070
% Trucks / AADT	5
% Trucks / PH	4
LOS	C
Simulated Speed	18

2010 AADT	5,180
Peak Hour	460
% Trucks / AADT	10
% Trucks / PH	7
LOS	B
Simulated Speed	37

2010 AADT	30,730
Peak Hour	2,150
% Trucks / AADT	29
% Trucks / PH	17
LOS	F
Simulated Speed	10

2010 AADT	29,870
Peak Hour	2,030
% Trucks / AADT	29
% Trucks / PH	19
LOS	C
Simulated Speed	55

2010 AADT	6,040
Peak Hour	580
% Trucks / AADT	10
% Trucks / PH	10
LOS	F
Simulated Speed	3

2010 AADT	29,870
Peak Hour	2,100
% Trucks / AADT	26
% Trucks / PH	16
LOS	C
Simulated Speed	66

2010 AADT	5,180
Peak Hour	360
% Trucks / AADT	22
% Trucks / PH	28
LOS	F
Simulated Speed	11

2010 AADT	6,040
Peak Hour	410
% Trucks / AADT	12
% Trucks / PH	10
LOS	B
Simulated Speed	39

2010 AADT	30,730
Peak Hour	2,150
% Trucks / AADT	27
% Trucks / PH	17
LOS	C
Simulated Speed	62

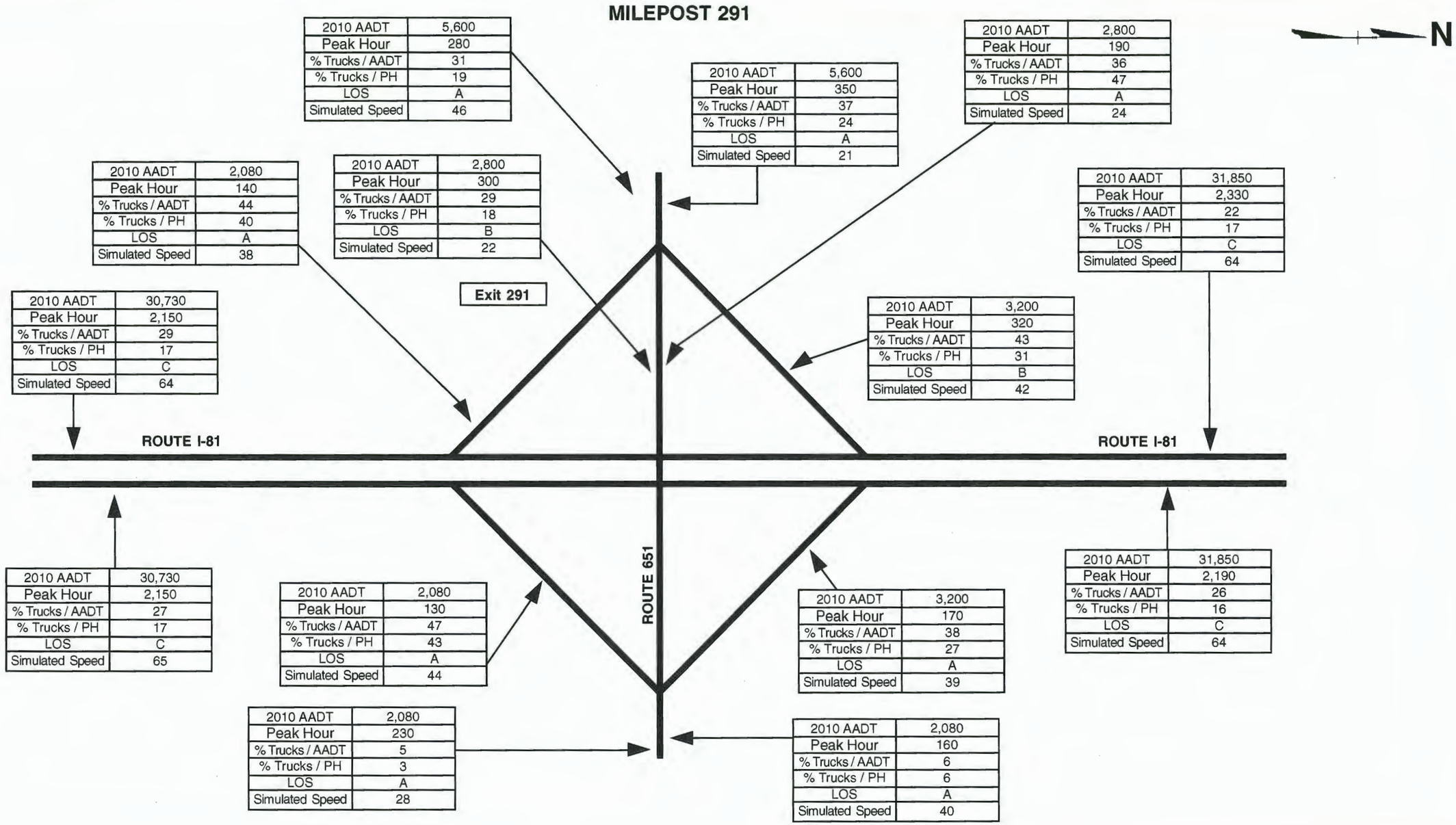
2010 AADT	10,240
Peak Hour	660
% Trucks / AADT	2
% Trucks / PH	3
LOS	B
Simulated Speed	26

2010 AADT	10,240
Peak Hour	820
% Trucks / AADT	3
% Trucks / PH	6
LOS	C
Simulated Speed	4

Note: *Signalized Intersection

Virginia Department of Transportation	**INTERSECTION OF:** **I-81 Ramps at Route 42 (Exit 283)** **FUTURE YEAR 2010 NO BUILD TRAFFIC DATA**	Date: November 1998 Figure: F-2.25	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. 30

MILEPOST 291



2010 AADT	5,600
Peak Hour	280
% Trucks / AADT	31
% Trucks / PH	19
LOS	A
Simulated Speed	46

2010 AADT	5,600
Peak Hour	350
% Trucks / AADT	37
% Trucks / PH	24
LOS	A
Simulated Speed	21

2010 AADT	2,800
Peak Hour	190
% Trucks / AADT	36
% Trucks / PH	47
LOS	A
Simulated Speed	24

2010 AADT	2,080
Peak Hour	140
% Trucks / AADT	44
% Trucks / PH	40
LOS	A
Simulated Speed	38

2010 AADT	2,800
Peak Hour	300
% Trucks / AADT	29
% Trucks / PH	18
LOS	B
Simulated Speed	22

2010 AADT	31,850
Peak Hour	2,330
% Trucks / AADT	22
% Trucks / PH	17
LOS	C
Simulated Speed	64

2010 AADT	30,730
Peak Hour	2,150
% Trucks / AADT	29
% Trucks / PH	17
LOS	C
Simulated Speed	64

2010 AADT	3,200
Peak Hour	320
% Trucks / AADT	43
% Trucks / PH	31
LOS	B
Simulated Speed	42

2010 AADT	30,730
Peak Hour	2,150
% Trucks / AADT	27
% Trucks / PH	17
LOS	C
Simulated Speed	65

2010 AADT	2,080
Peak Hour	130
% Trucks / AADT	47
% Trucks / PH	43
LOS	A
Simulated Speed	44

2010 AADT	3,200
Peak Hour	170
% Trucks / AADT	38
% Trucks / PH	27
LOS	A
Simulated Speed	39

2010 AADT	31,850
Peak Hour	2,190
% Trucks / AADT	26
% Trucks / PH	16
LOS	C
Simulated Speed	64

2010 AADT	2,080
Peak Hour	230
% Trucks / AADT	5
% Trucks / PH	3
LOS	A
Simulated Speed	28

2010 AADT	2,080
Peak Hour	160
% Trucks / AADT	6
% Trucks / PH	6
LOS	A
Simulated Speed	40

INTERSECTION OF:

I-81 Ramps at Route 651 (Exit 291)
FUTURE YEAR 2010 NO BUILD TRAFFIC DATA

Date: November 1998

Figure: F-2.26

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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MILEPOST 296

N

2010 AADT	2,320
Peak Hour	220
% Trucks / AADT	9
% Trucks / PH	7
LOS	A
Simulated Speed	22

2010 AADT	2,320
Peak Hour	230
% Trucks / AADT	7
% Trucks / PH	10
LOS	A
Simulated Speed	28

2010 AADT	2,320
Peak Hour	140
% Trucks / AADT	6
% Trucks / PH	3
LOS	A
Simulated Speed	49

2010 AADT	320
Peak Hour	50
% Trucks / AADT	4
% Trucks / PH	3
LOS	A
Simulated Speed	33

2010 AADT	320
Peak Hour	20
% Trucks / AADT	3
% Trucks / PH	0
LOS	A
Simulated Speed	45

2010 AADT	2,320
Peak Hour	230
% Trucks / AADT	7
% Trucks / PH	3
LOS	A
Simulated Speed	32

ROUTE 633

EXIT 296

ROUTE 55

2010 AADT	31,850
Peak Hour	2,330
% Trucks / AADT	22
% Trucks / PH	17
LOS	D
Simulated Speed	56

2010 AADT	960
Peak Hour	60
% Trucks / AADT	19
% Trucks / PH	20
LOS	A
Simulated Speed	42

2010 AADT	1,280
Peak Hour	170
% Trucks / AADT	10
% Trucks / PH	5
LOS	A
Simulated Speed	44

2010 AADT	32,170
Peak Hour	2,440
% Trucks / AADT	29
% Trucks / PH	17
LOS	C
Simulated Speed	66

ROUTE I-81

ROUTE I-81

2010 AADT	31,850
Peak Hour	2,190
% Trucks / AADT	26
% Trucks / PH	16
LOS	C
Simulated Speed	65

2010 AADT	960
Peak Hour	100
% Trucks / AADT	15
% Trucks / PH	15
LOS	A
Simulated Speed	43

2010 AADT	32,170
Peak Hour	2,170
% Trucks / AADT	25
% Trucks / PH	17
LOS	C
Simulated Speed	66

2010 AADT	1,280
Peak Hour	80
% Trucks / AADT	11
% Trucks / PH	13
LOS	A
Simulated Speed	37

ROUTE 55

2010 AADT	2,200
Peak Hour	230
% Trucks / AADT	7
% Trucks / PH	8
LOS	A
Simulated Speed	23

2010 AADT	2,200
Peak Hour	220
% Trucks / AADT	7
% Trucks / PH	4
LOS	A
Simulated Speed	50

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 55 (Exit 296)
FUTURE YEAR 2010 NO BUILD TRAFFIC DATA

Date: November 1998

Figure: F-2.27

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

Shenandoah, Warren, and Frederick Counties

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MILEPOST 298

N

2010 AADT	2,360
Peak Hour	200
% Trucks / AADT	11
% Trucks / PH	13
LOS	B
Simulated Speed	42

2010 AADT	3,640
Peak Hour	240
% Trucks / AADT	12
% Trucks / PH	8
LOS	B
Simulated Speed	42

2010 AADT	2,360
Peak Hour	260
% Trucks / AADT	16
% Trucks / PH	13
LOS	B
Simulated Speed	33

2010 AADT	880
Peak Hour	100
% Trucks / AADT	16
% Trucks / PH	6
LOS	A
Simulated Speed	41

2010 AADT	3,640
Peak Hour	490
% Trucks / AADT	9
% Trucks / PH	5
LOS	A
Simulated Speed	22

2010 AADT	34,370
Peak Hour	2,750
% Trucks / AADT	29
% Trucks / PH	17
LOS	D
Simulated Speed	61

Exit 298

2010 AADT	32,170
Peak Hour	2,440
% Trucks / AADT	29
% Trucks / PH	17
LOS	D
Simulated Speed	52

2010 AADT	3,080
Peak Hour	410
% Trucks / AADT	9
% Trucks / PH	4
LOS	B
Simulated Speed	41

ROUTE I-81

ROUTE I-81

ROUTE 11

2010 AADT	32,170
Peak Hour	2,170
% Trucks / AADT	25
% Trucks / PH	17
LOS	C
Simulated Speed	65

2010 AADT	880
Peak Hour	60
% Trucks / AADT	21
% Trucks / PH	14
LOS	A
Simulated Speed	44

2010 AADT	3,080
Peak Hour	240
% Trucks / AADT	10
% Trucks / PH	8
LOS	A
Simulated Speed	37

2010 AADT	34,370
Peak Hour	2,350
% Trucks / AADT	25
% Trucks / PH	17
LOS	C
Simulated Speed	64

2010 AADT	5,280
Peak Hour	450
% Trucks / AADT	6
% Trucks / PH	4
LOS	A
Simulated Speed	26

2010 AADT	5,280
Peak Hour	380
% Trucks / AADT	6
% Trucks / PH	6
LOS	A
Simulated Speed	36

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 11 (Exit 298)
FUTURE YEAR 2010 NO BUILD TRAFFIC DATA

Date: November 1998

Figure: F-2.28

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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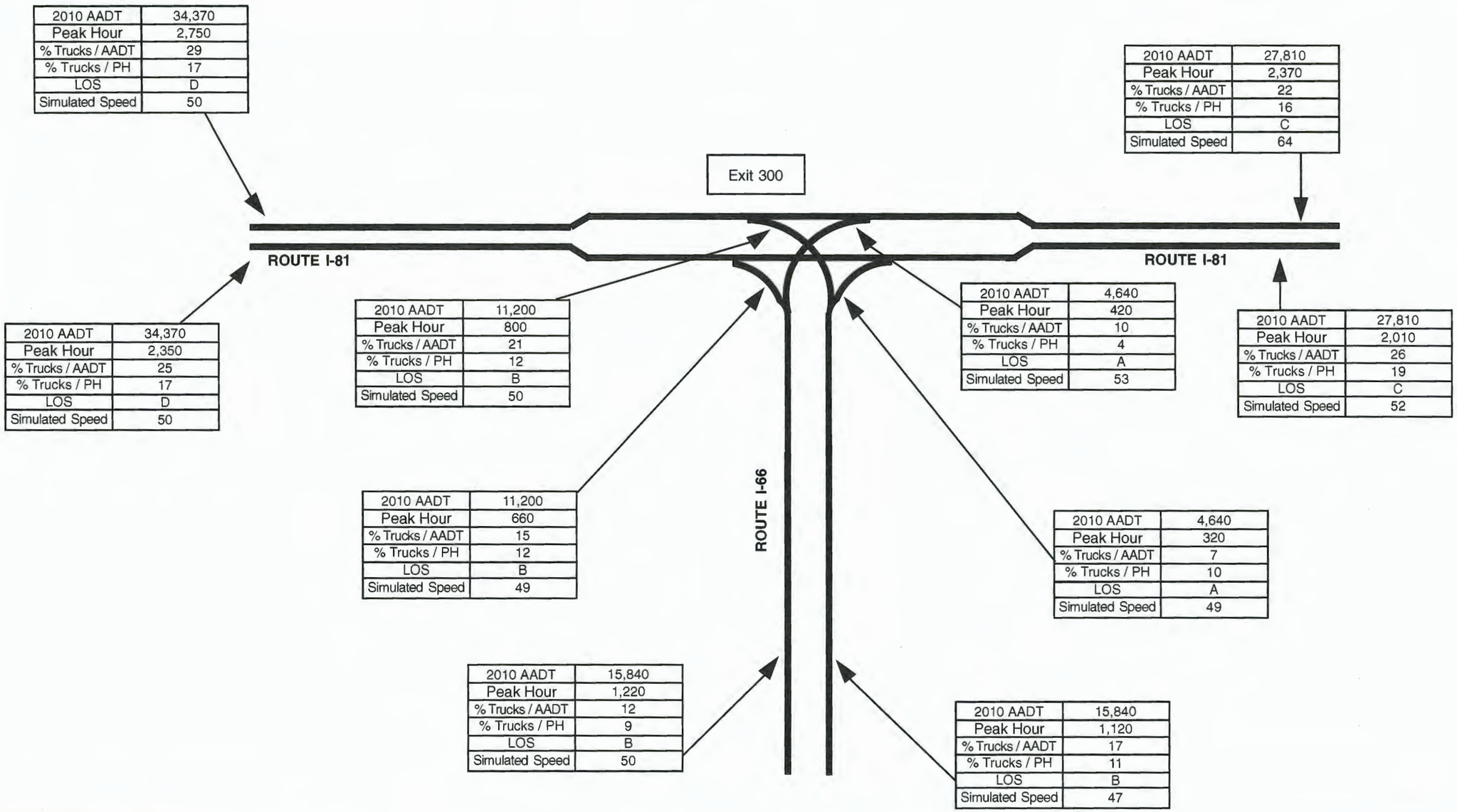
MILEPOST 300

N



2010 AADT	34,370
Peak Hour	2,750
% Trucks / AADT	29
% Trucks / PH	17
LOS	D
Simulated Speed	50

2010 AADT	27,810
Peak Hour	2,370
% Trucks / AADT	22
% Trucks / PH	16
LOS	C
Simulated Speed	64

2010 AADT	34,370
Peak Hour	2,350
% Trucks / AADT	25
% Trucks / PH	17
LOS	D
Simulated Speed	50

2010 AADT	11,200
Peak Hour	800
% Trucks / AADT	21
% Trucks / PH	12
LOS	B
Simulated Speed	50

2010 AADT	4,640
Peak Hour	420
% Trucks / AADT	10
% Trucks / PH	4
LOS	A
Simulated Speed	53

2010 AADT	27,810
Peak Hour	2,010
% Trucks / AADT	26
% Trucks / PH	19
LOS	C
Simulated Speed	52

2010 AADT	11,200
Peak Hour	660
% Trucks / AADT	15
% Trucks / PH	12
LOS	B
Simulated Speed	49

2010 AADT	4,640
Peak Hour	320
% Trucks / AADT	7
% Trucks / PH	10
LOS	A
Simulated Speed	49

2010 AADT	15,840
Peak Hour	1,220
% Trucks / AADT	12
% Trucks / PH	9
LOS	B
Simulated Speed	50

2010 AADT	15,840
Peak Hour	1,120
% Trucks / AADT	17
% Trucks / PH	11
LOS	B
Simulated Speed	47

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route I-66 (Exit 300)
FUTURE YEAR 2010 NO BUILD TRAFFIC DATA

Date: November 1998

Figure: F-2.29

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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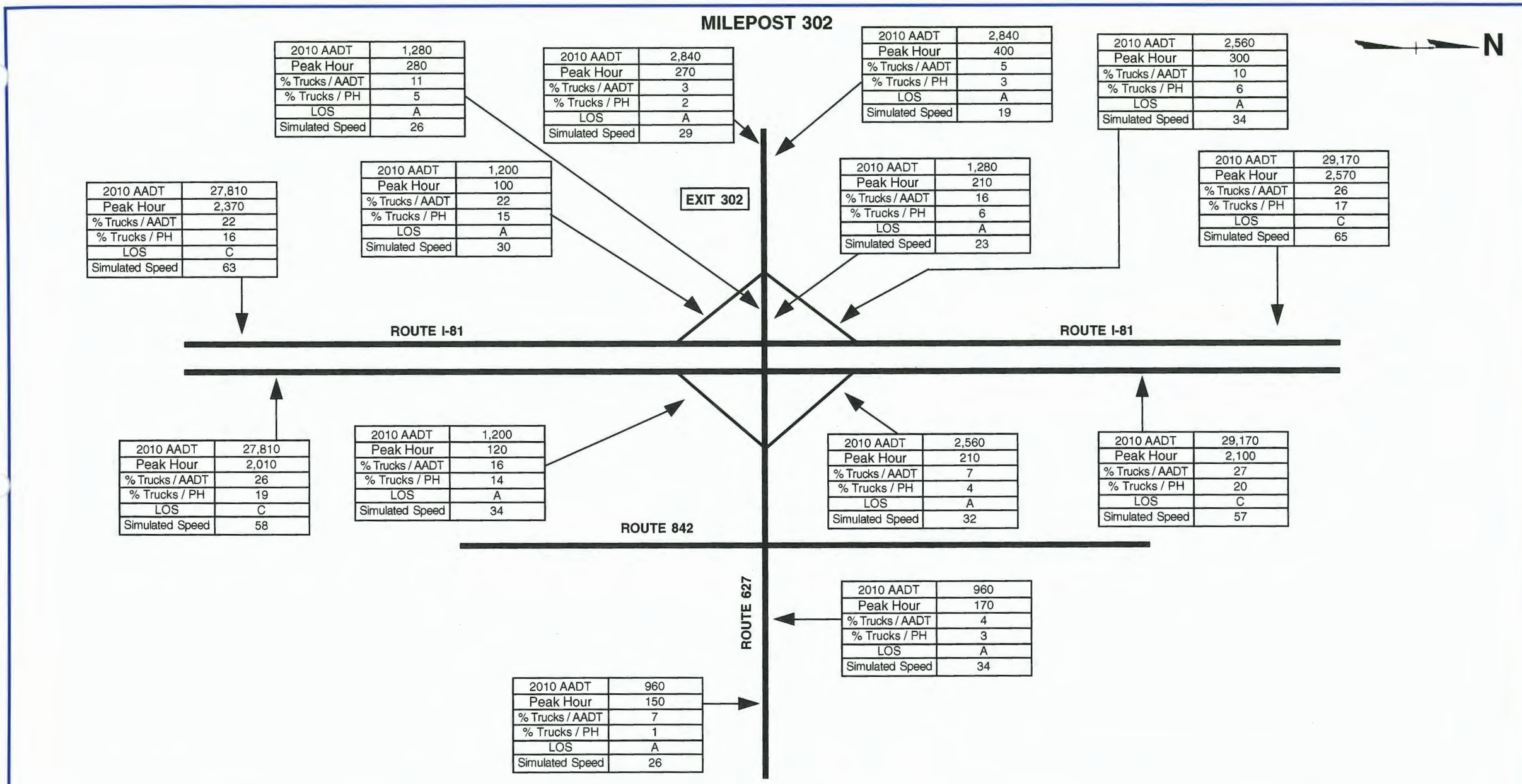

INTERSECTION OF:

I-81 Ramps at Route 627 (Exit 302)
FUTURE YEAR 2010 NO BUILD TRAFFIC DATA

Date: November 1998

Figure: F-2.30

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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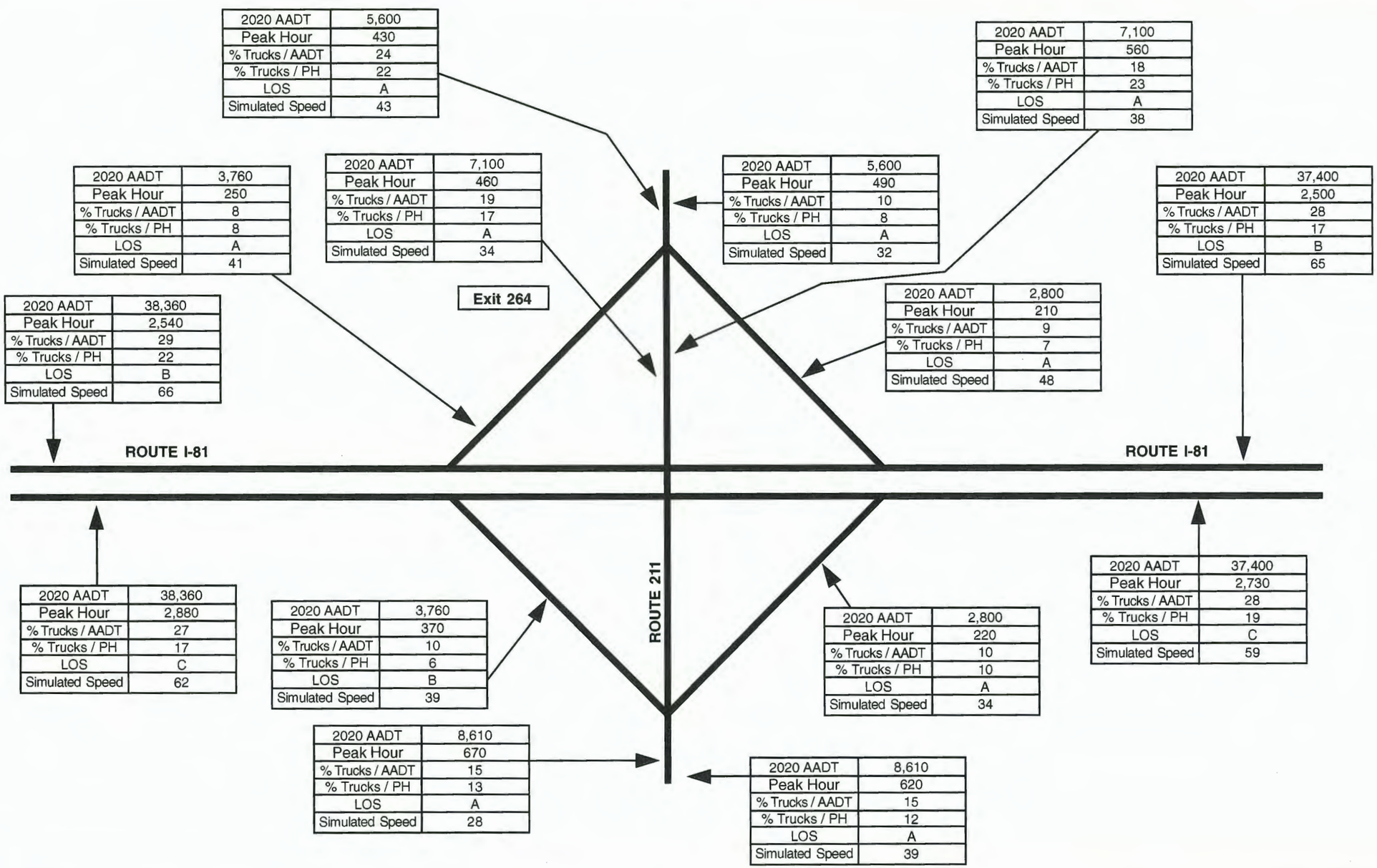
MILEPOST 264

N



2020 AADT	5,600
Peak Hour	430
% Trucks / AADT	24
% Trucks / PH	22
LOS	A
Simulated Speed	43

2020 AADT	7,100
Peak Hour	560
% Trucks / AADT	18
% Trucks / PH	23
LOS	A
Simulated Speed	38

2020 AADT	3,760
Peak Hour	250
% Trucks / AADT	8
% Trucks / PH	8
LOS	A
Simulated Speed	41

2020 AADT	7,100
Peak Hour	460
% Trucks / AADT	19
% Trucks / PH	17
LOS	A
Simulated Speed	34

2020 AADT	5,600
Peak Hour	490
% Trucks / AADT	10
% Trucks / PH	8
LOS	A
Simulated Speed	32

2020 AADT	37,400
Peak Hour	2,500
% Trucks / AADT	28
% Trucks / PH	17
LOS	B
Simulated Speed	65

2020 AADT	38,360
Peak Hour	2,540
% Trucks / AADT	29
% Trucks / PH	22
LOS	B
Simulated Speed	66

2020 AADT	2,800
Peak Hour	210
% Trucks / AADT	9
% Trucks / PH	7
LOS	A
Simulated Speed	48

2020 AADT	38,360
Peak Hour	2,880
% Trucks / AADT	27
% Trucks / PH	17
LOS	C
Simulated Speed	62

2020 AADT	3,760
Peak Hour	370
% Trucks / AADT	10
% Trucks / PH	6
LOS	B
Simulated Speed	39

2020 AADT	2,800
Peak Hour	220
% Trucks / AADT	10
% Trucks / PH	10
LOS	A
Simulated Speed	34

2020 AADT	37,400
Peak Hour	2,730
% Trucks / AADT	28
% Trucks / PH	19
LOS	C
Simulated Speed	59

2020 AADT	8,610
Peak Hour	670
% Trucks / AADT	15
% Trucks / PH	13
LOS	A
Simulated Speed	28

2020 AADT	8,610
Peak Hour	620
% Trucks / AADT	15
% Trucks / PH	12
LOS	A
Simulated Speed	39

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 211 (Exit 264)
FUTURE YEAR 2020 BUILD - TRAFFIC DATA

Date: November 1998

Figure: F-2.31

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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MILEPOST 269

N

2020 AADT	1,250
Peak Hour	120
% Trucks / AADT	15
% Trucks / PH	11
LOS	A
Simulated Speed	39

2020 AADT	1,450
Peak Hour	150
% Trucks / AADT	8
% Trucks / PH	4
LOS	A
Simulated Speed	29

2020 AADT	1,450
Peak Hour	110
% Trucks / AADT	15
% Trucks / PH	14
LOS	A
Simulated Speed	26

2020 AADT	1,250
Peak Hour	100
% Trucks / AADT	10
% Trucks / PH	5
LOS	A
Simulated Speed	28

2020 AADT	1,250
Peak Hour	120
% Trucks / AADT	9
% Trucks / PH	7
LOS	A
Simulated Speed	33

2020 AADT	36,800
Peak Hour	2,440
% Trucks / AADT	29
% Trucks / PH	18
LOS	B
Simulated Speed	65

Exit 269

2020 AADT	650
Peak Hour	60
% Trucks / AADT	18
% Trucks / PH	10
LOS	A
Simulated Speed	34

2020 AADT	37,400
Peak Hour	2,500
% Trucks / AADT	28
% Trucks / PH	17
LOS	B
Simulated Speed	65

ROUTE I-81

ROUTE I-81

ROUTE 730

2020 AADT	37,400
Peak Hour	2,730
% Trucks / AADT	28
% Trucks / PH	19
LOS	B
Simulated Speed	64

2020 AADT	1,250
Peak Hour	120
% Trucks / AADT	11
% Trucks / PH	8
LOS	A
Simulated Speed	34

2020 AADT	650
Peak Hour	70
% Trucks / AADT	17
% Trucks / PH	11
LOS	A
Simulated Speed	28

2020 AADT	36,800
Peak Hour	2,680
% Trucks / AADT	28
% Trucks / PH	17
LOS	B
Simulated Speed	65

2020 AADT	1,450
Peak Hour	150
% Trucks / AADT	11
% Trucks / PH	8
LOS	A
Simulated Speed	21

2020 AADT	1,450
Peak Hour	140
% Trucks / AADT	8
% Trucks / PH	7
LOS	A
Simulated Speed	48

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 730 (Exit 269)
FUTURE YEAR 2020 BUILD - TRAFFIC DATA

Date: November 1998

Figure: F-2.32

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

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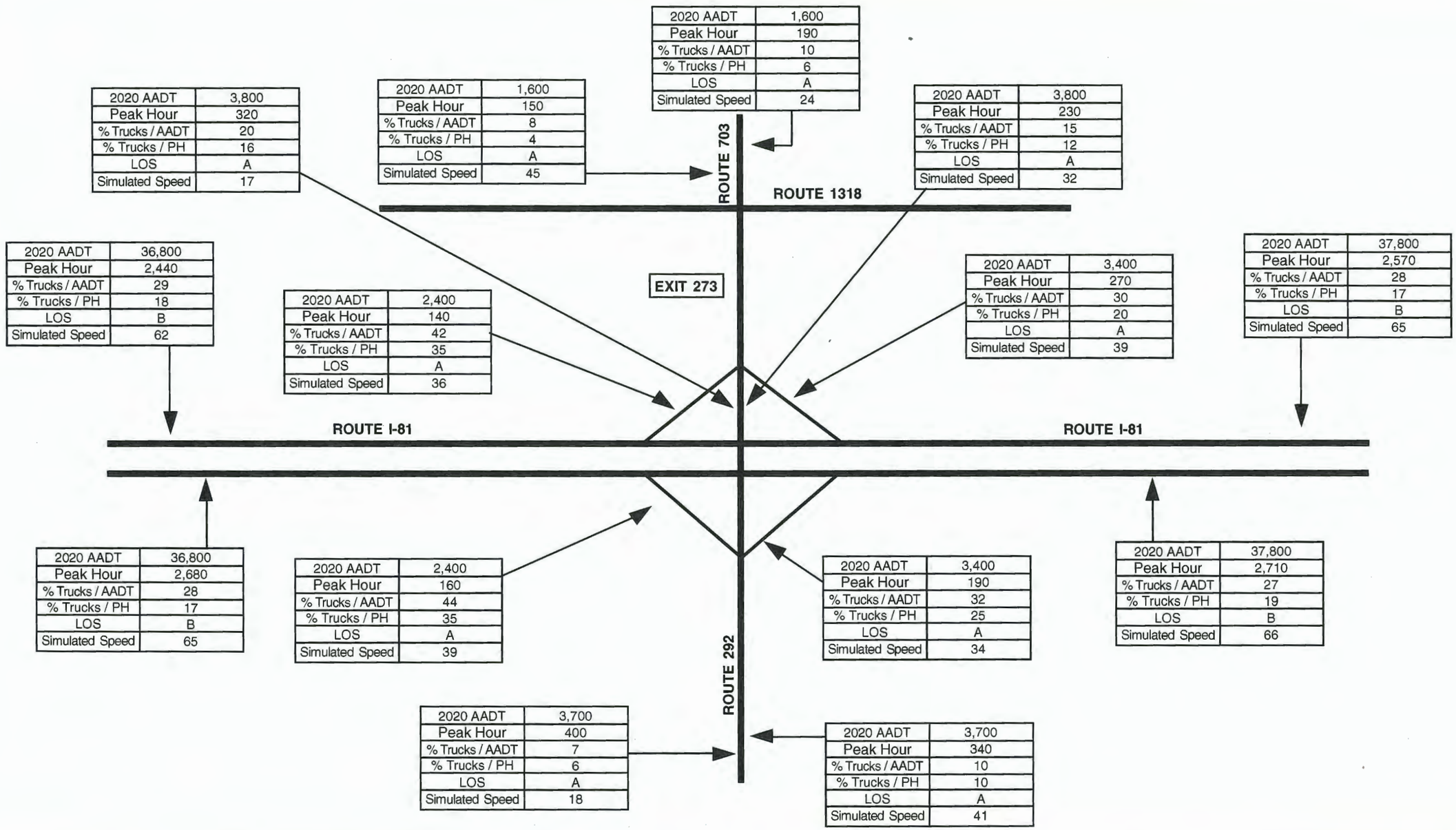
MILEPOST 273

N



2020 AADT	1,600
Peak Hour	190
% Trucks / AADT	10
% Trucks / PH	6
LOS	A
Simulated Speed	24

2020 AADT	3,800
Peak Hour	320
% Trucks / AADT	20
% Trucks / PH	16
LOS	A
Simulated Speed	17

2020 AADT	1,600
Peak Hour	150
% Trucks / AADT	8
% Trucks / PH	4
LOS	A
Simulated Speed	45

2020 AADT	3,800
Peak Hour	230
% Trucks / AADT	15
% Trucks / PH	12
LOS	A
Simulated Speed	32

2020 AADT	36,800
Peak Hour	2,440
% Trucks / AADT	29
% Trucks / PH	18
LOS	B
Simulated Speed	62

2020 AADT	2,400
Peak Hour	140
% Trucks / AADT	42
% Trucks / PH	35
LOS	A
Simulated Speed	36

2020 AADT	3,400
Peak Hour	270
% Trucks / AADT	30
% Trucks / PH	20
LOS	A
Simulated Speed	39

2020 AADT	37,800
Peak Hour	2,570
% Trucks / AADT	28
% Trucks / PH	17
LOS	B
Simulated Speed	65

2020 AADT	36,800
Peak Hour	2,680
% Trucks / AADT	28
% Trucks / PH	17
LOS	B
Simulated Speed	65

2020 AADT	2,400
Peak Hour	160
% Trucks / AADT	44
% Trucks / PH	35
LOS	A
Simulated Speed	39

2020 AADT	3,400
Peak Hour	190
% Trucks / AADT	32
% Trucks / PH	25
LOS	A
Simulated Speed	34

2020 AADT	37,800
Peak Hour	2,710
% Trucks / AADT	27
% Trucks / PH	19
LOS	B
Simulated Speed	66

2020 AADT	3,700
Peak Hour	400
% Trucks / AADT	7
% Trucks / PH	6
LOS	A
Simulated Speed	18

2020 AADT	3,700
Peak Hour	340
% Trucks / AADT	10
% Trucks / PH	10
LOS	A
Simulated Speed	41

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Routes 703 & 292 (Exit 273)
FUTURE YEAR 2020 BUILD - TRAFFIC DATA

Date: November 1998

Figure: F-2.33

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

Shenandoah, Warren, and Frederick Counties

Sheet No.
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MILEPOST 277

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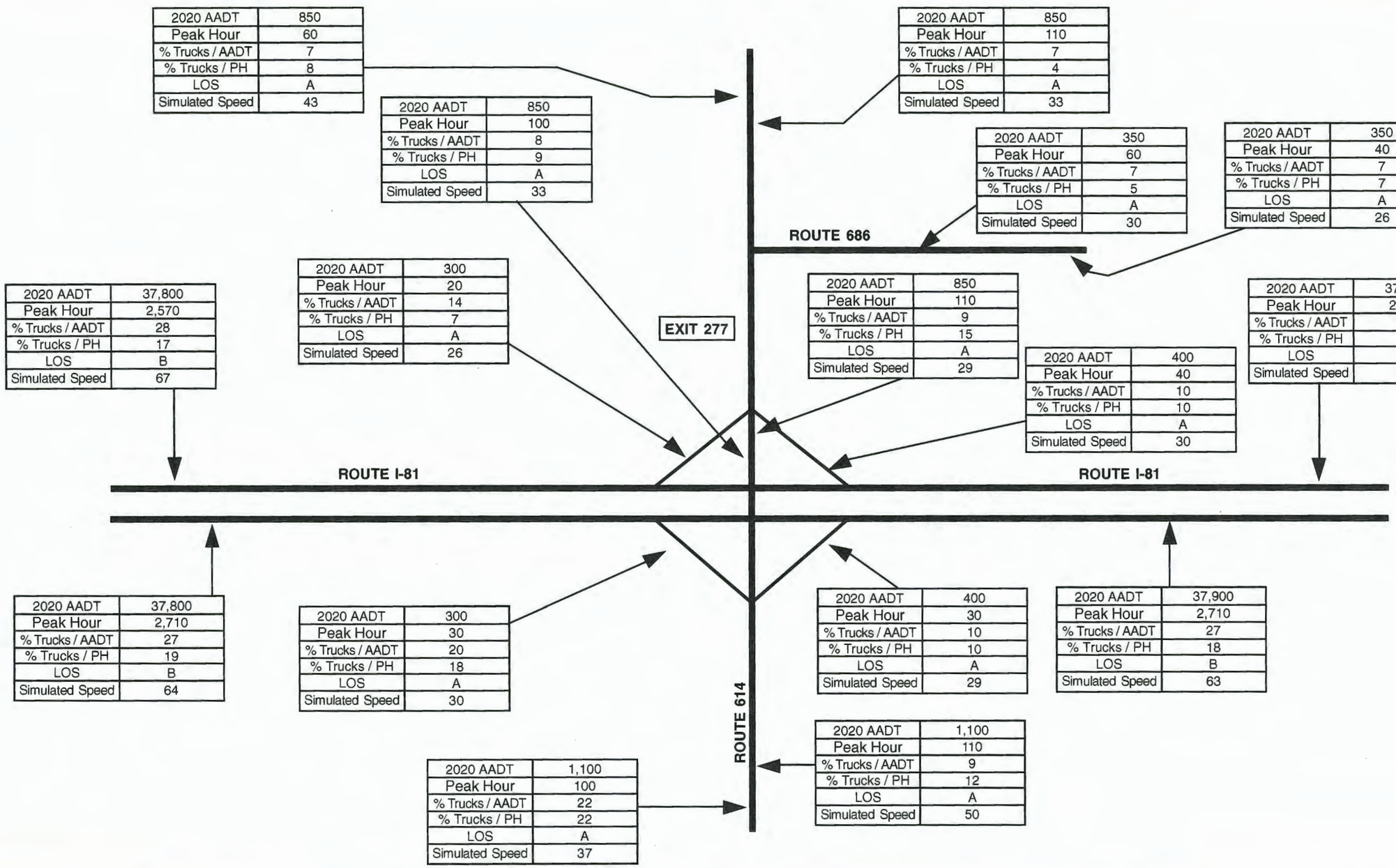

2020 AADT	850
Peak Hour	60
% Trucks / AADT	7
% Trucks / PH	8
LOS	A
Simulated Speed	43

2020 AADT	850
Peak Hour	110
% Trucks / AADT	7
% Trucks / PH	4
LOS	A
Simulated Speed	33

2020 AADT	850
Peak Hour	100
% Trucks / AADT	8
% Trucks / PH	9
LOS	A
Simulated Speed	33

2020 AADT	350
Peak Hour	60
% Trucks / AADT	7
% Trucks / PH	5
LOS	A
Simulated Speed	30

2020 AADT	350
Peak Hour	40
% Trucks / AADT	7
% Trucks / PH	7
LOS	A
Simulated Speed	26

2020 AADT	300
Peak Hour	20
% Trucks / AADT	14
% Trucks / PH	7
LOS	A
Simulated Speed	26

2020 AADT	850
Peak Hour	110
% Trucks / AADT	9
% Trucks / PH	15
LOS	A
Simulated Speed	29

2020 AADT	37,800
Peak Hour	2,570
% Trucks / AADT	28
% Trucks / PH	17
LOS	B
Simulated Speed	67

2020 AADT	37,900
Peak Hour	2,590
% Trucks / AADT	28
% Trucks / PH	17
LOS	B
Simulated Speed	67

2020 AADT	400
Peak Hour	40
% Trucks / AADT	10
% Trucks / PH	10
LOS	A
Simulated Speed	30

2020 AADT	37,800
Peak Hour	2,710
% Trucks / AADT	27
% Trucks / PH	19
LOS	B
Simulated Speed	64

2020 AADT	300
Peak Hour	30
% Trucks / AADT	20
% Trucks / PH	18
LOS	A
Simulated Speed	30

2020 AADT	400
Peak Hour	30
% Trucks / AADT	10
% Trucks / PH	10
LOS	A
Simulated Speed	29

2020 AADT	37,900
Peak Hour	2,710
% Trucks / AADT	27
% Trucks / PH	18
LOS	B
Simulated Speed	63

2020 AADT	1,100
Peak Hour	110
% Trucks / AADT	9
% Trucks / PH	12
LOS	A
Simulated Speed	50

2020 AADT	1,100
Peak Hour	100
% Trucks / AADT	22
% Trucks / PH	22
LOS	A
Simulated Speed	37

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 614 (Exit 277)
FUTURE YEAR 2020 BUILD - TRAFFIC DATA

Date: November 1998

Figure: F-2.34

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

Shenandoah, Warren, and Frederick Counties

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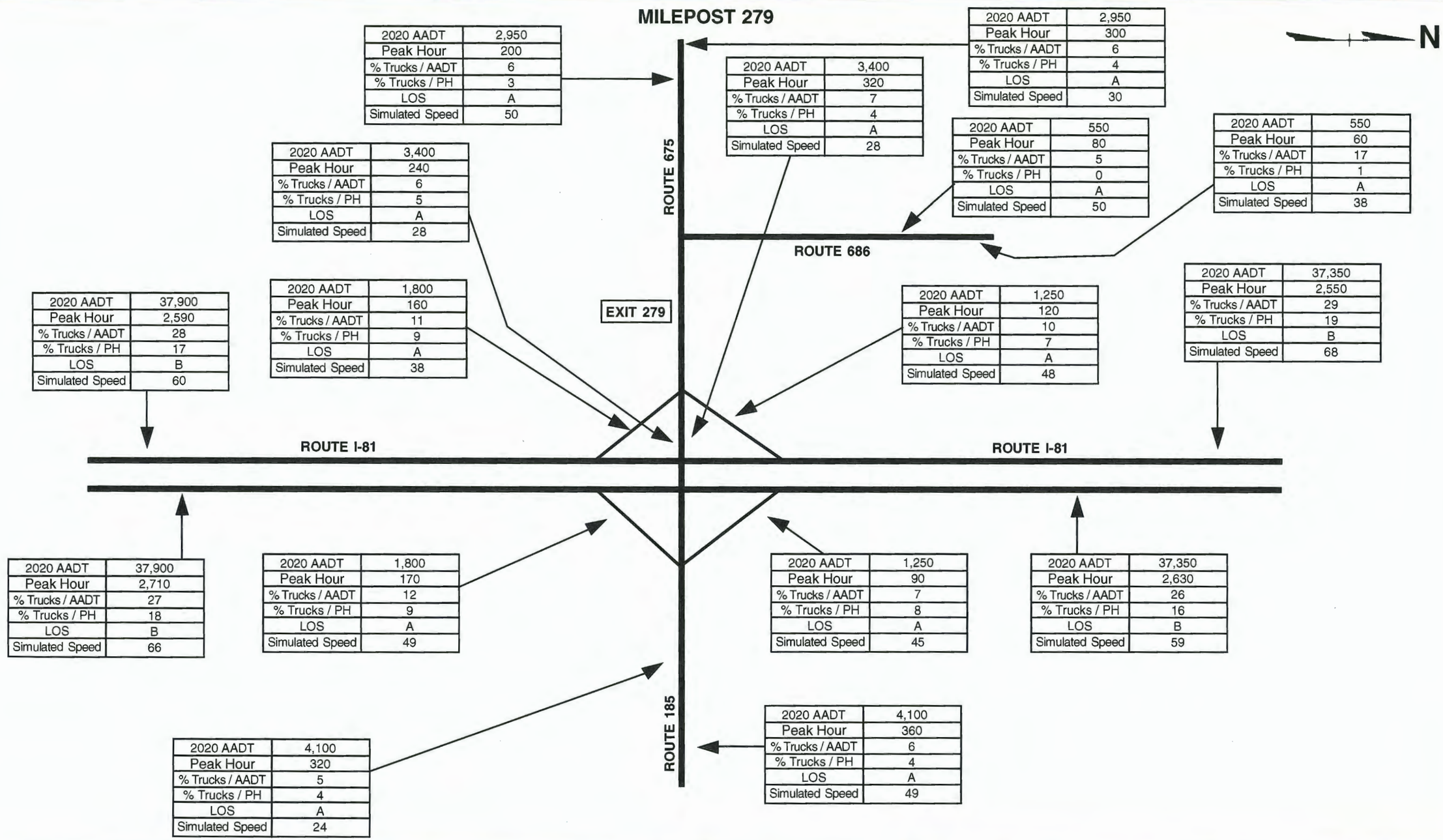

INTERSECTION OF:

I-81 Ramps at Route 185 (Exit 279)
FUTURE YEAR 2020 BUILD - TRAFFIC DATA

Date: November 1998

Figure: F-2.35

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

Shenandoah, Warren, and Frederick Counties

Sheet No.
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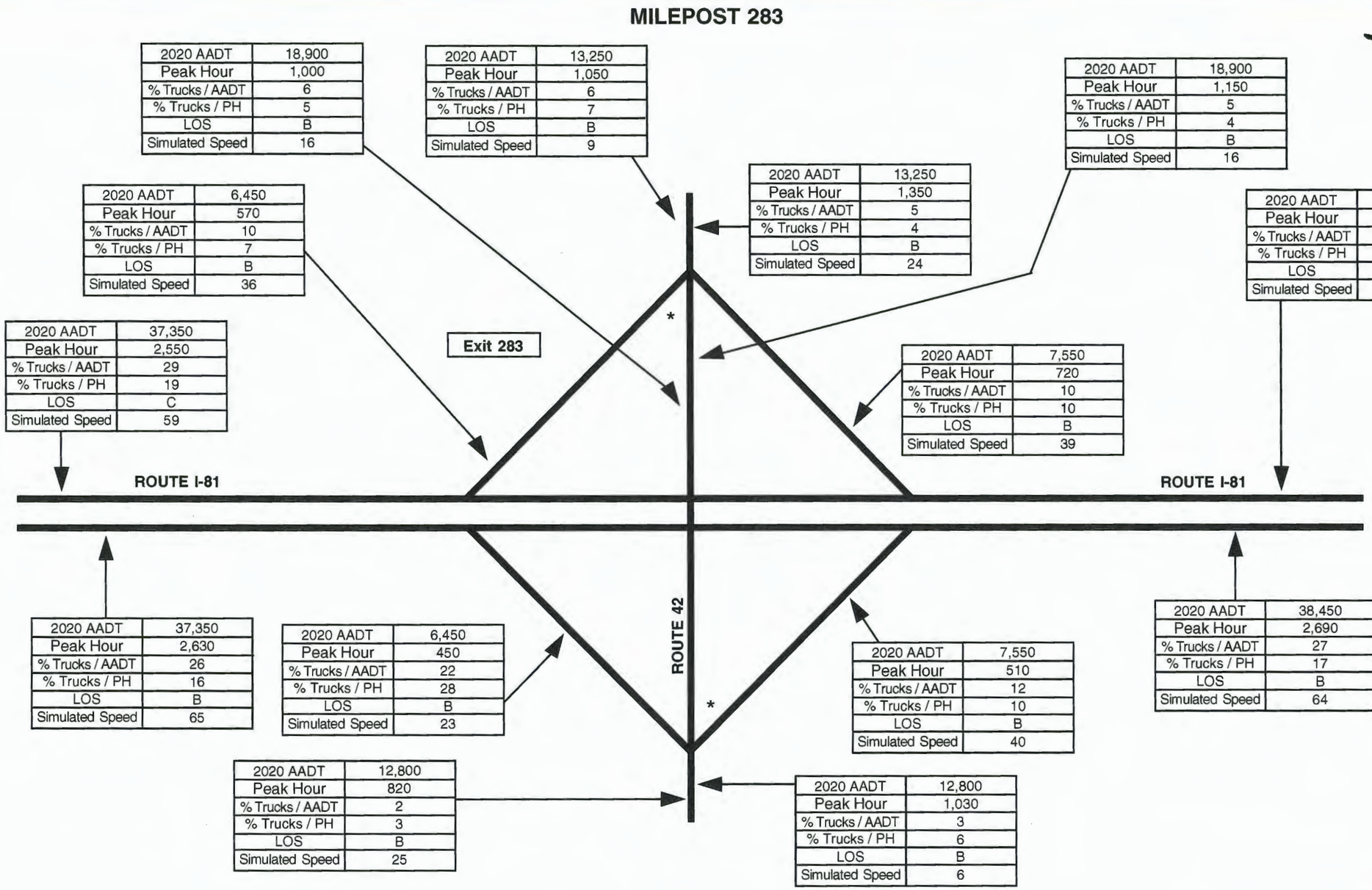
MILEPOST 283



2020 AADT	18,900
Peak Hour	1,000
% Trucks / AADT	6
% Trucks / PH	5
LOS	B
Simulated Speed	16

2020 AADT	13,250
Peak Hour	1,050
% Trucks / AADT	6
% Trucks / PH	7
LOS	B
Simulated Speed	9

2020 AADT	18,900
Peak Hour	1,150
% Trucks / AADT	5
% Trucks / PH	4
LOS	B
Simulated Speed	16

2020 AADT	13,250
Peak Hour	1,350
% Trucks / AADT	5
% Trucks / PH	4
LOS	B
Simulated Speed	24

2020 AADT	6,450
Peak Hour	570
% Trucks / AADT	10
% Trucks / PH	7
LOS	B
Simulated Speed	36

2020 AADT	38,450
Peak Hour	2,700
% Trucks / AADT	29
% Trucks / PH	17
LOS	B
Simulated Speed	60

2020 AADT	37,350
Peak Hour	2,550
% Trucks / AADT	29
% Trucks / PH	19
LOS	C
Simulated Speed	59

2020 AADT	7,550
Peak Hour	720
% Trucks / AADT	10
% Trucks / PH	10
LOS	B
Simulated Speed	39

2020 AADT	37,350
Peak Hour	2,630
% Trucks / AADT	26
% Trucks / PH	16
LOS	B
Simulated Speed	65

2020 AADT	6,450
Peak Hour	450
% Trucks / AADT	22
% Trucks / PH	28
LOS	B
Simulated Speed	23

2020 AADT	7,550
Peak Hour	510
% Trucks / AADT	12
% Trucks / PH	10
LOS	B
Simulated Speed	40

2020 AADT	38,450
Peak Hour	2,690
% Trucks / AADT	27
% Trucks / PH	17
LOS	B
Simulated Speed	64

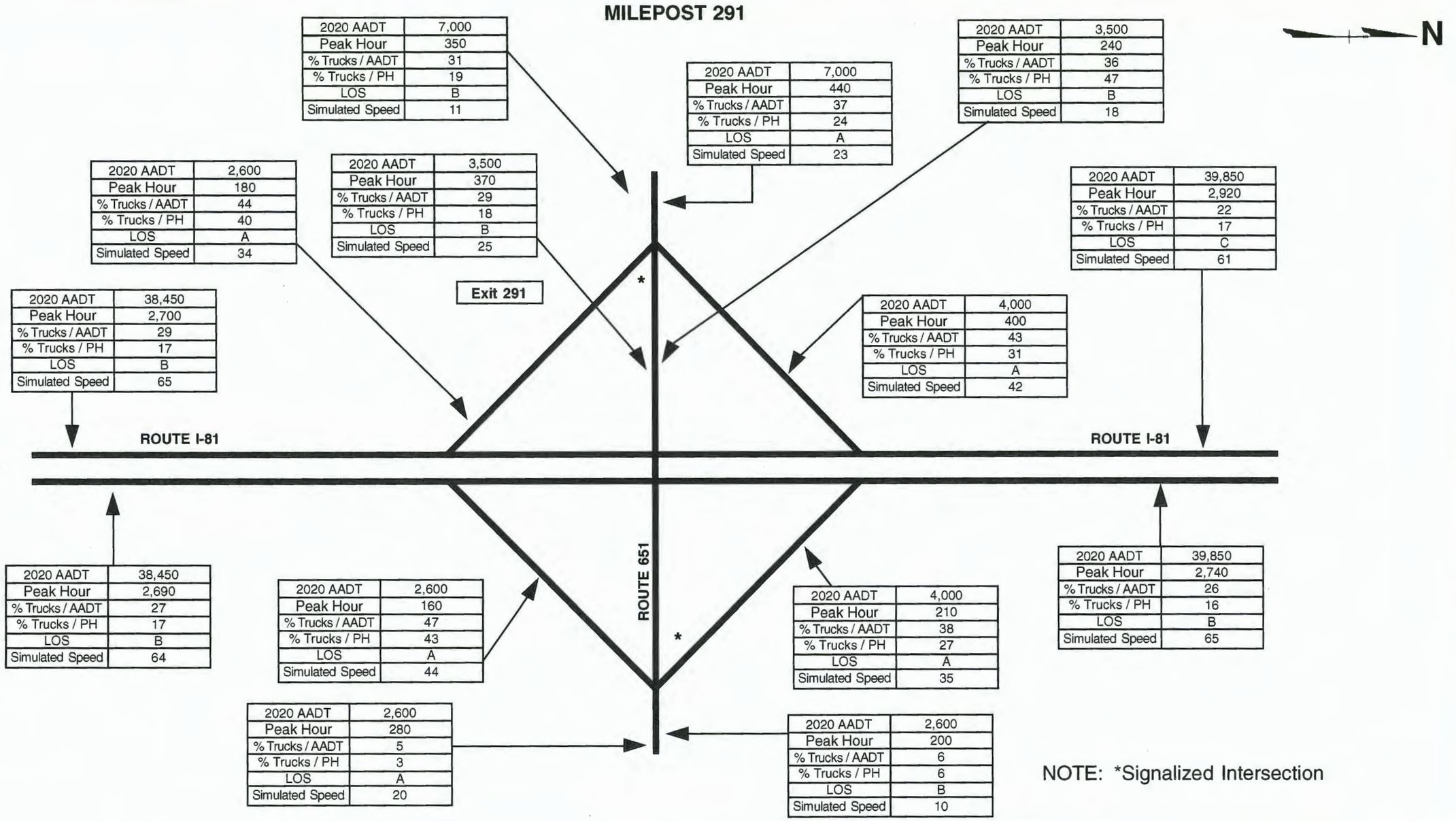
2020 AADT	12,800
Peak Hour	820
% Trucks / AADT	2
% Trucks / PH	3
LOS	B
Simulated Speed	25

2020 AADT	12,800
Peak Hour	1,030
% Trucks / AADT	3
% Trucks / PH	6
LOS	B
Simulated Speed	6

Note: *Signalized Intersection

Virginia Department of Transportation	**INTERSECTION OF:** **I-81 Ramps at Route 42 (Exit 283)** **FUTURE YEAR 2020 BUILD - TRAFFIC DATA**	Date: November 1998 Figure: F-2.36	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. 41

MILEPOST 291



2020 AADT	7,000
Peak Hour	350
% Trucks / AADT	31
% Trucks / PH	19
LOS	B
Simulated Speed	11

2020 AADT	7,000
Peak Hour	440
% Trucks / AADT	37
% Trucks / PH	24
LOS	A
Simulated Speed	23

2020 AADT	3,500
Peak Hour	240
% Trucks / AADT	36
% Trucks / PH	47
LOS	B
Simulated Speed	18

2020 AADT	2,600
Peak Hour	180
% Trucks / AADT	44
% Trucks / PH	40
LOS	A
Simulated Speed	34

2020 AADT	3,500
Peak Hour	370
% Trucks / AADT	29
% Trucks / PH	18
LOS	B
Simulated Speed	25

2020 AADT	39,850
Peak Hour	2,920
% Trucks / AADT	22
% Trucks / PH	17
LOS	C
Simulated Speed	61

2020 AADT	38,450
Peak Hour	2,700
% Trucks / AADT	29
% Trucks / PH	17
LOS	B
Simulated Speed	65

2020 AADT	4,000
Peak Hour	400
% Trucks / AADT	43
% Trucks / PH	31
LOS	A
Simulated Speed	42

2020 AADT	38,450
Peak Hour	2,690
% Trucks / AADT	27
% Trucks / PH	17
LOS	B
Simulated Speed	64

2020 AADT	2,600
Peak Hour	160
% Trucks / AADT	47
% Trucks / PH	43
LOS	A
Simulated Speed	44

2020 AADT	4,000
Peak Hour	210
% Trucks / AADT	38
% Trucks / PH	27
LOS	A
Simulated Speed	35

2020 AADT	39,850
Peak Hour	2,740
% Trucks / AADT	26
% Trucks / PH	16
LOS	B
Simulated Speed	65

2020 AADT	2,600
Peak Hour	280
% Trucks / AADT	5
% Trucks / PH	3
LOS	A
Simulated Speed	20

2020 AADT	2,600
Peak Hour	200
% Trucks / AADT	6
% Trucks / PH	6
LOS	B
Simulated Speed	10

NOTE: *Signalized Intersection

INTERSECTION OF:

I-81 Ramps at Route 651 (Exit 291)
FUTURE YEAR 2020 BUILD - TRAFFIC DATA

Date: November 1998

Figure: F-2.37

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

Shenandoah, Warren, and Frederick Counties

Sheet No.
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MILEPOST 296

N

2020 AADT	2,900
Peak Hour	280
% Trucks / AADT	9
% Trucks / PH	7
LOS	A
Simulated Speed	18

2020 AADT	2,900
Peak Hour	310
% Trucks / AADT	7
% Trucks / PH	10
LOS	A
Simulated Speed	24

2020 AADT	2,900
Peak Hour	190
% Trucks / AADT	6
% Trucks / PH	3
LOS	A
Simulated Speed	50

2020 AADT	400
Peak Hour	60
% Trucks / AADT	4
% Trucks / PH	3
LOS	A
Simulated Speed	37

2020 AADT	400
Peak Hour	30
% Trucks / AADT	3
% Trucks / PH	0
LOS	A
Simulated Speed	45

2020 AADT	2,900
Peak Hour	300
% Trucks / AADT	7
% Trucks / PH	3
LOS	A
Simulated Speed	30

ROUTE 633

EXIT 296

ROUTE 55

2020 AADT	39,850
Peak Hour	2,920
% Trucks / AADT	22
% Trucks / PH	17
LOS	C
Simulated Speed	57

2020 AADT	1,200
Peak Hour	80
% Trucks / AADT	19
% Trucks / PH	20
LOS	A
Simulated Speed	41

2020 AADT	1,600
Peak Hour	210
% Trucks / AADT	10
% Trucks / PH	5
LOS	A
Simulated Speed	43

2020 AADT	40,250
Peak Hour	3,050
% Trucks / AADT	29
% Trucks / PH	17
LOS	C
Simulated Speed	64

ROUTE I-81

ROUTE I-81

2020 AADT	39,850
Peak Hour	2,740
% Trucks / AADT	26
% Trucks / PH	16
LOS	B
Simulated Speed	66

2020 AADT	1,200
Peak Hour	130
% Trucks / AADT	15
% Trucks / PH	15
LOS	A
Simulated Speed	42

2020 AADT	1,600
Peak Hour	100
% Trucks / AADT	11
% Trucks / PH	13
LOS	A
Simulated Speed	33

2020 AADT	40,250
Peak Hour	2,710
% Trucks / AADT	25
% Trucks / PH	17
LOS	B
Simulated Speed	66

ROUTE 55

2020 AADT	2,750
Peak Hour	280
% Trucks / AADT	7
% Trucks / PH	8
LOS	A
Simulated Speed	21

2020 AADT	2,750
Peak Hour	270
% Trucks / AADT	7
% Trucks / PH	4
LOS	A
Simulated Speed	50

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 55 (Exit 296)
FUTURE YEAR 2020 BUILD - TRAFFIC DATA

Date: November 1998

Figure: F-2.38

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

Shenandoah, Warren, and Frederick Counties

Sheet No.
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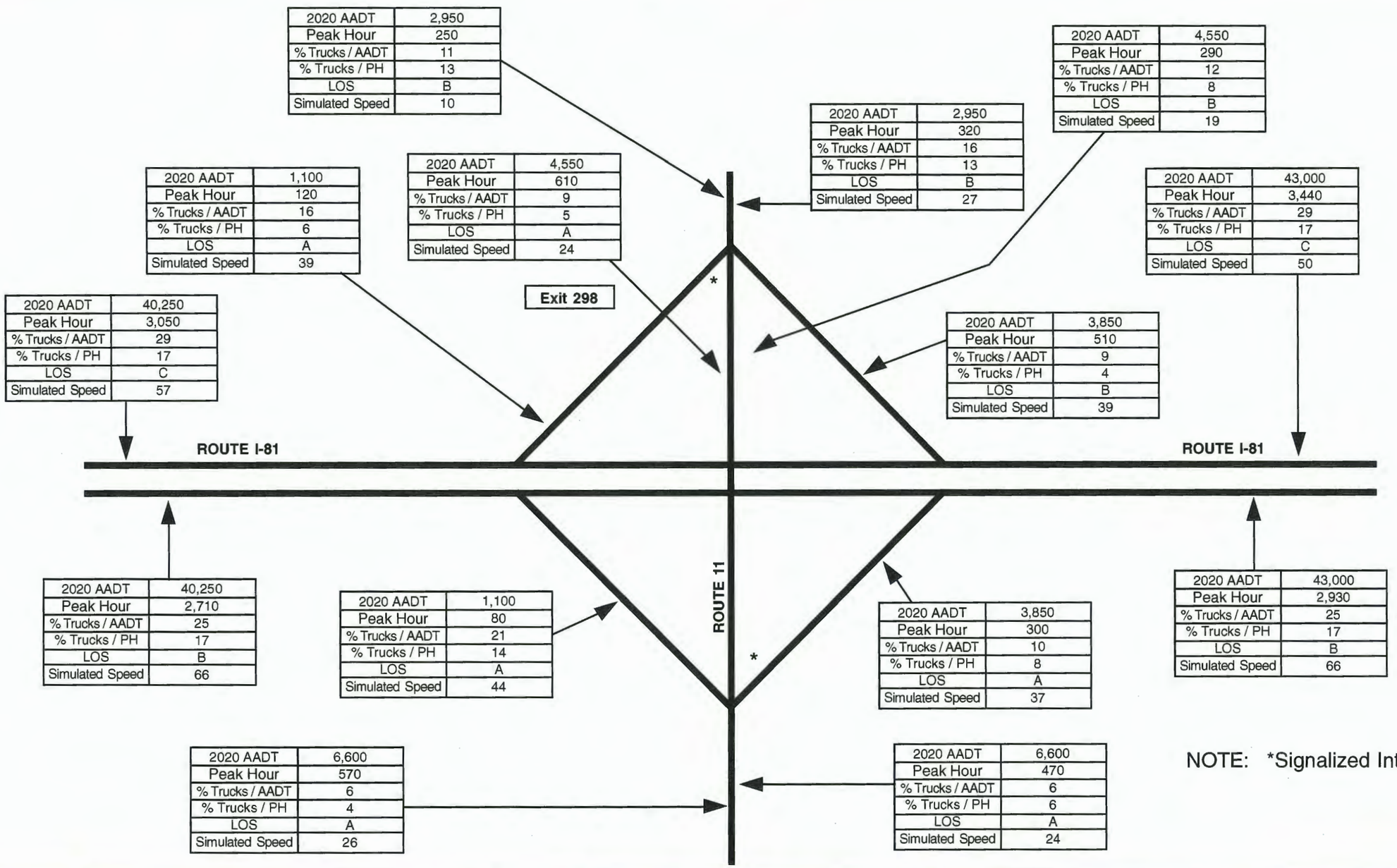
MILEPOST 298

N



2020 AADT	2,950
Peak Hour	250
% Trucks / AADT	11
% Trucks / PH	13
LOS	B
Simulated Speed	10

2020 AADT	4,550
Peak Hour	290
% Trucks / AADT	12
% Trucks / PH	8
LOS	B
Simulated Speed	19

2020 AADT	2,950
Peak Hour	320
% Trucks / AADT	16
% Trucks / PH	13
LOS	B
Simulated Speed	27

2020 AADT	1,100
Peak Hour	120
% Trucks / AADT	16
% Trucks / PH	6
LOS	A
Simulated Speed	39

2020 AADT	4,550
Peak Hour	610
% Trucks / AADT	9
% Trucks / PH	5
LOS	A
Simulated Speed	24

2020 AADT	43,000
Peak Hour	3,440
% Trucks / AADT	29
% Trucks / PH	17
LOS	C
Simulated Speed	50

2020 AADT	40,250
Peak Hour	3,050
% Trucks / AADT	29
% Trucks / PH	17
LOS	C
Simulated Speed	57

2020 AADT	3,850
Peak Hour	510
% Trucks / AADT	9
% Trucks / PH	4
LOS	B
Simulated Speed	39

2020 AADT	40,250
Peak Hour	2,710
% Trucks / AADT	25
% Trucks / PH	17
LOS	B
Simulated Speed	66

2020 AADT	1,100
Peak Hour	80
% Trucks / AADT	21
% Trucks / PH	14
LOS	A
Simulated Speed	44

2020 AADT	3,850
Peak Hour	300
% Trucks / AADT	10
% Trucks / PH	8
LOS	A
Simulated Speed	37

2020 AADT	43,000
Peak Hour	2,930
% Trucks / AADT	25
% Trucks / PH	17
LOS	B
Simulated Speed	66

2020 AADT	6,600
Peak Hour	570
% Trucks / AADT	6
% Trucks / PH	4
LOS	A
Simulated Speed	26

2020 AADT	6,600
Peak Hour	470
% Trucks / AADT	6
% Trucks / PH	6
LOS	A
Simulated Speed	24

NOTE: *Signalized Intersection

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route 11 (Exit 298)
FUTURE YEAR 2020 BUILD - TRAFFIC DATA

Date: November 1998

Figure: F-2.39

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

Shenandoah, Warren, and Frederick Counties

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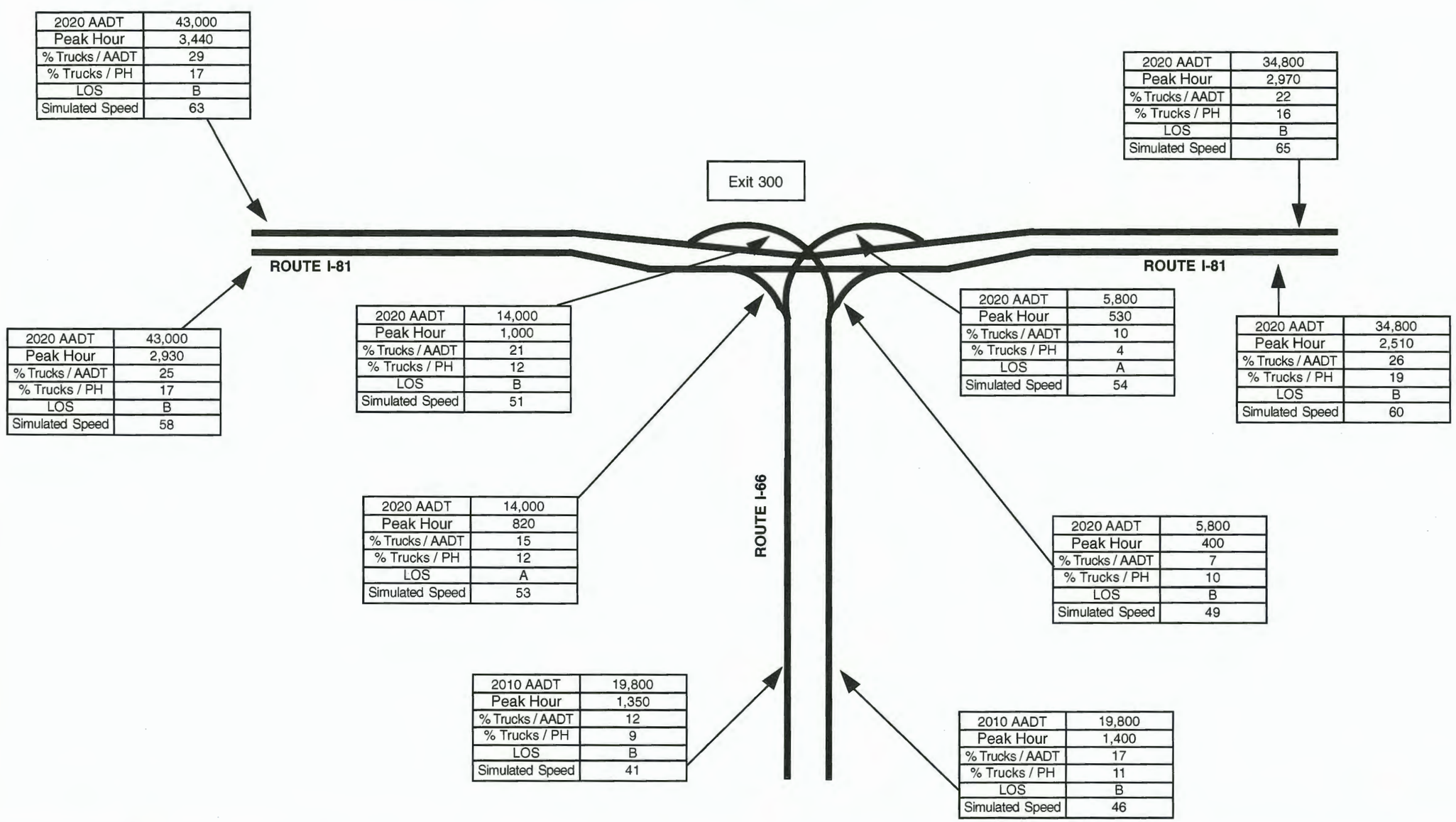
MILEPOST 300

N



2020 AADT	43,000
Peak Hour	3,440
% Trucks / AADT	29
% Trucks / PH	17
LOS	B
Simulated Speed	63

2020 AADT	34,800
Peak Hour	2,970
% Trucks / AADT	22
% Trucks / PH	16
LOS	B
Simulated Speed	65

2020 AADT	43,000
Peak Hour	2,930
% Trucks / AADT	25
% Trucks / PH	17
LOS	B
Simulated Speed	58

2020 AADT	14,000
Peak Hour	1,000
% Trucks / AADT	21
% Trucks / PH	12
LOS	B
Simulated Speed	51

2020 AADT	5,800
Peak Hour	530
% Trucks / AADT	10
% Trucks / PH	4
LOS	A
Simulated Speed	54

2020 AADT	34,800
Peak Hour	2,510
% Trucks / AADT	26
% Trucks / PH	19
LOS	B
Simulated Speed	60

2020 AADT	14,000
Peak Hour	820
% Trucks / AADT	15
% Trucks / PH	12
LOS	A
Simulated Speed	53

2020 AADT	5,800
Peak Hour	400
% Trucks / AADT	7
% Trucks / PH	10
LOS	B
Simulated Speed	49

2010 AADT	19,800
Peak Hour	1,350
% Trucks / AADT	12
% Trucks / PH	9
LOS	B
Simulated Speed	41

2010 AADT	19,800
Peak Hour	1,400
% Trucks / AADT	17
% Trucks / PH	11
LOS	B
Simulated Speed	46

Virginia Department of Transportation

INTERSECTION OF:

I-81 Ramps at Route I-66 (Exit 300)
FUTURE YEAR 2020 BUILD - TRAFFIC DATA

Date: November 1998

Figure: F-2.40

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

Shenandoah, Warren, and Frederick Counties

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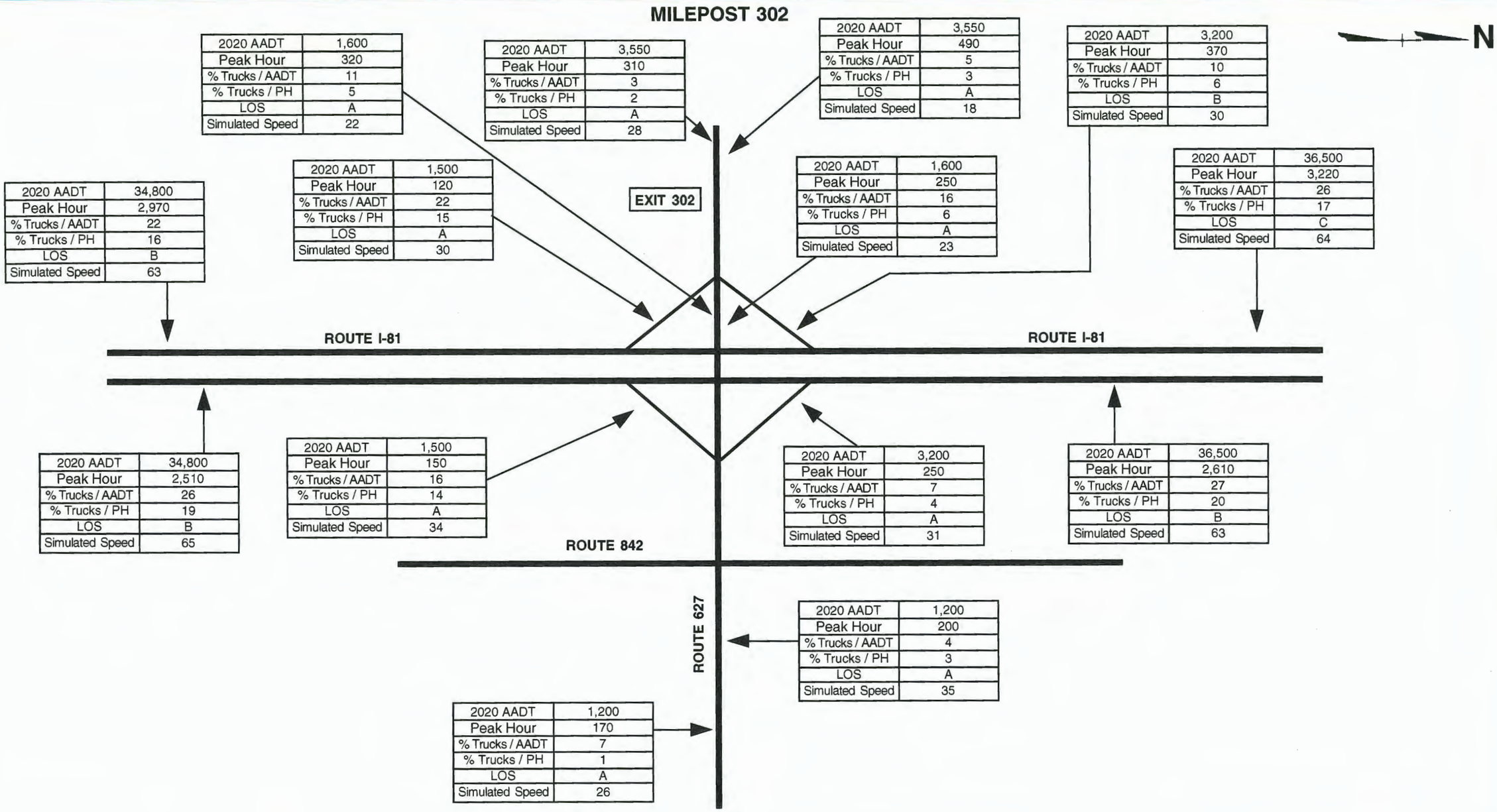

INTERSECTION OF:

I-81 Ramps at Route 627 (Exit 302)
FUTURE YEAR 2020 BUILD - TRAFFIC DATA

Date: November 1998

Figure: F-2.41

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

Shenandoah, Warren, and Frederick Counties

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I-81 Mainline Traffic Summary

Location		Base Year 1997									Future Year 2010 • No Build						Future Year 2020																				
		% Trucks (Daily)		% Trucks (Peak Hr.)		AADT Vol.	Peak Hr. Volume		Peak Hr. CORSIM LOS		Proj. ADT	DHV		% Trucks DHV	Design Hour LOS No Build		Proj. ADT	DHV		% Trucks DHV	Design Hour LOS															
																					No Build		CORSIM w/o Ln Restr 3 Lanes		CORSIM w/ Ln Restr 3 Lanes											
																									NB Lanes					SB Lanes						
From	To	NB	SB	NB	SB		NB	SB	NB	SB		NB	SB		NB	SB		NB	SB		NB	SB	NB	SB	1	2	3	4	avg	1	2	3	4	avg		
MP 264	Int. 264 Off Ramp	27	29	17	22	38,360	1,440	1,270	B	B	61,360	2,300	2,030	22	C	C	76,720	2,880	2,540	22	D	D	C	B	C	C	B		C	B	C	A		B		
Int. 264 On Ramp	Int. 269 Off Ramp	28	28	19	17	37,000	1,330	1,210	B	B	59,820	2,180	2,000	19	C	C	74,800	2,730	2,500	19	E	D	C	B	C	C	B		C	B	C	A		B		
Int. 269 On Ramp	Int. 273 Off Ramp	28	29	17	18	36,200	1,300	1,160	B	B	58,860	2,140	1,950	18	C	C	73,600	2,680	2,440	18	D	D	B	B	B	C	B		B	B	C	B		B		
Int. 273 On Ramp	Int. 277 Off Ramp	27	28	19	17	37,500	1,320	1,210	B	B	60,460	2,160	2,050	19	C	C	75,600	2,710	2,570	19	D	C	B	B	C	C	C		C	B	C	B		B		
Int. 277 On Ramp	Int. 279 Off Ramp	27	28	18	17	37,100	1,300	1,200	B	B	59,980	2,140	2,030	18	C	C	75,800	2,710	2,590	18	D	D	B	B	C	C	C		C	C	C	B		B		
Int. 279 On Ramp	Int. 283 Off Ramp	26	29	16	19	36,900	1,270	1,180	B	B	59,740	2,100	2,030	19	C	C	74,700	2,630	2,550	19	D	C	B	B	C	C	B		B	C	C	C		C		
Int. 283 On Ramp	Int. 291 Off Ramp	27	29	17	17	37,500	1,280	1,190	B	B	61,460	2,150	2,150	17	C	F	76,900	2,690	2,700	17	D	F	B	B	C	C	A		B	C	C	B		B		
Int. 291 On Ramp	Int. 296 Off Ramp	26	22	16	17	39,200	1,310	1,280	B	B	63,700	2,190	2,330	17	C	D	79,700	2,740	2,920	17	D	F	B	C	C	C	C		C	C	C	B		C		
Int. 296 On Ramp	Int. 298 Off Ramp	25	29	17	17	39,700	1,290	1,350	B	B	64,340	2,170	2,440	17	C	D	80,500	2,710	3,050	17	D	F	B	C	B	C	A		B	C	C	C		C		
Int. 298 On Ramp	Int. 300 Off Ramp	25	29	17	17	43,100	1,420	1,520	B	B	68,740	2,350	2,750	17	D	D	86,000	2,930	3,440	17	F	F	B	C	C	C	C	A	B	B	D	D	B	C		
Int. 300 On Ramp	Int. 302 Off Ramp	26	22	19	16	34,100	1,150	1,200	B	B	55,620	2,010	2,370	19	C	C	69,600	2,510	2,970	19	E	F	B	B	C	B	A		B	B	C	B		B		
Int. 302 On Ramp	MP 305	27	26	20	17	36,200	1,240	1,310	B	B	58,340	2,100	2,570	20	C	C	73,000	2,610	3,220	20	E	F	B	C	C	B	A		B	C	C	B		C		

Virginia Department of Transportation

I-81 Mainline Traffic Summary

Date: November 1998

Figure: F-2.42

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

Shenandoah, Warren, and Frederick Counties

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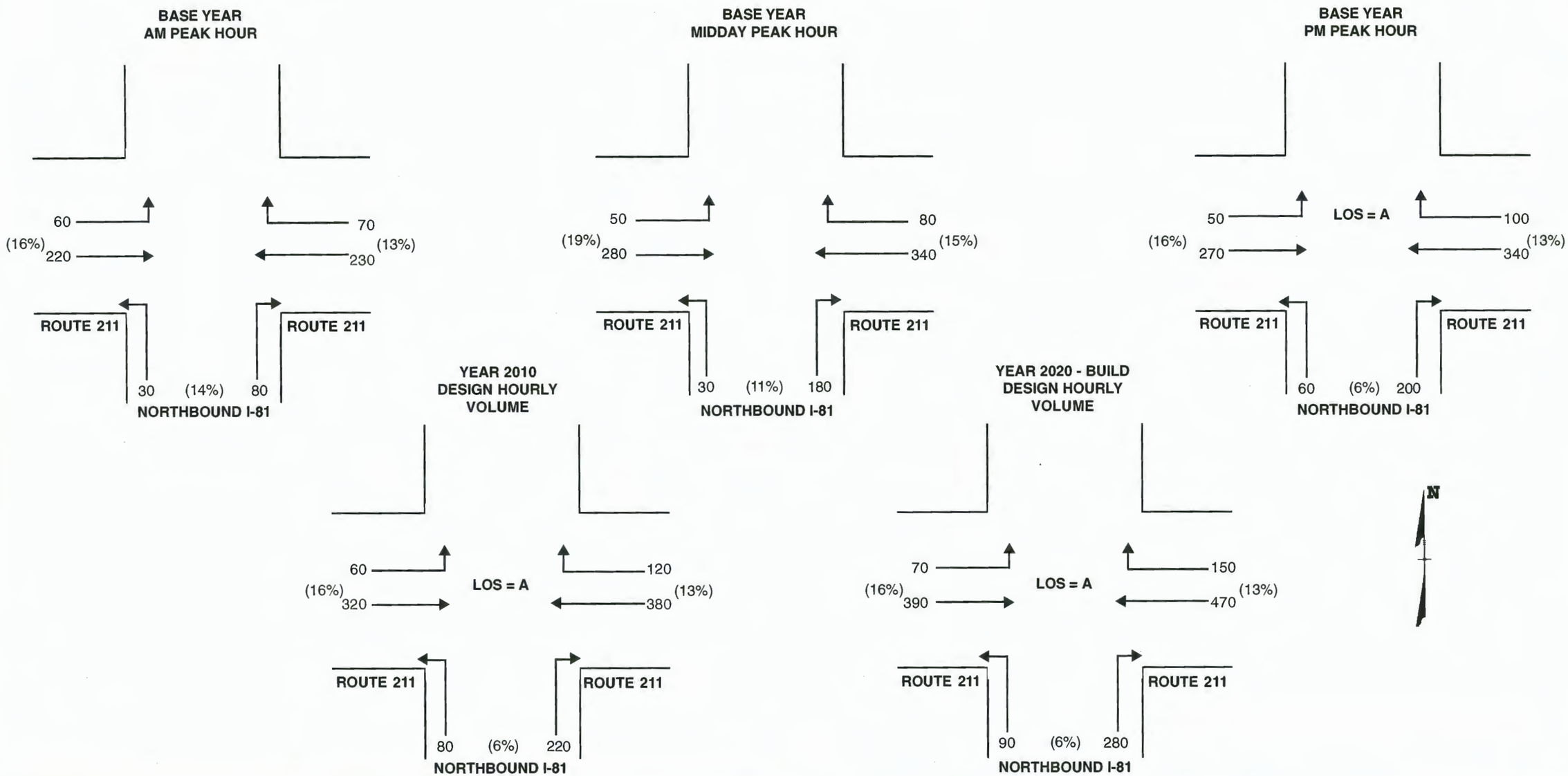
TURNING MOVEMENT SUMMARY

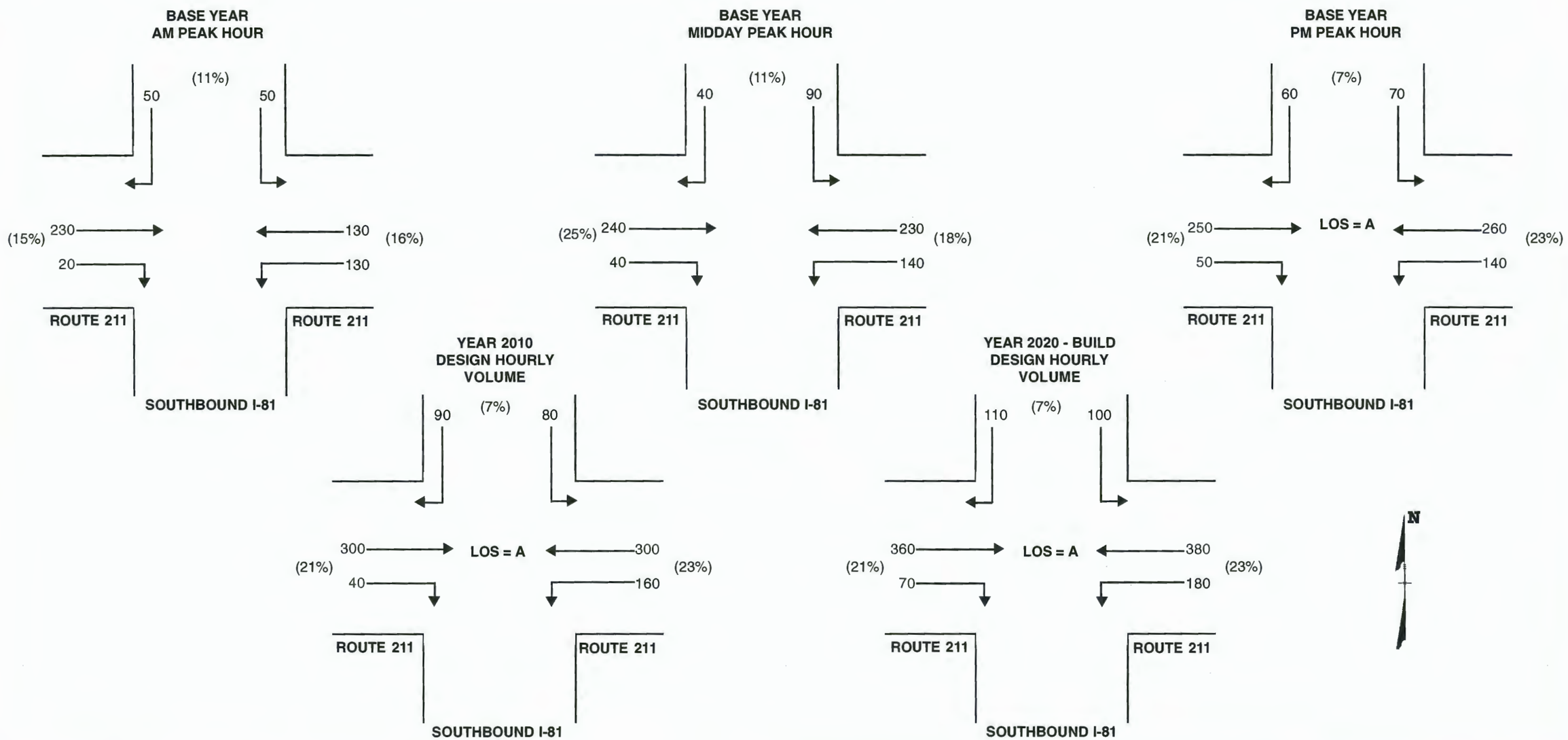
MILEPOST: 264



Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	INTERSECTION OF: **Northbound I-81 Off Ramp and Route 211 (Exit 264)**	Date: November 1998 Figure: F-2.43	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. 48

TURNING MOVEMENT SUMMARY

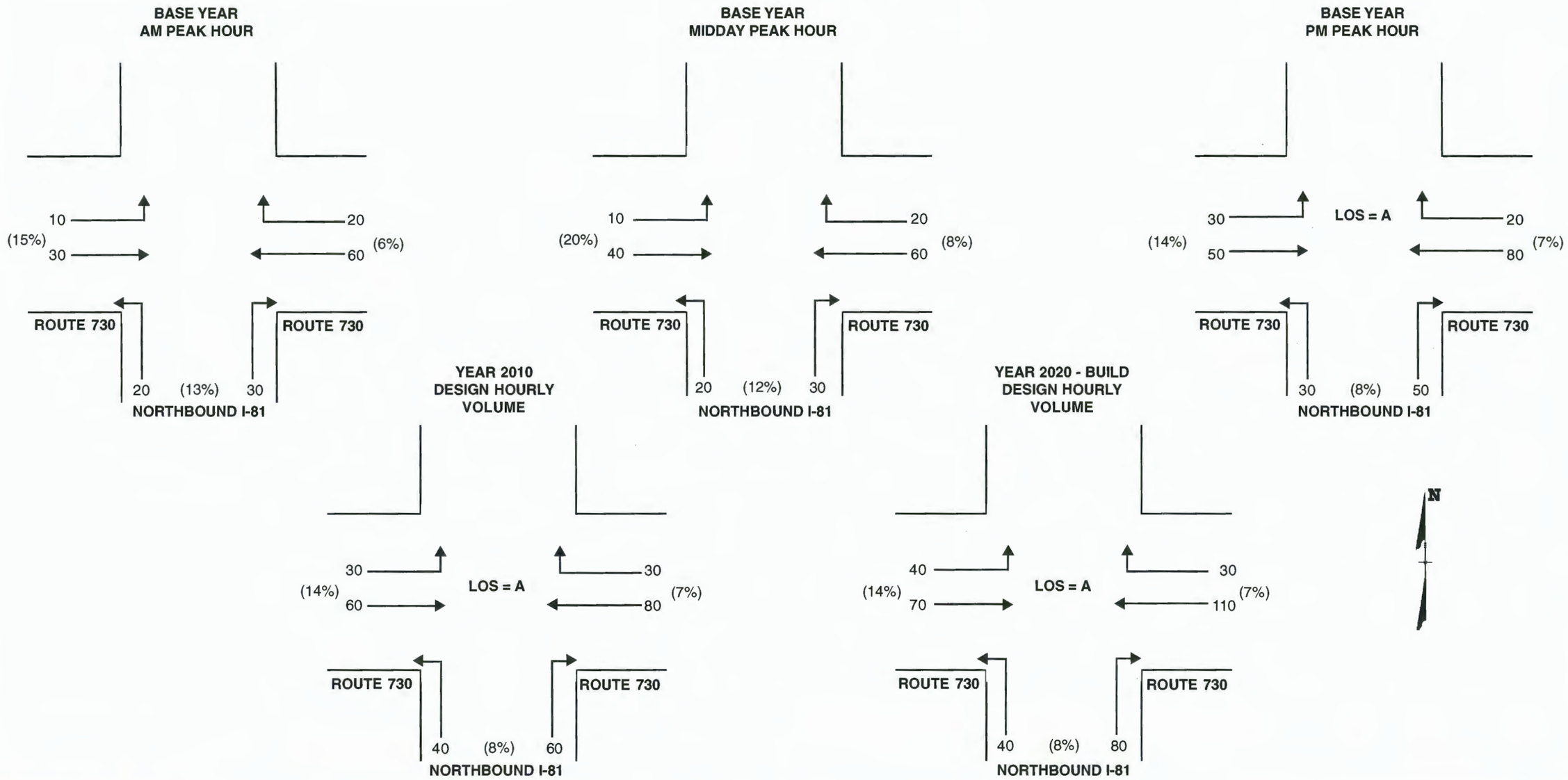
MILEPOST: 264



Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	INTERSECTION OF: **Southbound I-81 Off Ramp and Route 211 (Exit 264)**	Date: November 1998 Figure: F-2.44	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. 49

TURNING MOVEMENT SUMMARY

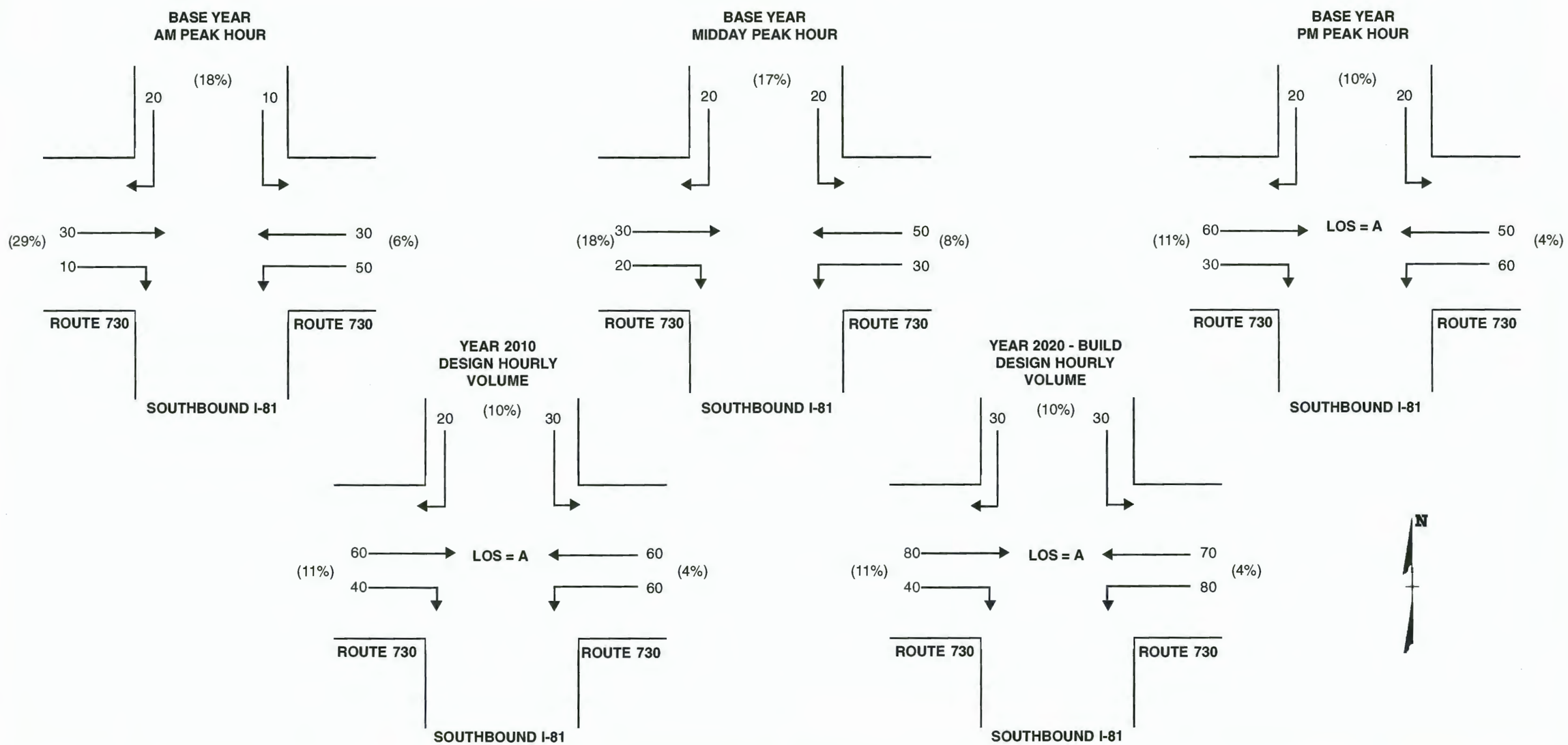
MILEPOST: 269



Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	INTERSECTION OF: **Northbound I-81 Off Ramp and Route 730 (Exit 269)**	Date: November 1998 Figure: F-2.45	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. 50

TURNING MOVEMENT SUMMARY

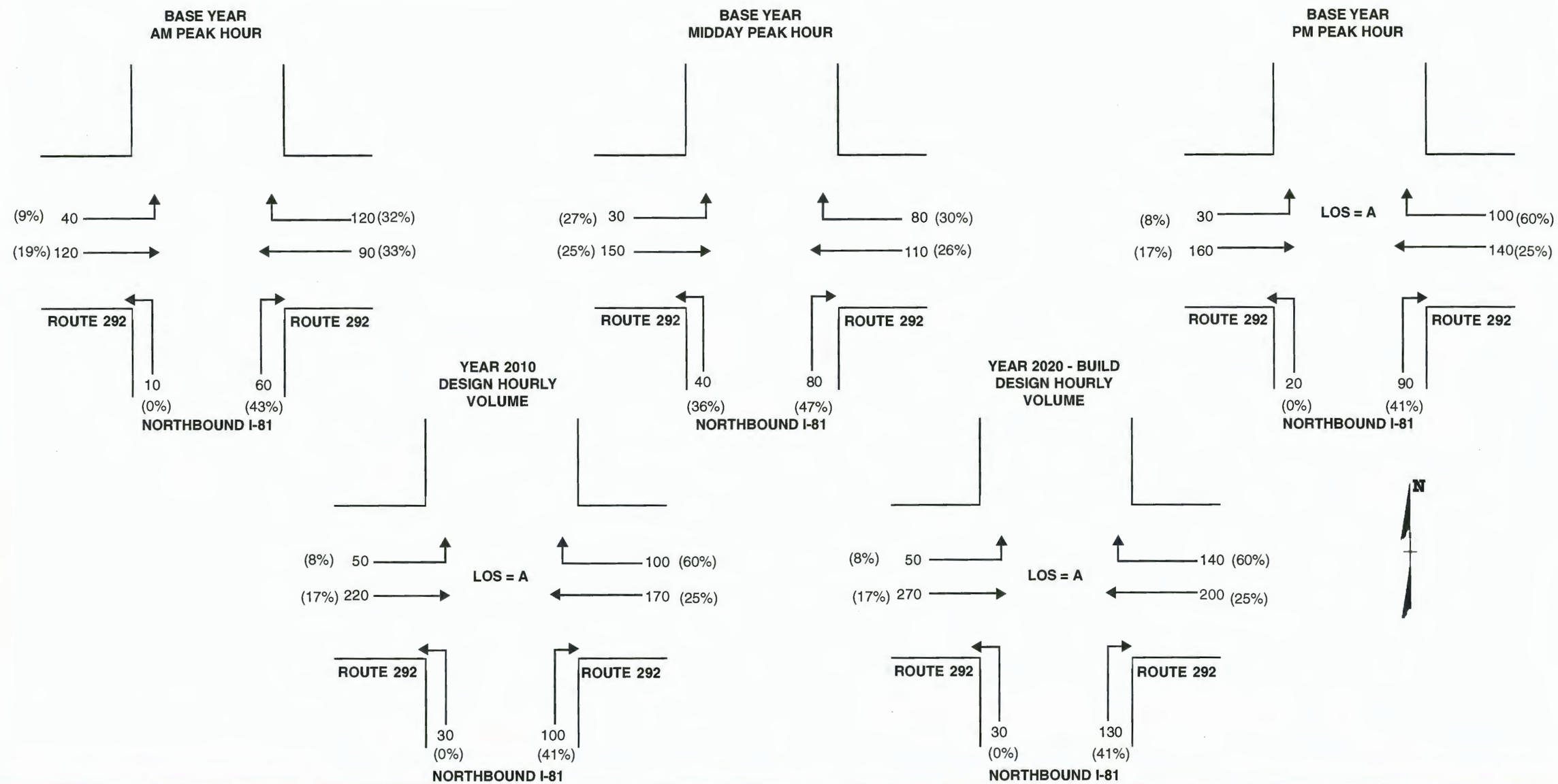
MILEPOST: 269



Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	INTERSECTION OF: **Southbound I-81 Off Ramp and Route 730 (Exit 269)**	Date: November 1998 Figure: F-2.46	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. 51

TURNING MOVEMENT SUMMARY

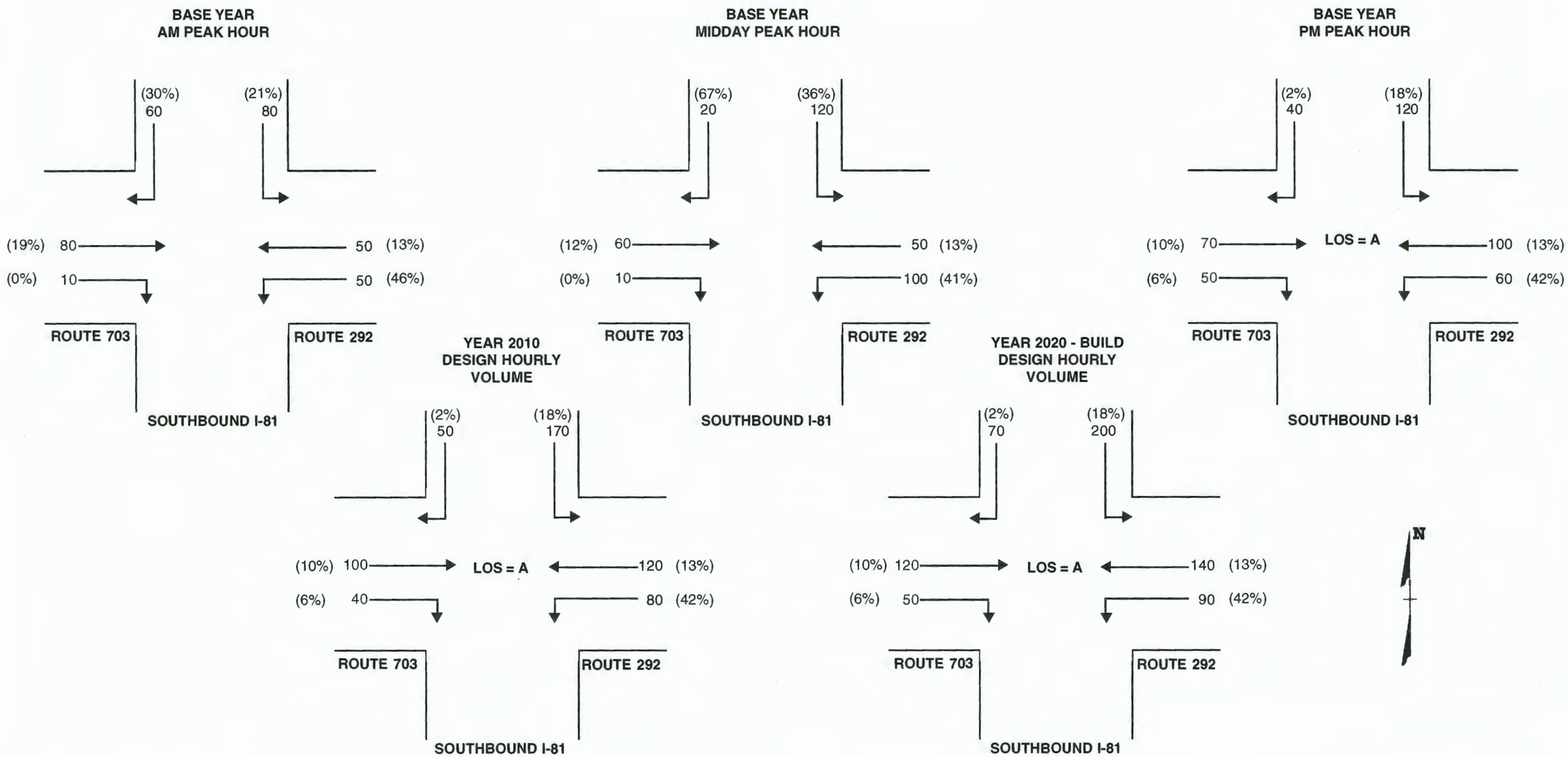
MILEPOST: 273



Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	INTERSECTION OF: **Northbound I-81 Off Ramp and Routes 703 & 292 (Exit 273)**	Date: November 1998 Figure: F-2.47	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. 52

TURNING MOVEMENT SUMMARY

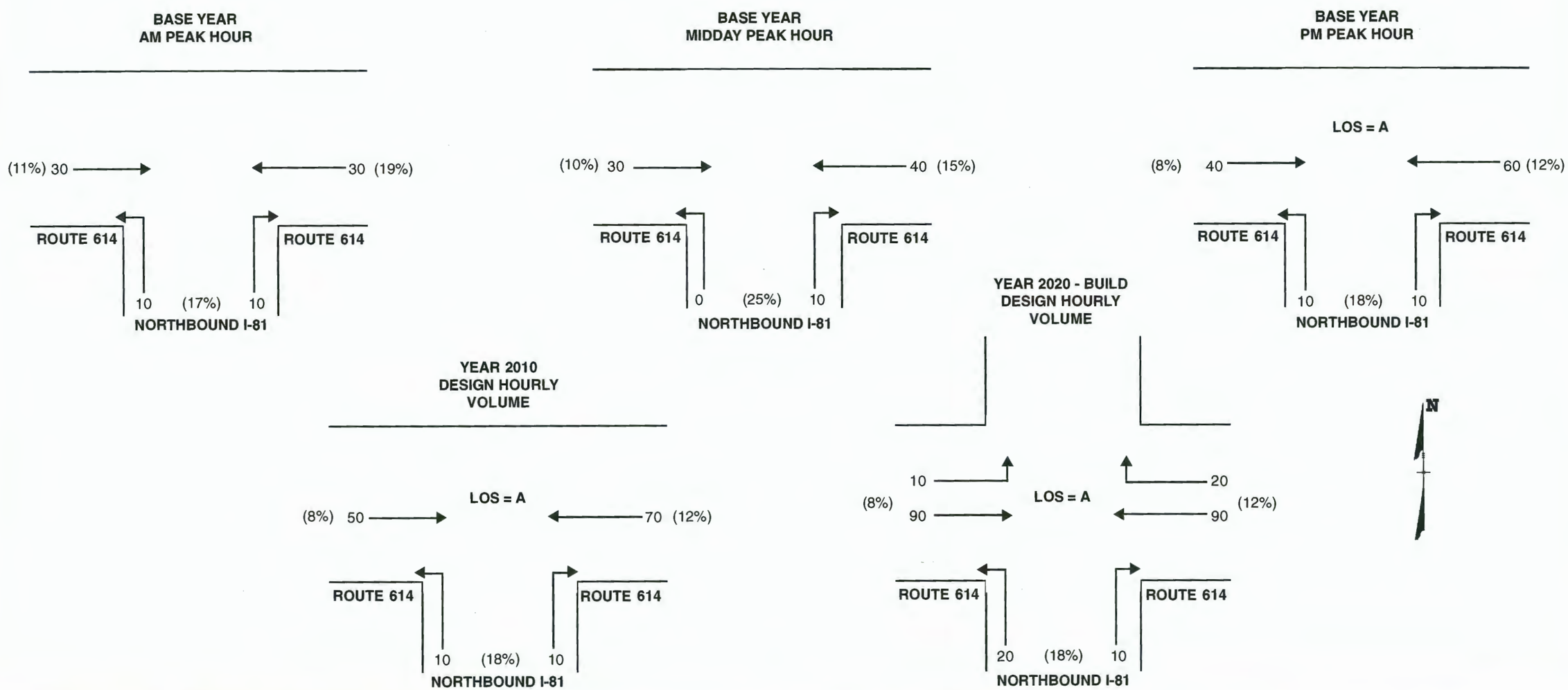
MILEPOST: 273



Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	INTERSECTION OF: **Southbound I-81 Off Ramp and Routes 703 & 292 (Exit 273)**	Date: November 1998 Figure: A-2.48	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. 53

TURNING MOVEMENT SUMMARY

MILEPOST: 277



Legend

000 Peak Hour Volumes
(00%) Percent of Trucks
LOS Level of Service

INTERSECTION OF:

Northbound I-81 Off Ramp and Route 614 (Exit 277)

Date: November 1998

Figure: F-2.49

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

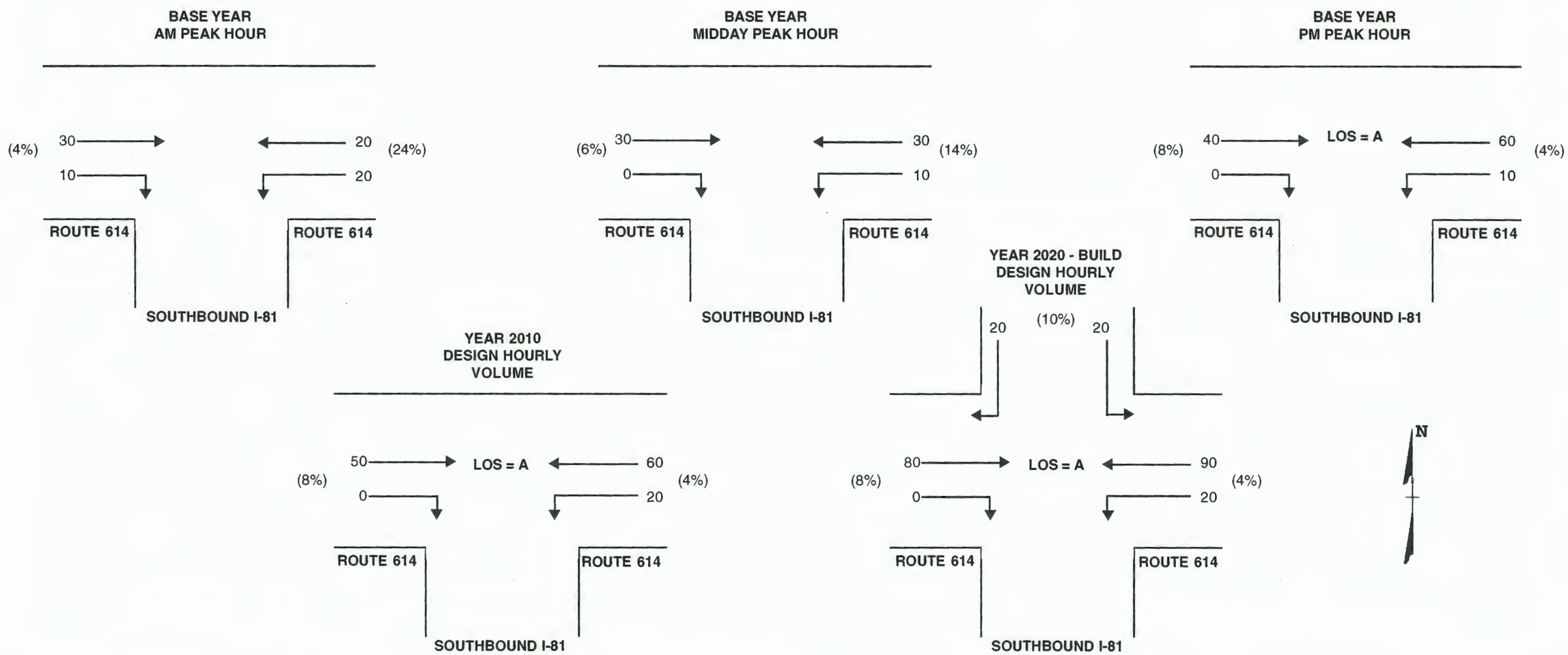
Shenandoah, Warren, and Frederick Counties

Sheet No.

54

TURNING MOVEMENT SUMMARY

MILEPOST: 277



Virginia Department of Transportation

Legend

000 Peak Hour Volumes
(00%) Percent of Trucks
LOS Level of Service

INTERSECTION OF:

Southbound I-81 Off Ramp and Route 614 (Exit 277)

Date: November 1998

Figure: F-2.50

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

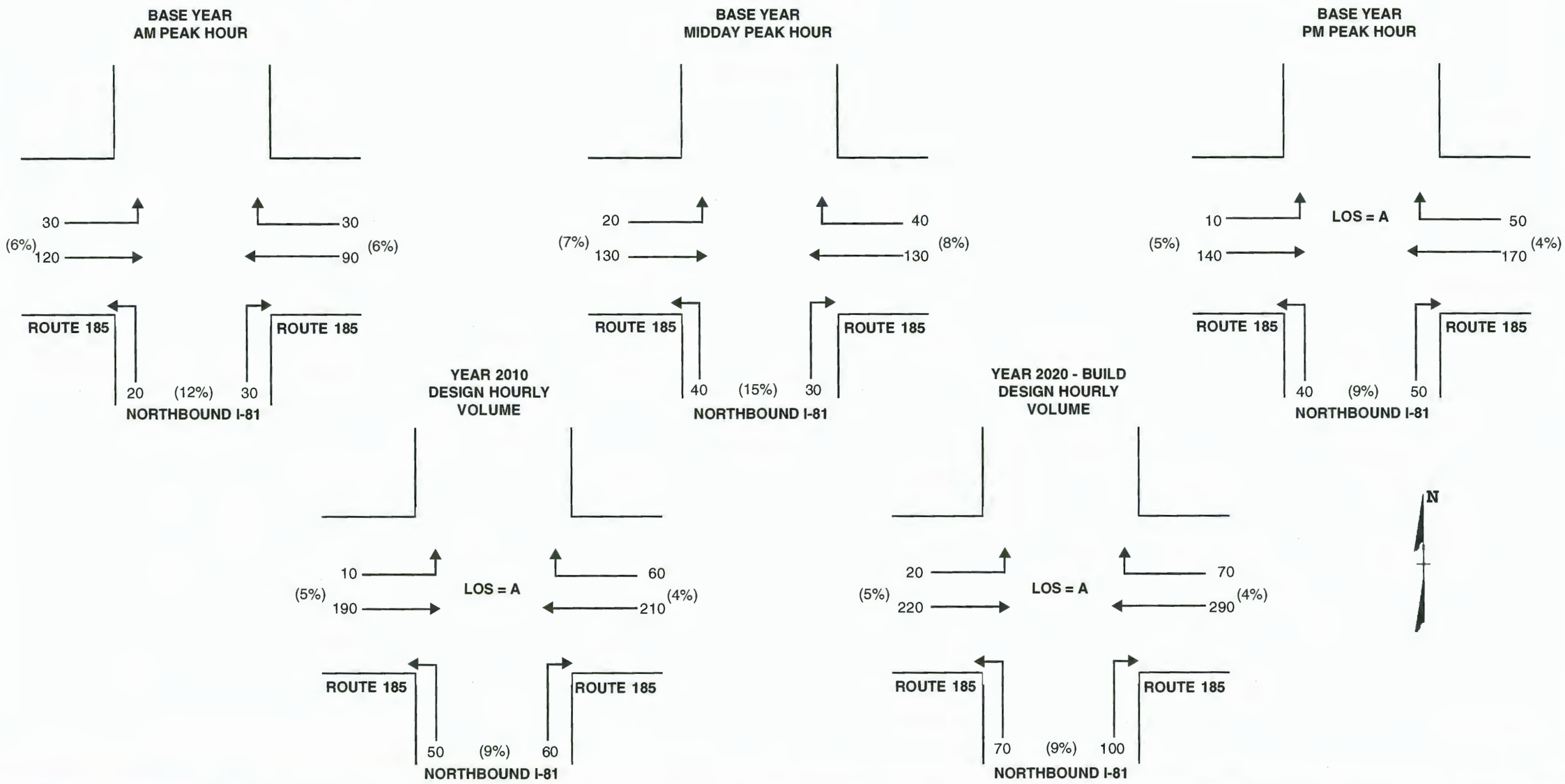
Shenandoah, Warren, and Frederick Counties

Sheet No.

55

TURNING MOVEMENT SUMMARY

MILEPOST: 279



Virginia Department of Transportation

Legend

000 Peak Hour Volumes
(00%) Percent of Trucks
LOS Level of Service

INTERSECTION OF:

Northbound I-81 Off Ramp and Route 185 (Exit 279)

Date: November 1998

Figure: F-2.51

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

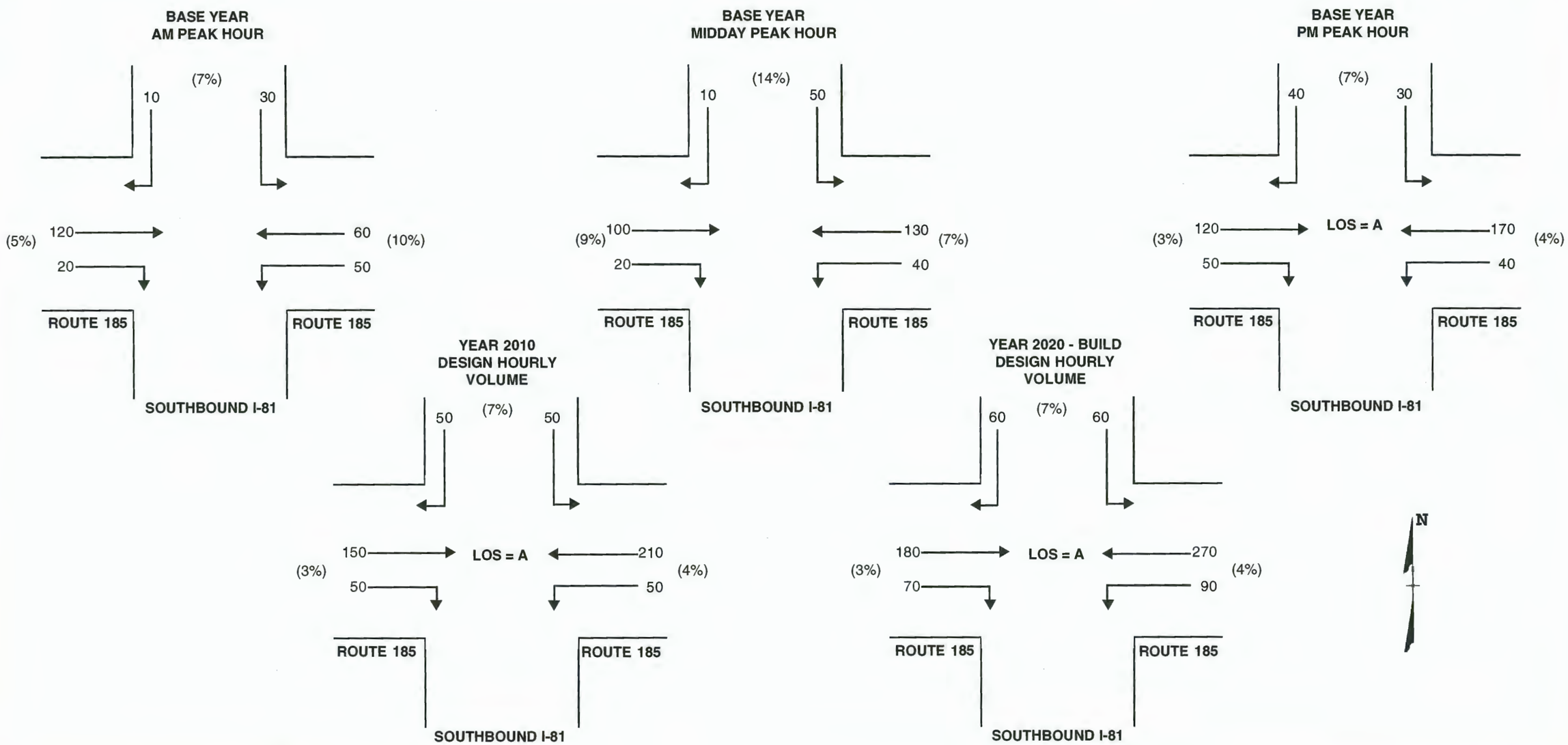
Shenandoah, Warren, and Frederick Counties

Sheet No.

56

TURNING MOVEMENT SUMMARY

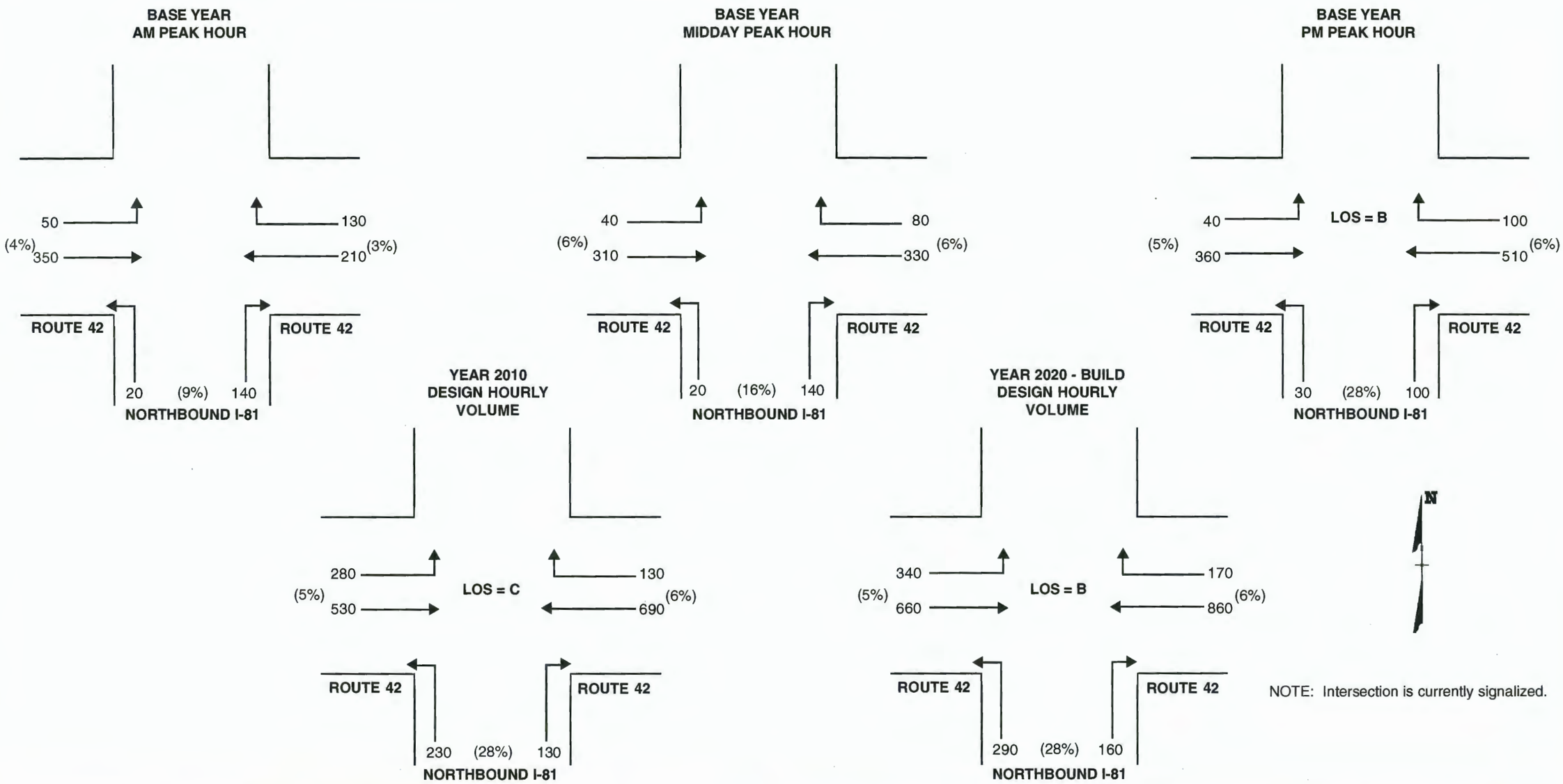
MILEPOST: 279



Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	INTERSECTION OF: **Southbound I-81 Off Ramp and Route 185 (Exit 279)**	Date: November 1998 Figure: F-2.52	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. *57*

TURNING MOVEMENT SUMMARY

MILEPOST: 283

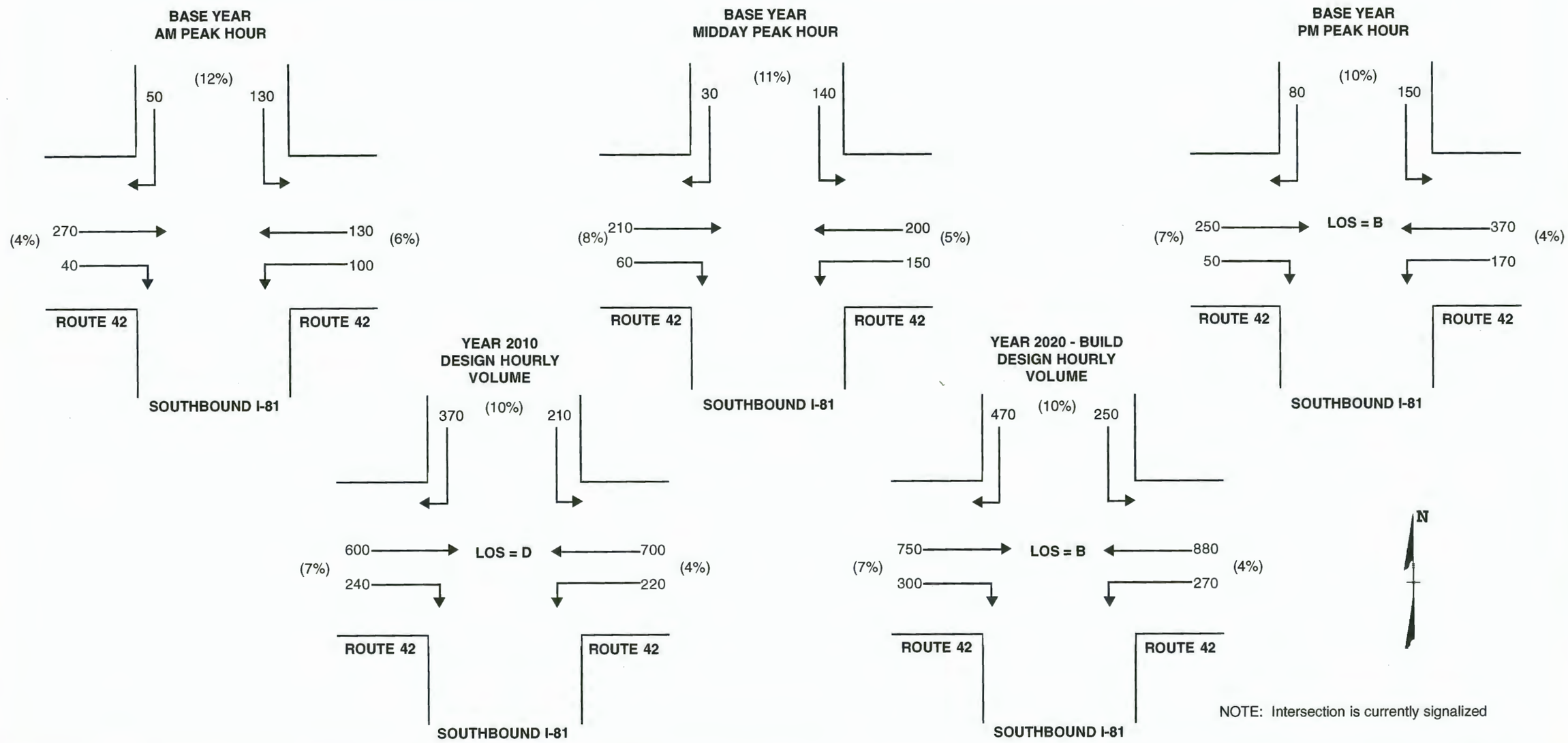


NOTE: Intersection is currently signalized.

Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	INTERSECTION OF: **Northbound I-81 Off Ramp and Route 42 (Exit 283)**	Date: November 1998 Figure: F-2.53	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. 58

TURNING MOVEMENT SUMMARY

MILEPOST: 283

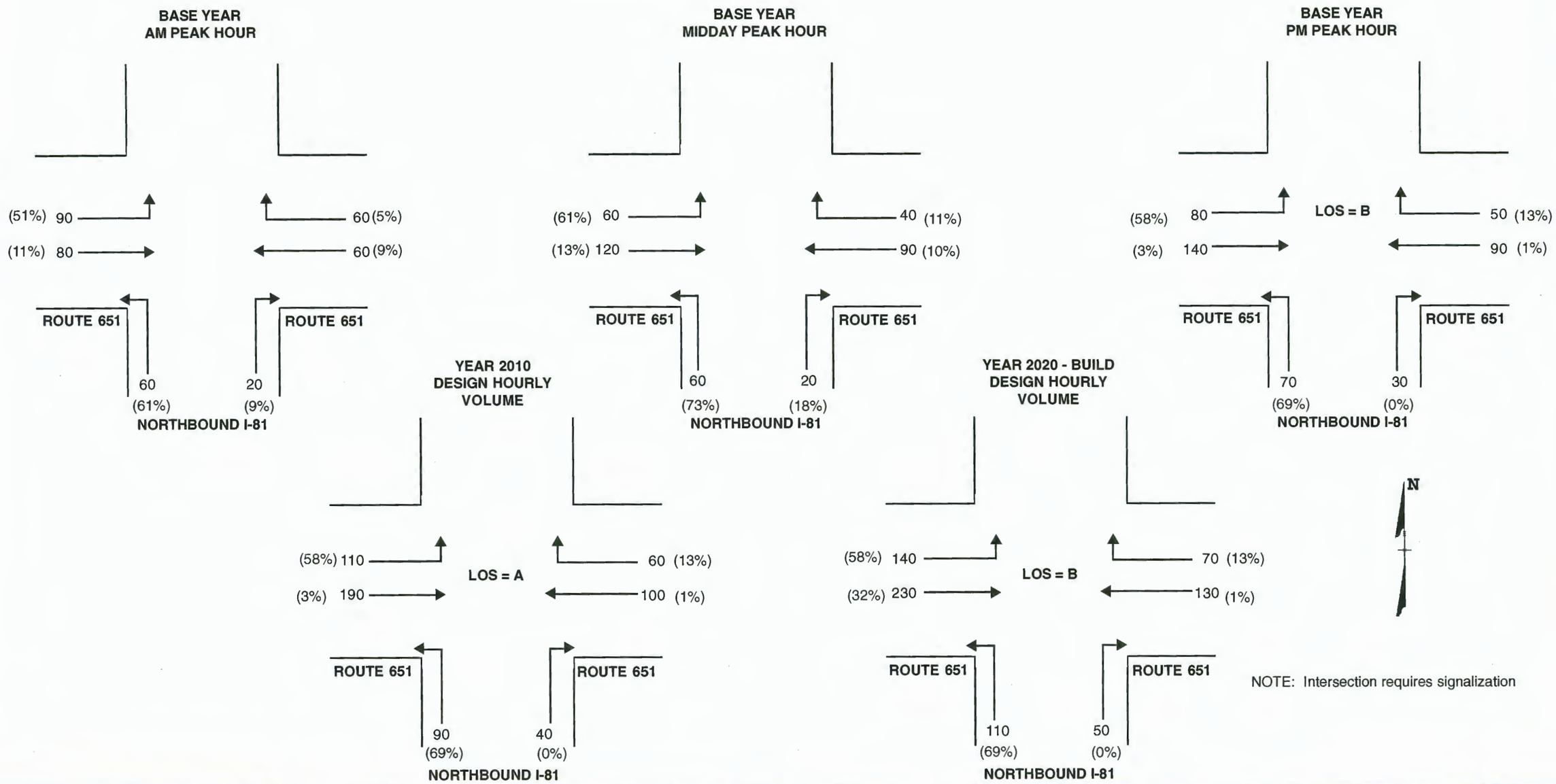


NOTE: Intersection is currently signalized

Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	**INTERSECTION OF:** **Southbound I-81 Off Ramp and Route 42 (Exit 283)**	Date: November 1998 Figure: F-2.54	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. 59

TURNING MOVEMENT SUMMARY

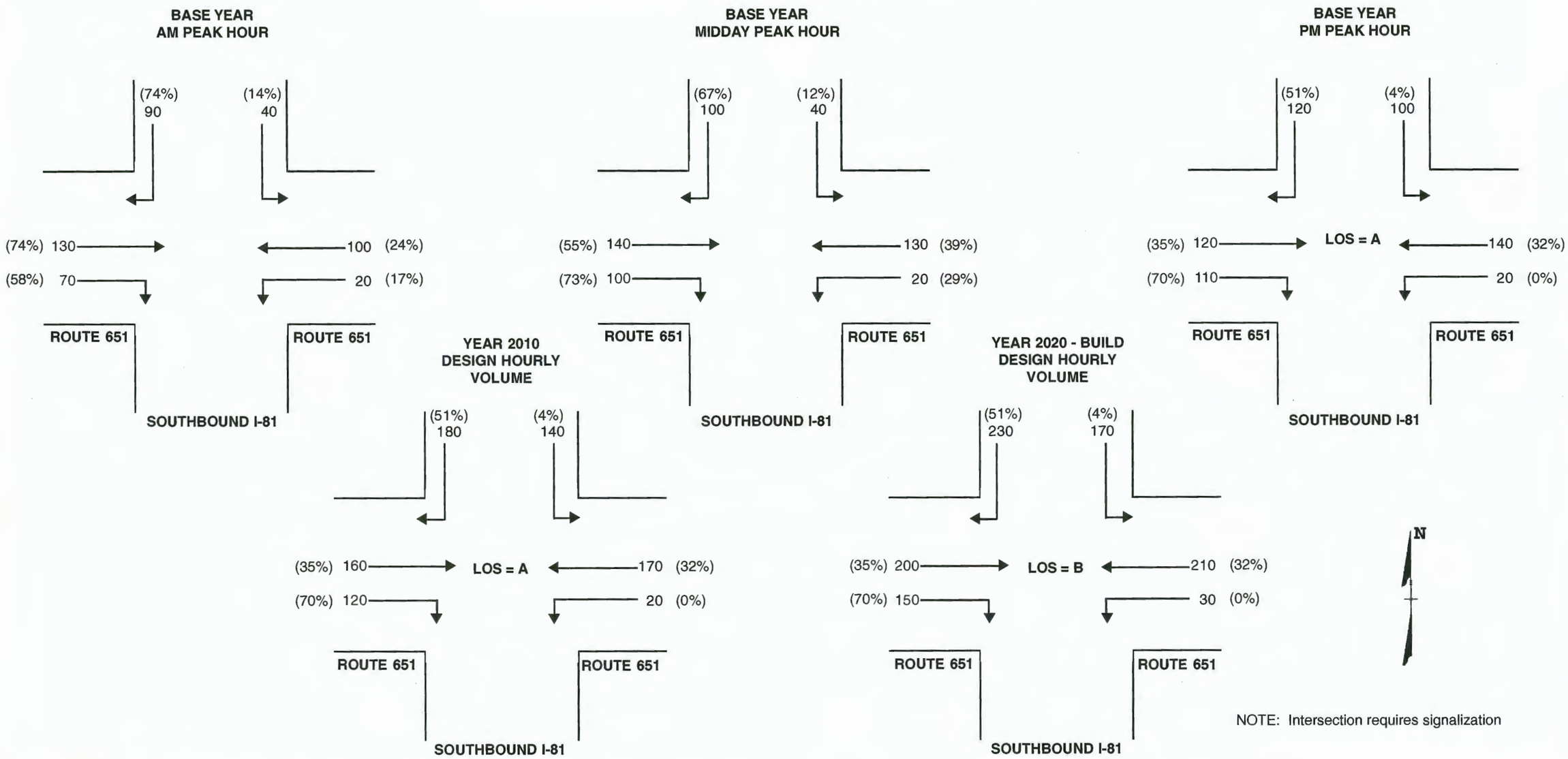
MILEPOST: 291



Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	**INTERSECTION OF:** **Northbound I-81 Off Ramp and Route 651 (Exit 291)**	Date: November 1998 Figure: F-2.55	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. *60*

TURNING MOVEMENT SUMMARY

MILEPOST: 291

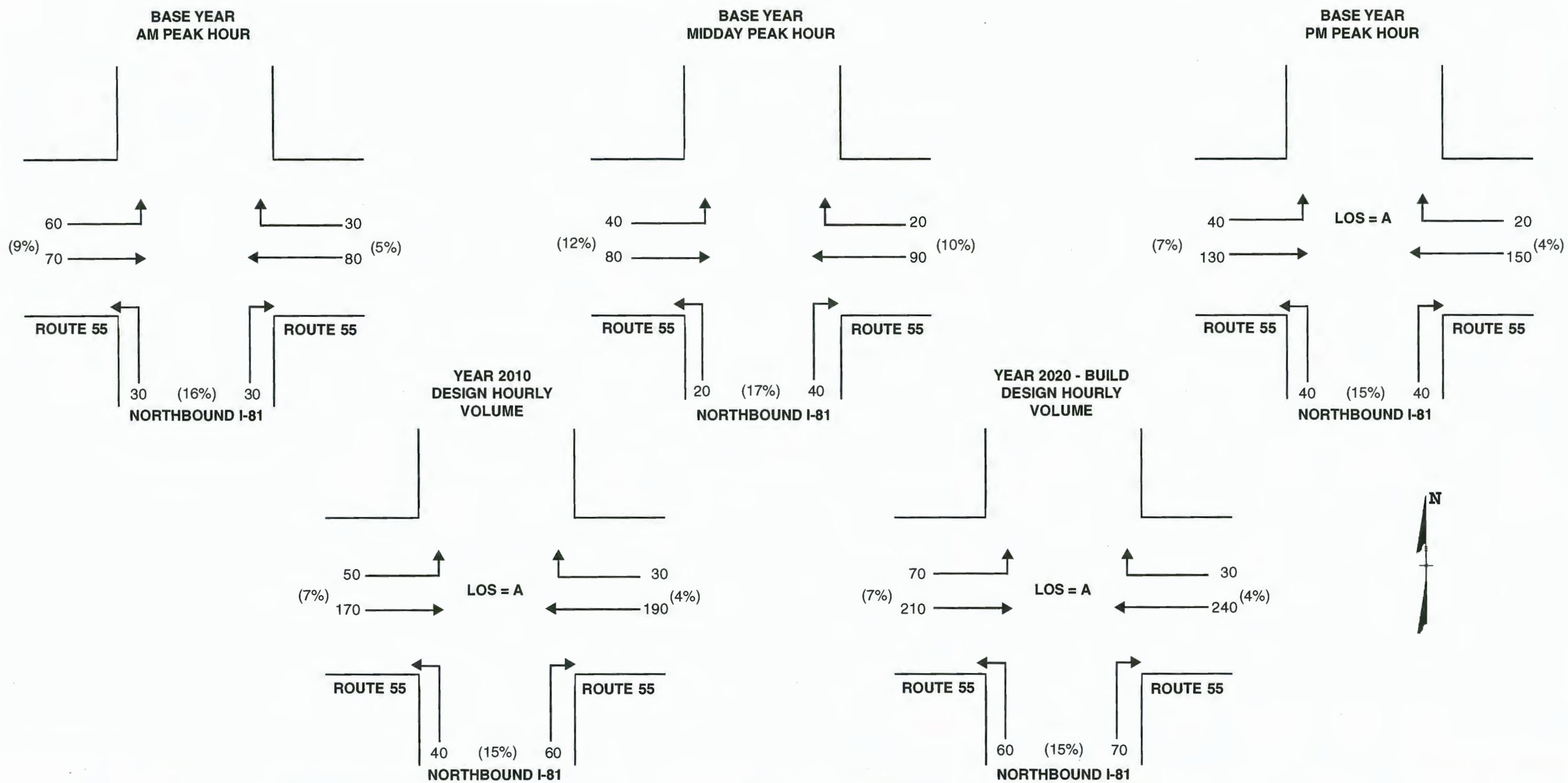


NOTE: Intersection requires signalization

Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	INTERSECTION OF: **Southbound I-81 Off Ramp and Route 651 (Exit 291)**	Date: November 1998 Figure: F-2.56	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. *61*

TURNING MOVEMENT SUMMARY

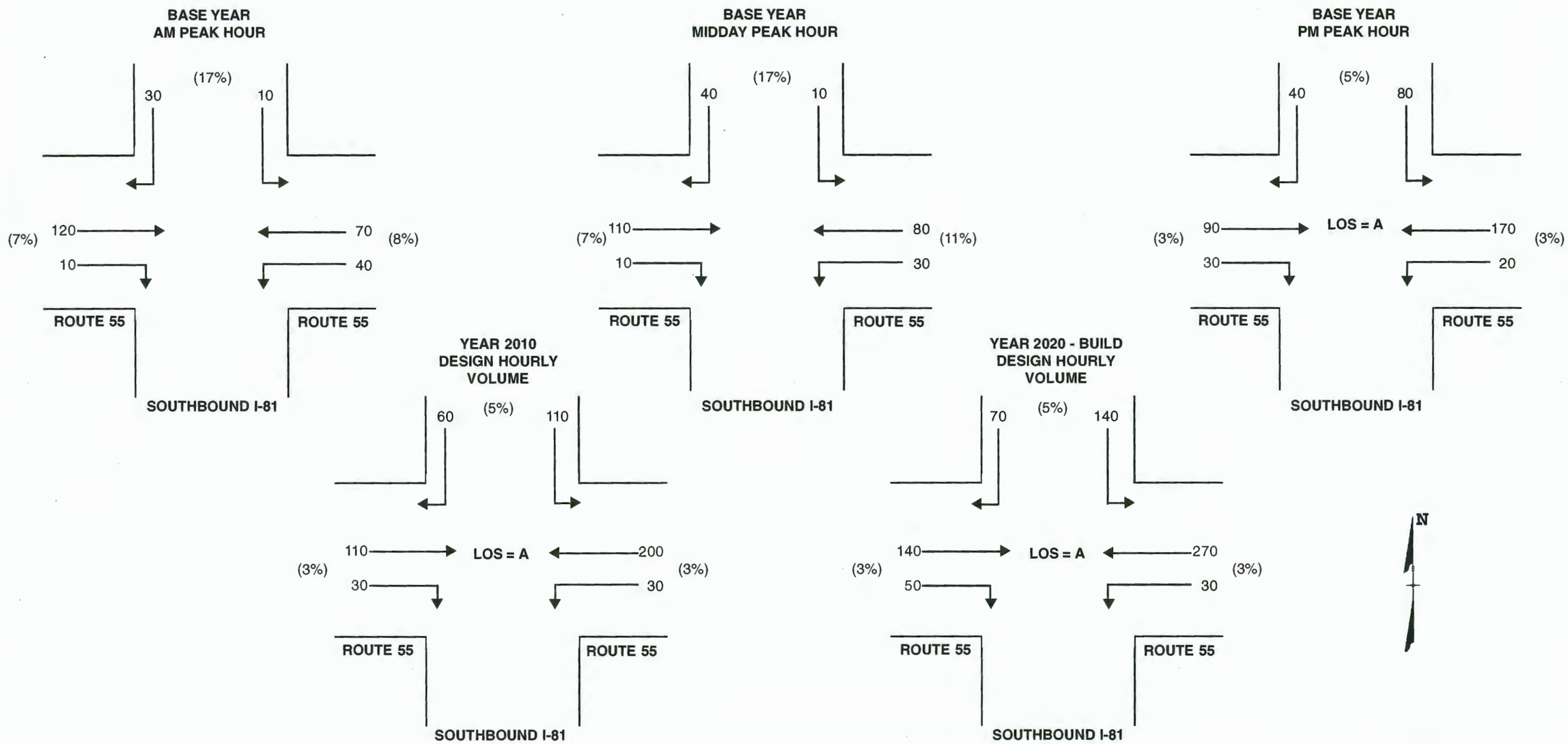
MILEPOST: 296



Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	INTERSECTION OF: **Northbound I-81 Off Ramp and Route 55 (Exit 296)**	Date: November 1998 Figure: F-2.57	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. 62

TURNING MOVEMENT SUMMARY

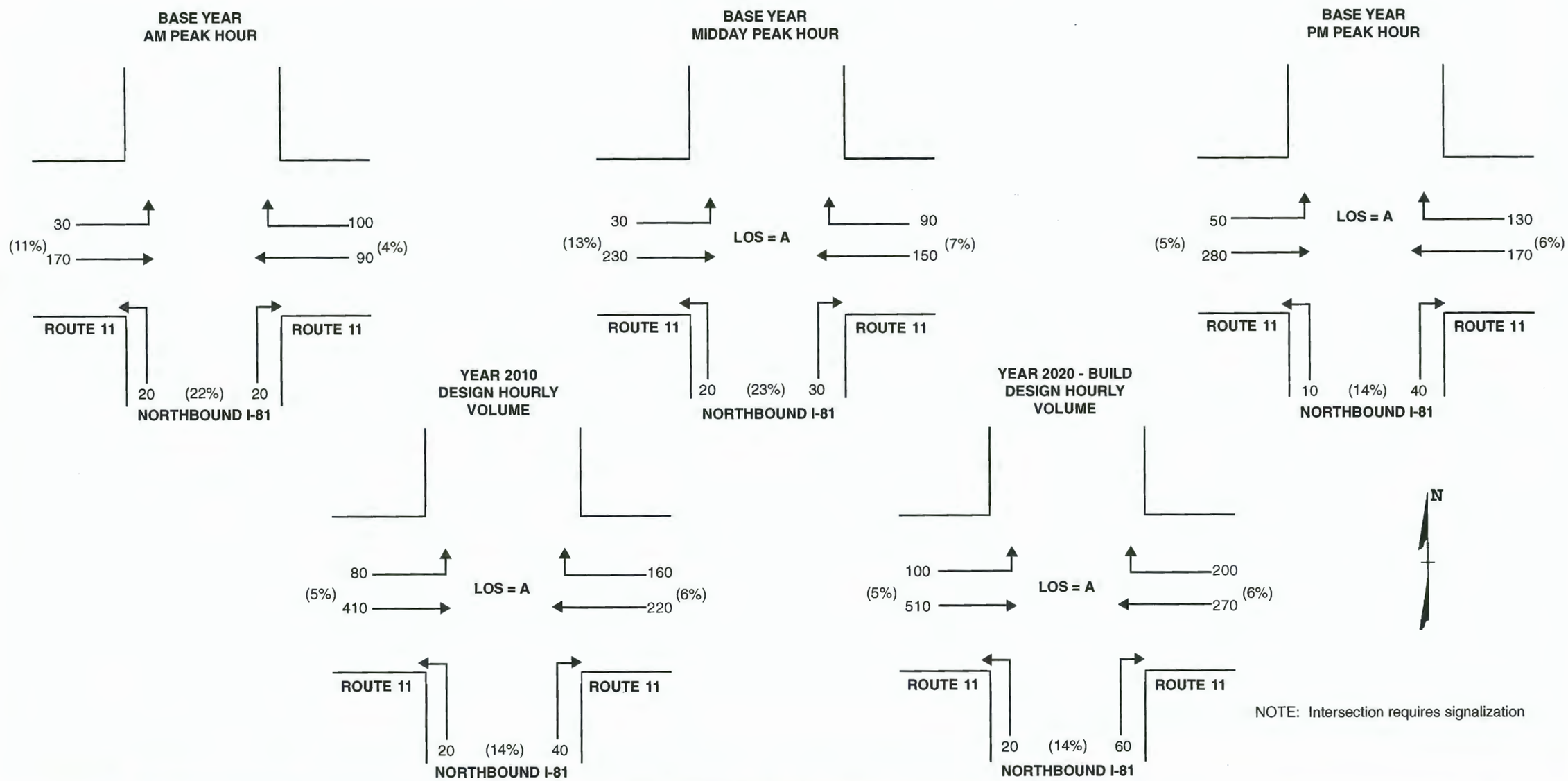
MILEPOST: 296



Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	INTERSECTION OF: **Southbound I-81 Off Ramp and Route 55 (Exit 296)**	Date: November 1998 Figure: F-2.58	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. *63*

TURNING MOVEMENT SUMMARY

MILEPOST: 298



NOTE: Intersection requires signalization

Virginia Department of Transportation

Legend

000 Peak Hour Volumes
(00%) Percent of Trucks
LOS Level of Service

INTERSECTION OF:

Northbound I-81 Off Ramp and Route 11 (Exit 298)

Date: November 1998

Figure: F-2.59

Interstate 81
Improvement Study

Project Number: 0081-968-113, PE-101

Shenandoah, Warren, and Frederick Counties

Sheet No.

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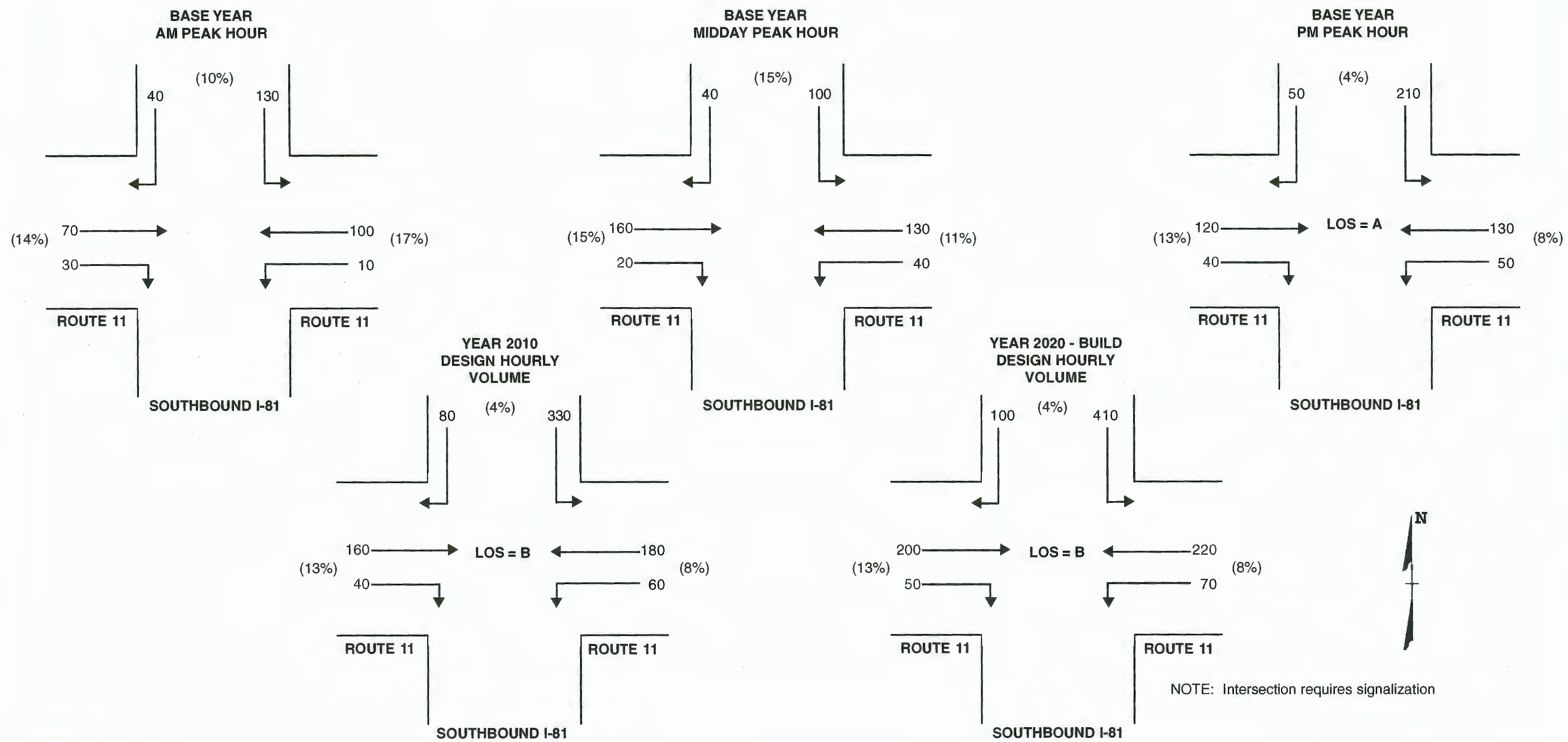
TURNING MOVEMENT SUMMARY

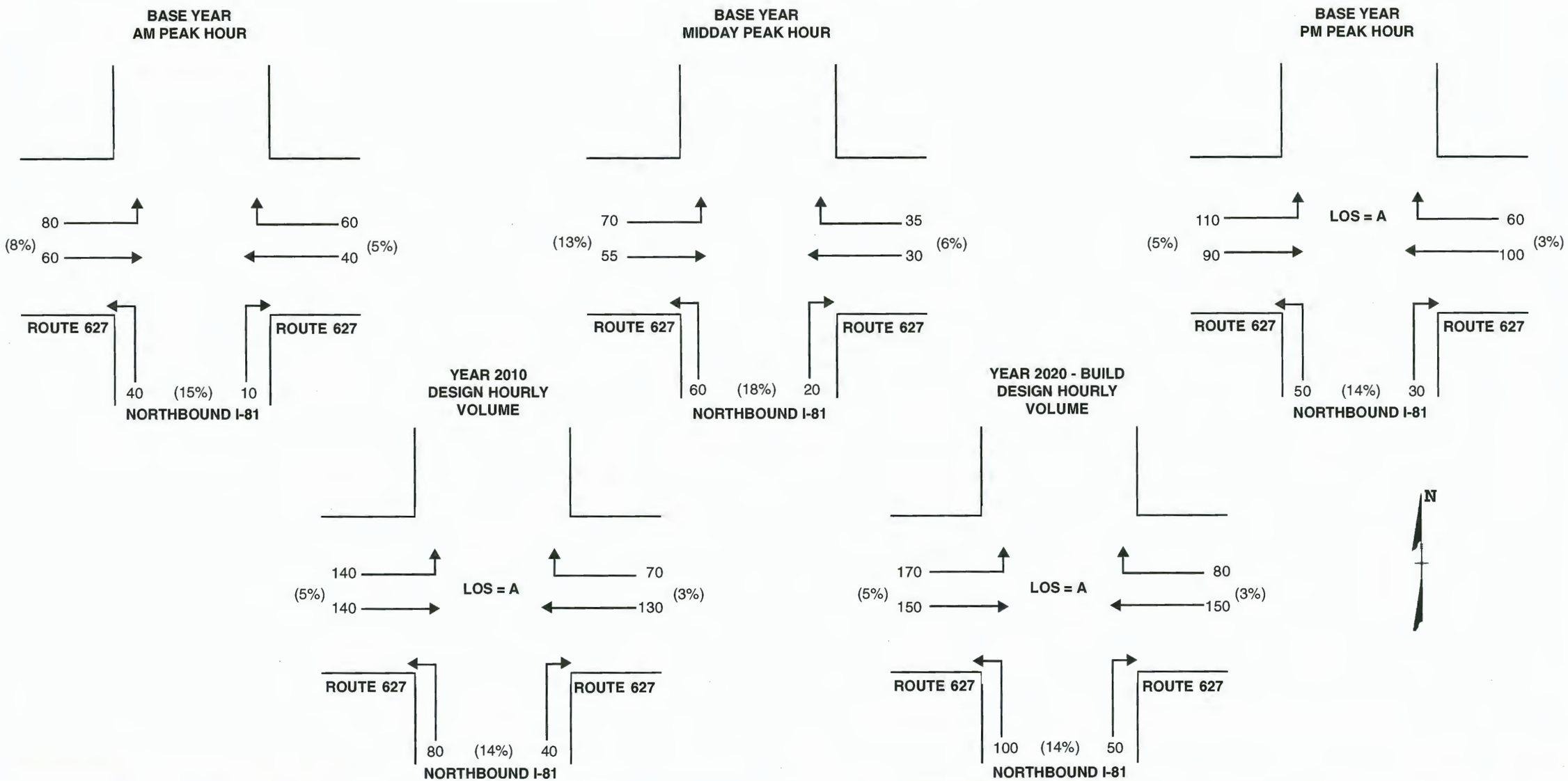
MILEPOST: 298



Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	INTERSECTION OF: **Southbound I-81 Off Ramp and Route 11 (Exit 298)**	Date: November 1998 Figure: F-2.60	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. *65*

TURNING MOVEMENT SUMMARY

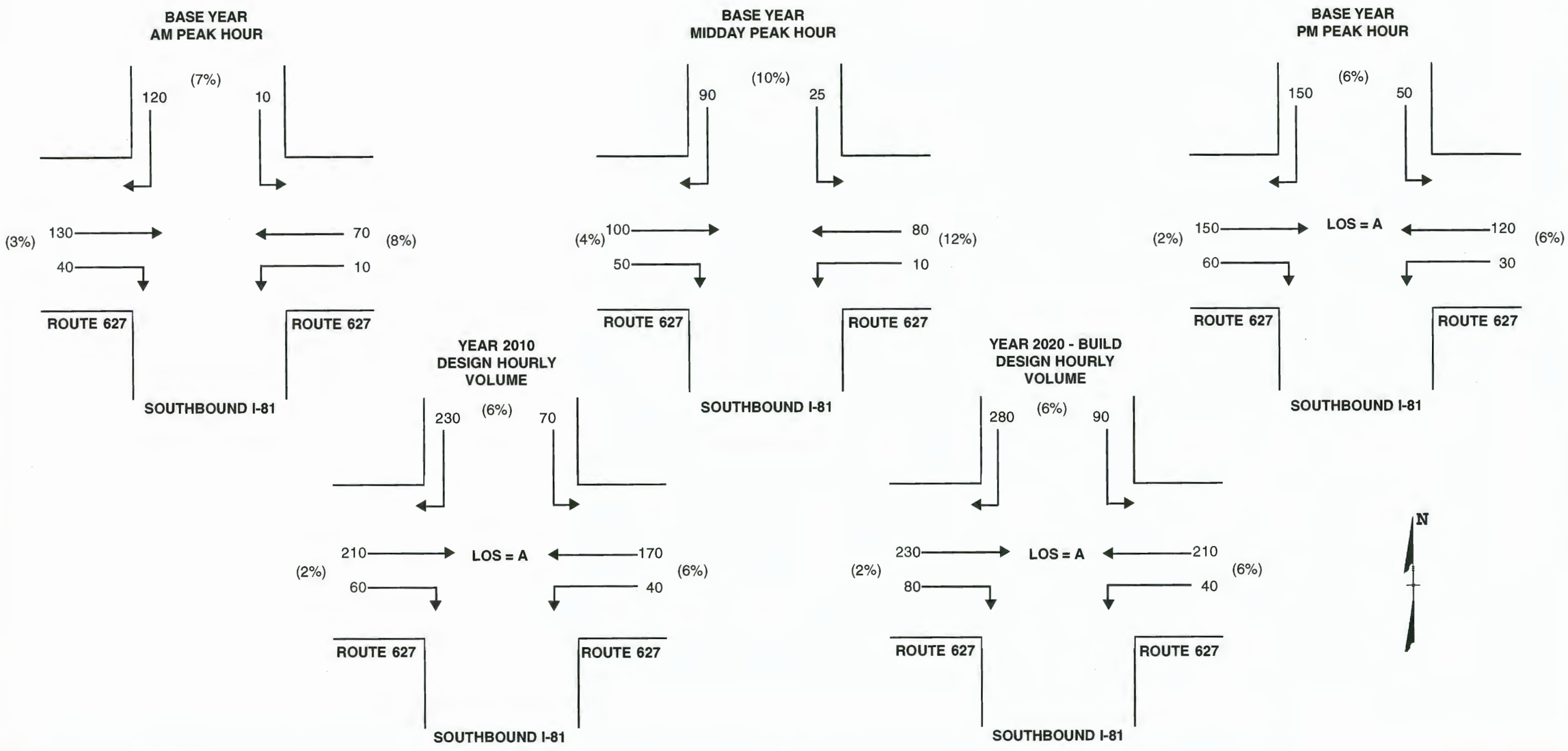
MILEPOST: 302



Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	INTERSECTION OF: **Northbound I-81 Off Ramp and Route 627 (Exit 302)**	Date: November 1998 Figure: F-2.61	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. *66*

TURNING MOVEMENT SUMMARY

MILEPOST: 302



Virginia Department of Transportation	Legend 000 Peak Hour Volumes (00%) Percent of Trucks LOS Level of Service	INTERSECTION OF: **Southbound I-81 Off Ramp and Route 627 (Exit 302)**	Date: November 1998 Figure: A-2.62	Interstate 81 Improvement Study Project Number: 0081-968-113, PE-101 Shenandoah, Warren, and Frederick Counties	Sheet No. *67*

3.0 COST ESTIMATE

The cost estimates developed for this study are for planning and programming purposes only. During the development of final construction plans, a detailed cost estimate will be prepared. The roadway construction costs are based upon unit prices from bid tabulations for recent construction projects in the area.

The pavement costs have been estimated based on preliminary pavement designs from VDOT Materials Engineers. The recommendation of the Staunton District engineers was to replace the existing pavement and include full depth paved shoulders.

The earthwork quantities have been computed using IGrds software and assumed maximum 2:1 side slopes. No shrink/swell factors have been applied.

A cost of $1.2 million per mile has been applied to the construction costs for drainage, guardrail, and incidental items.

Right-of-way cost estimates have been developed based on average current appraised values of similar properties in the area. Total areas of take were compiled for each parcel which will potentially be affected by the proposed widening project.

Cost estimates for bridges have been developed as outlined in Section 6.4 on sheet 74.

4.0 TYPICAL SECTION

For clarity, the typical sections (Section 9, Sheets TS-1 through TS-7) show the position of the existing pavement relative to the various widening schemes. However, it is recommended that all existing pavement be replaced with a stronger full depth pavement structure that will withstand the existing and projected increased traffic volumes.

The proposed typical section provides a 6-lane divided interstate facility with a minimum median width of 15.2 m. A vegetated median will be provided throughout with the existing median preserved as much as possible which is consistent with the rural character of the I-81 corridor.

Additional lanes are proposed to the outside in the areas where the existing median width cannot feasibly accommodate the widening, and the loss of median width diminishes the rural aesthetics of the I-81 corridor. This segment of I-81 has significant lengths of wide bifurcated median, and the widening is proposed to the inside within these segments.

The proposed 6-lane outside widening concept proposes 2 new lanes to the outside of the existing roadway and is generally described as follows:

- existing median travel is untouched other than the existing 0.9 m inside paved shoulder is removed
- existing median lane of pavement converts to a paved shoulder
- existing outside lane of pavement continues to be a through lane
- two additional through lanes are added to the outside
- a new outside paved shoulder is added

The proposed 6-lane inside widening concept proposes 2 new lanes within the existing median and is generally described as follows:

- existing 3.0 m outside paved shoulder is removed
- existing outside lane of pavement converts to a paved shoulder
- existing median lane of pavement continues to be a through lane
- 2 additional through lanes are added to the inside
- new inside paved shoulder is added

Either of the above widening concepts offers considerable flexibility with construction sequencing and traffic maintenance since 2 travel lanes must be maintained in each direction at all times during construction.

A combination of inside/outside widening is proposed at appropriate locations and in some restricted areas, the inside widening concept proposes only 1 additional through lane be constructed within the median rather than the 2-lane concept described above.

The location of the existing pavement is to be used in all widening schemes either as a through lane or as a paved shoulder.

All typical sections include 3.6 m wide full depth paved shoulders left and right of the through travel lanes.

5.0 ROADWAY IMPROVEMENTS

5.1 Introduction

The subject of this study is an I-81 segment located in Shenandoah, Frederick, and Warren Counties. The study begins at the Rockingham/Shenandoah County Line near milepost 264 and ends north of the truck weigh station at milepost 305 in Frederick County.

The total length of the study is 66.1 km (41.1 miles).

This section of I-81 generally parallels US Route 11 and was constructed in the early 1960's. It passes through the Town of New Market, immediately west of the Towns of Mt. Jackson and Edinburg, through the Town of Woodstock, west of the Towns of Toms Brook and Strasburg, and immediately east of the Town of Middletown.

The existing roadway consists of 3.6 m travel lanes (2 in each direction), separated by a vegetated median. The existing limited access right-of-way is a minimum of 76.2 m in width, and the median is a minimum of 20.1 m, increasing up to 105 m, for the project. The roadways are most often bifurcated both horizontally and vertically.

There are 11 interchanges within this study area. All will require modifications (or reconstruction) to meet current standards and to accommodate projected traffic volumes.

The recommended improvement maintains the rural nature of I-81, while widening the 4 lane facility to 6 lanes. Substandard features such as vertical clearance under bridges, superelevation, and sight distance have been improved to current standards.

Accident statistics should be obtained from VDOT's Traffic Engineering Division when design projects are initiated on this segment of I-81 and analyzed to identify any additional potential deficiencies in the existing facility.

There are portions of I-81 with substandard vertical curves (MP 292.4 to MP 292.7 SBL only and MP 299.7 to MP 300.0 NBL only), which do not meet 110 km/h minimum design criteria for stopping sight distance. The recommended improvement will upgrade these segments to current standards, eliminating the need for any design exceptions.

5.2 Design Criteria

Mainline

Functional Classification	Rural Principal Arterial (Interstate)
Design Speed	110 km/h
Lane Width	3.6 m
Shoulder Width (graded)	4.5 m (left and right)
Shoulder Width (paved)	3.6 m (left and right)
Minimum Curve Radius	500 m
Maximum Grade	4%
Side Slopes	CS-4E
Stopping Sight Distance	247 m (des.) 180 m (min.)

Ramps

Design Speed	100 km/h (max.) 35 km/h (min.)
Pavement Width	4.8 m - 5.4 m
Minimum Curve Radius	46 m
Maximum Grade	7%

5.3 Maintenance of Traffic

Traffic safety was an integral element of this study during the planning and preliminary design phase and will continue through final design and ultimately through construction.

Traffic along I-81 and through the interchanges will be inhibited as little as possible during construction. Traffic will be clearly guided while approaching and traversing construction areas, and maintained by using a minimum of two lanes in each direction at all times. Concrete barriers will be used when construction is adjacent to traffic lanes. Other traffic channeling devices will be used to warn drivers of hazards created by construction activities nearby and to direct drivers safely past the hazards.

Reconstruction of the interchanges will not impede traffic except when absolutely necessary for short periods of time. The proper sequence of construction will allow minimal interruption of traffic and provide increased safety to the public and to the construction workers.

For the areas where the two-lane outside widening scheme is recommended, the widened roadway will be constructed in 2 phases:

Phase I
Install concrete barrier on the existing outside shoulder and construct approximately 9.2 m of new pavement outside the barrier. Shift traffic to the new pavement and relocate the concrete barrier to the inside edge of the new pavement.

Phase II
Remove the existing roadway and shoulders and replace with full depth pavement. Remove the existing inside shoulder pavement and regrade. Ultimately, the existing paved inside traffic lane will be converted to the inside full depth shoulder for the new 3 lane freeway. Remove barrier, place final surface, stripe pavement, and divert traffic to the completed facility.

For the areas where it is recommended two lane widening be accomplished within the median, the widened roadway will be constructed in 2 phases:

Phase I
Install concrete barrier on the existing inside shoulder and construct approximately 9.8 m of new pavement inside the barrier. Shift traffic to the new pavement and relocate the concrete barrier to the outside edge of the new pavement.

Phase II
Remove the existing roadway and paved shoulders and replace with full depth pavement. Ultimately, the existing outside traffic lane will be converted to the outside full depth shoulder for the new 3 lane freeway. Remove barrier, place final surface, stripe pavement, and divert traffic to completed facility.

For the areas where it is recommended one-lane widening be accomplished within the median, the widened roadway will be constructed in 4 phases:

Phase I
Remove the existing inside shoulder and replace it with temporary pavement 1.2 m wide adjacent to the

existing roadway and capable of withstanding continuous traffic. Install concrete barrier or temporary guardrail inside the temporary pavement as required to protect traffic. Shift traffic 1.2 m to the left using this temporary pavement and install a concrete barrier on the outside edge of the existing roadway.

Phase II
Remove the existing paved outside shoulder and construct 3.6 m of new full depth pavement outside the barrier and adjacent to the existing pavement. This will ultimately become the outside shoulder of the new three lane freeway. Shift 1 lane of traffic onto this newly constructed portion and 1 lane onto the adjacent existing outside traffic lane and relocate the concrete barrier to just inside the center of the existing roadway.

Phase III
Remove the temporary pavement. Replace the existing roadway inside the concrete barrier with full depth pavement. Construct approximately 9.2 m of new pavement adjacent to and inside the reconstructed existing roadway pavement. Install concrete barrier or temporary guardrail on the inside of the completed portion as required to protect traffic. Shift traffic to this completed portion and relocate the concrete barrier to the outside edge of the completed portion.

Phase IV
Replace the remaining portion of the existing pavement with full depth pavement. Remove barrier, place final surface, stripe pavement, and divert traffic to the completed facility.

From MP 290.0 to MP 292.4 where it is recommended to widen the NBL 1 lane to the inside and the SBL 2 lanes to the outside, an alternate method of maintaining traffic may be better and will be fully evaluated during the final design phase. For this alternate, the widened NBL would be constructed in 2 phases:

Phase I
After the southbound roadway has been completely reconstructed, install temporary median crossovers to divert northbound traffic onto the completed southbound roadway. Install concrete barriers along the centerline of the new southbound roadway. Divert southbound traffic to the outside half of the completed southbound roadway and part of the outside full depth paved shoulder and northbound traffic via the temporary crossovers to the inside half of the completed southbound roadway and part of the inside full depth paved shoulder.

Phase II
Reconstruct and widen northbound roadway, stripe pavement, and divert northbound traffic onto completed facility. Remove concrete barrier from southbound roadway, restripe pavement, and divert southbound traffic onto completed facility.

For the areas where it is recommended to widen three lanes to the inside or outside, the widened roadway will be constructed in 2 phases:

Phase I
Install a concrete barrier on the outer edge of the existing shoulder and construct new pavement behind the barrier. Shift traffic to the new pavement and relocate the concrete barrier to the edge of the new pavement.

Phase II
Remove the existing pavement and paved shoulders and replace with full depth pavement. Remove barrier, place final surface, stripe pavement, and divert traffic to the completed facility.

Throughout this project, widening schemes combining inside and outside widening have been recommended in several areas. Maintenance of traffic and sequence of construction for the basic schemes as outlined above will be adjusted according to the combination of schemes recommended for each specific segment of this project.

For the areas where the profile of I-81 is to be corrected to provide adequate sight distances (MP 292.4 to MP 292.7 SBL and MP 299.7 to MP 300.0 NBL), phased construction and temporary pavement will be used to maintain four-lane traffic during construction.

Where crossroads overpass I-81, generally new bridges will be constructed adjacent to the existing bridges and crossroad traffic will be maintained on the existing bridges until the completion of the new bridges. At the Routes 42, 55, and 11 overpasses, wider bridges and their approach roadways will be constructed in stages, and the traffic shifted from the existing bridges to a portion of the new bridges; thence, the existing bridges demolished and the remaining portions of the new bridges completed. At Routes 657, 655, 653, and 646 overpasses, new bridges will replace the existing bridge in the same location to minimize impact to the surrounding Civil War battlefield sites. During construction of these bridges, traffic will be detoured around the construction site using alternate existing roadways.

Where Routes 211, 614, and 675 "underpass" I-81, the crossroad traffic will be maintained on the existing roadways until the new I-81 bridges are completed. Then a portion of the widened crossroad will be constructed beneath the new I-81 bridges, traffic shifted to the new roadway portion, and the remainder of the crossroad adjustment completed.

At Routes 600, 625, and 601 "underpasses," the crossroads' profiles are to be adjusted to provide adequate vertical clearance under I-81. Crossroad traffic will be maintained by either detouring the traffic using alternate existing roadways or by adjusting the crossroads in stages. If staged construction is employed, a portion of the adjusted crossroad and adjacent temporary pavement will be constructed, traffic shifted to the new roadway portion, and the remainder of the crossroad adjustment completed.

At the I-81/I-66 Interchange, construction will be accomplished in four phases:

Phase I
Construct the I-66 westbound to I-81 southbound bridge over traffic and adjacent to the existing bridge.

Connect the approaches of the new bridge to the existing roadways at the ends of the new bridge with temporary pavement, divert traffic onto the new bridge, and demolish the existing bridge.

Phase II
Construct the I-81 southbound to I-66 eastbound bridge under the new I-66 WB to I-81 SB bridge and adjacent to the existing bridge. Connect the approaches of the new bridge with temporary pavement to the existing roadways at the ends of the new bridge, divert traffic onto the new bridge, and demolish the existing bridge. Construct the new I-81 NB to I-66 EB connector.

Phase III
Construct the relocated I-81 SBL and widen the I-81 NBL through the interchange. Construct the new I-81 SB to I-66 EB connector and remove the old I-81 SBL.

Phase IV
Connect the new bridges' approaches to newly constructed connectors. Remove temporary connectors, place final surface, stripe pavement, and divert traffic to the completed facility.

For interchange ramps, traffic will generally be maintained on the existing ramps until the new and improved ramps are constructed. In instances where the new ramp's horizontal alignment coincides with the existing ramp, construction of the new ramp will be staged while maintaining traffic on a portion of the existing ramp and on the existing ramp's shoulder.

5.4 Stormwater Management

Transportation projects in Virginia are required to address the impacts of stormwater runoff on the natural environment. In compliance with the Virginia Stormwater Management Regulations (SWMR) and the Virginia Erosion and Sediment Control Regulations (ESCR). The SWMR and the ESCR are administered by the Virginia Department of Conservation and Recreation.

A key requirement of the Virginia stormwater regulations is the use of "best management practices" (BMPs) for controlling the quantity and quality of stormwater runoff. These BMPs include nonstructural methods, such as land management and zoning, and structural methods such as the use of detention basins. The erosion and sediment control regulations require facilities for controlling erosion during road construction while the SWM regulations are for permanent facilities.

SWM facilities are required whenever the amount of new impervious area contributing to an outfall exceeds a threshold level - one acre according to the SWMR. I-81 improvements will add impervious surface areas which increase stormwater runoff volumes and rates of flow from the highway right-of-way. At these outfall points to the natural drainage ways, management facilities in the form of detention basins are proposed. These will be designed to limit the rate of outflow to pre-development levels so as not to adversely affect receiving channels. The basins will also serve to capture "first-flush" pollutants washed off the roadway surfaces and allow them to settle out through extended detention.

The outfalls requiring SWM basins were determined based on the one acre rule. The siting of potential basins was based on engineering judgement considering the terrain and adjacent property. Generally the basins were located where they could feasibly intercept the most roadway runoff while avoiding perennial streams and allowing larger off-site drainage to bypass the basins. All reasonable basin sites are shown for planning purposes with the understanding that the final locations will be decided upon in the final design phase of the project. Also, for planning purposes, all basins are shown at one uniform size and configuration based on an estimate of the runoff volume storage requirements for an average highway outfall along I-81.

This project passes through three Civil War battlefield areas that are either on the National Register or potentially eligible for the National Register of Historic Properties. In these areas, encroachment beyond the existing right-of-way will likely be restricted. Within the battlefields and to comply with both the historic restrictions and the SWM regulations, basins have been located within the existing right-of-way where possible and where they would be effective. In addition, the basin size at other preferred locations beyond the limits of the battlefields will be increased to capture and treat previously untreated runoff of sufficient quantity to compensate for the remaining increased and untreated runoff that will discharge to natural channels within the battlefields. The downstream channels at these outfalls will be of sufficient capacity to accept any increased runoff in accord with the Erosion and Sediment Control regulations. Therefore, no SWM basins are shown within the battlefield areas outside the existing right-of-way.

6.0 BRIDGES

6.1 Introduction

6.1.1 Purpose
This study includes a preliminary evaluation of the 54 bridges within the study limits for the widening of Interstate 81 by 1 lane in each direction. An evaluation of each bridge is made to establish preliminary cost estimates for the effects of widening I-81.

6.1.2 Bridge and Corridor Description
The section of I-81 within the study limits was originally constructed in the early to mid-1960's. The corridor generally follows the US Route 11 alignment from the Rockingham/Shenandoah County line at MP 264 to MP 305 in Frederick County. The terrain is rolling, typical of the valley and ridge region of Virginia in which it is situated.

6.1.3 Existing Information
The conclusions in this study are based upon existing information provided by VDOT, including selected as-built plans and VDOT Inspection Reports. Each bridge site was visited and a cursory inspection was made. The cursory inspections consisted of visual verification of plans and inspection reports, and photographs of current conditions.

6.2 Preliminary Design Data

6.2.1 General Criteria

Bridge evaluations were based on the following criteria:

- condition of the structure
- load-carrying capacity of the structure
- existing and proposed minimum clearances
- age of the structure

Bridges which had received a structural evaluation rating of 6 or below were considered in need of total replacement for the estimated project construction date of 2006 or 2016. This criterion was based on the current age of most of the bridges (30+ years), and the prediction that the bridges would be at the end of their estimated useful life by 2016. Bridges which had received a structural evaluation rating above 6 were evaluated further for possible continuation of service. The evaluations also considered bridge characteristics including: configuration, materials, components, and the feasibility of correction of deficiencies.

The load-carrying capacity of each bridge was evaluated based on the most recent available bridge inspection report. Bridges with inventory ratings below 36 tons (based on HS-20 truck loading) were determined in need of total replacement. Considering the age of most of the study bridges and the high volume of heavy truck traffic on I-81, an inventory rating below 36 tons was considered unacceptable.

6.2.2 Clearance Requirements

Minimum clearances were evaluated for both existing and proposed configurations. Any bridge which did not meet current vertical clearance requirements was designated for total replacement. Bridges which were currently at minimum vertical clearance were evaluated to determine if widening without reducing vertical clearance was feasible (by using a shallower depth superstructure in the widened area).

Bridges crossing over I-81 were checked for horizontal clearances for widening the interstate either to the median or to the outside. The following horizontal clearance criteria were used:

a. Without a traffic barrier or guardrail: minimum horizontal clearance = 10.0 m (33'-0")

b. With a traffic barrier in front of the pier or abutment: minimum horizontal clearance = 3.6 m (12'-0")

c. With a guardrail in front of pier or abutment: minimum horizontal clearance = 3.6 m (12'-0") from face of guardrail. The guardrail should be 1.8 m (6'-0") from the face of the pier or abutment.

d. Design exception considered for a traffic barrier in front of pier or abutment with 1.8 m (6'-0") minimum horizontal clearance

Traffic barriers and guardrails were considered undesirable from the standpoint of future roadway widening of I-81. No bridge within the study corridor warranted consideration of the design exception (criterion d).

6.2.3 Construction Restrictions

Bridge widening concepts were developed under the assumption that 4 lanes of traffic will be maintained on I-81 at all times during bridge construction, due to the heavy volume of traffic. Traffic on bridges crossing over I-81, which are being replaced, will be maintained by either constructing the new bridge on a new alignment, or by using staged construction. It is anticipated that brief closures of I-81 for setting girders over the interstate will be scheduled during off-peak periods. Such closures would most likely occur between 12:00 a.m. and 5:00 a.m. and last 2 or 3 hours. Detour routes would be established to maintain traffic during these periods.

Bridge conceptual designs have been developed to accommodate staged construction where necessary. Construction joints have been located in bridge decks and substructure units, and girder spacings have been established around staging requirements.

6.2.4 Estimated Project Construction

Estimated construction dates of 2006 and 2016 are used as a basis for design criteria and bridge evaluations. Based on the existing condition of the bridges along the study corridor, the age of the bridges, and the need to provide a 75 year useful life for the widened facility, our study found no significant difference in structure recommendations between a 2006 or 2016 construction schedule.

6.2.5 Traffic Data for the Bridges

Projected average daily traffic volumes for the year 2020 are used for establishing bridge design criteria. Directional average daily traffic projections for I-81 are in the range of 35,000 to 43,000 vehicles per day per direction for year 2020. Average daily truck traffic for I-81 is projected to range from 17 to 22 percent.

Average daily traffic projections for intersecting roadways are also based on the year 2020.

6.2.6 Geotechnical Information

Foundation concepts for conceptual bridge designs are based on the foundations used for the existing bridge at each site. No additional geotechnical information has been gathered for this widening study.

Where an existing bridge is founded on piles, the proposed bridge is also indicated on piles, with pile lengths based on the approximate existing pile quantities. Where an existing bridge is on spread footings, the proposed bridge is indicated on spread footings, with the bottom of the footing elevations approximately equal to existing elevations.

Existing bridge inspection reports were reviewed for bridge scour observations. Where no scour is evident at an existing bridge site, the foundations and bridge configurations for the proposed bridges are based on the existing design.

If bridge scour evidence is found at an existing site, then prudent scour countermeasures are included in the conceptual bridge designs. Prudent scour countermeasures include lowering pier foundations or socketing into bedrock with drilled shafts. The span configuration of proposed bridges are designed to minimize exposure to

scour. No hydraulic or hydrologic analyses were performed for this study.

6.2.7 Environmental Conditions

Environmental conditions which may affect the bridge designs include wetlands, water quality, endangered species, cultural resources, hazardous waste, and air/noise impacts. A summary of environmental impacts for the entire study area is included elsewhere in this report.

The study corridor includes three significant Civil War battlefield sites which affect the widening of I-81. The New Market battlefield encompasses the I-81 corridor from the Route 211 Interchange at MP 264 to the bridges over the North Fork of the Shenandoah River at MP 269.

The Tom's Brook battlefield includes the I-81 bridges over Pugh's Run at MP 286 and the bridges between MP 289 and MP 292. The Cedar Creek battlefield includes the bridges between MP 292 and MP 293 and from the Route 11 Interchange at MP 298 to the Route 627 Interchange at MP 302.

The primary impacts of these battlefield sites on the I-81 widening will affect location and design of the roadway. Bridge replacement/widening schemes which require minimal or no right-of-way acquisition will be favored to mitigate impacts to these cultural resources.

6.2.8 Bridge Maintenance

Bridge maintenance is a consideration for both evaluating existing bridges for widening versus replacement and the design of new bridges. The expected bridge maintenance requirements for existing bridges over a 75-year life cycle beyond 2006 or 2016 are used to help determine the feasibility of keeping all or portions of the old structure. In most cases, it has been determined that bridge maintenance costs would exceed the cost of a new bridge.

Bridge maintenance is also a key factor in the conceptual design of new bridges. Low maintenance design features which have been used include integral abutments and continuous decks. Other design details for reduced maintenance can be incorporated into final bridge design; however, the impact of such details on the estimated construction cost is minor and beyond the accuracy of this conceptual study.

6.2.9 Aesthetics

The primary criteria for aesthetics used in this study are "open" configurations to preserve the rural character of I-81, balanced span proportions, slender superstructures, and simple uncluttered elements. Open configurations typically avoid tall abutments and heavy solid piers, tending towards two-span layouts for bridges over I-81.

Balanced configurations typically avoid short end spans and short middle spans in favor of more equal proportions between spans. Three-span bridges are ideally set in an 8-10-8 span proportion under these guidelines.

Continuous steel girder bridges often result in a pleasing slenderness without jeopardizing strength or serviceability.

6.2.10 Utilities

No utilities have been identified along the study corridor that have a significant effect on the bridges. Such utilities may include high voltage power lines, sewer mains, water mains, gas mains, or petroleum pipelines. Minor utilities which are attached to or under the existing bridges will be handled during final design, and have a minor effect on estimated construction cost which is not significant to this conceptual-level study.

6.2.11 Lighting

No lighting is included along the study corridor. If lighting is added at a future date, the costs of additional electrical conduit and lighting supports are incidental to the bridge costs.

6.3 Bridge Design Criteria

6.3.1 Alternate Structure Considerations

Conceptual bridge designs are based on current design practice in Virginia for similar bridges in comparable locations. Alternate bridge designs were evaluated at all bridge locations. Where alternate designs provide practical and realistic design solutions, then such design alternates were developed for comparison.

Alternate bridge designs were not developed beyond the evaluation phase where alternatives were not practical or did not meet the criteria for safety and future widening of I-81. Examples include many of the bridges over I-81, for which acceptable prestressed concrete alternatives were not feasible for the desired span lengths. Many bridges carrying I-81 over local roads do not have sufficient vertical clearance for a widened structure. In these cases, structural steel superstructures were selected for the bridge report, since prestressed concrete alternatives would require deeper superstructure depths than steel.

Structural steel superstructures were typically selected for development of the bridge reports and estimated construction costs. Detailed comparison of steel versus prestressed concrete are left to final design and are beyond the practical accuracy of this study.

6.3.2 Structural Steel Alternatives

Superstructure alternatives designed for structural steel are typically continuous plate girders with composite reinforced concrete decks. Conceptual designs and cost estimates are based on welded plate girders for all structural steel alternatives regardless of span length. Rolled beam alternatives were not developed for continuous span bridges to avoid the use of welded cover plates. The impact of plate girders versus rolled beams on conceptual construction cost estimates is not significant.

Haunches over the center pier for the two-span continuous plate girders were evaluated; however, the material cost savings were deemed not significant to this conceptual level study and better left to final design.

Welded box girders were evaluated for some of the bridges with span lengths in excess of 50 meters. It was generally determined that plate girders were a more conservative choice for this conceptual level study.

6.3.3 Reinforced Concrete Alternatives

Reinforced concrete superstructure alternatives were not considered for the bridges within the study corridor. The span lengths and configurations of these bridges are not within the practical range of reinforced concrete spans, unless concessions are made in bridge maintenance and long term serviceability criteria.

6.3.4 Prestressed Concrete Alternatives

Prestressed concrete superstructure alternatives were developed for bridges within the acceptable span length restrictions for standard AASHTO beams. Vertical clearance requirements limit the effective range of locations where prestressed concrete beams can be used. Many bridges carrying I-81 over local roads are at minimum vertical clearance (often 4.42 meters) with shallow superstructure depths. Replacement with prestressed concrete beams would require a lowering of the profile of the intersecting roadway to attain the minimum allowable vertical clearance.

Prestressed concrete superstructure alternatives were developed for certain typical bridges within the study limits. The prestressed concrete beams were considered continuous for live load, and integral abutments were used where feasible. Since existing vertical clearances were at minimum at most bridge locations where prestressed concrete beams were considered, structural steel was typically the only alternative included in the bridge technical reports.

6.3.5 Foundation Types

Conceptual foundation designs are typically based upon the type of foundation used for the existing bridge. Prudent engineering judgement is applied in the development of design concepts for bridge foundations. Pile foundations are generally designed as HP12 x 53 steel piles driven to weathered rock with a bearing capacity of 64 tonnes (70 tons). Pile lengths are based on existing as-built plan quantities.

Spread footings are generally sized to bear upon weathered rock at elevations similar to the existing bridge plans.

6.4 Cost Estimate Summary

6.4.1 Methodology

Conceptual level construction cost estimates have been developed by estimating quantities for each bridge and multiplying by a unit cost per quantity. Recognizing that the conceptual level designs are not as comprehensive as final bridge designs, quantity estimation techniques have been devised to provide consistency and accuracy in estimating. Examples of quantity estimation techniques include:

- Structural Steel: A parametric study of 2-span and 3-span continuous plate girder designs throughout the span ranges encountered in the study corridor was performed, resulting in graphs plotting steel mass versus total span length. These curves have been compared with actual final bridge designs for accuracy.
- Prestressed Concrete Beams: Actual beam lengths are computed for each bridge.
- Reinforced Concrete Deck Slab: Actual concrete quantities are readily calculated from conceptual designs.
- Abutments: Concrete quantities are computed from volume per unit length formulas developed from parametric studies of existing final bridge designs for various types of abutments.
- Piers: Actual concrete quantities are readily computed from conceptual designs.
- Reinforcing Steel: Steel mass per unit volume values have been developed for reinforced concrete elements including decks, abutments, and piers. These values are based on comparisons of existing final bridge designs.
- Steel Piles: The number of piles per substructure unit is estimated based on span lengths and column spacing. Pile lengths are estimated from existing bridge as-built plans for each site.
- Structure Excavation: Actual excavation quantities are computed from conceptual design based on footing depth from existing as-built bridge plans.
- Concrete Parapet: Actual parapet lengths from conceptual design are used.
- Miscellaneous Items: Concrete slab slope protection, deck joints, deck grooving, porous backfill, pipe underdrain, etc. quantities are either computed or estimated from conceptual designs.

Life cycle costs are considered when comparing bridge alternatives that have a significant difference in life cycle costs. An example is a comparison between a structural steel superstructure versus prestressed concrete. When weathering steel is not used, the life cycle cost of the structural steel alternative must include bridge painting costs, which are not needed for prestressed concrete. Another example might be a comparison of an alternative with deck joints versus no deck joints, where the life cycle cost of deck joint maintenance should be considered.

Most life cycle cost differences can be reduced or eliminated through good design practice, such as the use of weathering steel, and the elimination of deck joints. Where circumstances dictate a significant life cycle cost difference between competing bridge alternatives, then life cycle costs should be considered.

6.4.2 Unit Costs

Item	Unit Cost
Concrete, Class 25	$425 per cu. meter
Concrete, Class 30	$500 per cu. meter
Reinforcing Steel, Grade 400	$1.22 per kg
Epoxy-coated Reinf. Steel, Grade 400	$1.50 per kg
Structural Steel High-Str. Plate Girders	$2.45 per kg
Structure Excavation	$40 per cu. meter
Steel Piles (HP 12 x 53)	$80 per meter
Concrete Parapet	$170 per meter
Concrete Slab Slope Protection (100 mm)	$55 per sq. meter
Elastomeric Exp. Dam (75-100 mm)	$330 per meter
Bridge Deck Grooving	$9 per sq. meter
Porous Backfill	$50 per cu. meter
Pipe Underdrain (150 mm)	$28 per meter
Demolition of Existing Bridge	$50 per sq. meter
Widen/Repair Concrete, Class 30	$800 per cu. meter
Widen/Repair Concrete, Class 25	$600 per cu. meter

7.0 ENVIRONMENTAL SUMMARY

I-81 Corridor
Shenandoah, Warren, and Frederick Counties
MP 264 - MP 305

Categorical Exclusion and Environmental Assessments are the most likely documents required for this I-81 widening project. As the project progresses to the design phase, VDOT will coordinate with the Federal Highway Administration to determine the most appropriate level of documentation. The environmental document will then be completed by VDOT Staunton District's environmental section prior to advertisement.

7.1 Summary of Potential Impacts

7.1.1 Water Quality Permits

All immediately visible streams and wetlands are indicated. The Staunton District's environmental section will prepare formal permit determinations and obtain the necessary permits prior to project advertisement.

7.1.2 Endangered Species

The addition of one lane in each direction to the existing Route 81 corridor will have a minimal impact to wildlife habitat due to previous disturbance associated with community developments and industrial activities along the corridor.

All known state and federal threatened and endangered species in the vicinity of the project area will be identified.

7.1.3 Public Parks and Recreation

The New Market Battlefield Park is located along I-81 just north of Exit 264 (Route 211) in the Town of New Market. Impacts to the park will need to be addressed during the development of the environmental document as the project develops.

There are no national forests affected by the corridor development.

7.1.4 Agricultural and Forestal Districts

Virginia's Agricultural and Forestal District program was established to preserve areas of agriculture and forestal land. The district is created for a specified period of time and during that period, the district cannot be changed. At the end of this period, it is subject to review, after which it may be continued, modified, or terminated. The Bauserman-Glen Grove, the Fishers Hill-Sandy Hook, and the Toms Brook Districts are currently in the process of being renewed. Also, Shenandoah County has received a request to form a new district about 0.34 miles, north of Route 638 adjoining I-81 to the west.

The Agricultural and Forestal Districts in the area are shown on Figures F-7.1, F-7.2, F-7.3, F-7.4, and F-7.4a (sheets 77 through 81). Those adjacent to I-81 are described below and referenced to the applicable Plan Sheets:

Sheet 20	Parcel S273S-09	(Emmart, W. H. and Son, Inc.)
Sheet 20	Parcel S273S-10	(Emmart, W. H. and Son, Inc.)
Sheet 20	Parcel S273S-11	(Painter, Nina Jean)
Sheet 20	Parcel S273S-12	(Painter, Nina Jean)
Sheet 20	Parcel S273S-13	(Luray Caverns Corporation)
Sheet 20	Parcel S274S-01	(Shirley, Denny W.)
Sheet 22	Parcel S274N-04	(Fleming, Thomas R., Inc.)
Sheet 23	Parcel S276S-01	(Mullen, Cynthia French)
Sheet 52	Parcel S290N-01	(Hottle, Carl Ellis and Wife)
Sheet 52	Parcel S290S-01	(Gachenour, Susie M.)
Sheet 53	Parcel S290S-07	(Morris, Harry M. or Anna J.)
Sheet 53	Parcel S290S-08	(Wakeman, P. Stanley or Wanda H.)
Sheet 54	Parcel S291S-01	(Wakeman, Paul Stanley and Wanda H.)
Sheet 55	Parcel S291S-05	(A. T. Williams Oil Company, Inc.)
Sheet 55	Parcel S291S-06	(Wakeman, Paul Stanley and Wanda H.)
Sheet 57	Parcel S292N-04	(Sullivan, Nancy R.)
Sheet 57	Parcel S292N-05	(Bauserman, Cecil L. or Nancy M.)

7.1.5 Cultural Resources

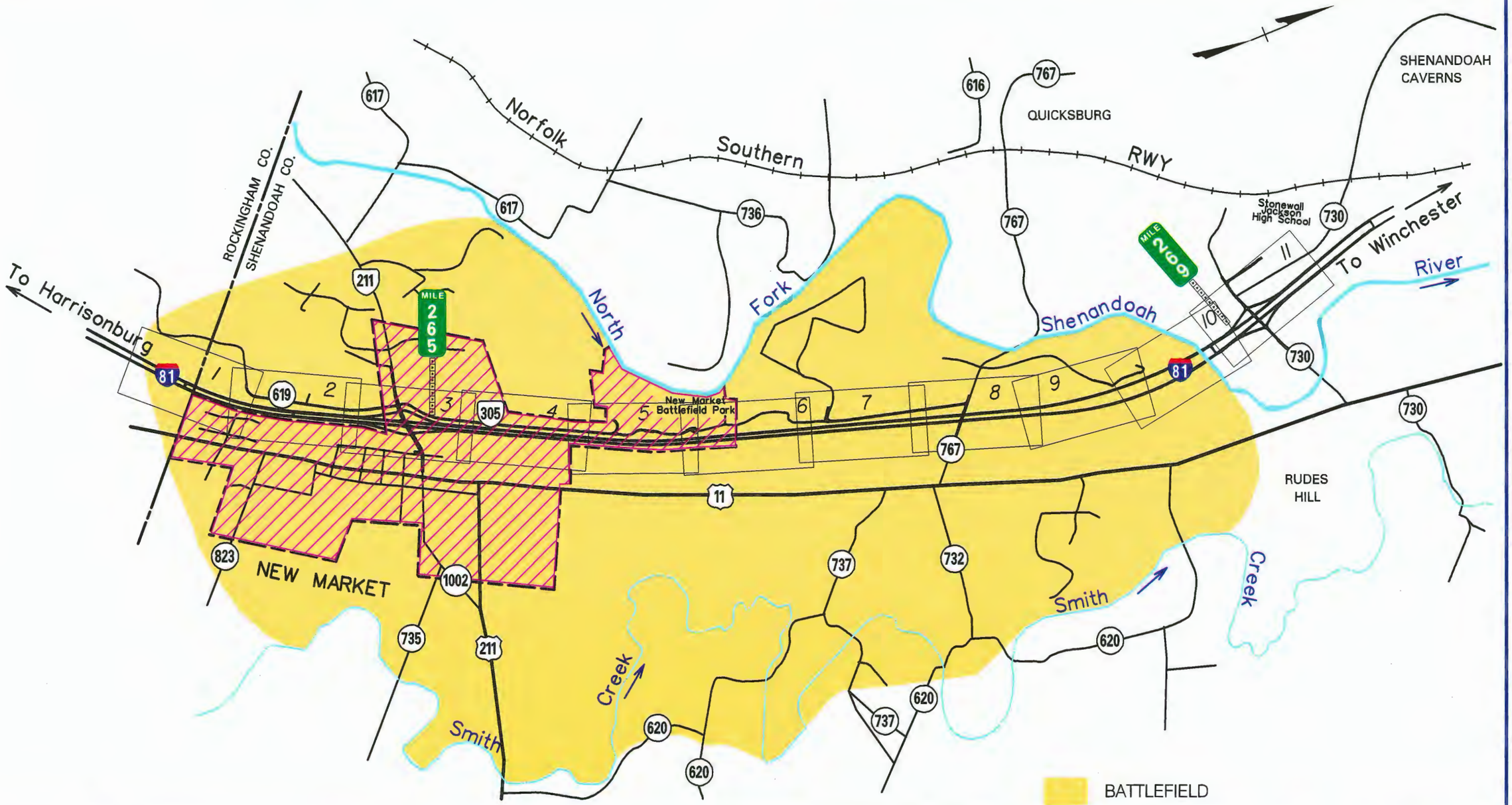
In depth cultural resource surveys will be conducted when the project progresses to the design stage. The New Market Battlefield is shown on Conceptual Plan Sheet 5. Other battlefields are shown on Figures F-7.1, F-7.3, F-7.4, and F-7.4a (sheets 77, 79, 80, and 81).

7.1.6 Hazardous Waste

As a result of community and town development along the interstate corridor, there are potential hazardous material impacts, especially for areas which are proposed for interchange improvements and widening to the outside. Detailed site assessments will be performed as the project develops.

7.1.7 Potential Air/Noise Impacts

Detailed studies will be conducted to determine the potential for air and noise impacts during the final design phase of any construction project.



Virginia Department of Transportation VDOT	**NEW MARKET BATTLEFIELD AREA**	**Date:** November 1998 **Figure:** F-7.1	**Interstate 81** **Improvement Study** Project Number: 0081-968-113, PE-101 Shenandoah, Warren and Frederick Counties	Sheet No. **77**

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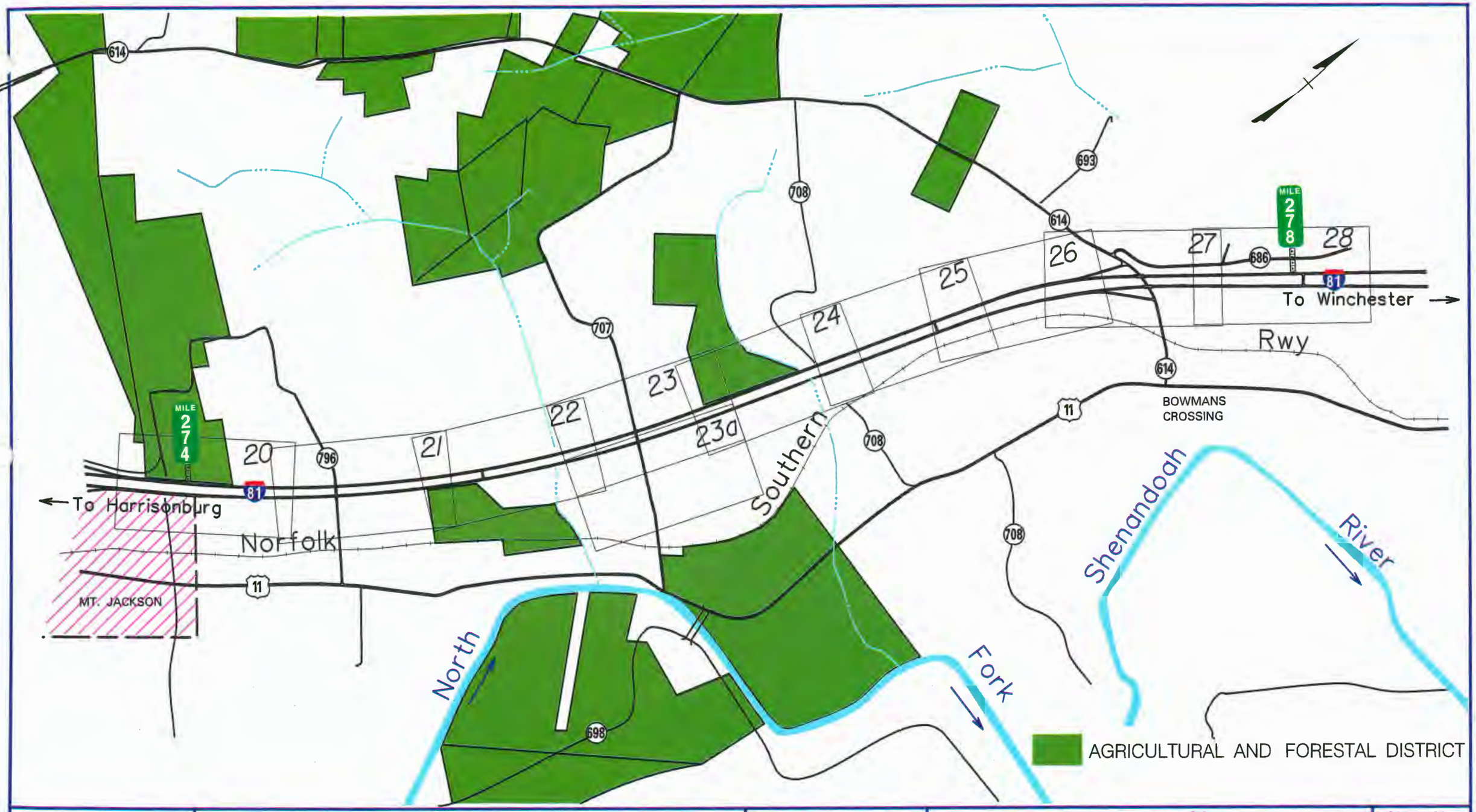
Date: 11/13/98



Virginia Department of Transportation VDOT	**MOUNT JACKSON AGRICULTURAL AND FORESTAL DISTRICTS**	**Date:** November 1998 **Figure:** F - 7.2	**Interstate 81 Improvement Study** Project Number: 0081-968-113, PE-101 Shenandoah, Warren and Frederick Counties	Sheet No. 78

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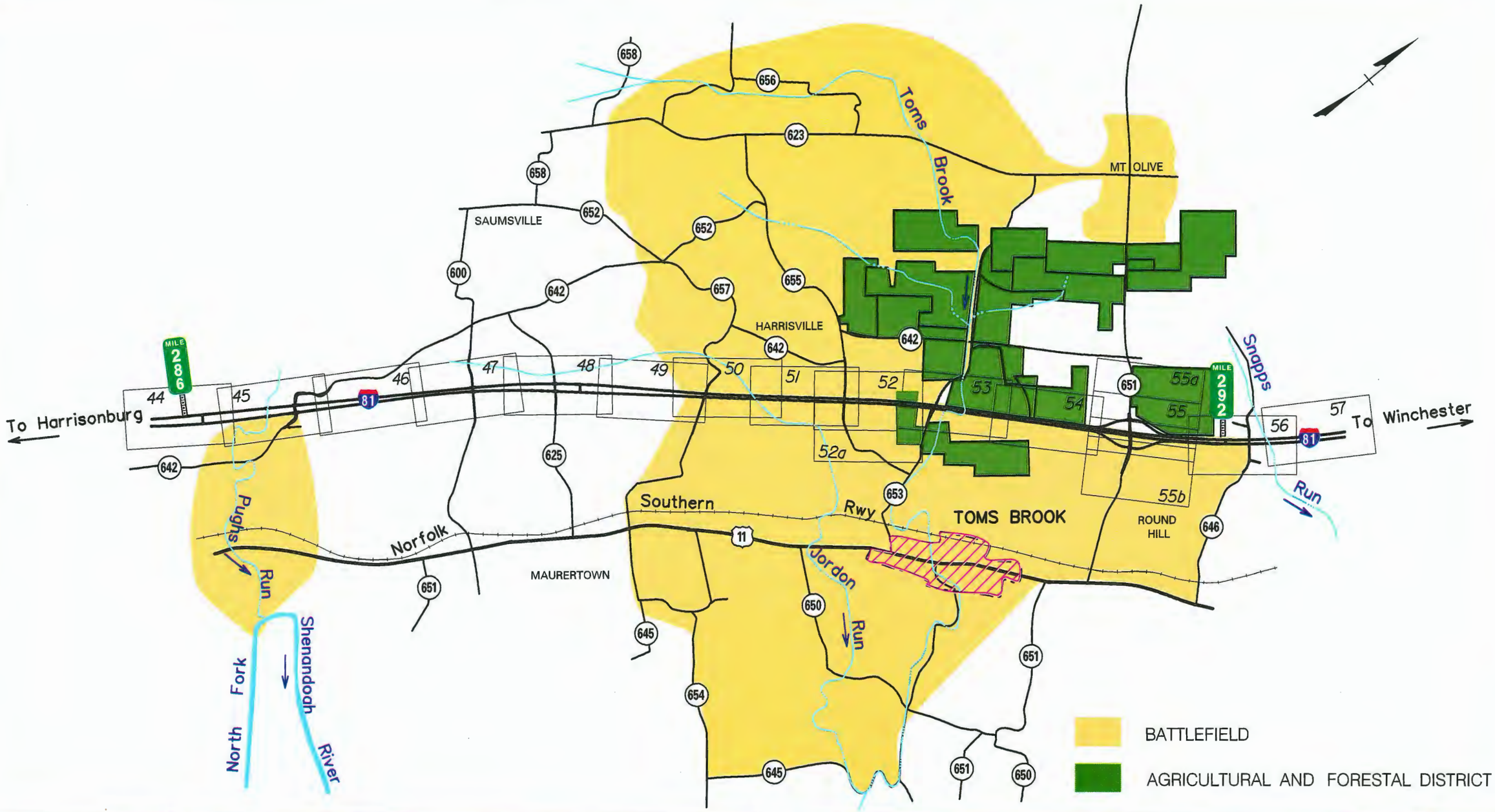

Virginia Department of Transportation VDOT	**TOMS BROOK BATTLEFIELD AREA & AGRICULTURAL AND FORESTAL DISTRICTS**	**Date:** November 1998 **Figure:** F - 7.3	**Interstate 81 Improvement Study** Project Number: 0081-968-113, PE-101 Shenandoah, Warren and Frederick Counties	Sheet No. **79**

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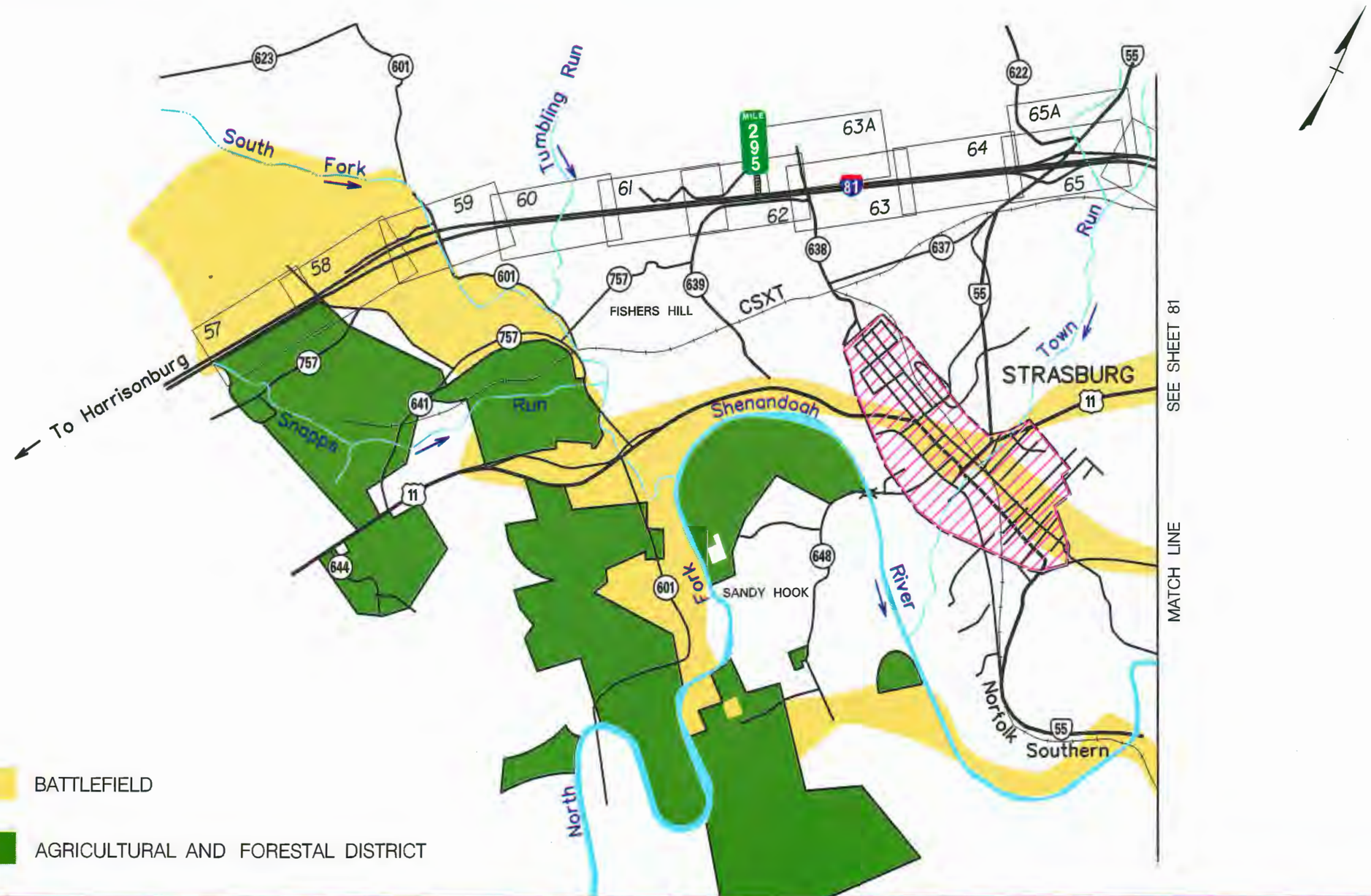

Virginia Department of Transportation VDOT	**CEDAR CREEK BATTLEFIELD AREA & FISHER HILL AND SANDY HOOK AGRICULTURAL AND FORESTAL DISTRICTS**	**Date: November 1998** **Figure: F - 7.4**	**Interstate 81** **Improvement Study** Project Number: 0081–968–113, PE–101 Shenandoah, Warren and Frederick Counties	Sheet No. **80**

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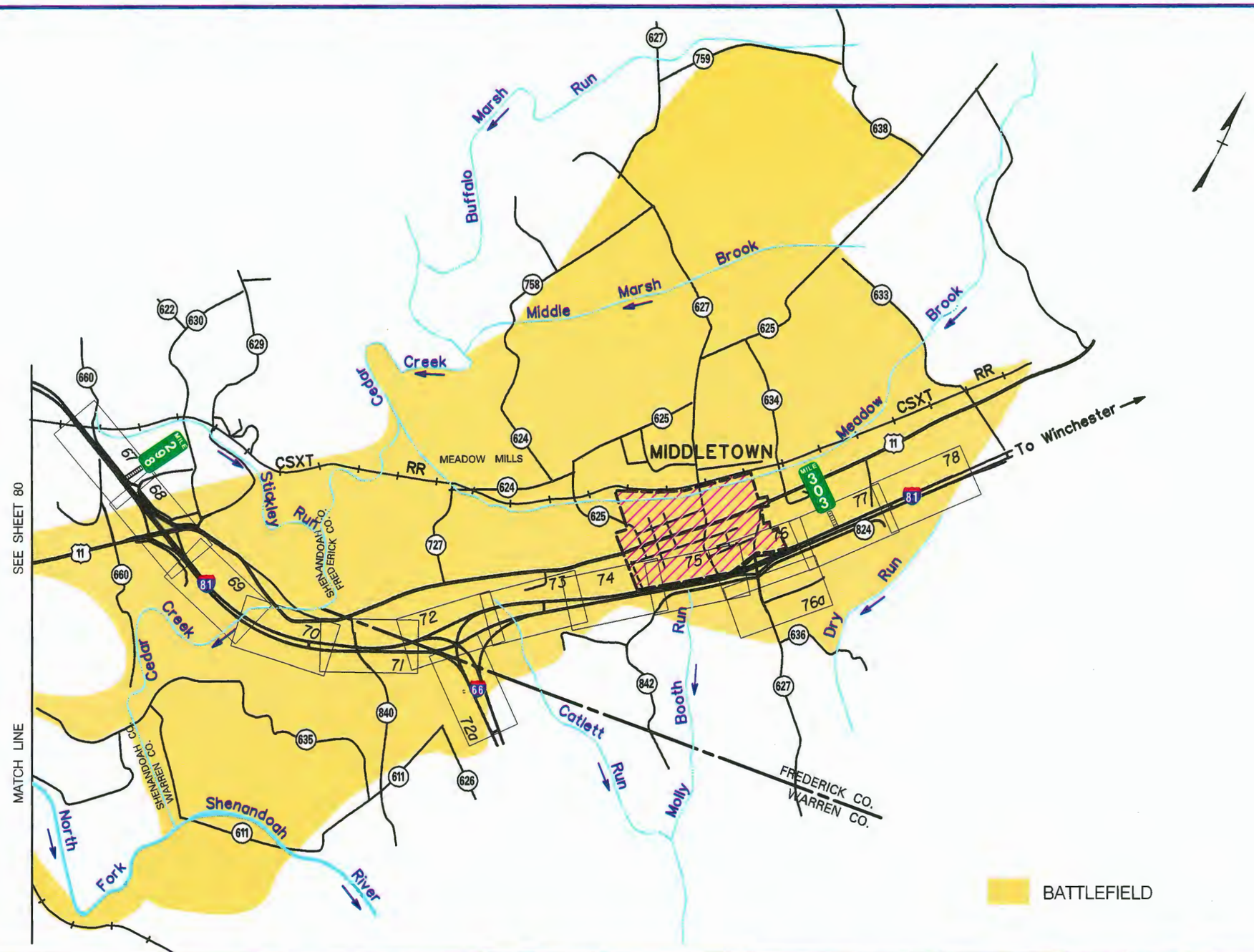

Virginia Department of Transportation VDOT	**CEDAR CREEK BATTLEFIELD AREA**	**Date:** November 1998 **Figure:** F - 7.4a	**Interstate 81** **Improvement Study** Project Number: 0081-968-113, PE-101 Shenandoah, Warren and Frederick Counties

Sheet No.
81

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Segment Designations	Location	Length	Recommendations	Cost Summary (Thousands 1998 Dollars)			
				Roadway	Structure	R/W	Total
Beginning of Study to Exit 264	MP 263.9 - MP 264.9	1.6 km /1.0 mi.	This segment will be widened to the outside in both directions.	$10,163		$26	$10,189
Exit 264 Interchange New Market	Route 211 at MP 264.9		The existing diamond interchange configuration is being retained with modifications to accommodate the mainline widening. The Route 211 roadway will be lowered to provide increased vertical clearance on Route 211 beneath the new I-81 bridges	$1,346	$2,500	$1,466	$5,312
Exit 264 to Exit 269	MP 264.9 - MP 269.0	6.6 km/4.1 mi.	It is recommended that this segment be widened to the outside in both directions from Exit 264 to MP 268.1 and switch to the inside in both directions from MP 268.1 to Exit 269.	$18,840	$13,625	$267	$32,732
Exit 269 Interchange	Route 730 at MP 269.0		The existing diamond interchange is being reconstructed to provide an expanded, modern diamond interchange configuration. A third lane will be provided on Route 730 through the interchange area to facilitate left turn movements.	$1,550	$1,875	$1,093	$4,518
Exit 269 to Exit 273	MP 269.0 - MP 273.5	7.2 km/4.5 mi.	Widening throughout this segment is proposed to the inside for both the northbound and southbound lanes.	$25,638	$8,750	$79	$34,467
Exit 273 Interchange Mt. Jackson	Route 292/703 at MP 273.5		It is proposed to reconstruct the existing diamond interchange to provide an expanded, modern diamond interchange configuration. Route 292/703 will be widened to 4 lanes with a center left turn lane through the interchange area and eastward to Route 11.	$2,976	$4,125	$1,212	$8,313
Exit 273 to Exit 277	MP 273.5 - MP 277.4	6.2 km/3.9 mi.	This segment will be widened to the inside in both directions.	$22,973	$2,625	$85	$25,683
Exit 277 Interchange Bowman's Crossing	Route 614 at MP 277.4		This is currently a half diamond interchange with ramps to and from the south. A southbound off ramp and a northbound on-ramp is recommended to provide a complete diamond interchange at this location. A third lane is proposed on Route 614 through the interchange area to facilitate left turn movements.	$1,526	$2,375	$496	$4,397
Exit 277 to Exit 279	MP 277.4 - MP 279.2	2.9 km/1.8 mi.	Widening throughout this segment is proposed to the inside in both directions.	$10,518		$30	$10,548

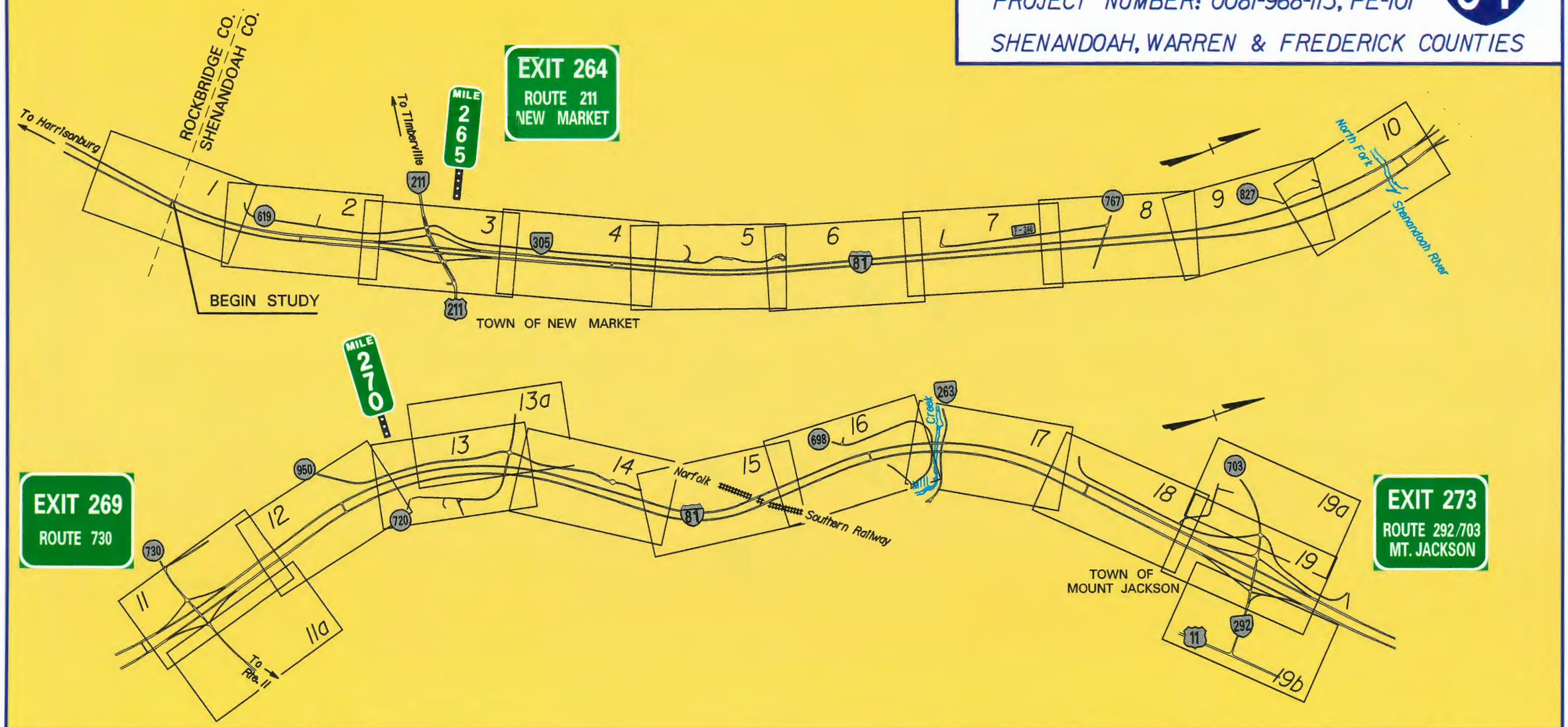
Segment Designations	Location	Length	Recommendations	Cost Summary (Thousands 1998 Dollars)			
				Roadway	Structure	R/W	Total
Exit 279 Interchange Edinburg	Route 185/675 at MP 279.2		It is proposed to reconstruct the existing diamond interchange and widen Route 185/675 to 4 lanes with a center left turn lane through the interchange area.	$1,487	$7,375	$775	$9,637
Exit 279 to Exit 283	MP 279.2 - MP 283.2	6.4 km/4.0 mi.	Widening is proposed to the inside in both directions from Exit 279 to MP 282.2; then the widening switches to the outside in both directions and extends to Exit 283 (Route 42).	$23,281	$6,375	$283	$29,939
Exit 283 Interchange Woodstock	Route 42 at MP 283.2		It is recommended to reconstruct the existing diamond interchange and widen Route 42 to 4 lanes with the appropriate turn lanes.	$2,141	$3,750	$3,660	$9,551
Exit 283 to Exit 291	MP 283.2 - MP 291.3	13.0 km/8.1 mi.	Widening to the outside in both directions is proposed from Route 42 to MP 286.1. Beginning at MP 286.1, the widening switches to the inside on the northbound lane while the outside widening continues on the southbound lane. This concept extends to Exit 291 (Route 651).	$46,575	$13,500	$629	$60,704
Exit 291 Interchange Toms Brook	Route 651 at MP 291.3		The existing diamond interchange is being reconstructed to provide an expanded, modern diamond interchange configuration. The proposal includes widening Route 651 to 4 lanes with appropriate turn lanes.	$2,081	$2,875	$698	$5,654
Exit 291 to Exit 296	MP 291.3 - MP 296.5	8.3 km/5.2 mi.	From Exit 291 to MP 293.0, the northbound lane is widened to the inside, and the southbound lane is widened to the outside. Between MP 292.4 and MP 292.6, the southbound lane will be reconstructed to increase vertical site distance. North of MP 293.0, both the northbound and southbound lanes are widened to the outside to Exit 296 (Route 55).	$31,100	$3,750	$416	$35,266
Exit 296 Interchange Strasburg	Route 55 at MP 296.5		The existing diamond interchange configuration is being modified to provide improved ramp alignments on the west side of I-81. It is recommended to widen Route 55 to 4 lanes through the interchange area.	$2,537	$7,875	$653	$11,065
Exit 296 to Exit 298	MP 296.5 - MP 298.3	2.8 km/1.8 mi.	This segment will be widened to the outside in both directions.	$11,025	$3,000	$66	$14,091
Exit 298 Interchange Strasburg	Route 11 at MP 298.3		The existing diamond interchange configuration is being retained with modifications to accommodate the mainline widening and to provide improved design features.	$965	$4,375	$484	$5,824

Segment Designations	Location	Length	Recommendations	Cost Summary (Thousands 1998 Dollars) Roadway	Structure	R/W	Total
Exit 298 to Exit 300	MP 298.3 - MP 300.4	3.4 km/2.1 mi.	The outside widening concept is utilized in both directions north of Route 11 to MP 299.7. Between MP 299.7 and MP 300.0, the northbound lanes are reconstructed to increase vertical site distance, and the southbound lane is reconstructed between MP 299.5 and MP 300.0 to improve the horizontal alignment. From MP 300.0 to MP 300.4, the northbound lane is widened to the inside, and the southbound lane is relocated to provide a new 3-lane roadway.	$12,614	$7,875	$39	$20,528
Exit 300 Interchange	I-66 at MP 300.4		The existing I-66 interchange will be reconstructed to eliminate the existing "left-hand-on" traffic movements for westbound I-66 to southbound I-81, and "left-hand-off" movements for southbound I-81 to eastbound I-66. Also, the I-81 design will include appropriate dual accel/decel lanes for these two traffic movements.	$2,963	$6,875	$37	$9,875
Exit 300 to Exit 302	MP 300.4 to MP 302.4	3.2 km/2.0 mi.	The northbound lane is widened to the inside, and the southbound lane is relocated to provide a new 3-lane roadway between MP 300.4 and MP 301.0. North of MP 301.0 to the Route 627 bridge, the northbound roadway is widened to the outside, and the southbound roadway is widened to the inside.	$11,757		$36	$11,793
Exit 302 Interchange Middletown	Route 627 at MP 302.4		The existing diamond interchange is being reconstructed to provide an expanded, modern diamond interchange configuration. A third lane will be provided on Route 627 through the interchange area to facilitate left turn movements.	$2,208	$1,500	$1,840	$5,548
Exit 302 to End Study	MP 302.4 to MP 305.0	4.2 km/2.6 mi.	From the Route 627 bridge northward to MP 302.8, the southbound lane is widened to the inside, and 3 new lanes are constructed in the northbound direction. From MP 302.8, the widening is to the inside in both directions northward to the end of the study at MP 305.0.	$14,623		$45	$14,668
			TOTAL PROJECT COST	$260,887	$105,000	$14,415	$380,302

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

CONCEPTUAL PLAN SHEET INDEX

NOT TO SCALE

VDOT METRIC

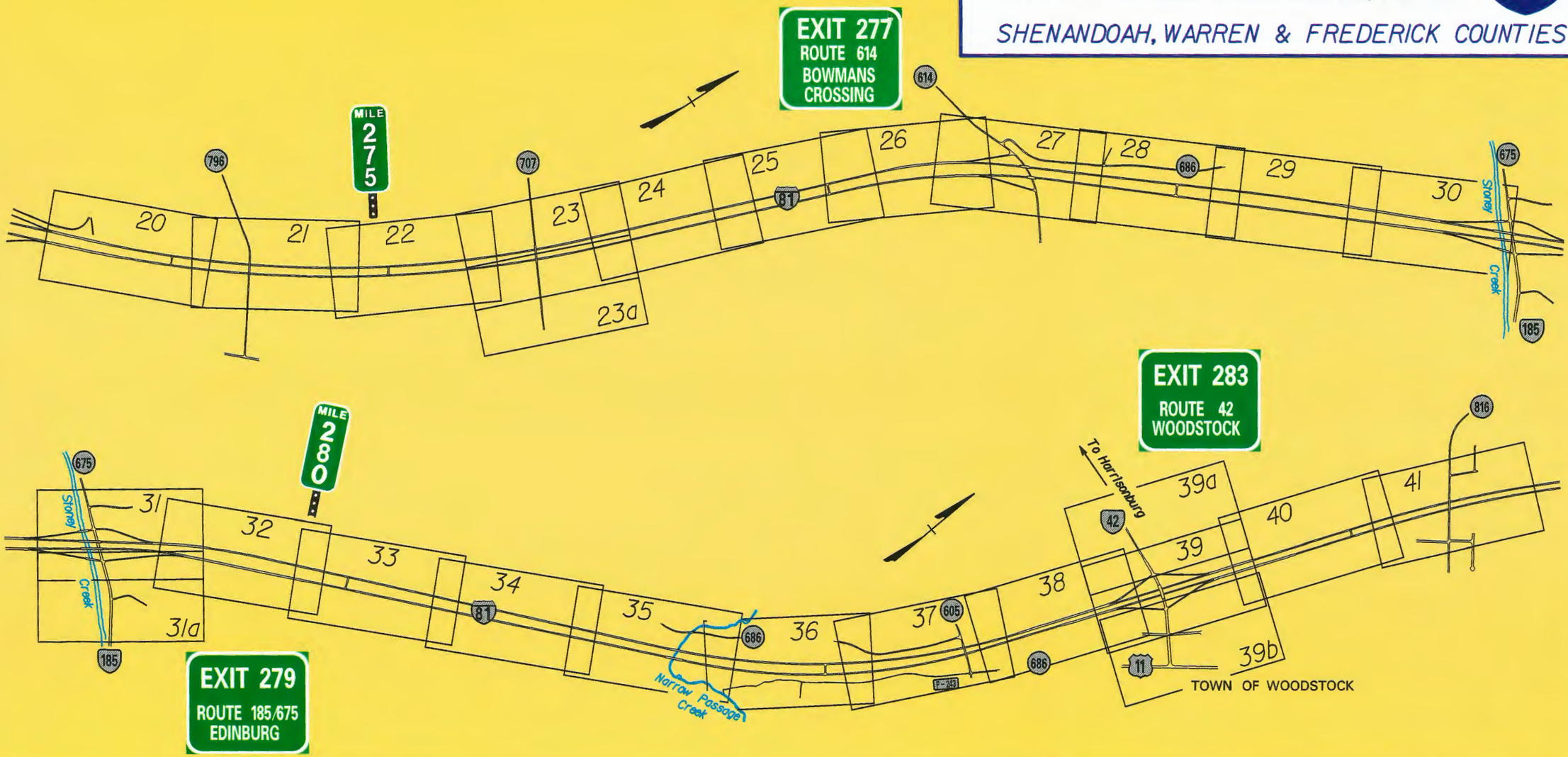
Sheet No.

I-1

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

VDOT

CONCEPTUAL PLAN SHEET INDEX

NOT TO SCALE

VDOT METRIC

Sheet No.

I-2

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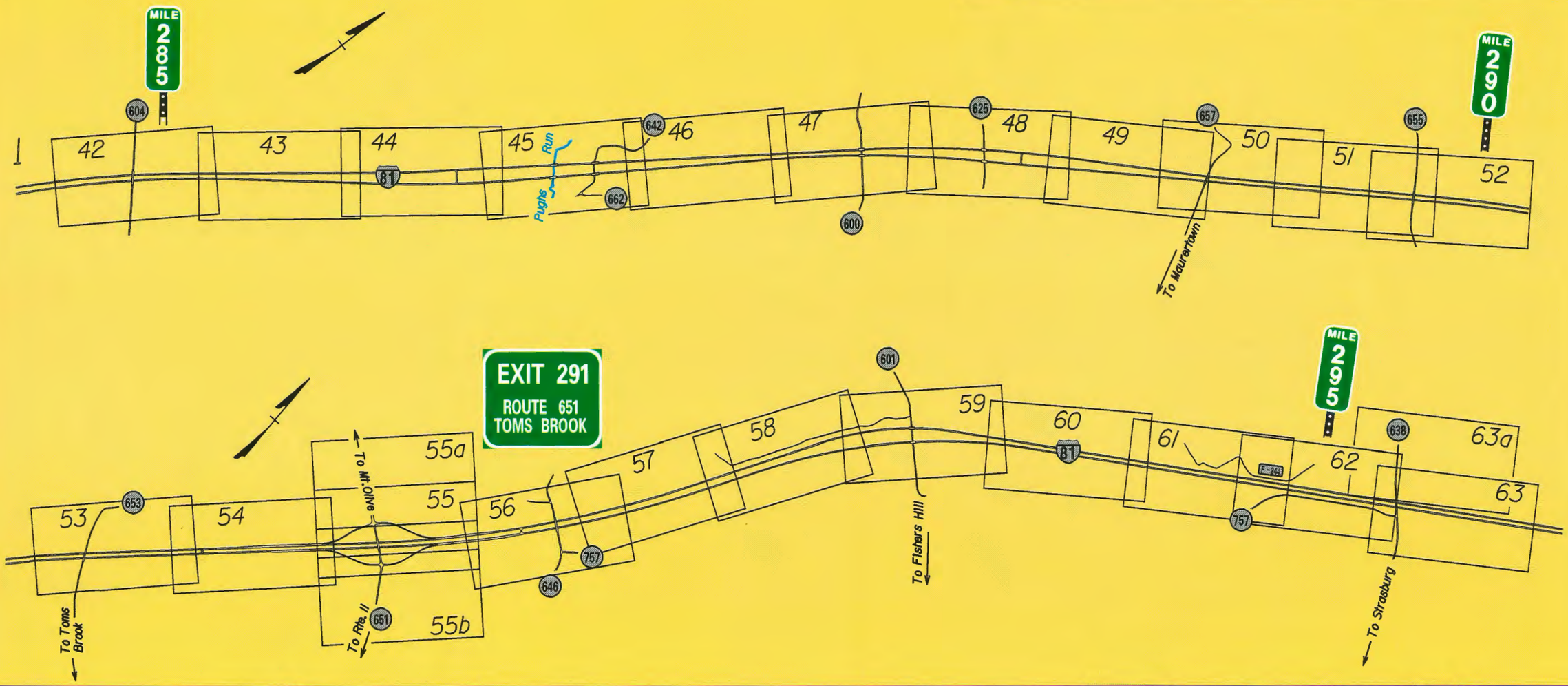
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

VDOT

CONCEPTUAL PLAN SHEET INDEX

NOT TO SCALE

VDOT METRIC

Sheet No.

I-3

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81

EXIT 296
ROUTE 55
STRASBURG

EXIT 298
ROUTE 11
STRASBURG

EXIT 300
66

EXIT 302
ROUTE 627
MIDDLETOWN

MILE 300

MILE 305

64 65 65a 66 67 68 69 70 71 72 72a 73 74 75 76 76a 77 78 79 80 81

To West Virginia

To Strasburg

CSXT Railroad

FREDERICK CO.

SHENANDOAH CO.

Cedar Creek

FREDERICK CO.
WARREN CO.

To Front Royal

SHENANDOAH CO.
WARREN CO.

TOWN OF MIDDLETOWN

To Rte. 11

Truck Weigh Station

END STUDY

To Winchester

Virginia Department of Transportation

CONCEPTUAL PLAN SHEET INDEX

NOT TO SCALE

VDOT METRIC

Sheet No.

I-4

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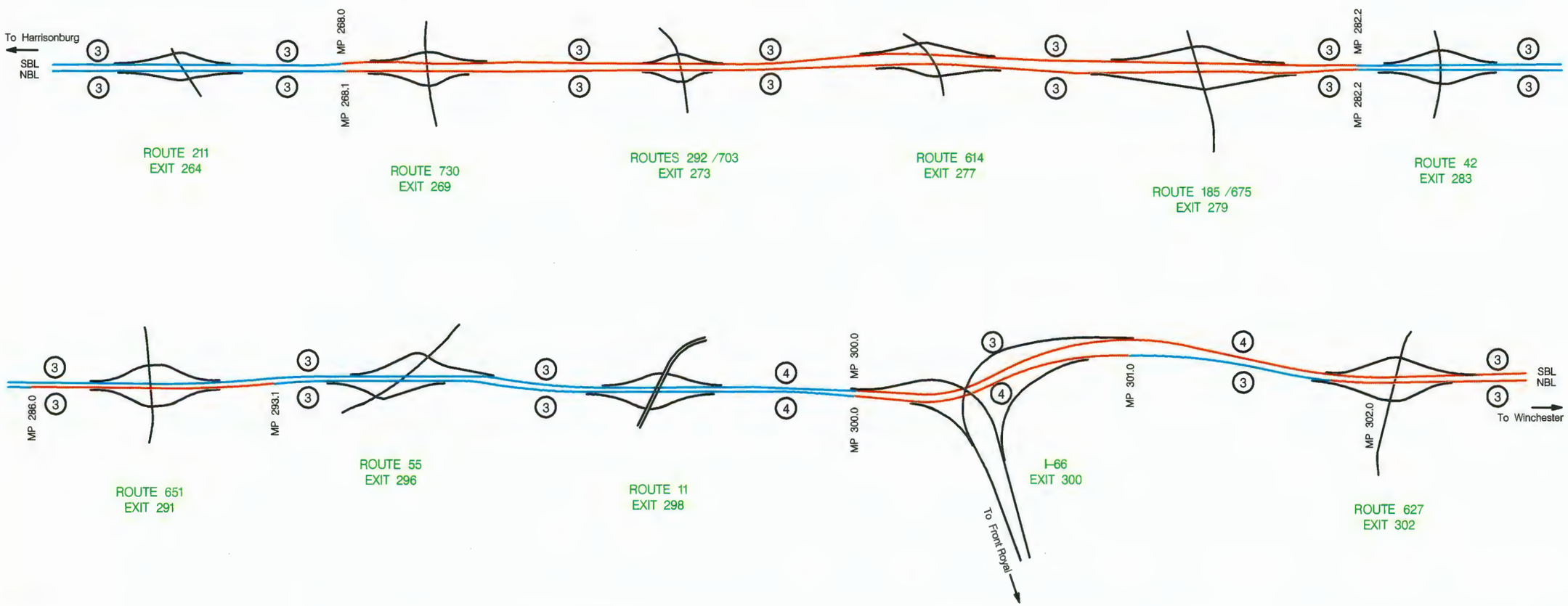
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

VDOT

Proposed Widening Concept Plan

Not To Scale

VDOT METRIC

Sheet No.

W-1

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

FROM	TO	TYPICAL SECTION	SHEET NO.
MP 263.9	MP 268.1	1	1 - 9
MP 268.1	MP 282.2	2	9 - 37
MP 282.2	MP 286.1	1	37 - 44
MP 286.1	MP 290.0	3	44 - 52
MP 290.0	MP 292.4	4	52 - 57
MP 292.4	MP 292.7	5	57 - 58
MP 292.7	MP 293.0	3	58
MP 293.0	MP 298.8	1	58 - 69
MP 298.8	MP 299.7	11	69 - 70
MP 299.7	MP 300.0	9	71
MP 300.0	MP 301.1	10	71 - 73
MP 301.1	MP 302.0	6	73 - 75
MP 302.0	MP 303.0	8	75 - 77
MP 303.0	MP 304.5	2	77 - 79
MP 304.5	MP 305.0	7	79 - 81

Virginia Department of Transportation

TYPICAL SECTION INDEX

VDOT METRIC

Sheet No.

TS-1

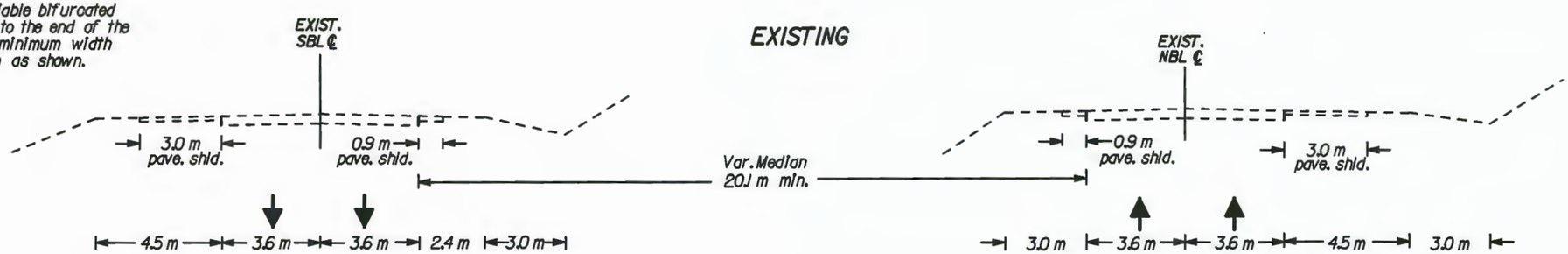
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

Note: Existing pavement is to be replaced with new full depth pavement.

Note:
Existing I-81 has a variable bifurcated median from MP 264 to the end of the study at MP 305. The minimum width of the median is 20.1 m as shown.



TYPICAL SECTION 1

Retain existing median and add 2 lanes to the outside. Utilize the existing median lane as a paved shoulder.

Virginia Department of Transportation

PROPOSED TYPICAL SECTIONS

NOT TO SCALE

VDOT METRIC

Sheet No.

TS-2

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Interstate 81 Improvement Study

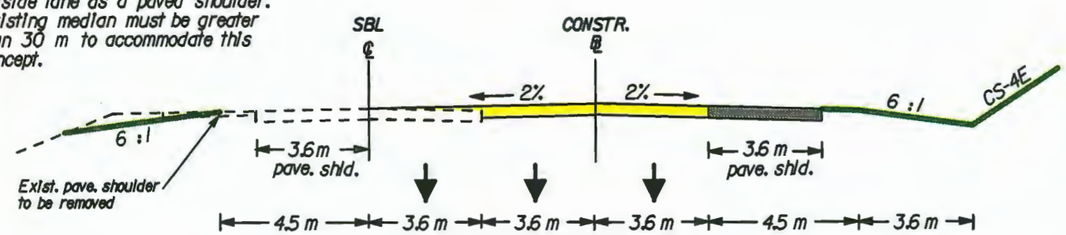
PROJECT NUMBER: 0081-968-113, PE-101

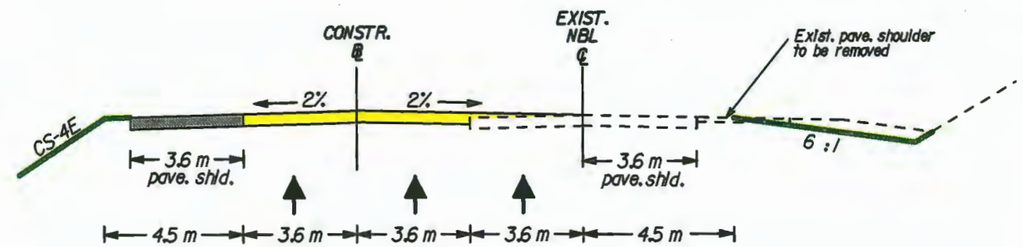
SHENANDOAH, WARREN & FREDERICK COUNTIES

Note: Existing pavement is to be replaced with new full depth pavement.

TYPICAL SECTION 2

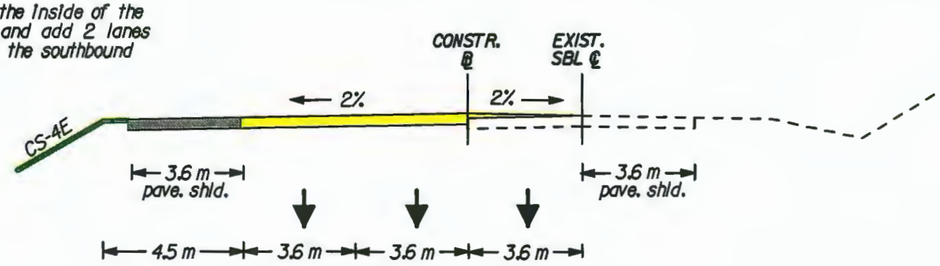
Add 2 lanes in each direction in the median. Utilize the existing outside lane as a paved shoulder. Existing median must be greater than 30 m to accommodate this concept.

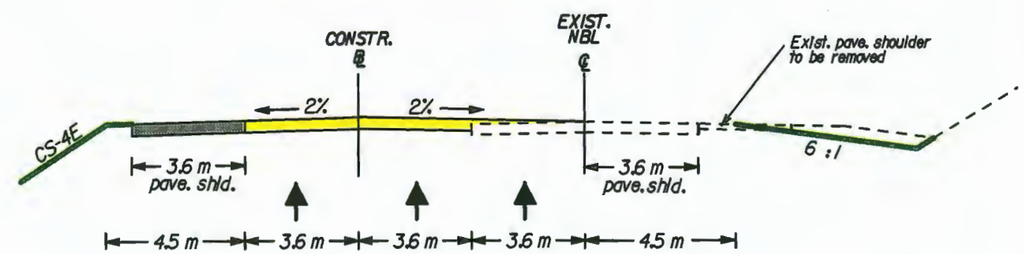




TYPICAL SECTION 3

Add 2 lanes to the inside of the northbound lane and add 2 lanes to the outside of the southbound lane.





Virginia Department of Transportation

PROPOSED TYPICAL SECTIONS

NOT TO SCALE

VDOT METRIC

Sheet No.

TS-3

Interstate 81 Improvement Study

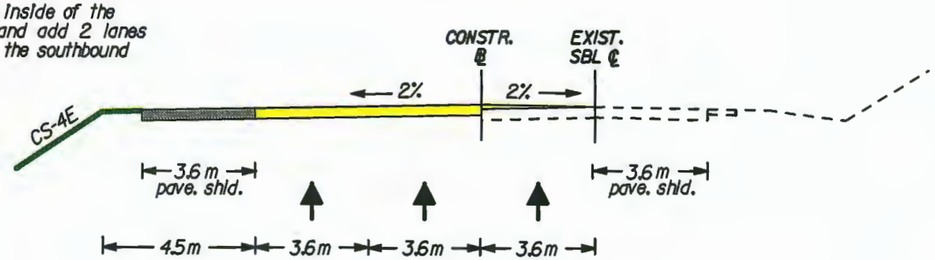
PROJECT NUMBER: 0081-968-113, PE-101

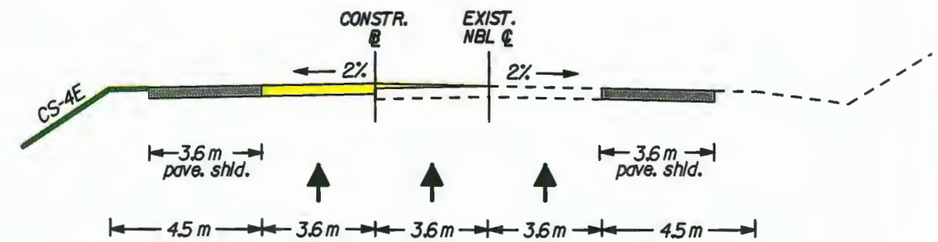
SHENANDOAH, WARREN & FREDERICK COUNTIES

Note: Existing pavement is to be replaced with new full depth pavement.

TYPICAL SECTION 4

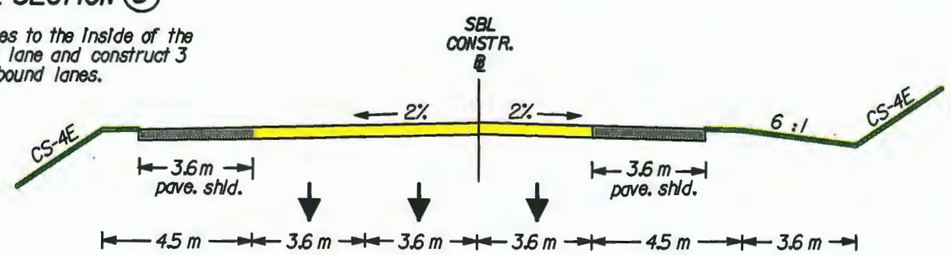
Add 1 lane to the inside of the northbound lane and add 2 lanes to the outside of the southbound lane.

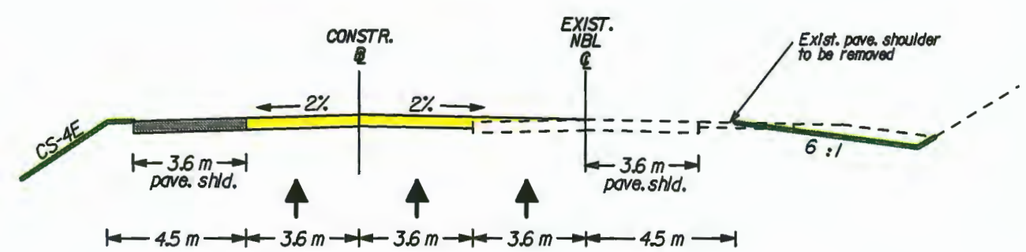




TYPICAL SECTION 5

Add 2 lanes to the inside of the northbound lane and construct 3 new southbound lanes.





Virginia Department of Transportation

PROPOSED TYPICAL SECTIONS

NOT TO SCALE

VDOT METRIC

Sheet No.

TS-4

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Interstate 81 Improvement Study

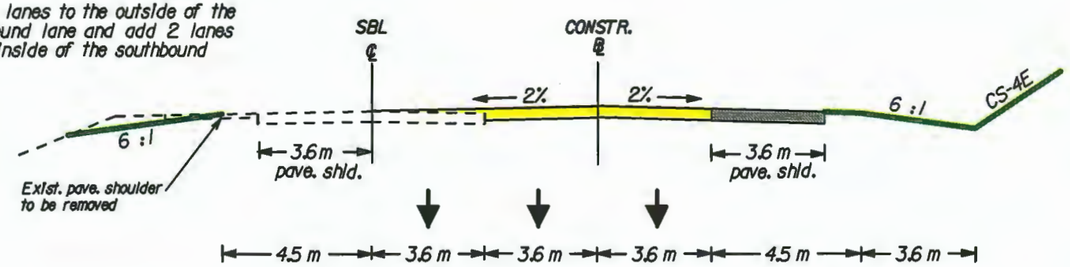
PROJECT NUMBER: 0081-968-113, PE-101

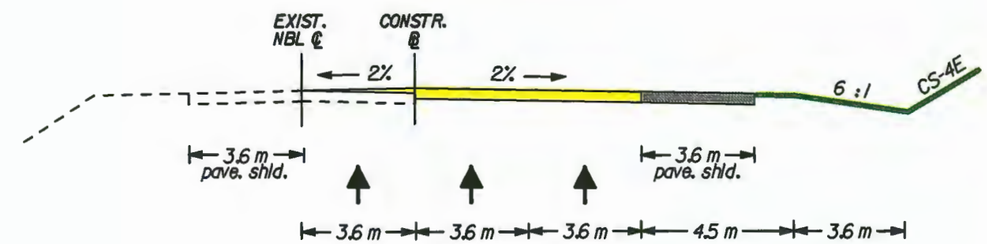
SHENANDOAH, WARREN & FREDERICK COUNTIES

Note: Existing pavement is to be replaced with new full depth pavement.

TYPICAL SECTION 6

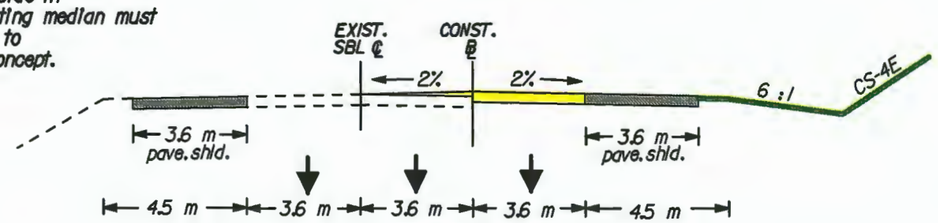
Add 2 lanes to the outside of the northbound lane and add 2 lanes to the inside of the southbound lane.

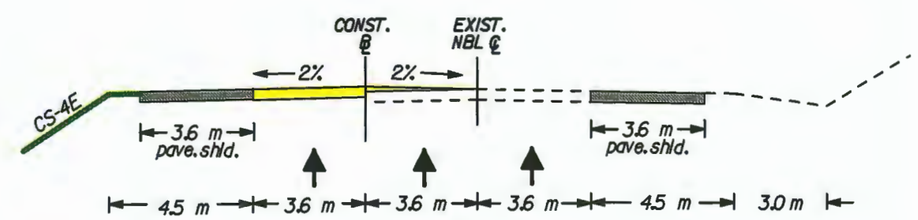




TYPICAL SECTION 7

Add 1 lane to the inside in each direction. Existing median must be 23m or greater to accommodate this concept.





Virginia Department of Transportation

VDOT

PROPOSED TYPICAL SECTIONS

NOT TO SCALE

VDOT METRIC

Sheet No.

TS-5

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Date: 11/12/98

Interstate 81 Improvement Study

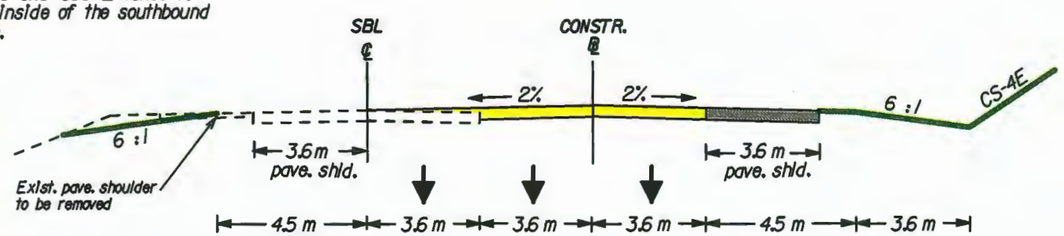
PROJECT NUMBER: 0081-968-113, PE-101

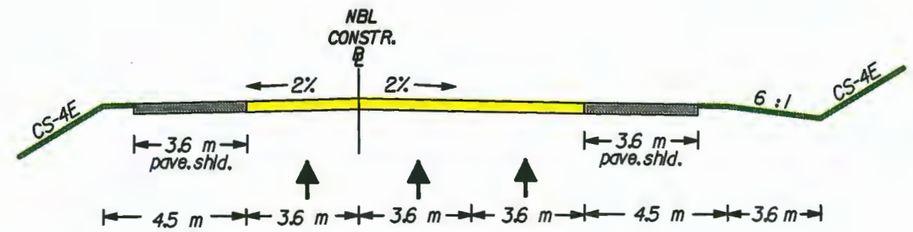
SHENANDOAH, WARREN & FREDERICK COUNTIES

Note: Existing pavement is to be replaced with new full depth pavement.

TYPICAL SECTION 8

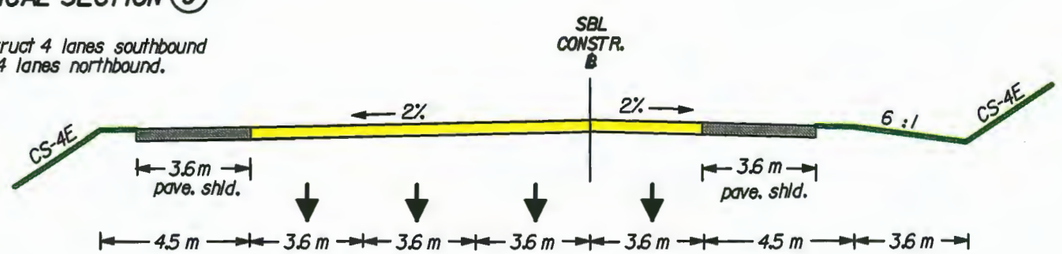
Construct 3 new northbound lanes and add 2 lanes to the inside of the southbound lane.

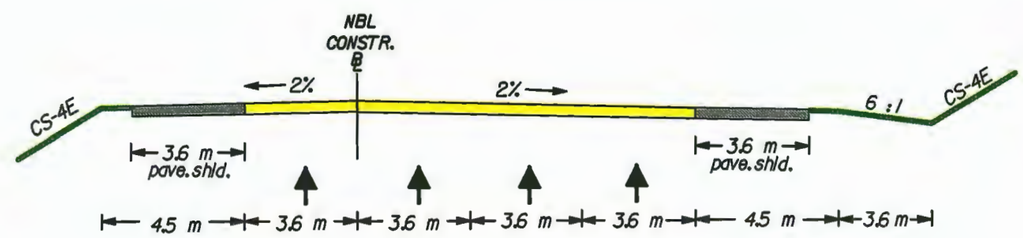




TYPICAL SECTION 9

Construct 4 lanes southbound and 4 lanes northbound.





Virginia Department of Transportation

VDOT

PROPOSED TYPICAL SECTIONS

NOT TO SCALE

VDOT METRIC

Sheet No.

TS-6

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Date: 11/12/98

Interstate 81 Improvement Study

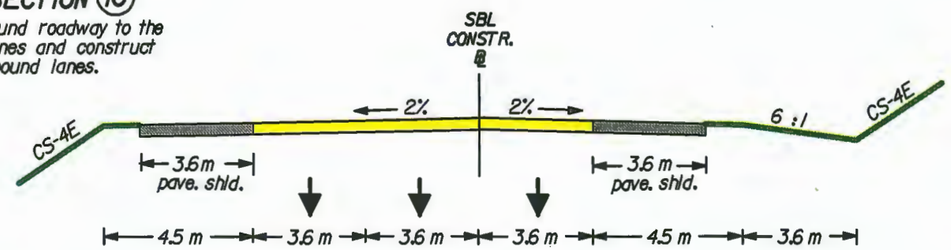
PROJECT NUMBER: 0081-968-113, PE-101

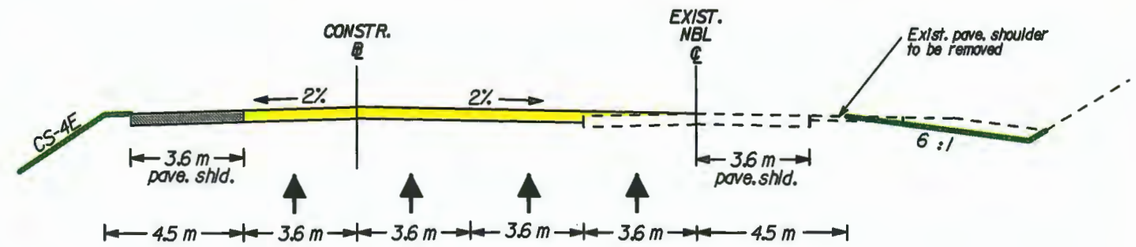
SHENANDOAH, WARREN & FREDERICK COUNTIES

Note: Existing pavement is to be replaced with new full depth pavement.

TYPICAL SECTION (10)

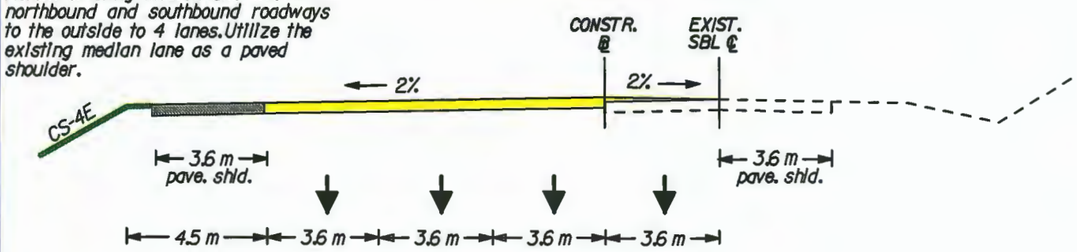
Widen northbound roadway to the inside to 4 lanes and construct 3 new southbound lanes.

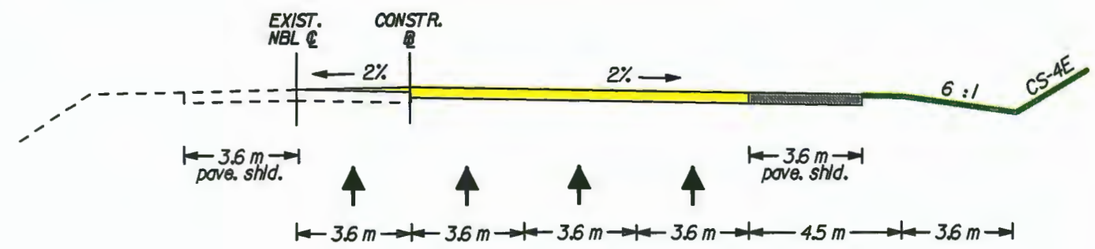




TYPICAL SECTION (11)

Retain existing median and widen northbound and southbound roadways to the outside to 4 lanes. Utilize the existing median lane as a paved shoulder.





Virginia Department of Transportation

VDOT

PROPOSED TYPICAL SECTIONS

NOT TO SCALE

VDOT METRIC

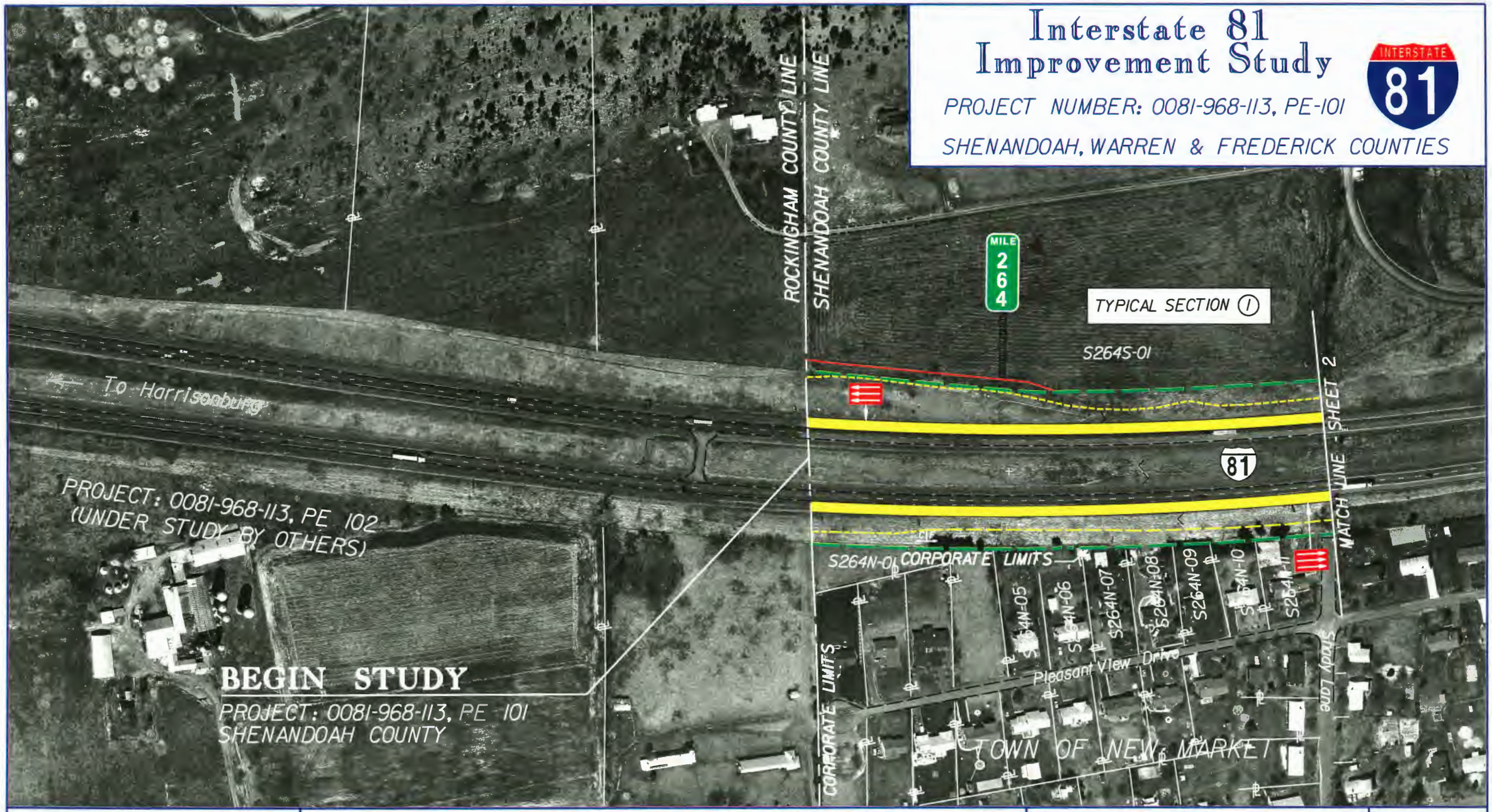
Sheet No.

TS-7

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

1

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Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81

S264S-05
S264S-06
S264S-07
S264S-08
S264S-09
S264S-10
S264S-11
S264S-12
S264S-17
S264S-01
Miller Lane
619
TYPICAL SECTION 1
81
MATCH LINE - SHEET 1
MATCH LINE - SHEET 3
S264N-12
S264N-13
S264N-14
S264N-15
S264N-16
S264N-17
S264N-18
S264N-19
S264N-20
S264N-21
S264N-22
CORPORATE LIMITS
TOWN OF NEW MARKET
Massanutten Ave.
Stonewall Street

Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

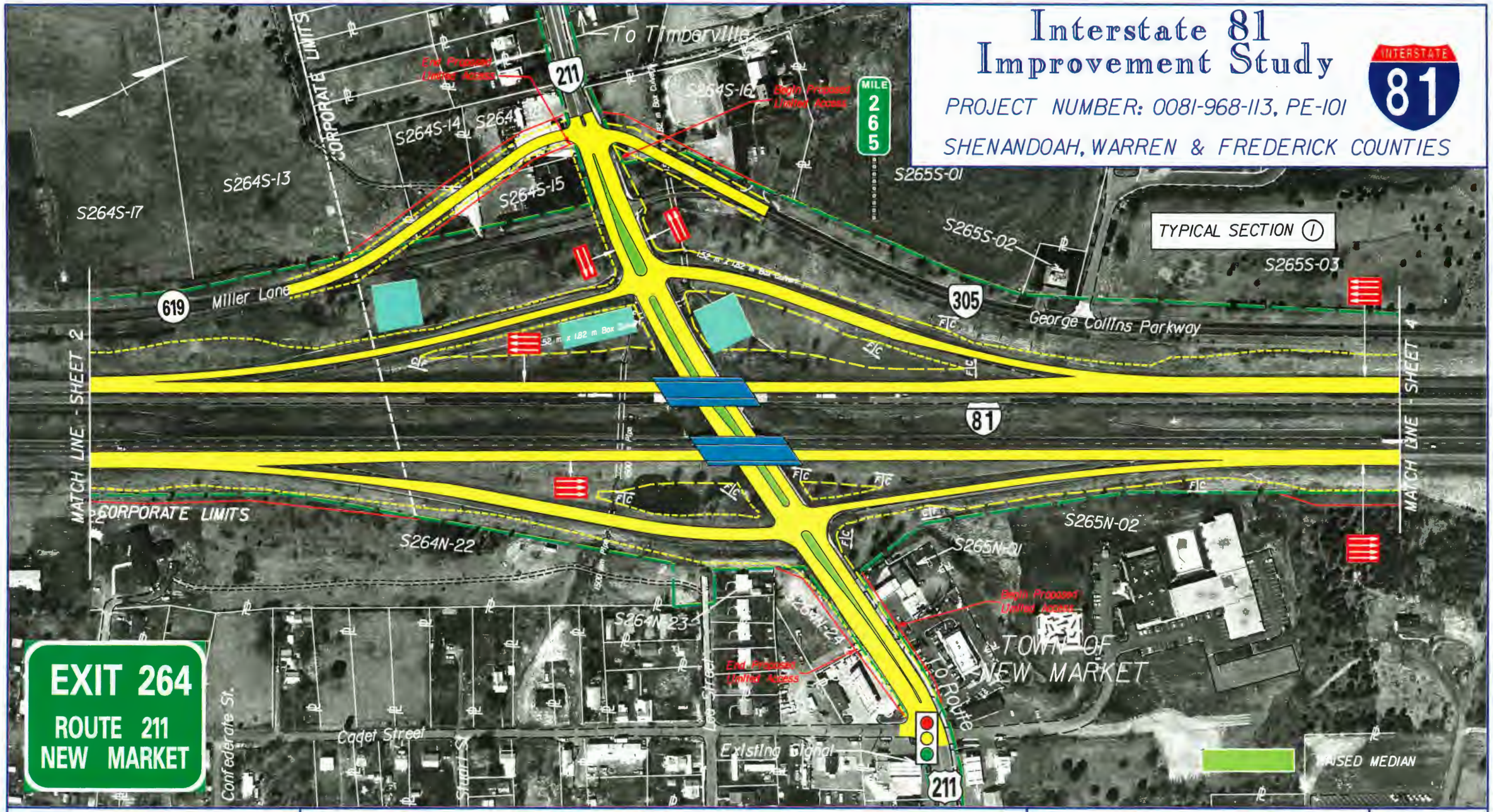
2

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

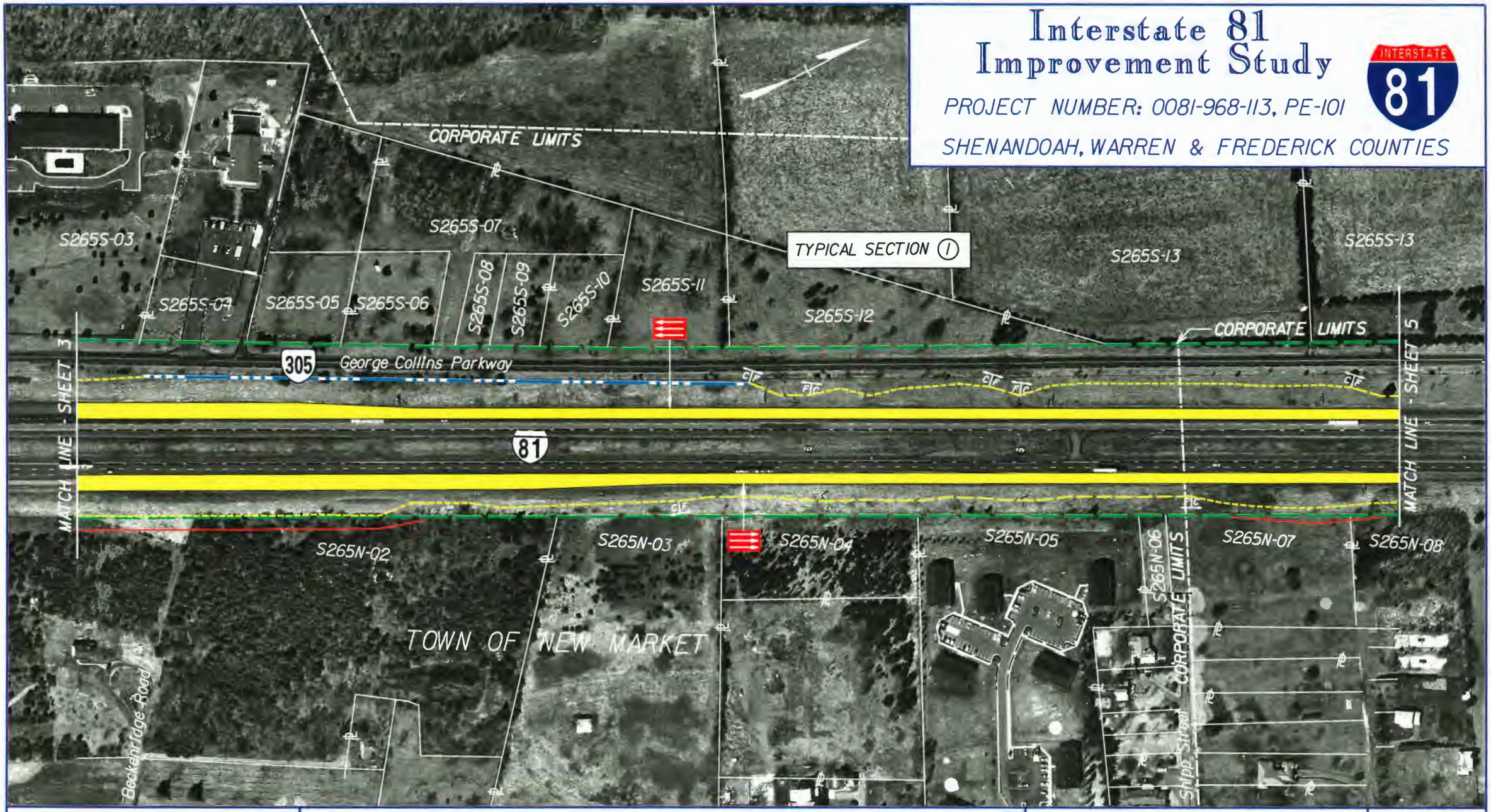
Sheet No.

3

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

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0 50 m 100 m

VDOT METRIC

Sheet No.

4

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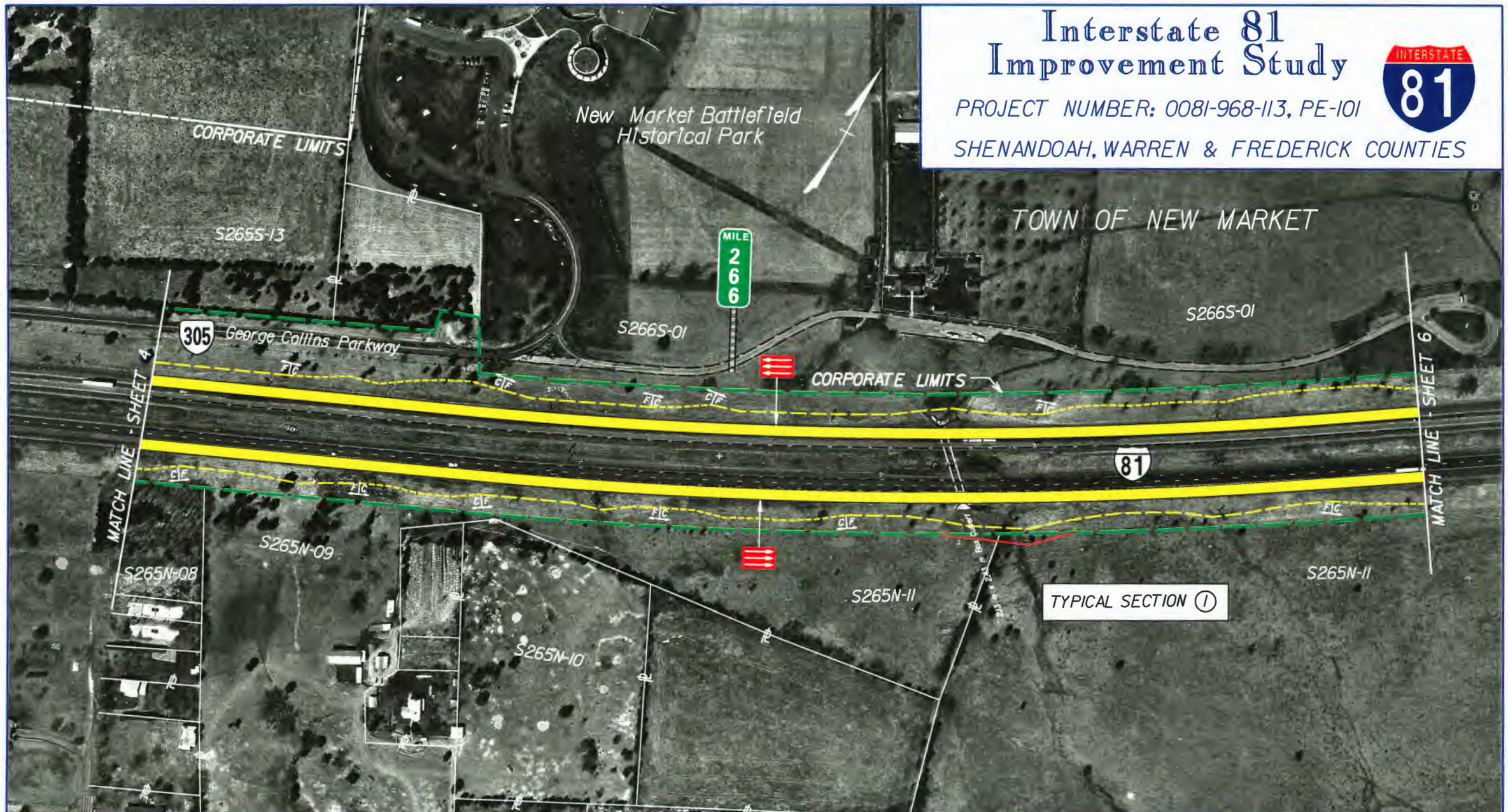
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

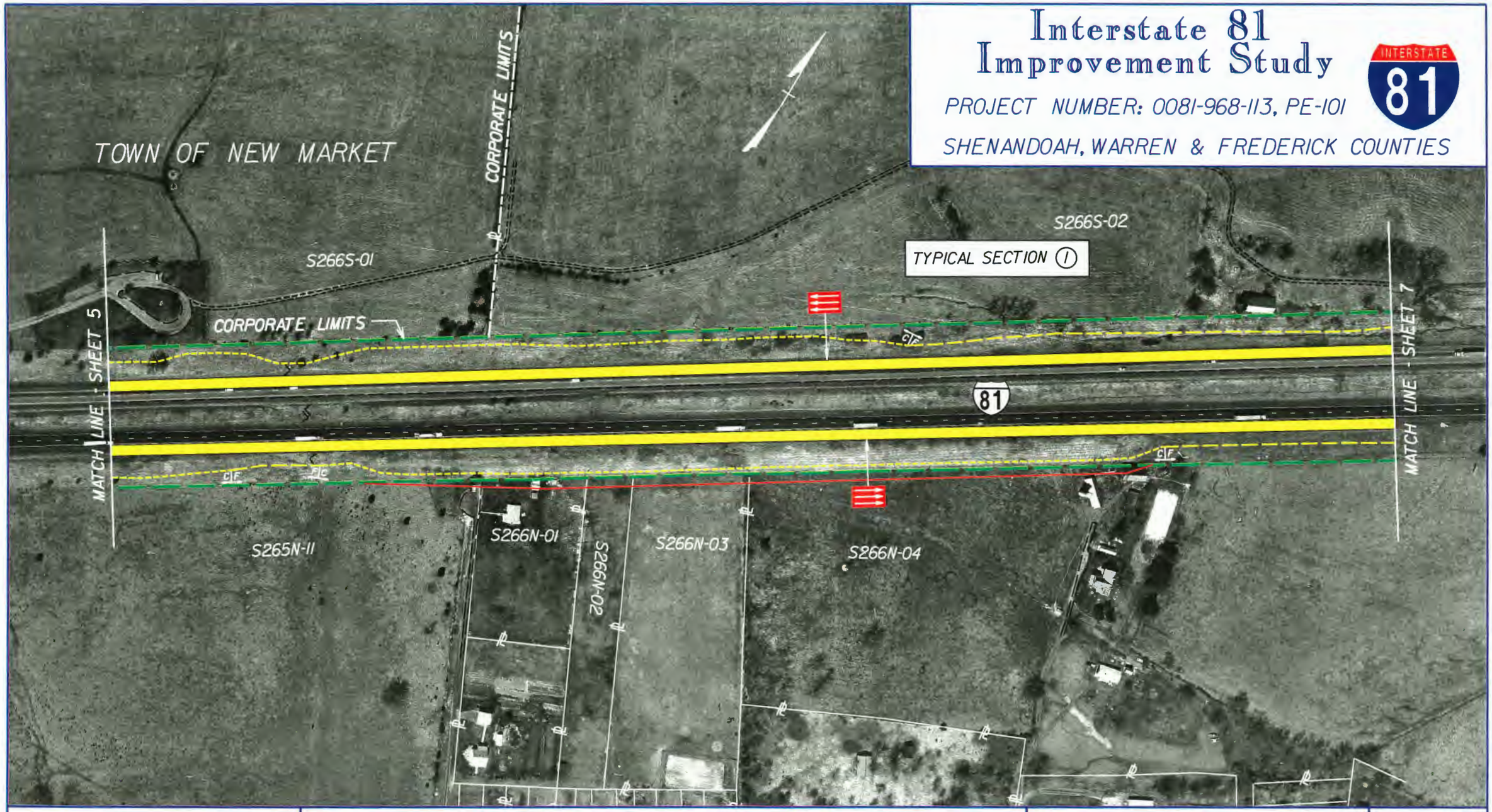
Sheet No.

5

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

6

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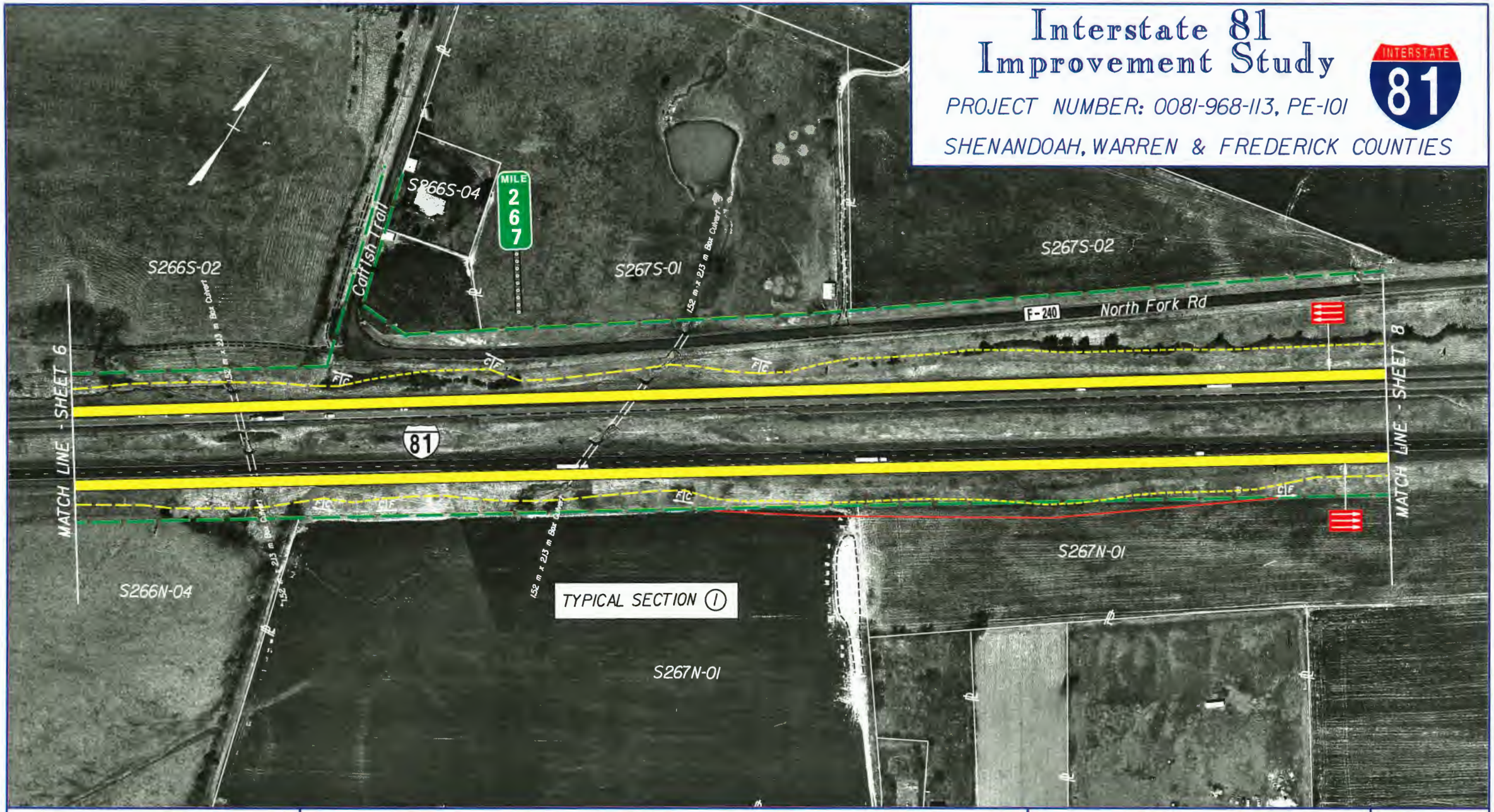
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

7

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81

S267S-03

S267S-04

S267S-05

Quicksburg Rd

F-240 North Fork Rd

Potential Stormwater Management Basin

81

767

S267N-01

S267N-02

S267N-02

S268N-01

TYPICAL SECTION 1

MATCH LINE - SHEET 7

MATCH LINE - SHEET 9

Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

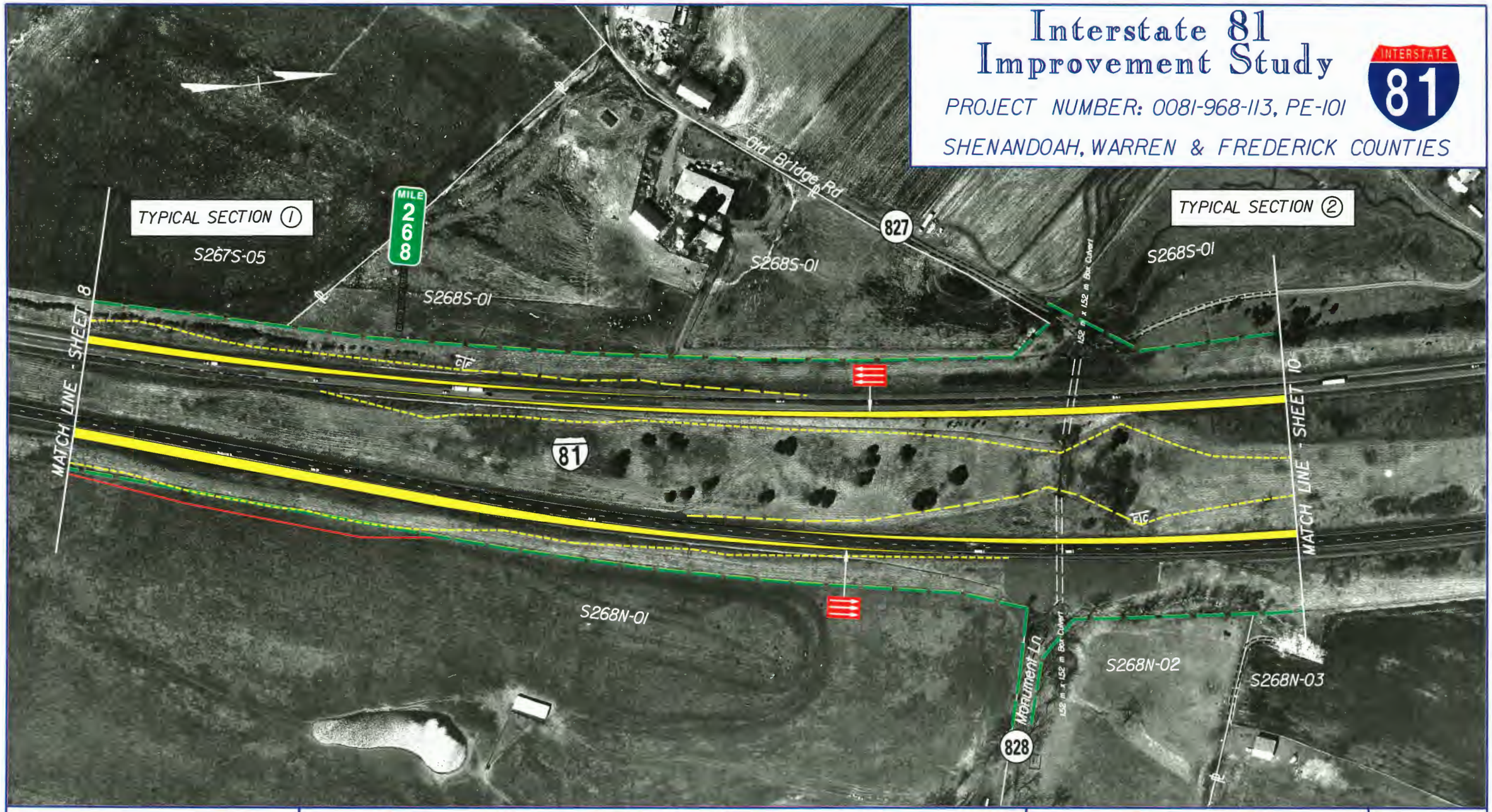
Sheet No.

8

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

9

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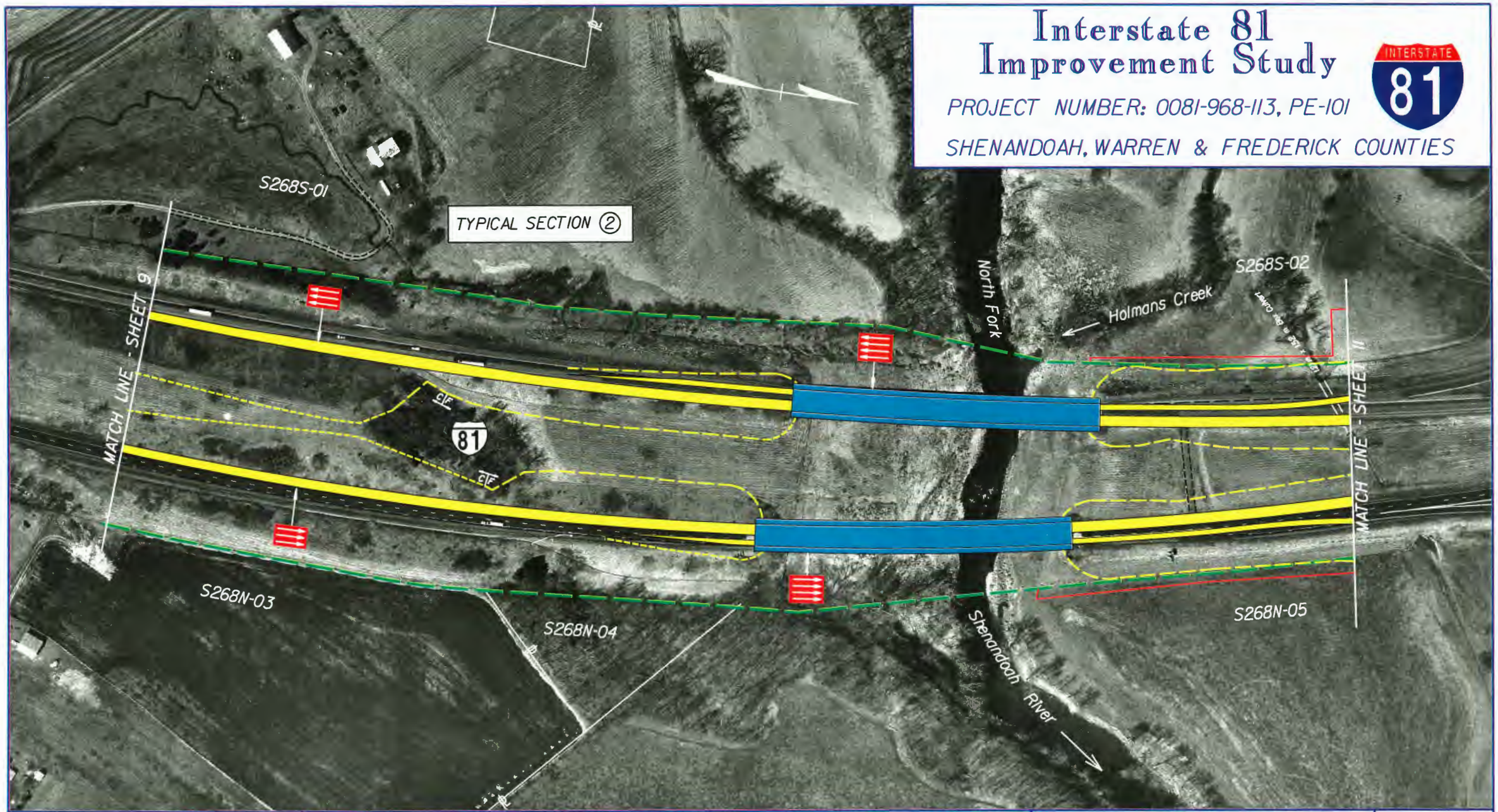
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

10

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81

EXIT 269
ROUTE 730

Holmans Creek

Coverns Rd

730

S268S-02

End Existing Limited Access

Begin Existing Limited Access

MILE 269

Potential Stormwater Management Basin

S269S-01

Coverns Rd

S269S-02

TYPICAL SECTION ②

Potential Stormwater Management Basin

S269S-05

S269S-03

S269S-04

S268S-02

MATCH LINE - SHEET 10

MATCH LINE - SHEET 12

81

S268N-05

S269N-05

S269N-04

S269N-03

MATCH LINE - SHEET IIA

To Rte 11

North Fork Shenandoah River

Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

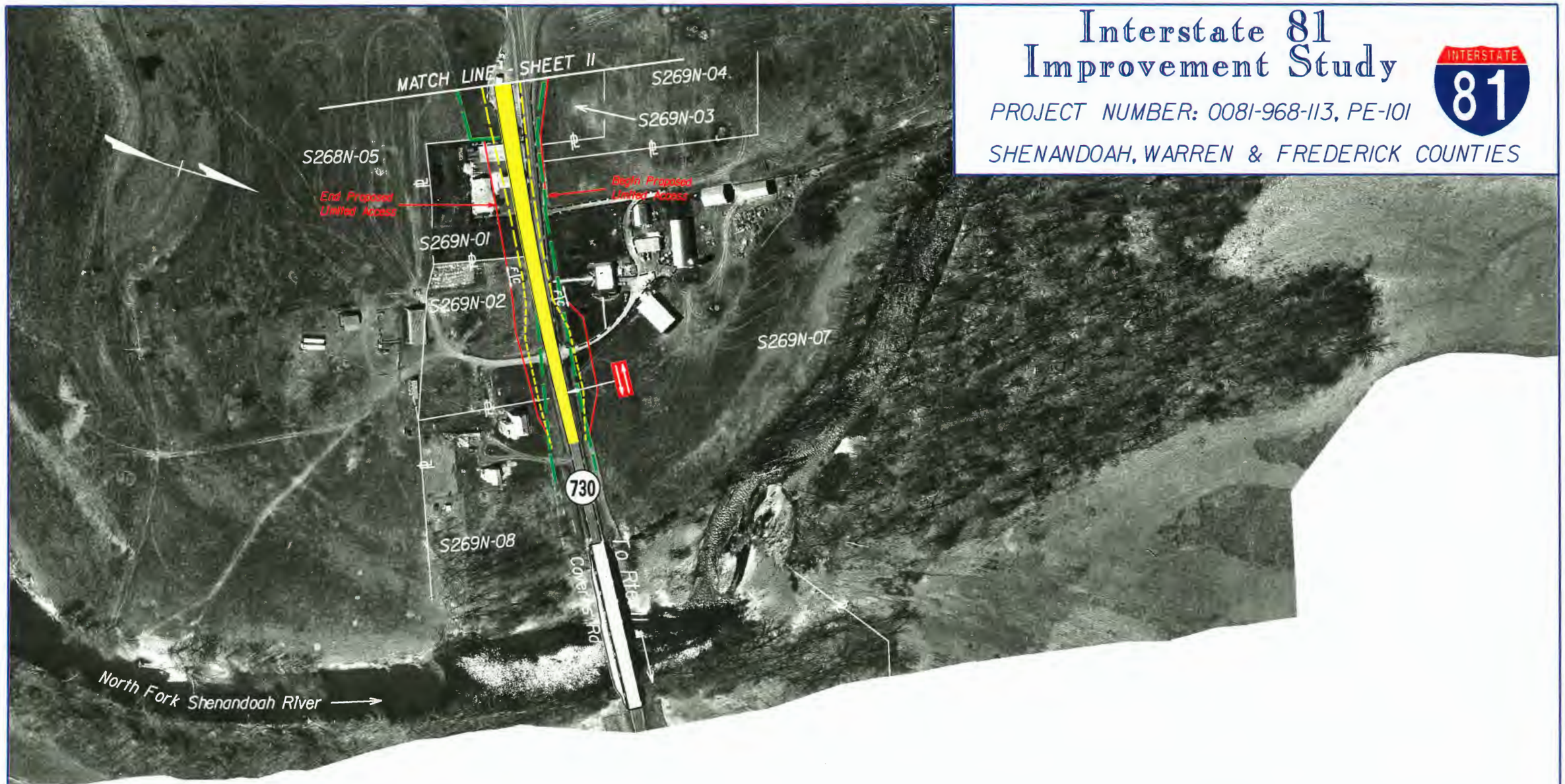
Sheet No.

11

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

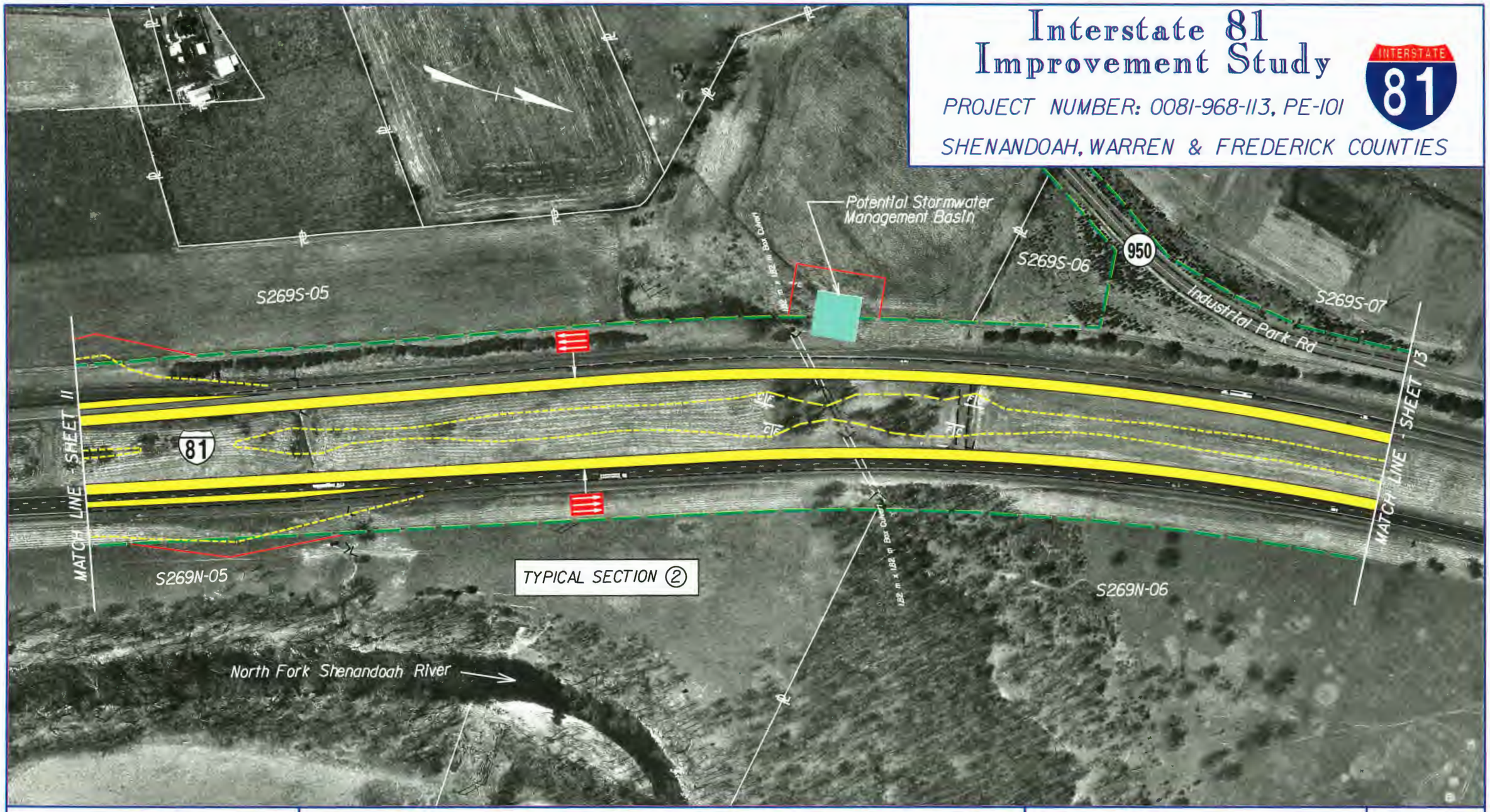
IIA

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

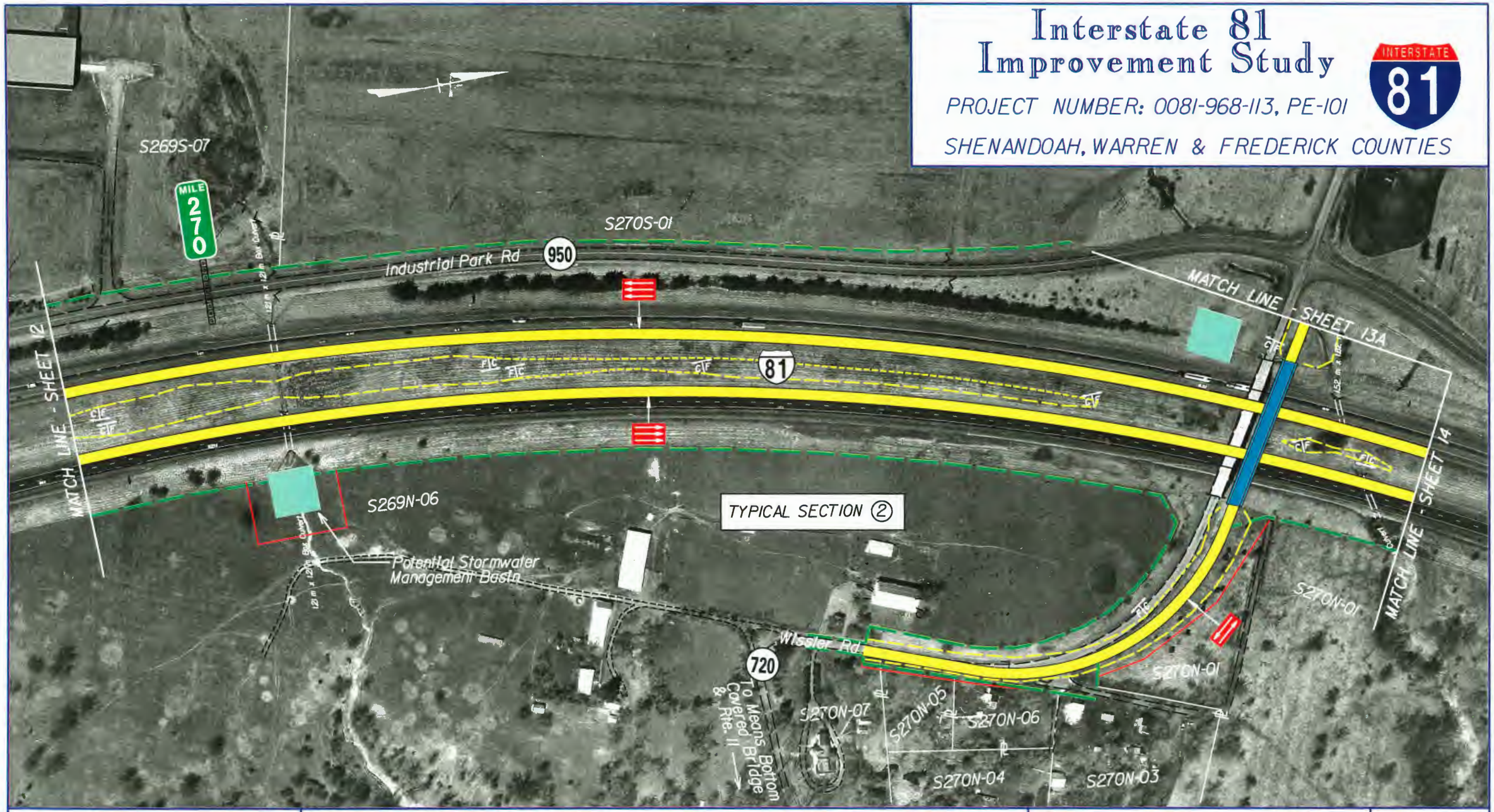
Sheet No.

12

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

13

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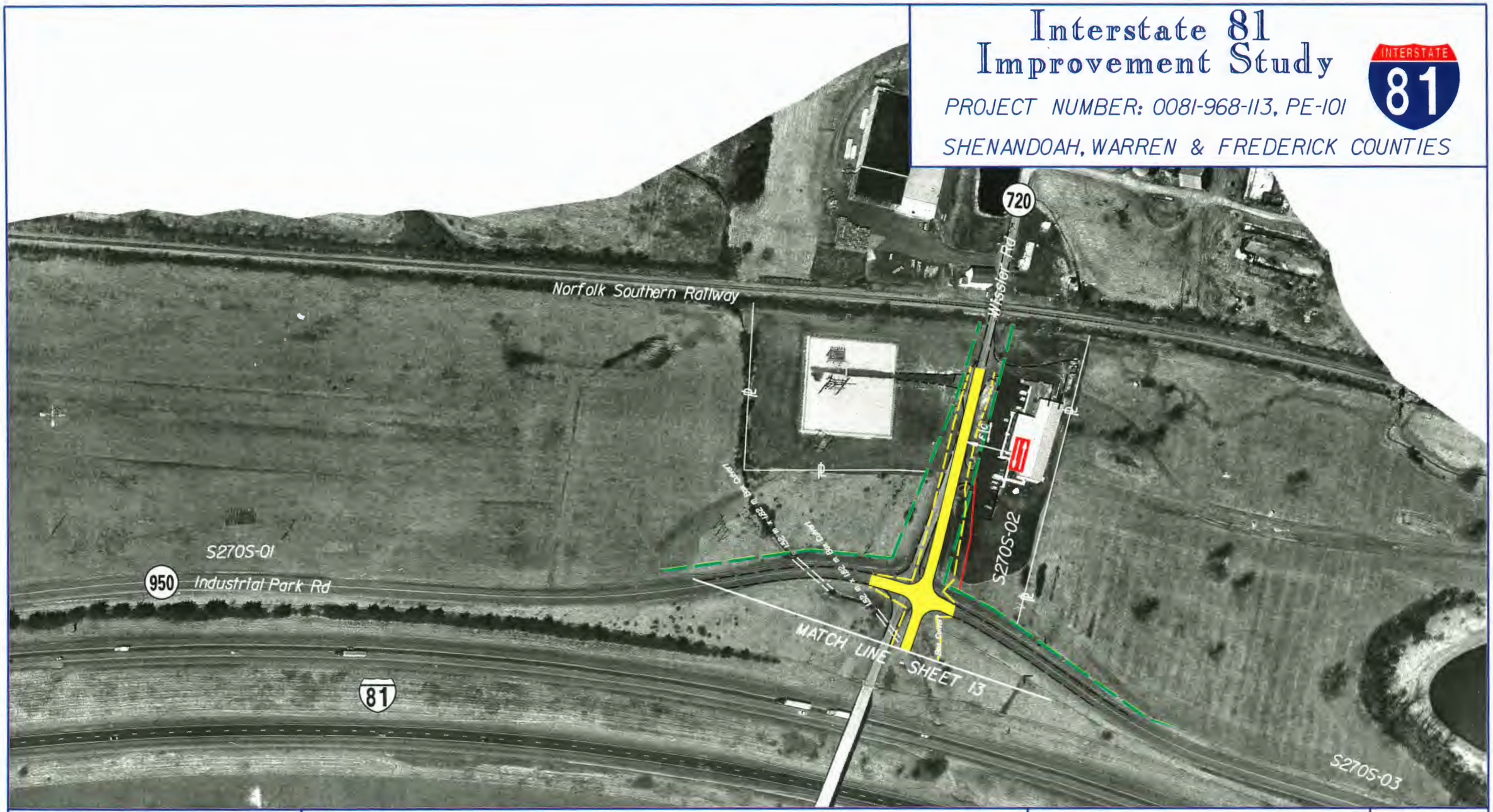
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

13A

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81

S270S-04

S270S-03

Industrial Park Rd

950

S270S-05

S270S-06

MILE 271

MATCH LINE - SHEET 13

MATCH LINE - SHEET 15

81

S270N-01

TYPICAL SECTION 2

S270N-02

Potential Stormwater Management Basin

Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

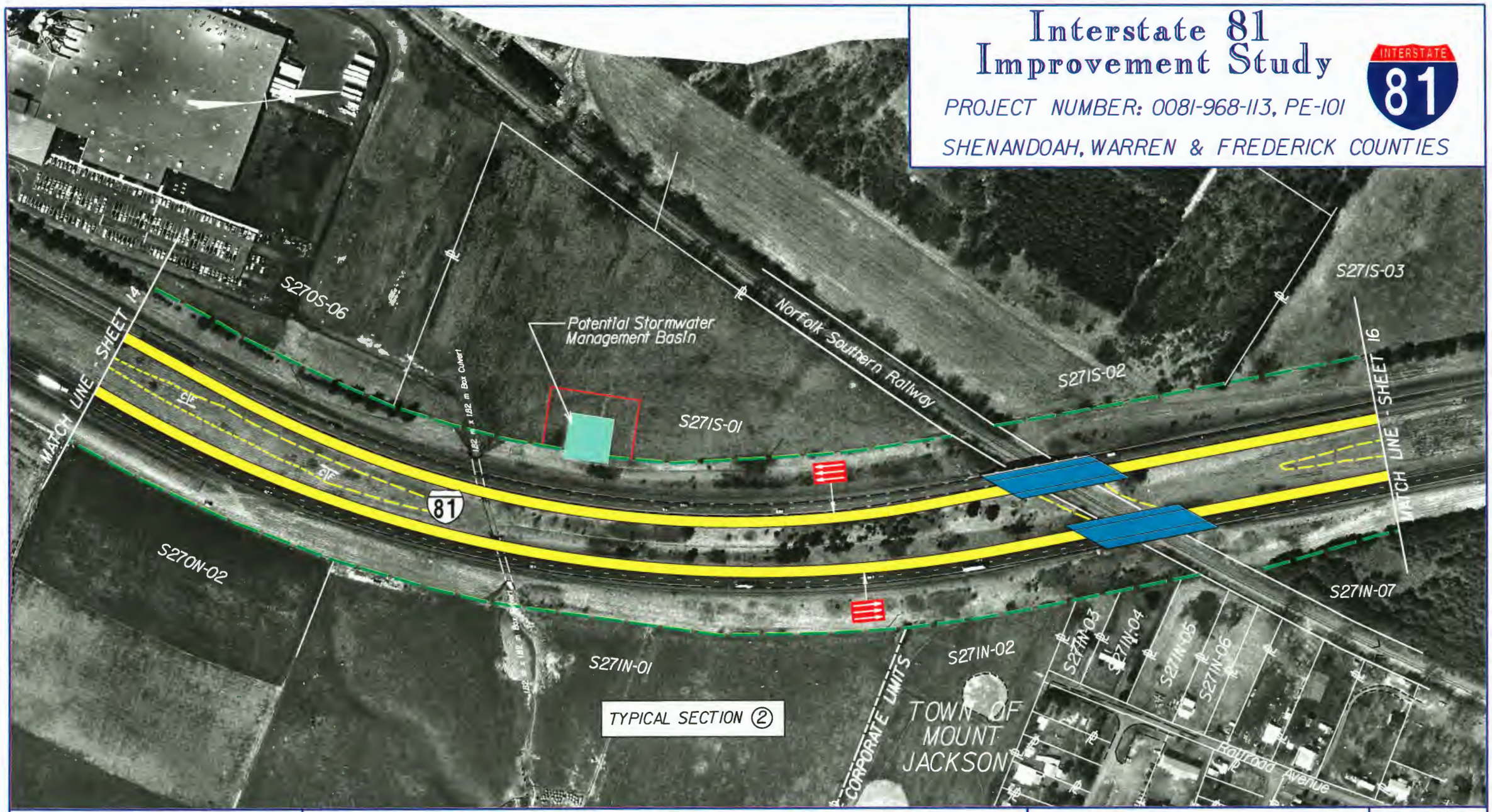
Sheet No.

14

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

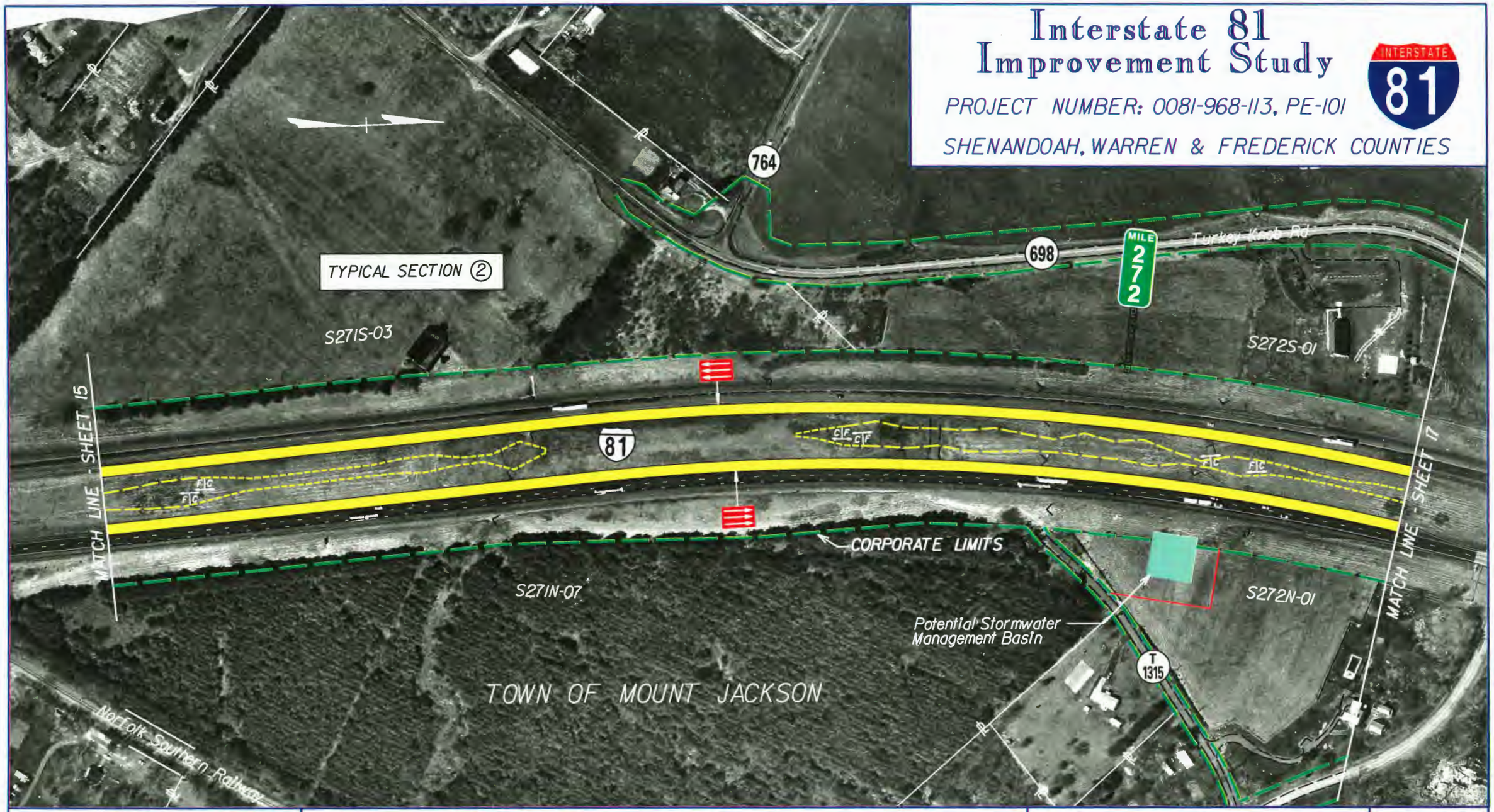
Sheet No.

15

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

16

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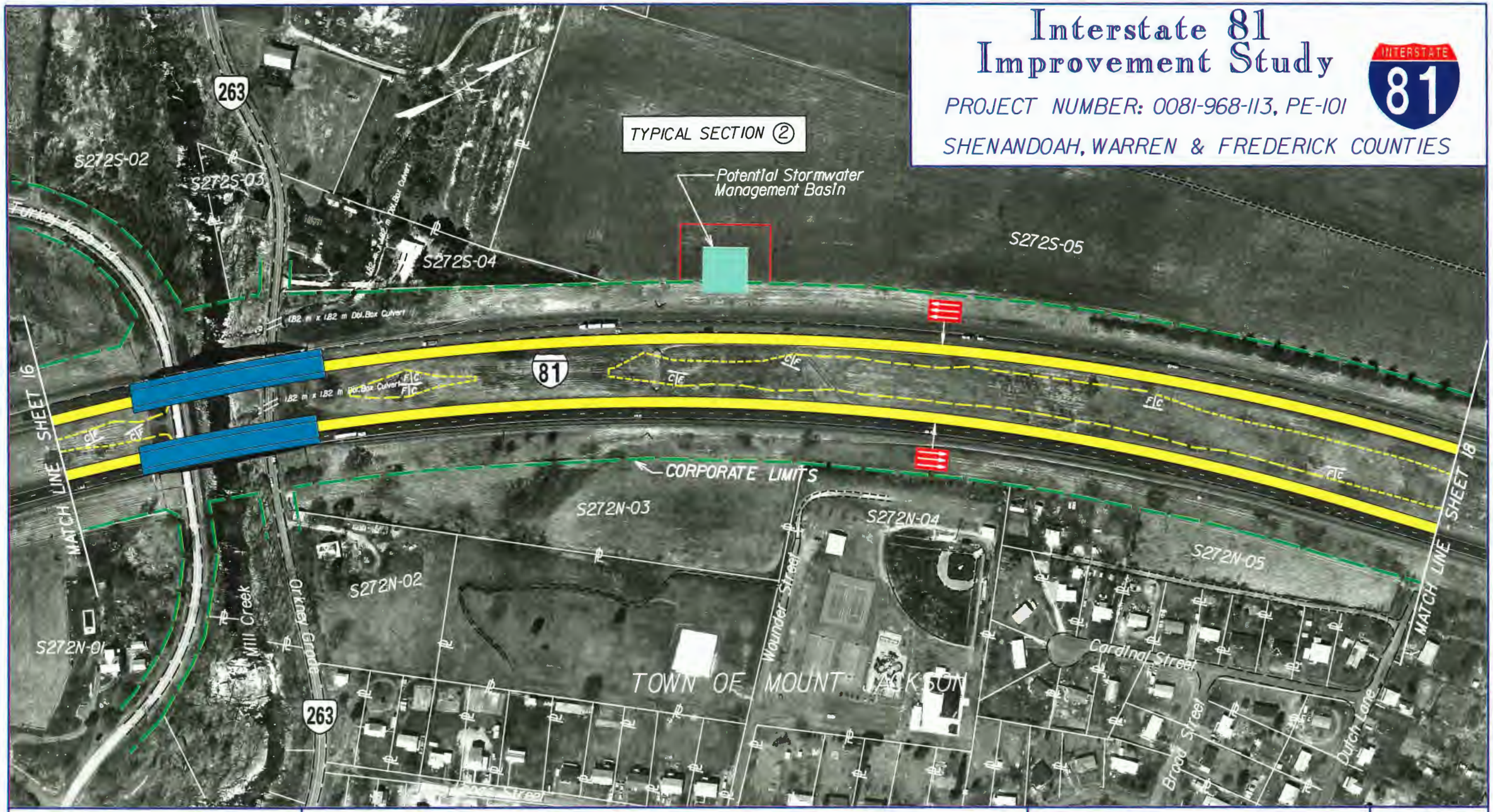
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

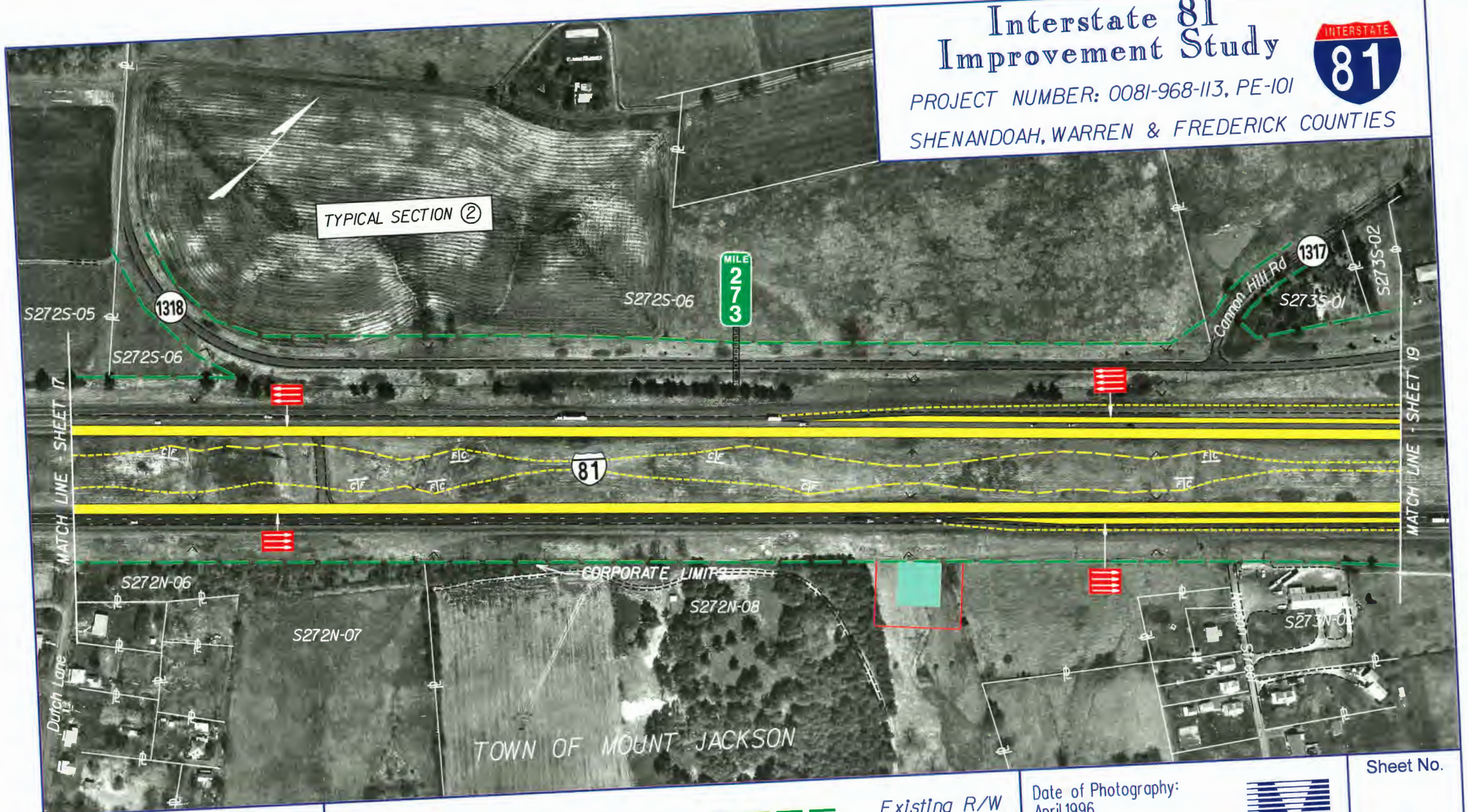
VDOT METRIC

Sheet No. 17

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

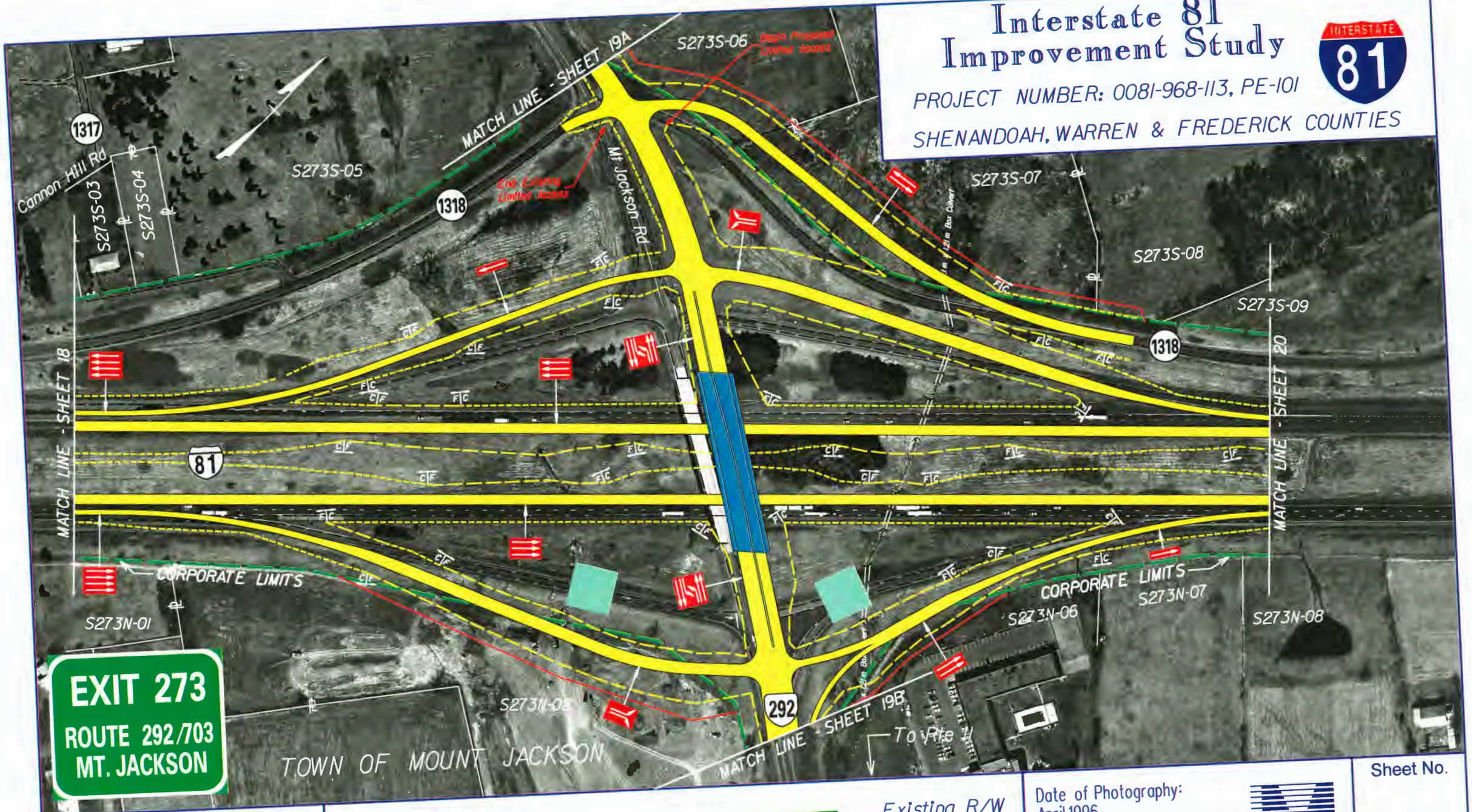
Sheet No.

18

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

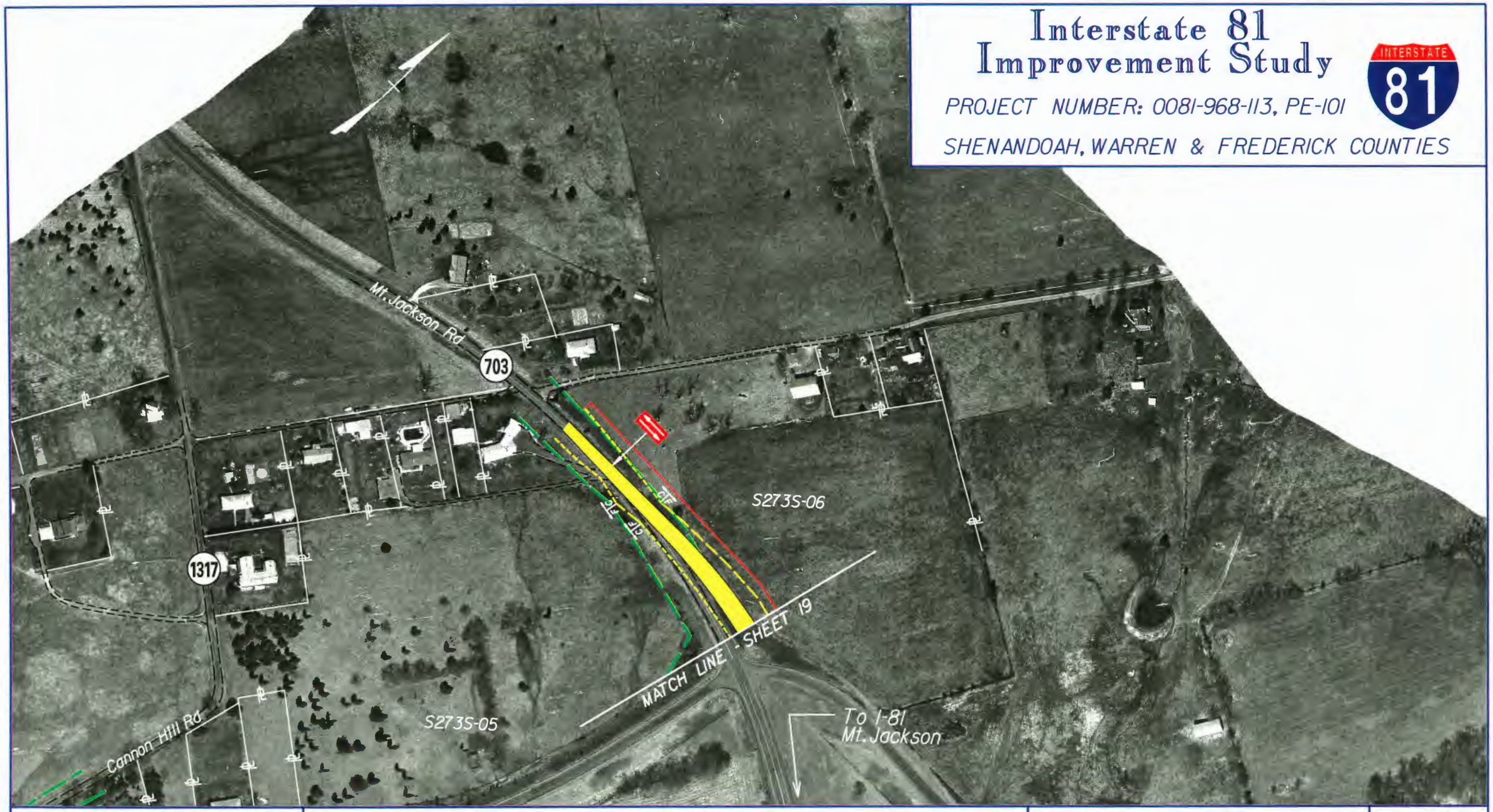
Sheet No.

19

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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VDOT METRIC

Sheet No.

19A

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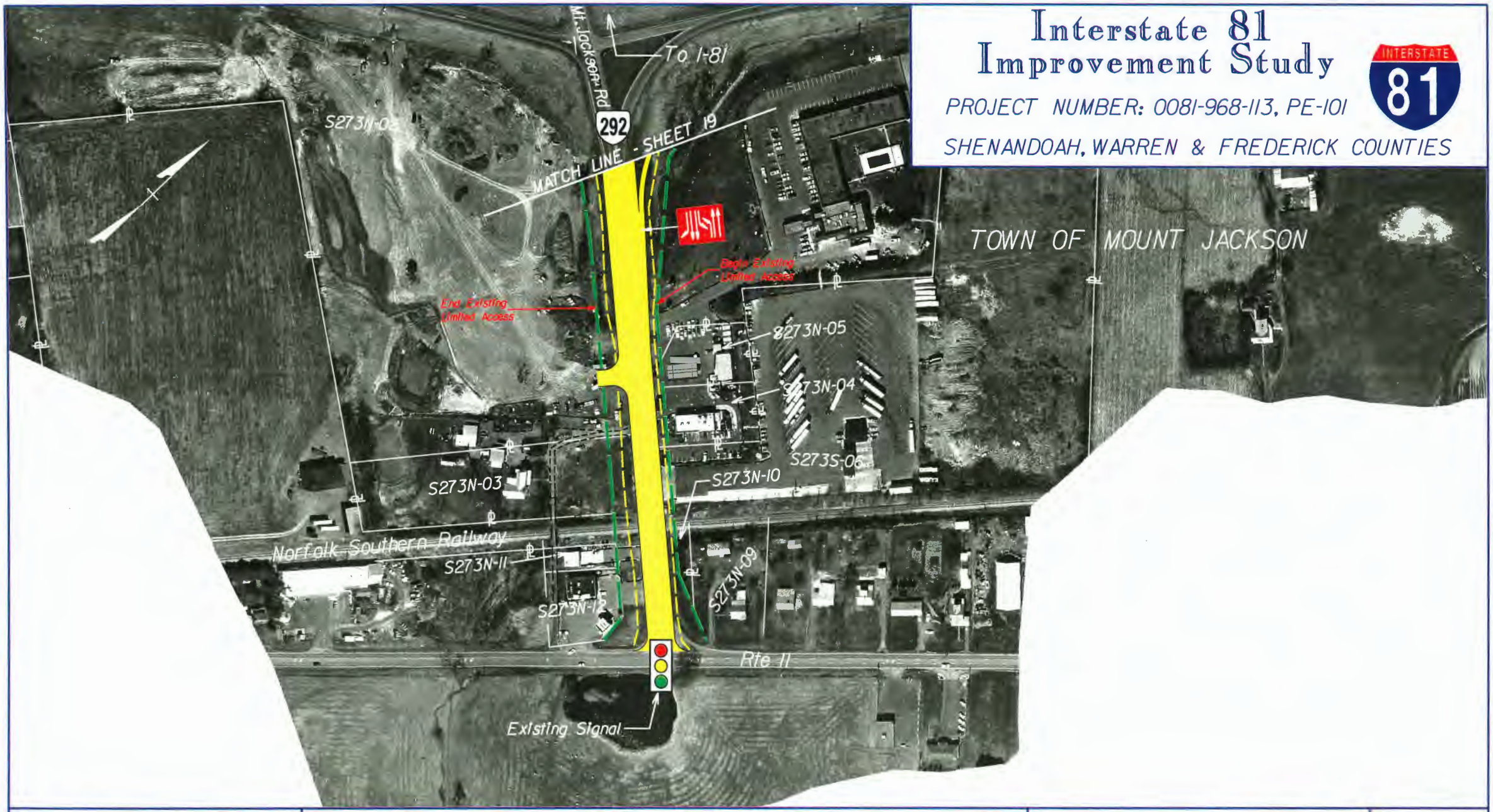
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

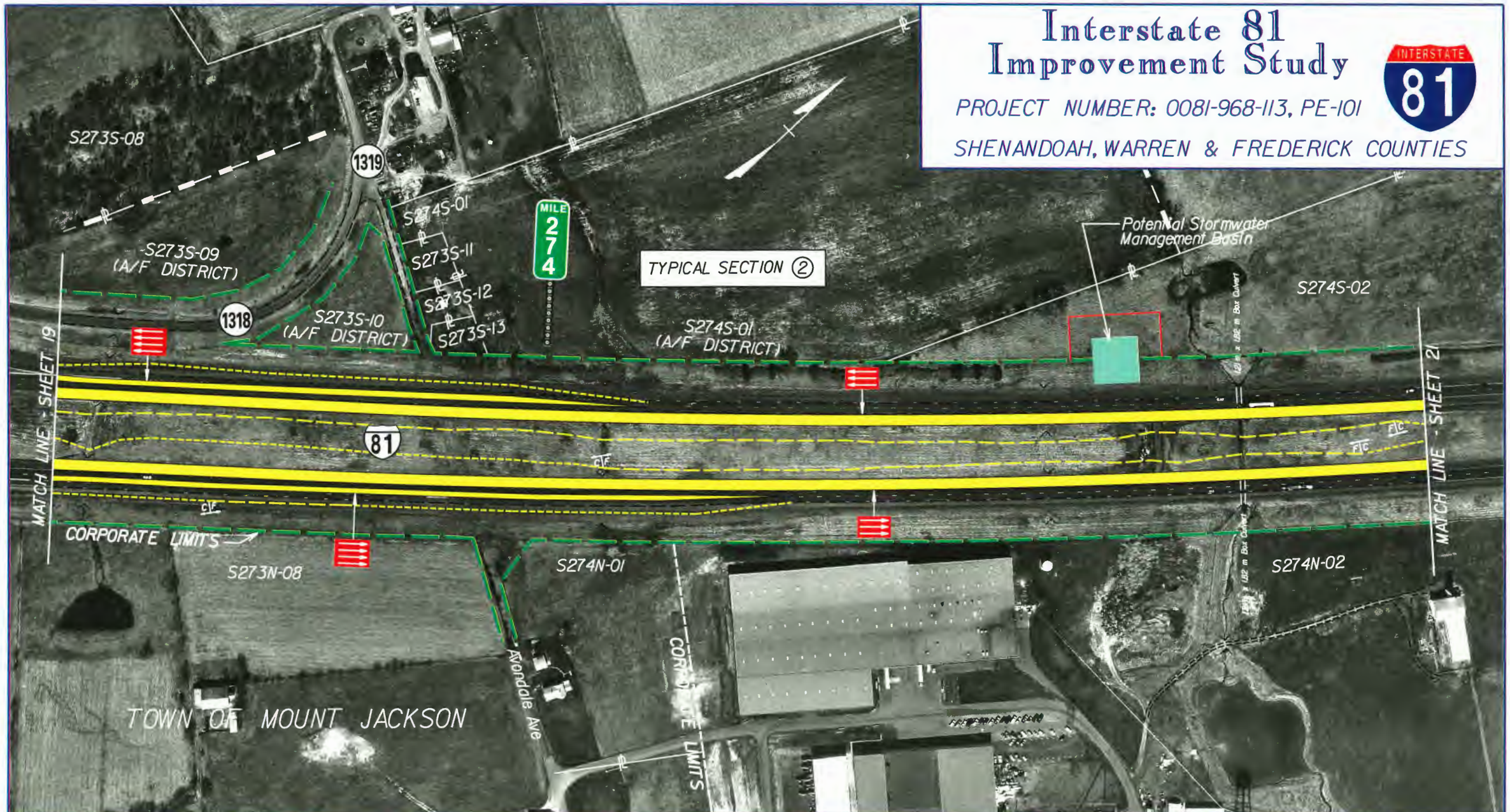
Sheet No.

19B

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

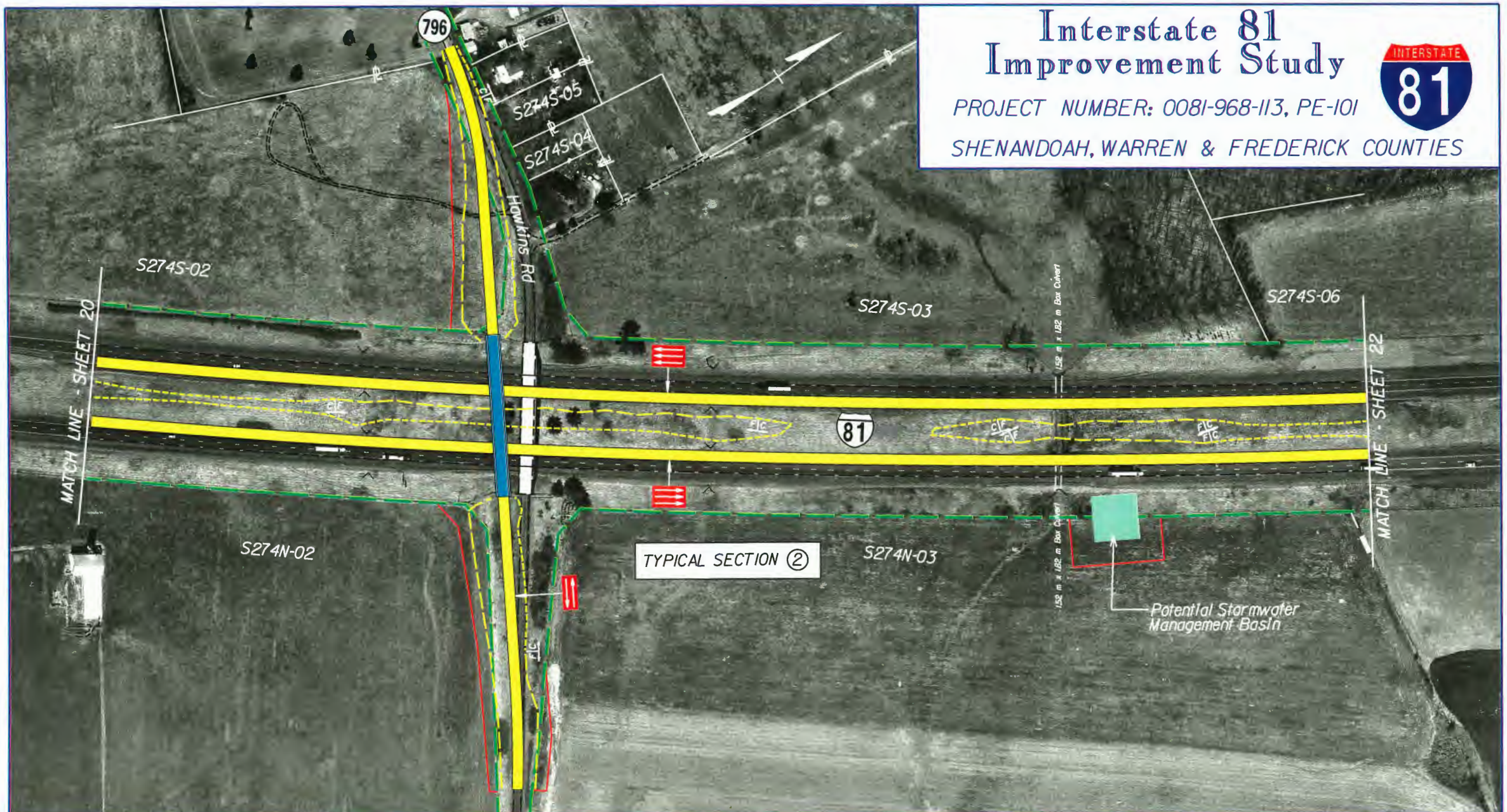
Sheet No.

20

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

21

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

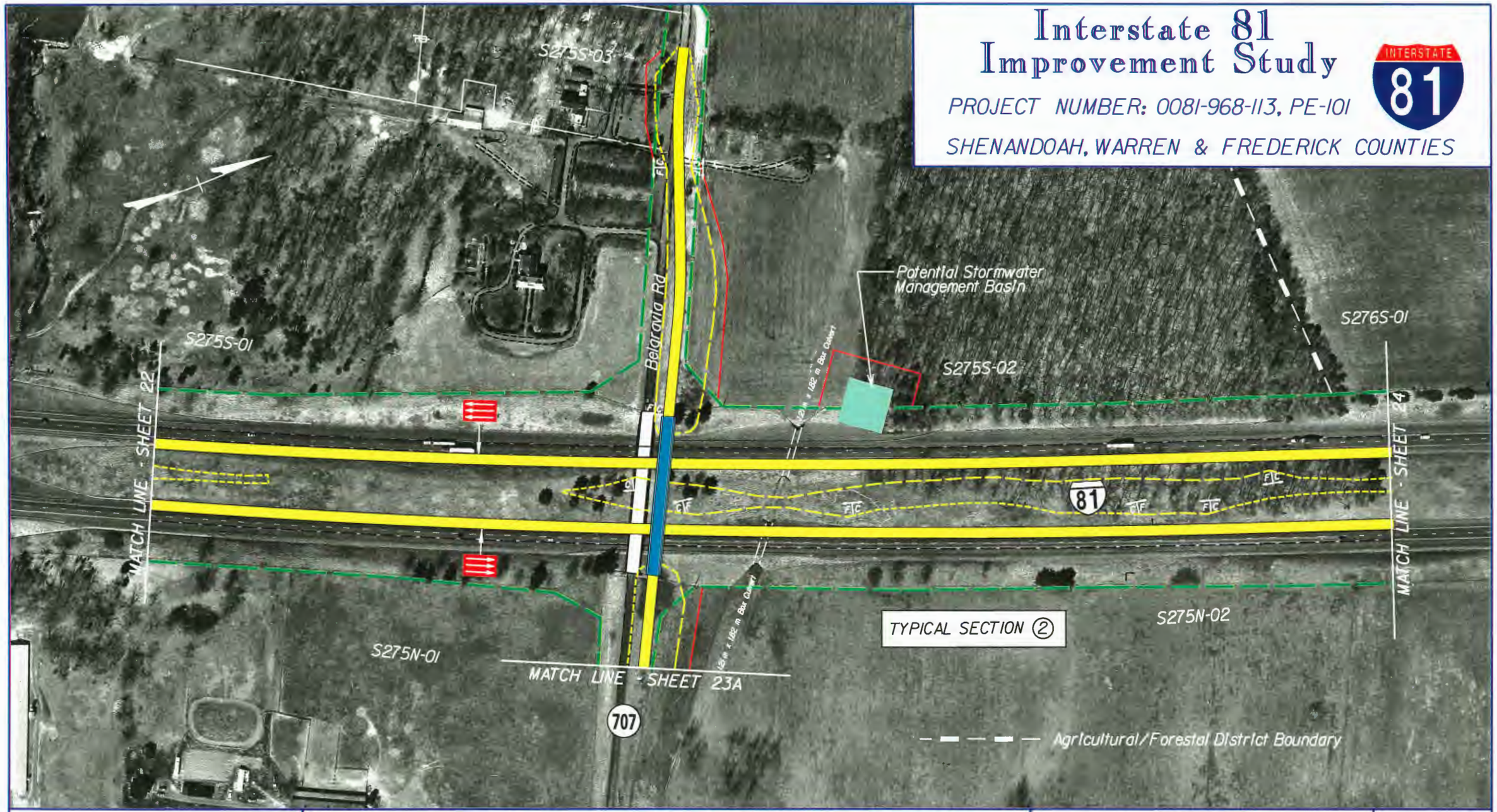
Sheet No.

22

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

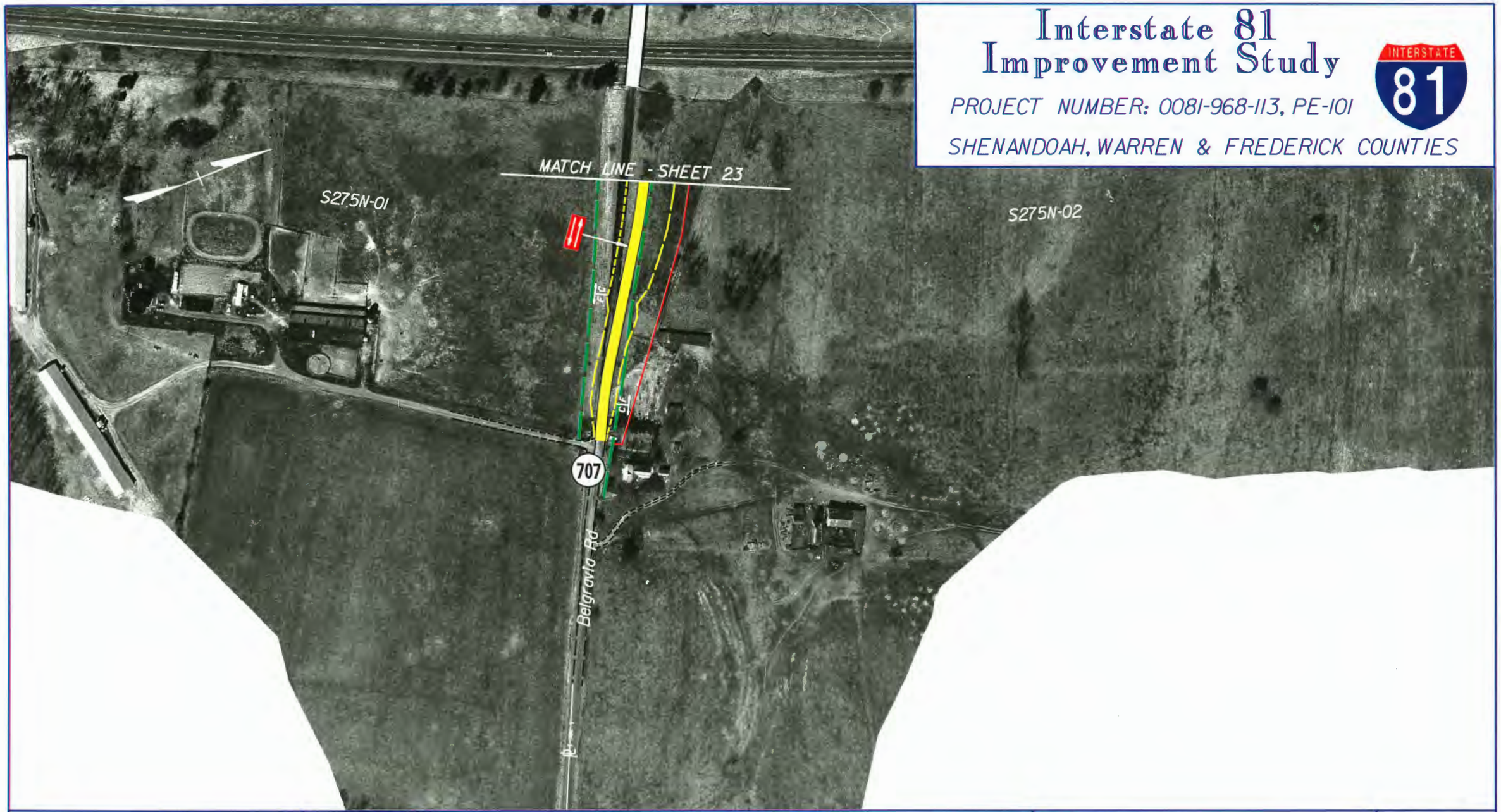
VDOT METRIC

Sheet No. 23

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

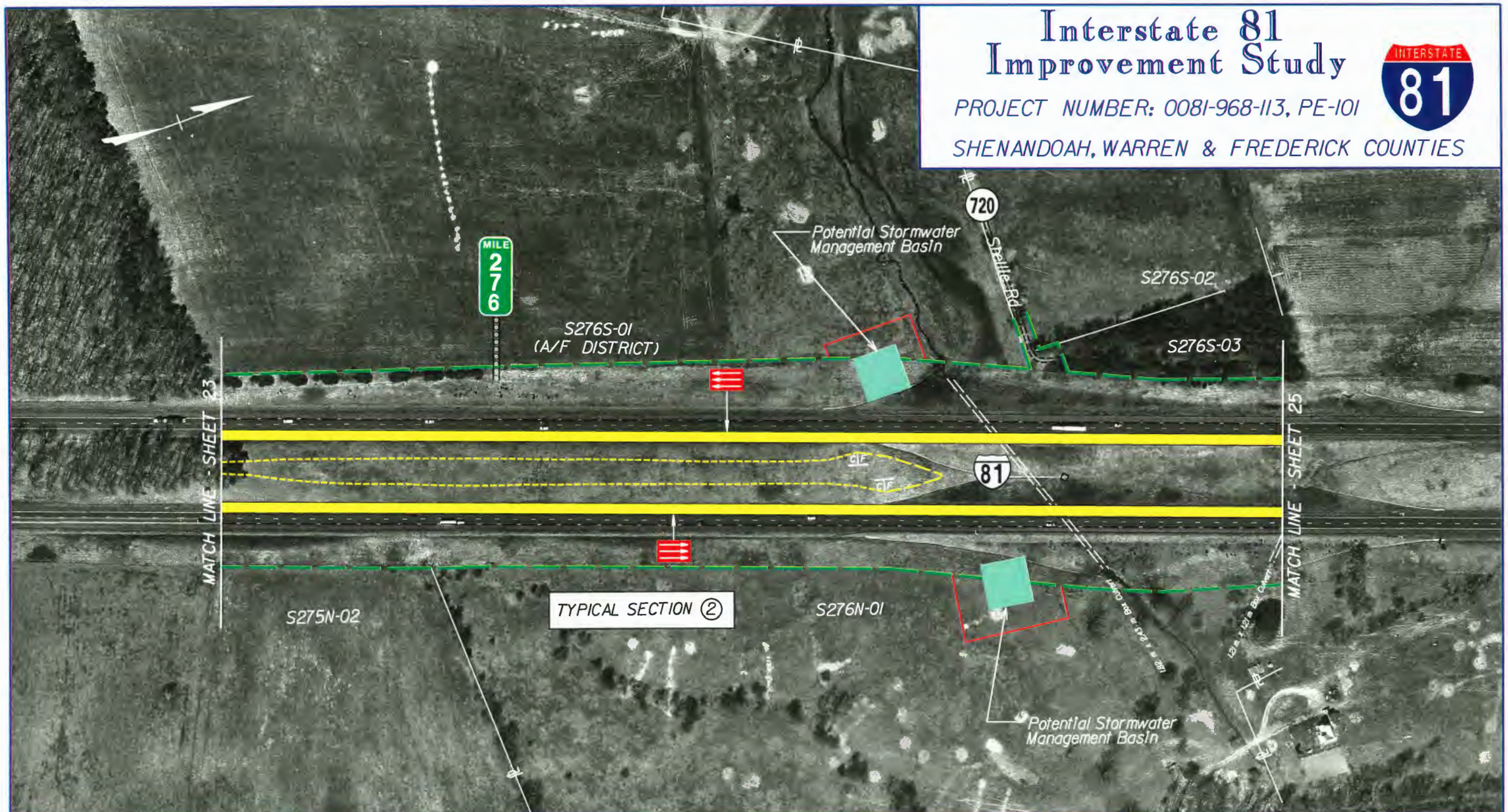
Sheet No.

23A

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

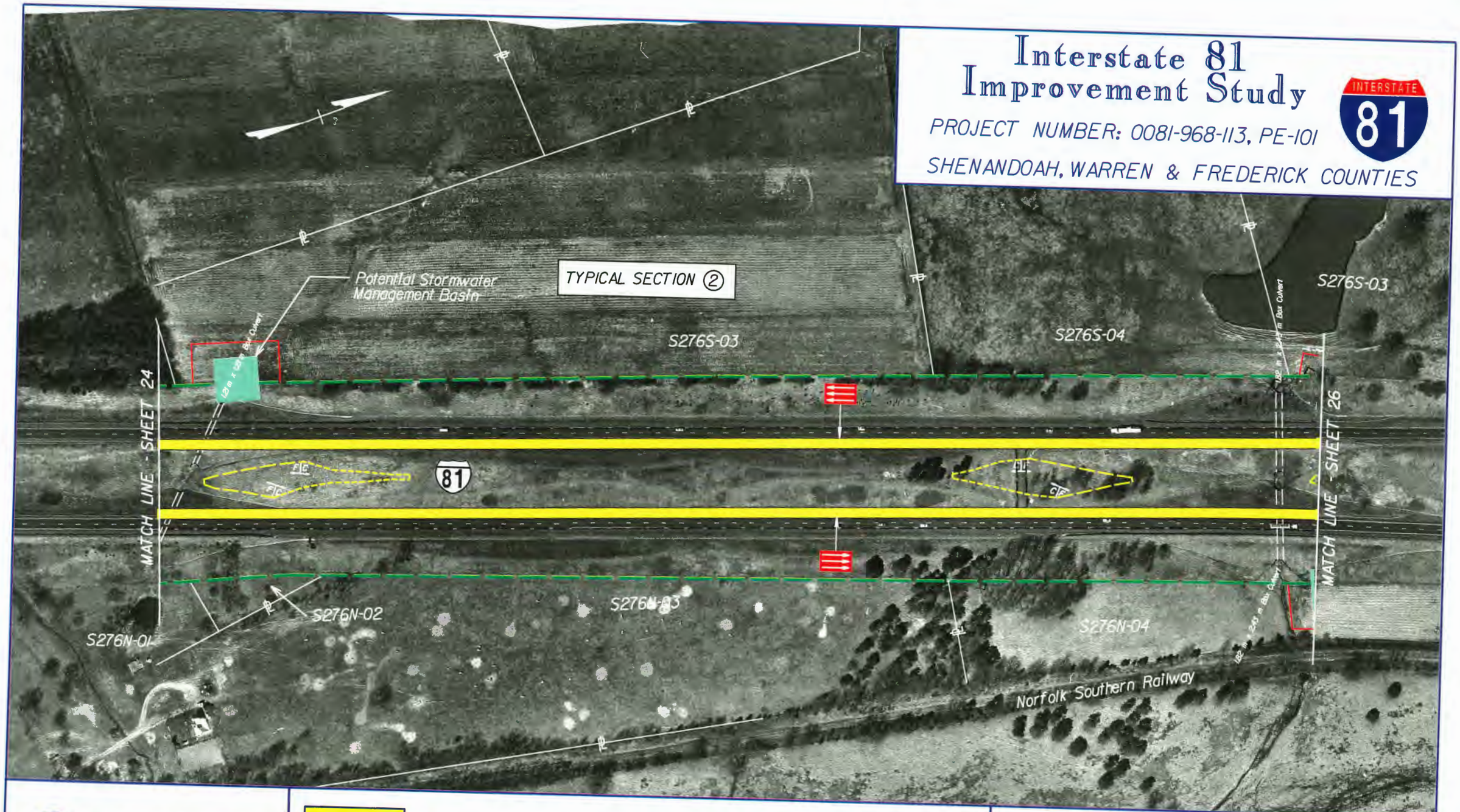
24

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

25

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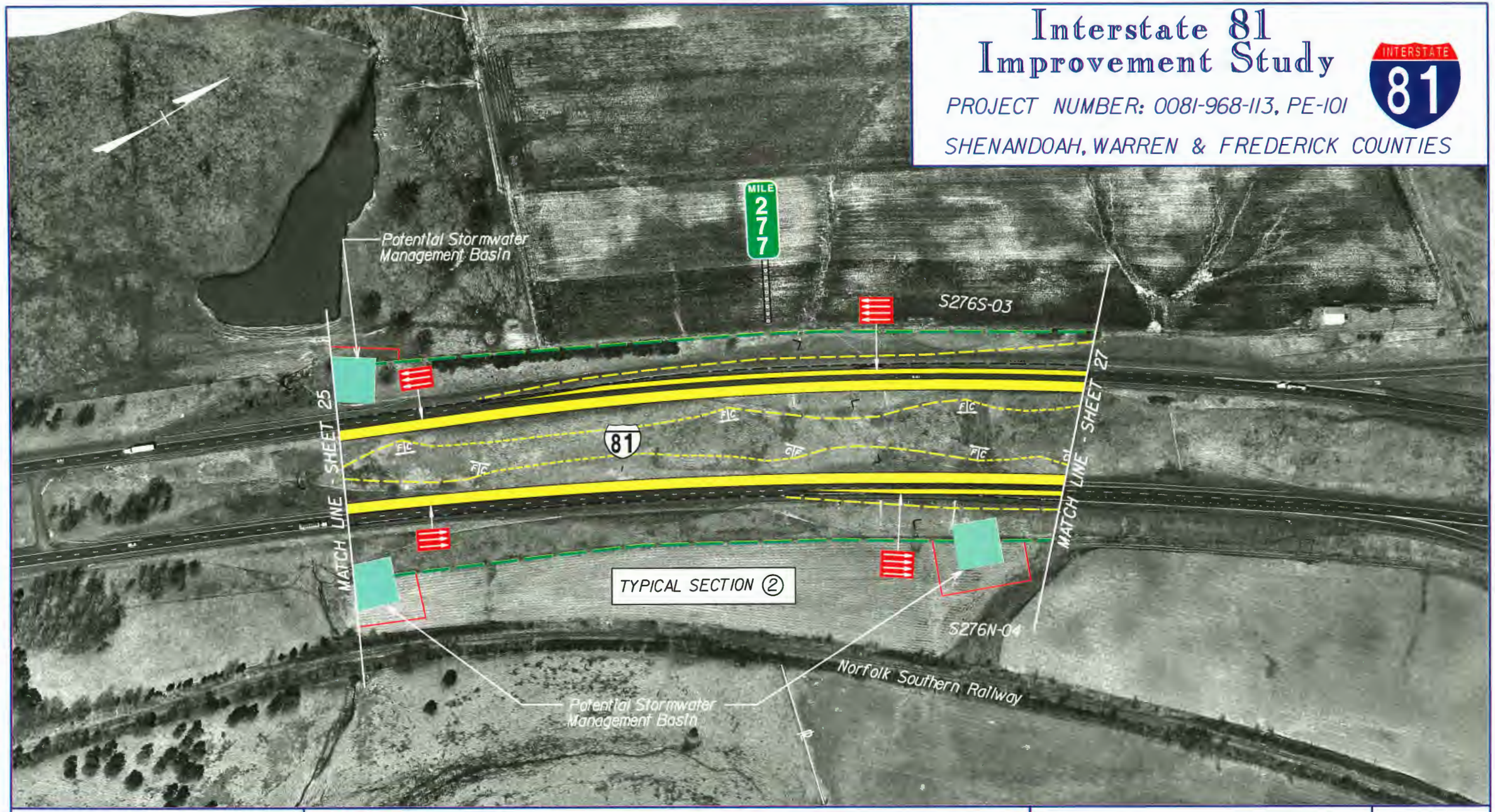
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

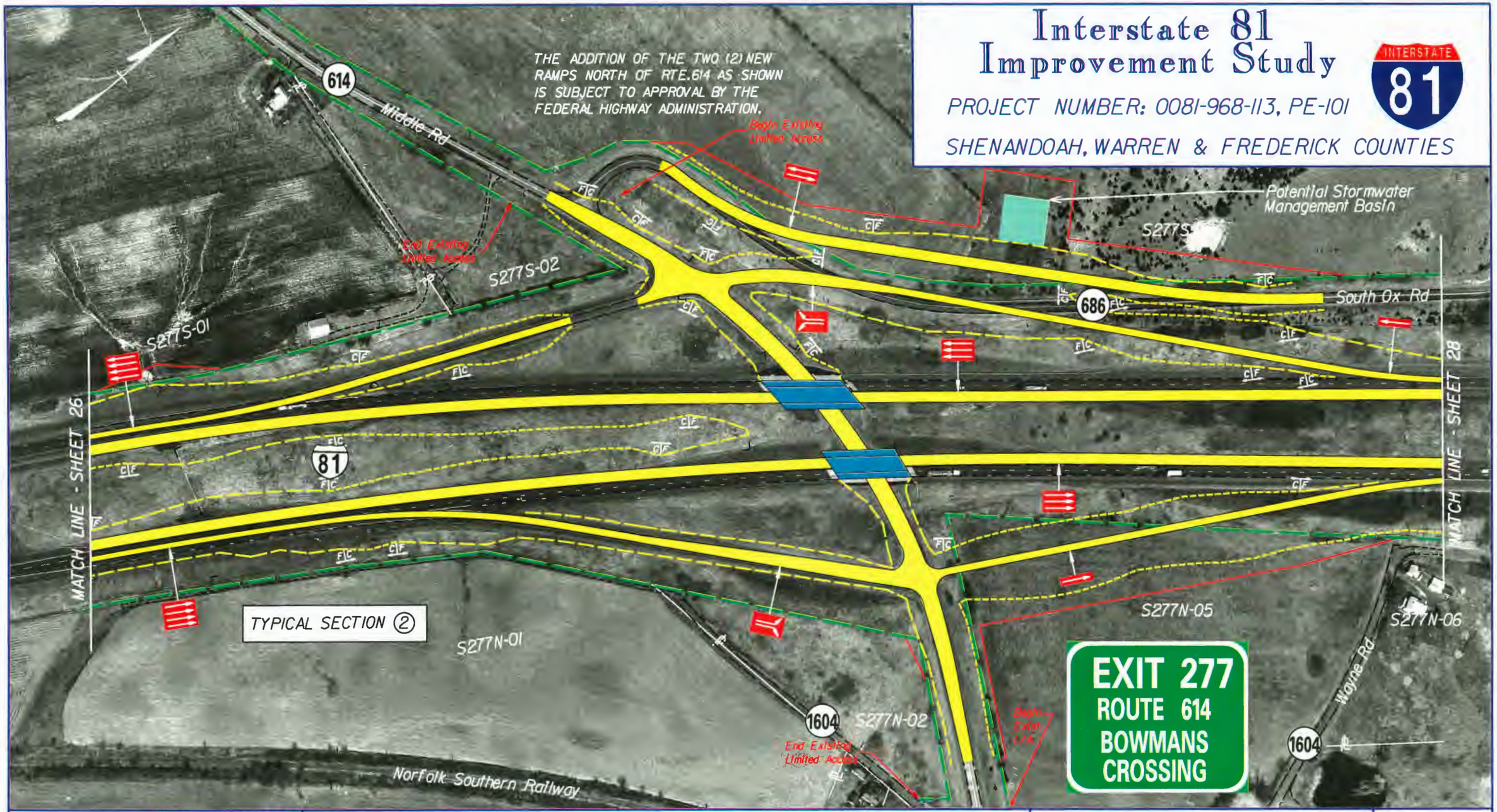
Sheet No.

26

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

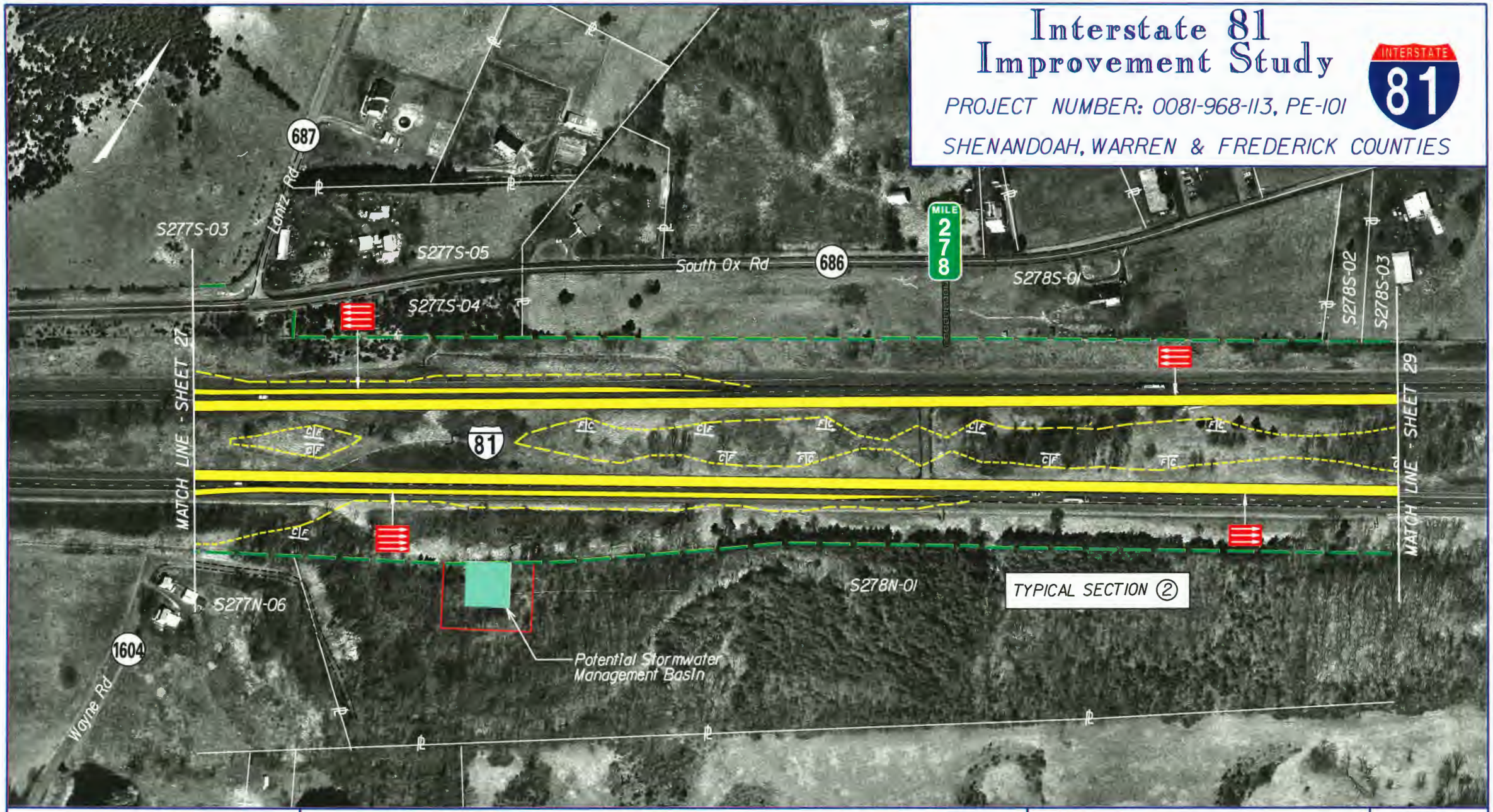
Sheet No.

27

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

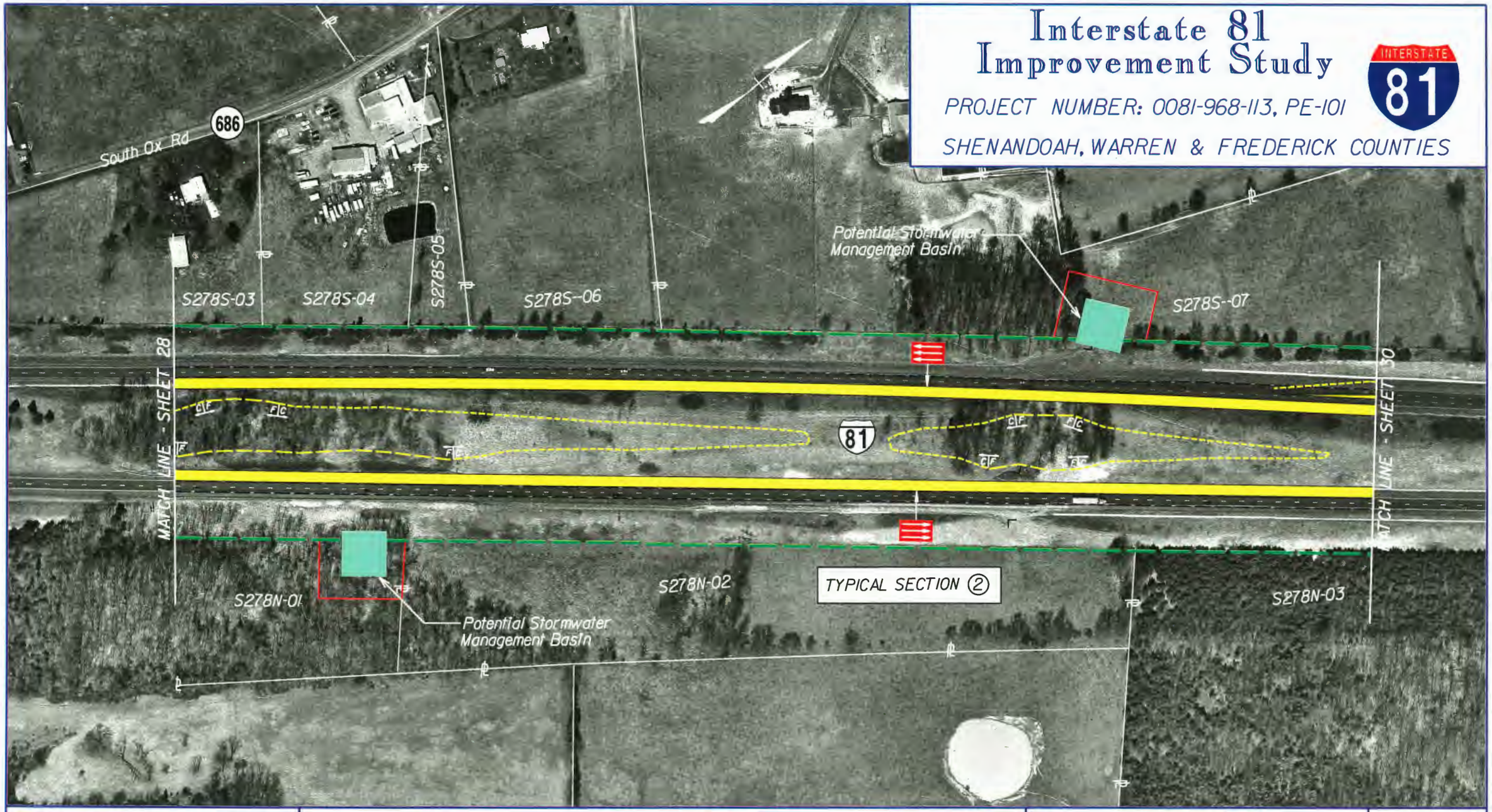
Sheet No.

28

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

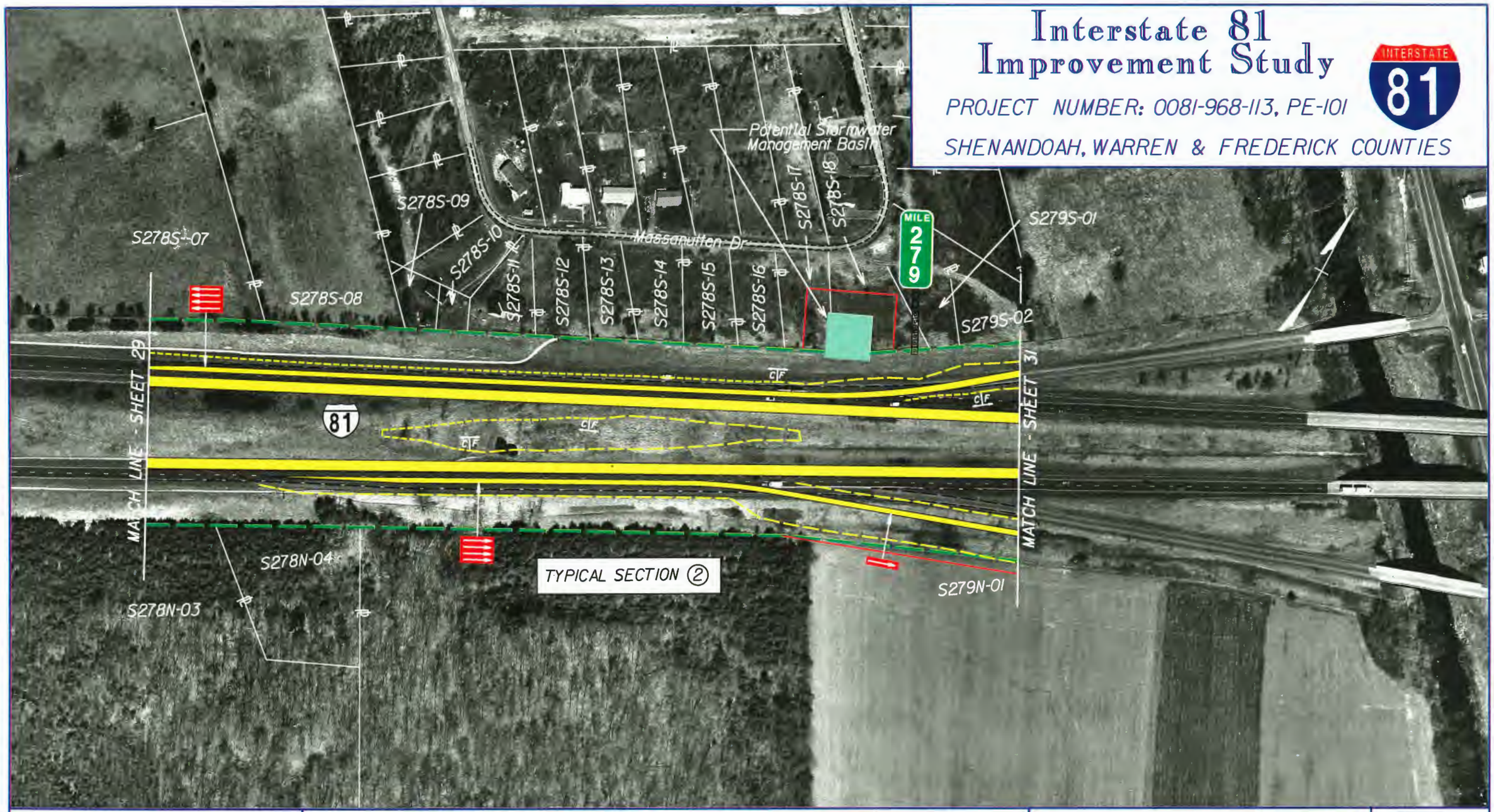
Sheet No.

29

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

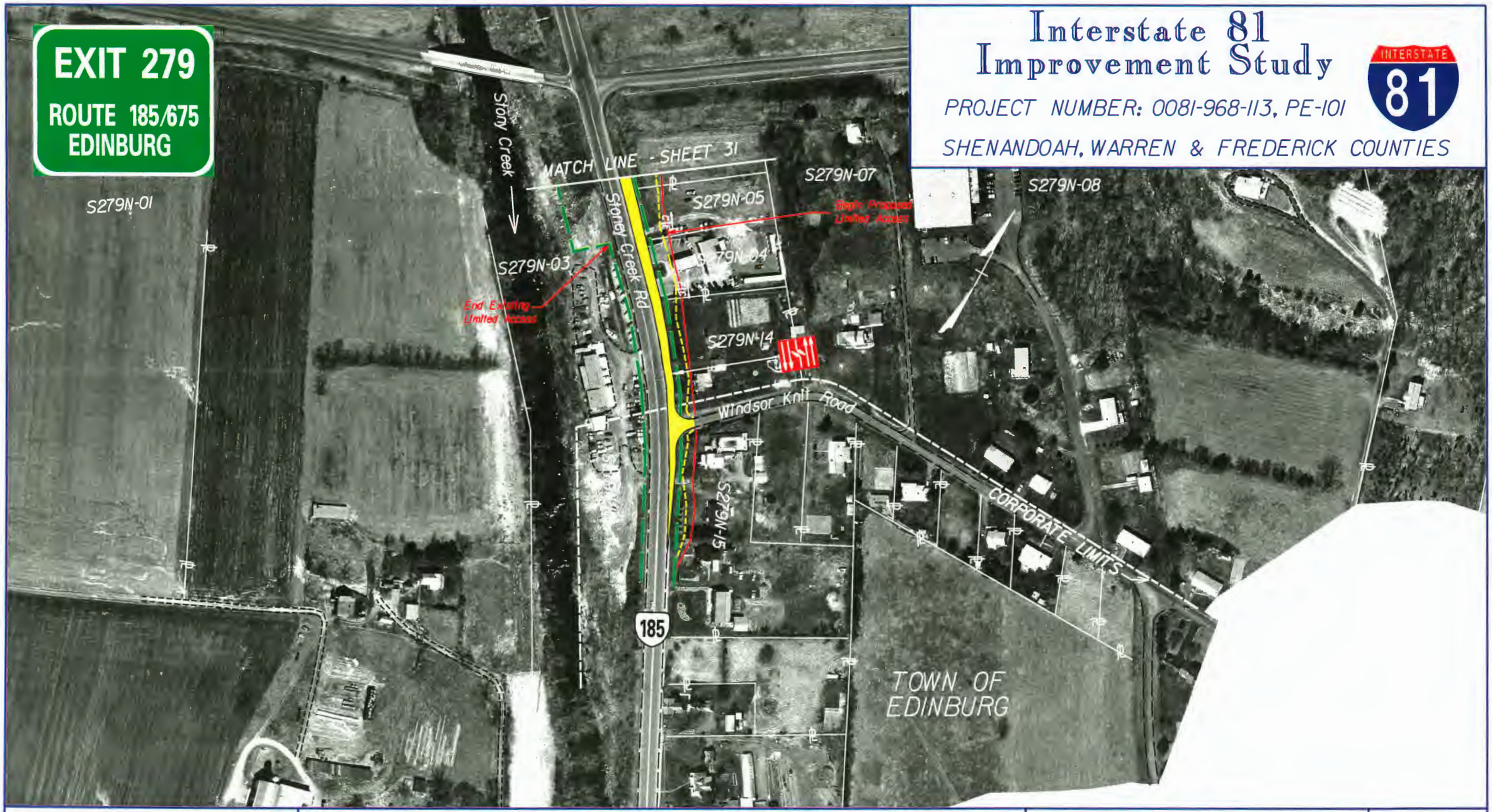
30

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormw Managemer

Date of Photography: April 1996

SCALE 1 : 2500

50 m 100 m

VDOT METRIC

Sheet No.

31A

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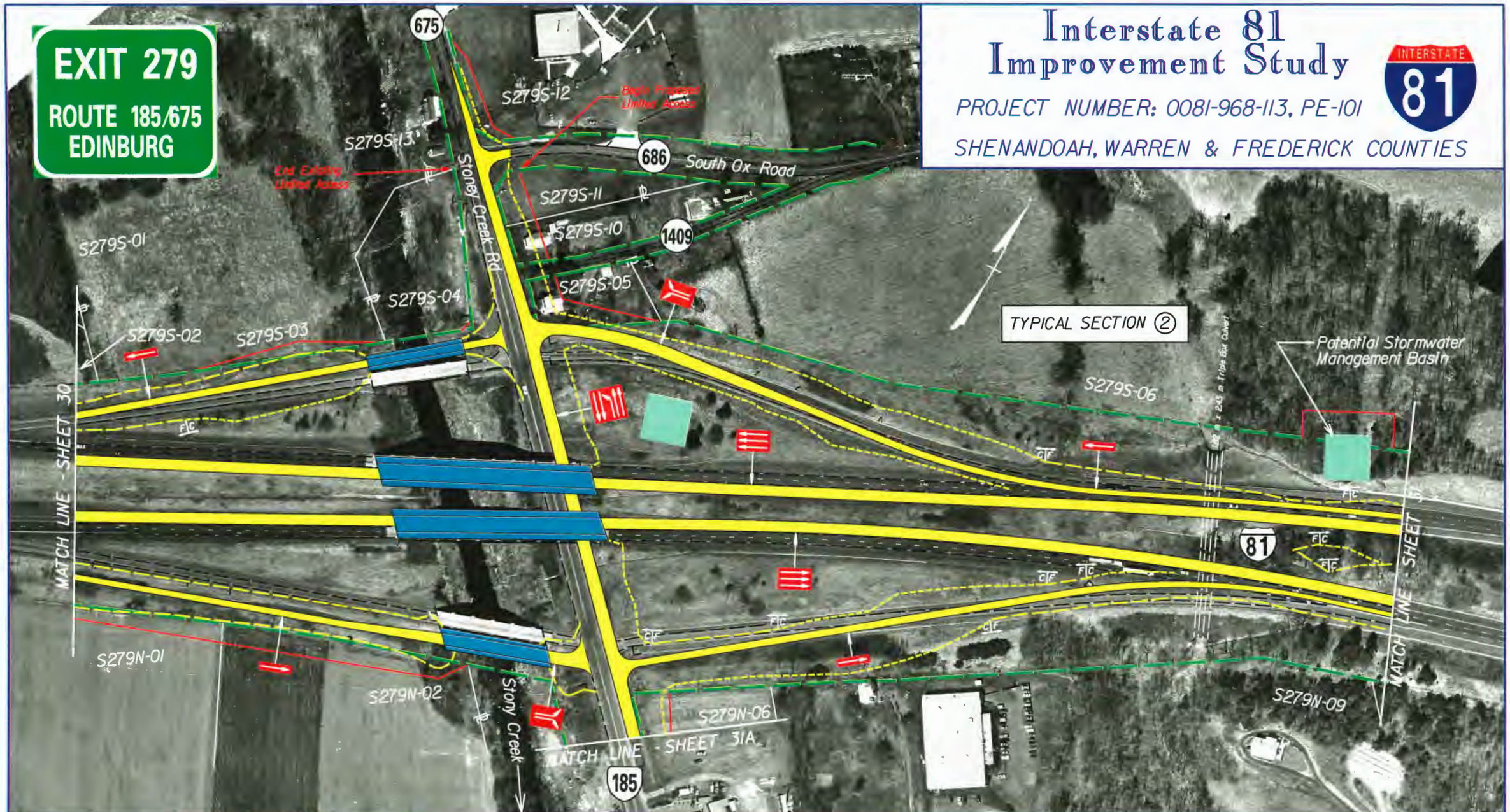
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

31

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

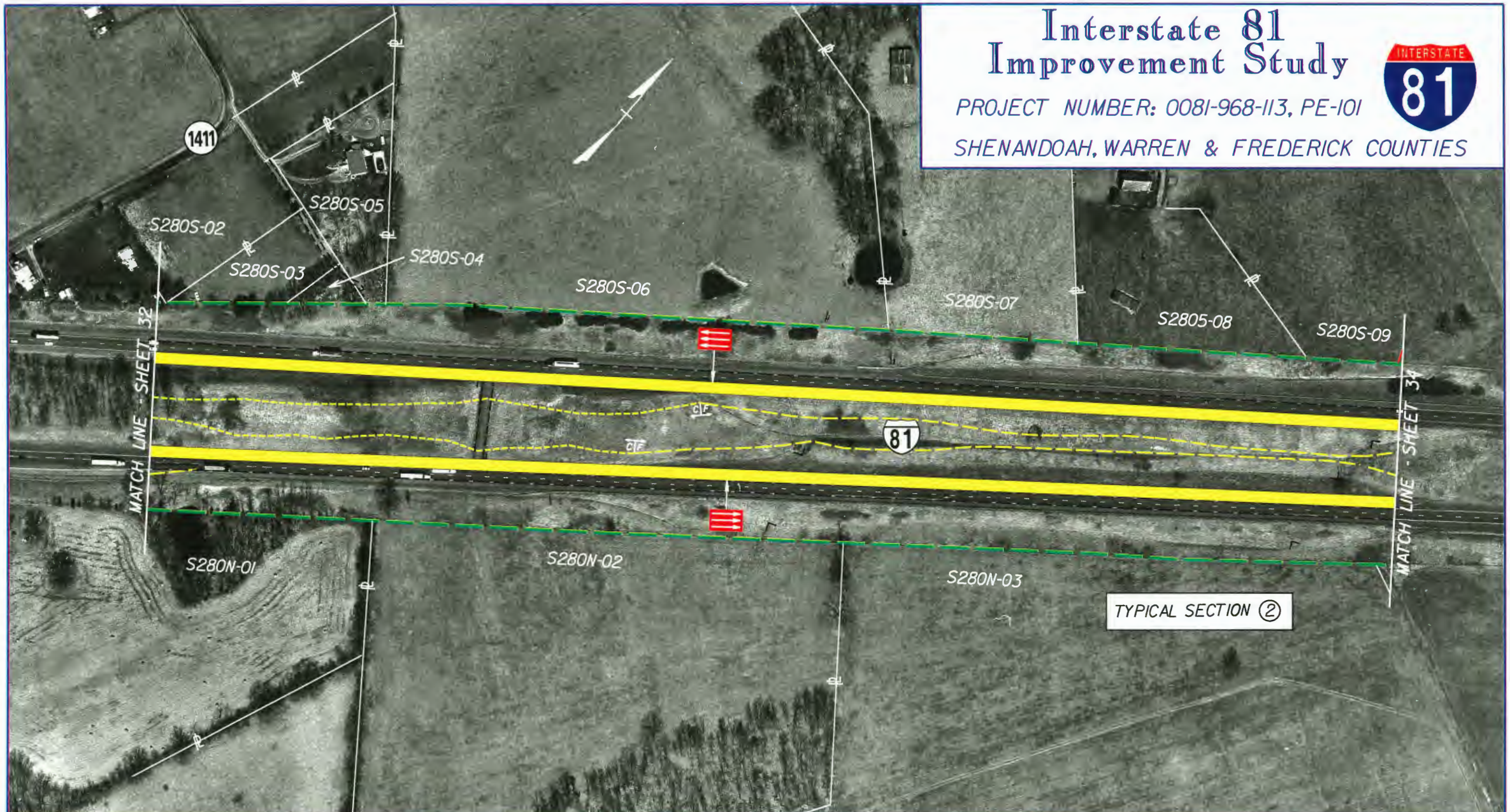
Sheet No.

32

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

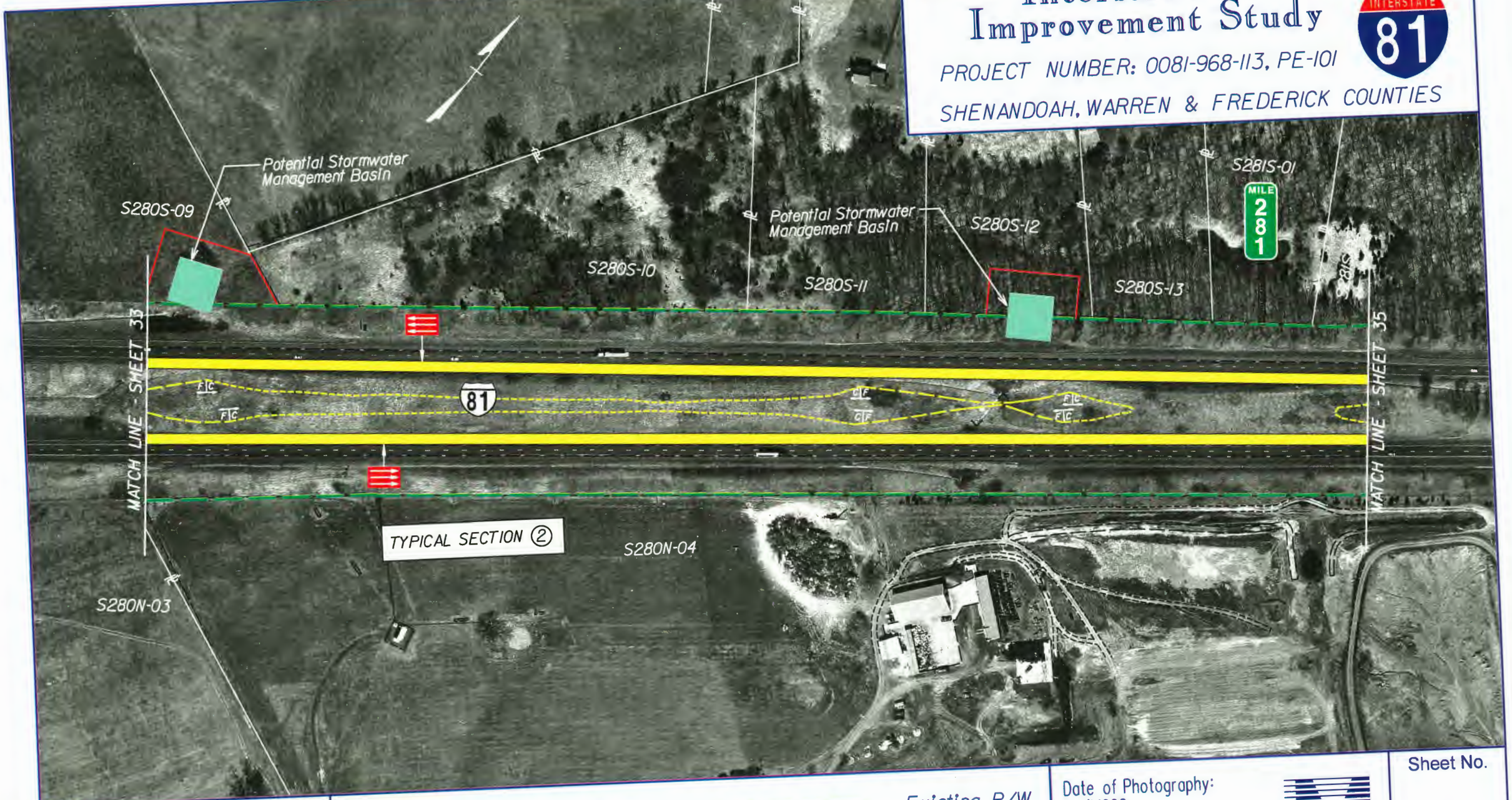
33

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

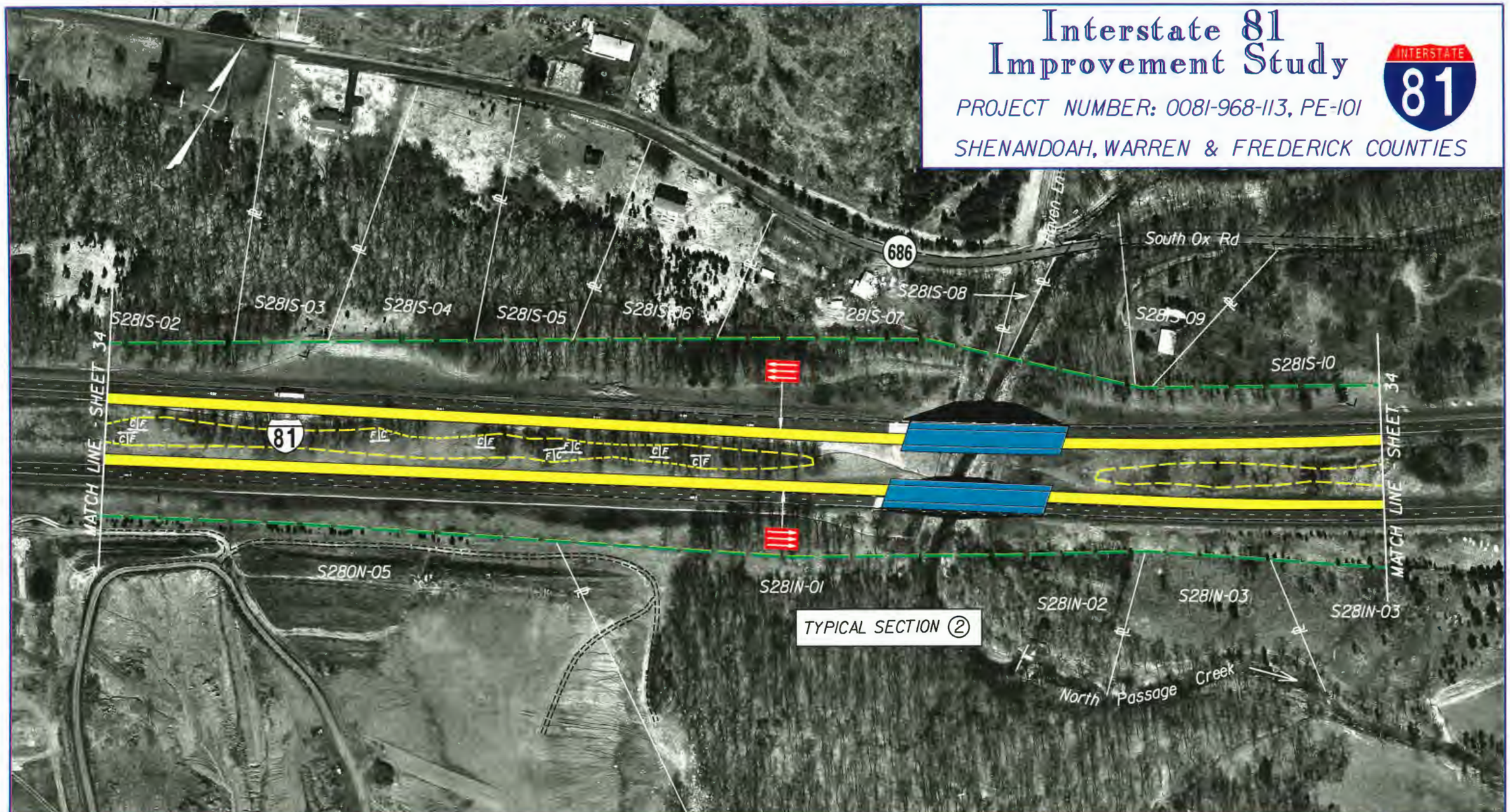
34

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

35

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81

South Ox Rd

686

S281S-10

S281S-11

TYPICAL SECTION ②

S281S-12

S281S-13

S281S-14

S281S-15

MILE 282

S281S-16

MATCH LINE - SHEET 35

MATCH LINE - SHEET 37

81

F-243

S281N-03

Potential Stormwater Management Basin

North Passage Creek

S281N-04

S281N-05

S282N-01

Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

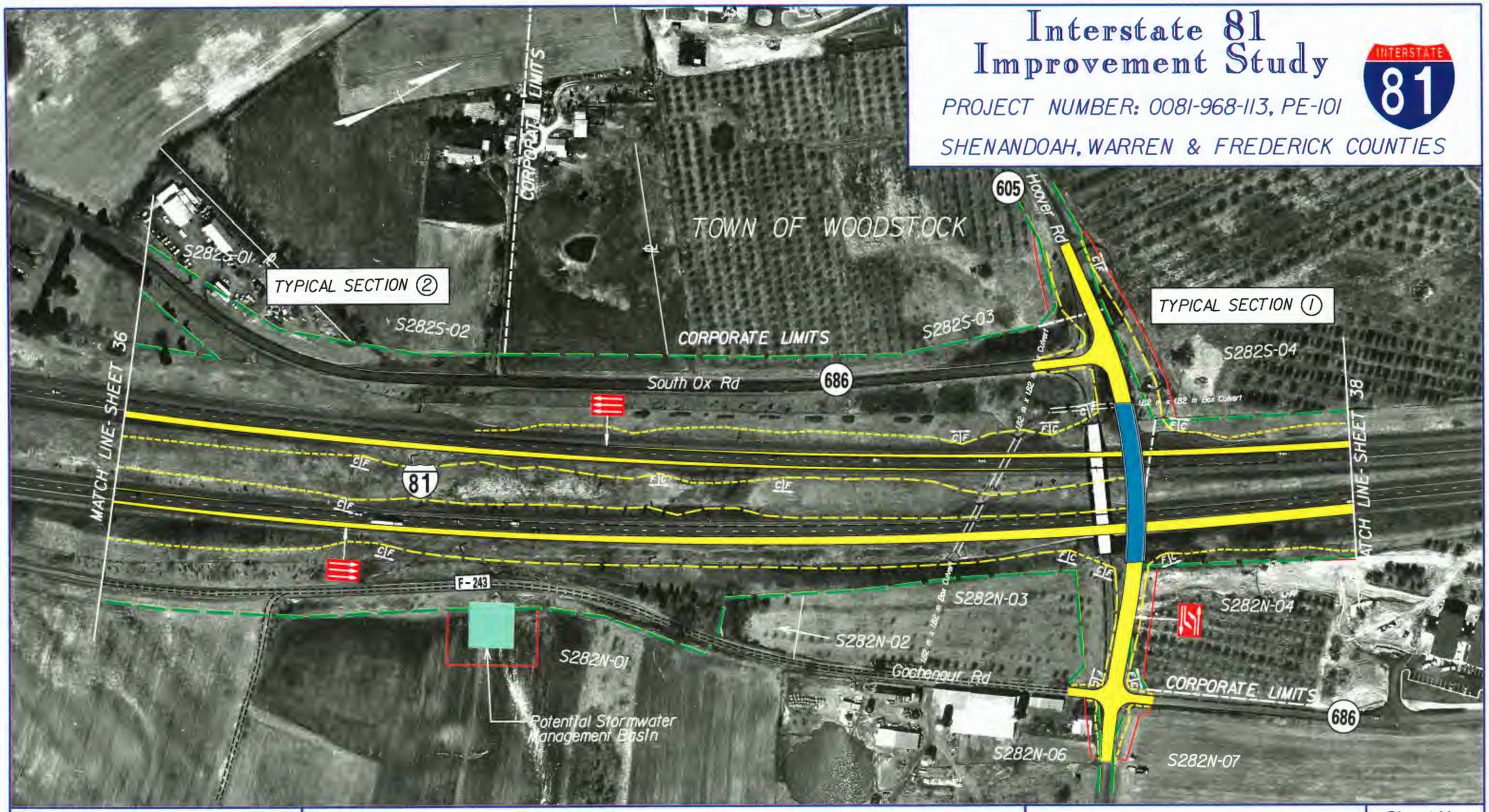
Sheet No.

36

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

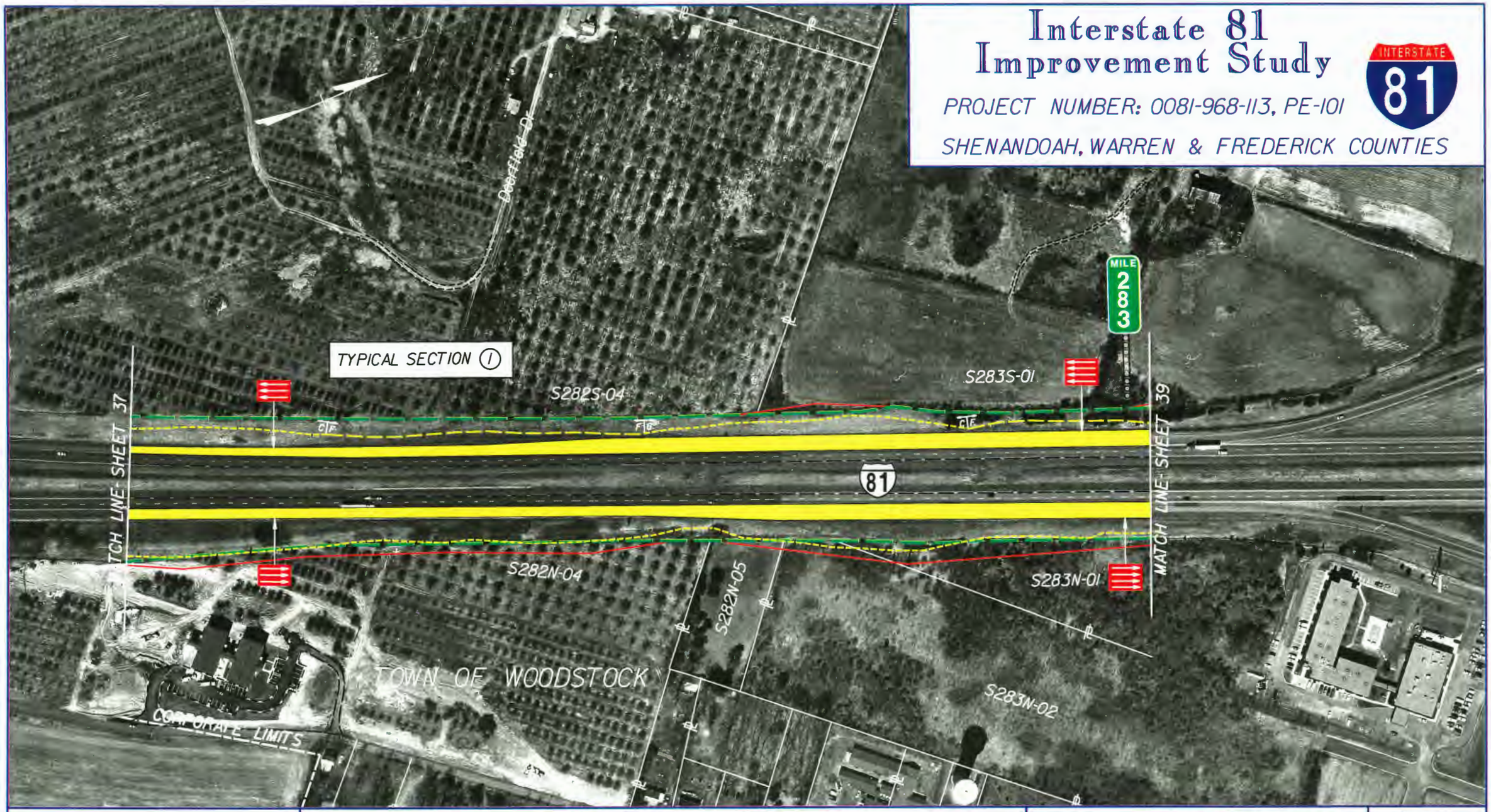
Sheet No.

37

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No. 38

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81

To Harrisonburg

42

MATCH LINE- SHEET 39A

TOWN OF WOODSTOCK

S283S-10

End Proposed Limited Access

Begin Proposed Limited Access

Reservoir Rd

S283S-03

S283S-04

Existing Signal

S283S-02

S283S-06

TYPICAL SECTION (1)

S283S-01

S283S-07

MATCH LINE- SHEET 38

MATCH LINE- SHEET 40

81

S283N-01

Existing Signal

S283N-16

S283N-15

S283N-17

S283N-14

S283N-13

S283N-12

S283N-10

S283N-11

S283N-09

County Fairground

Motel

Warren Dr

Drive

MATCH LINE- SHEET 39B To Rte 11

RAISED MEDIAN

EXIT 283

ROUTE 42

WOODSTOCK

Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1: 2500

0 5

METRIC

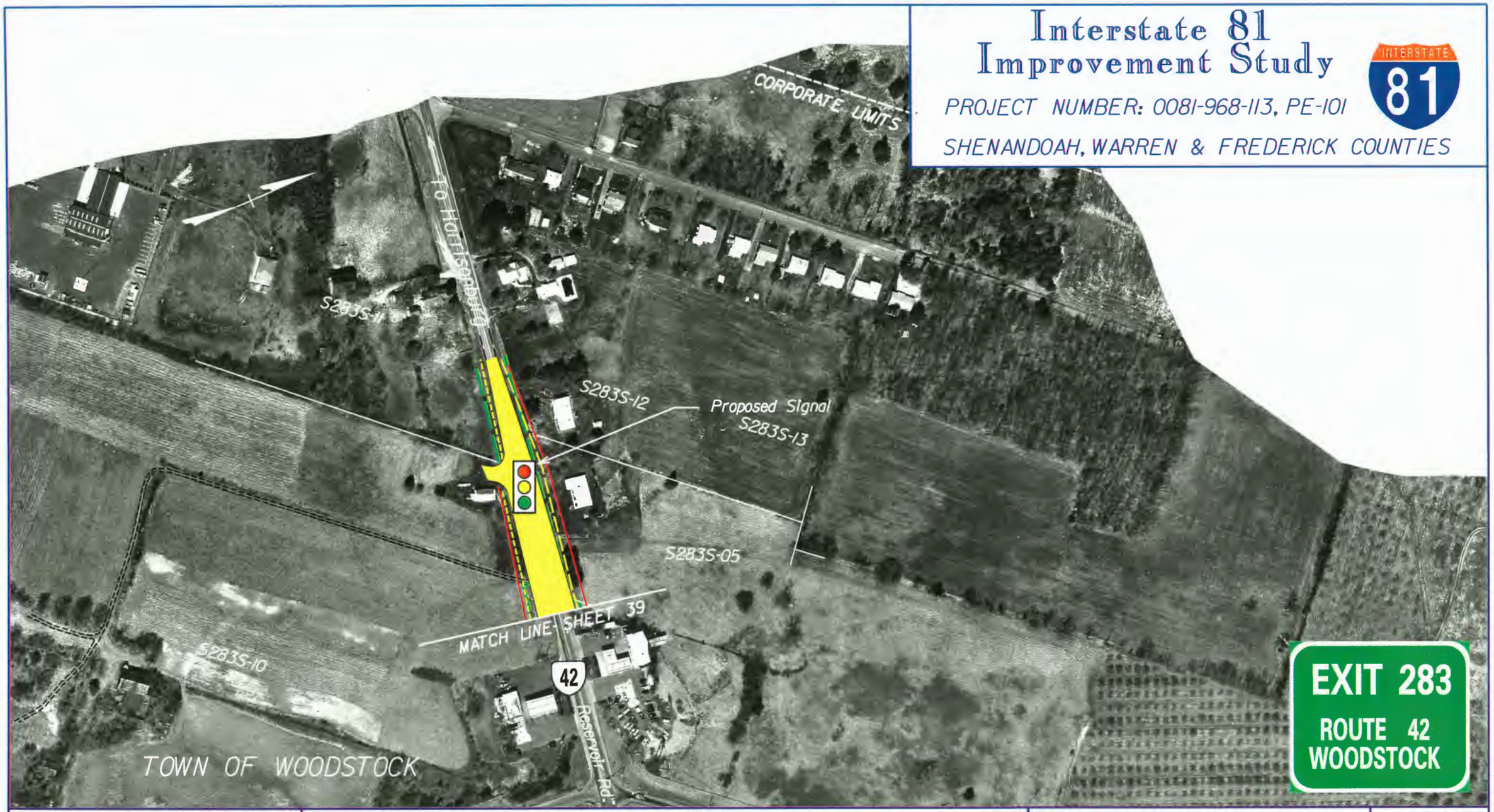
Sheet No.

39

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

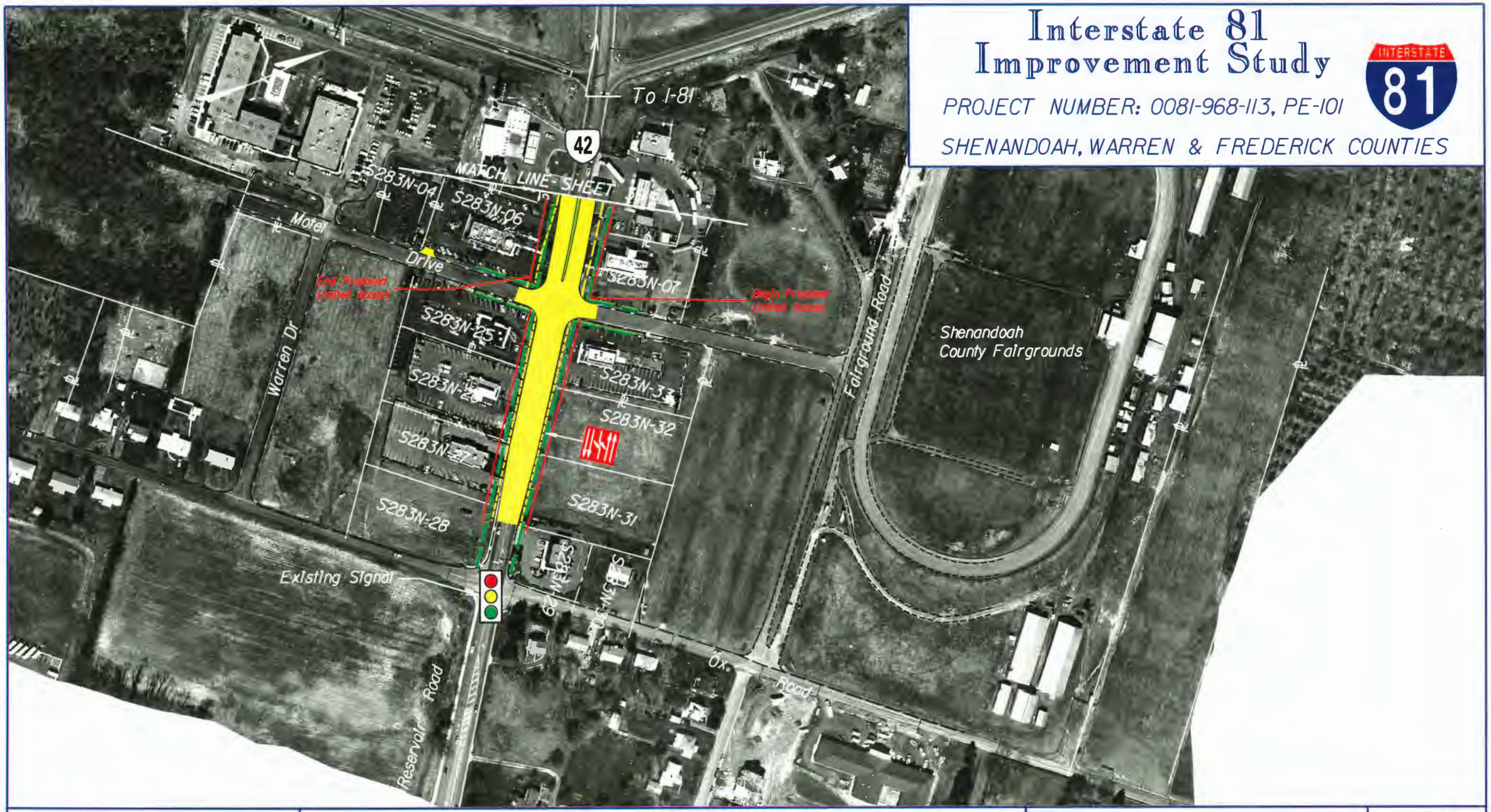
Sheet No.

39A

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

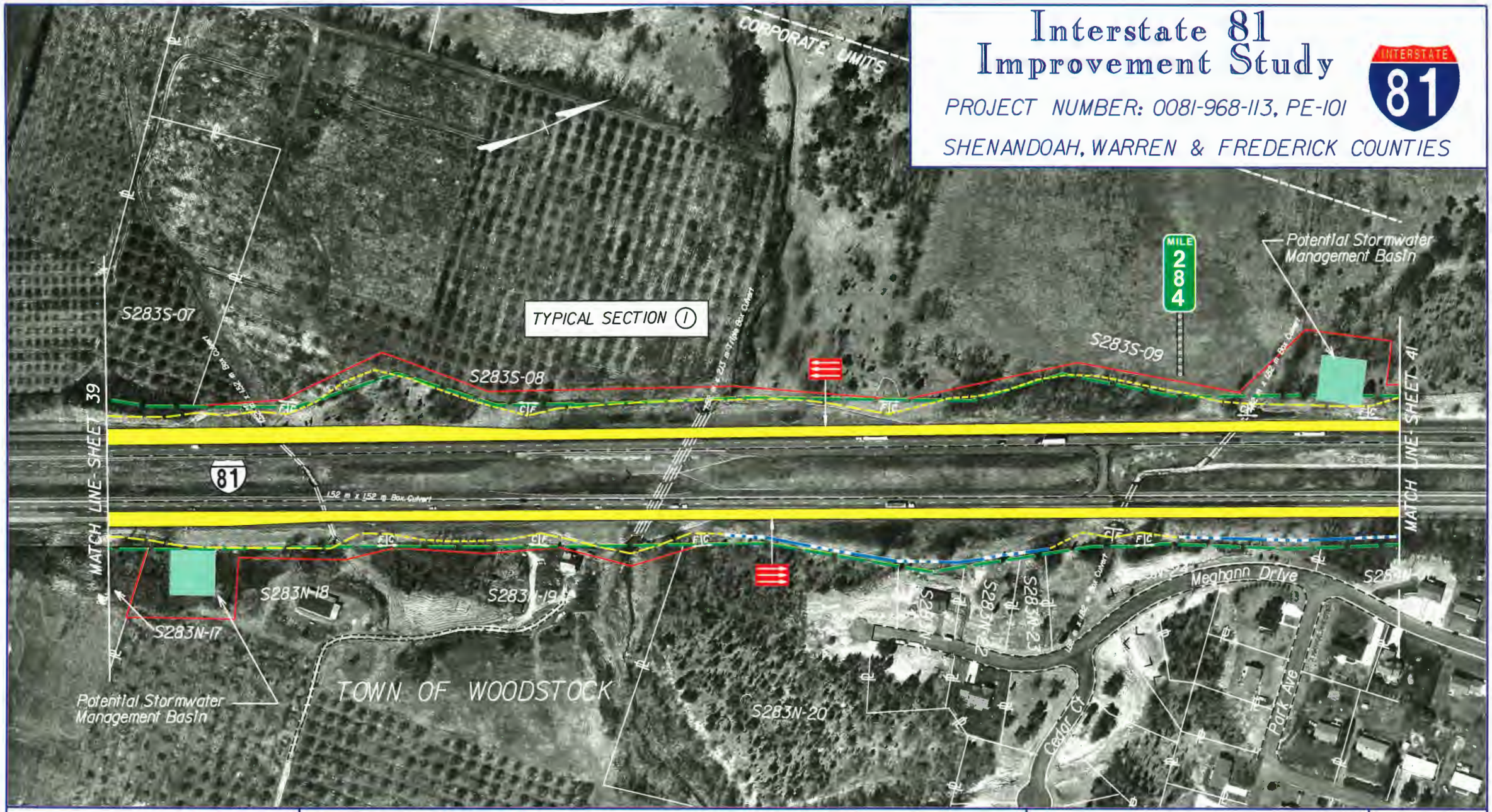
Sheet No.

39B

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

40

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81

816

S284S-03

S284S-04

Hisey Ave

S284S-02

S284S-01

CORPORATE LIMITS

S283S-09

S284S-05

S284S-06

TYPICAL SECTION 1

S284S-07

MATCH LINE- SHEET 40

MATCH LINE- SHEET 42

81

S284N-12

S284N-13

S284N-06

S284N-11

S284N-10

S284N-09

S284N-08

S284N-07

S284N-14

Meadow View Dr

Meadow View Dr

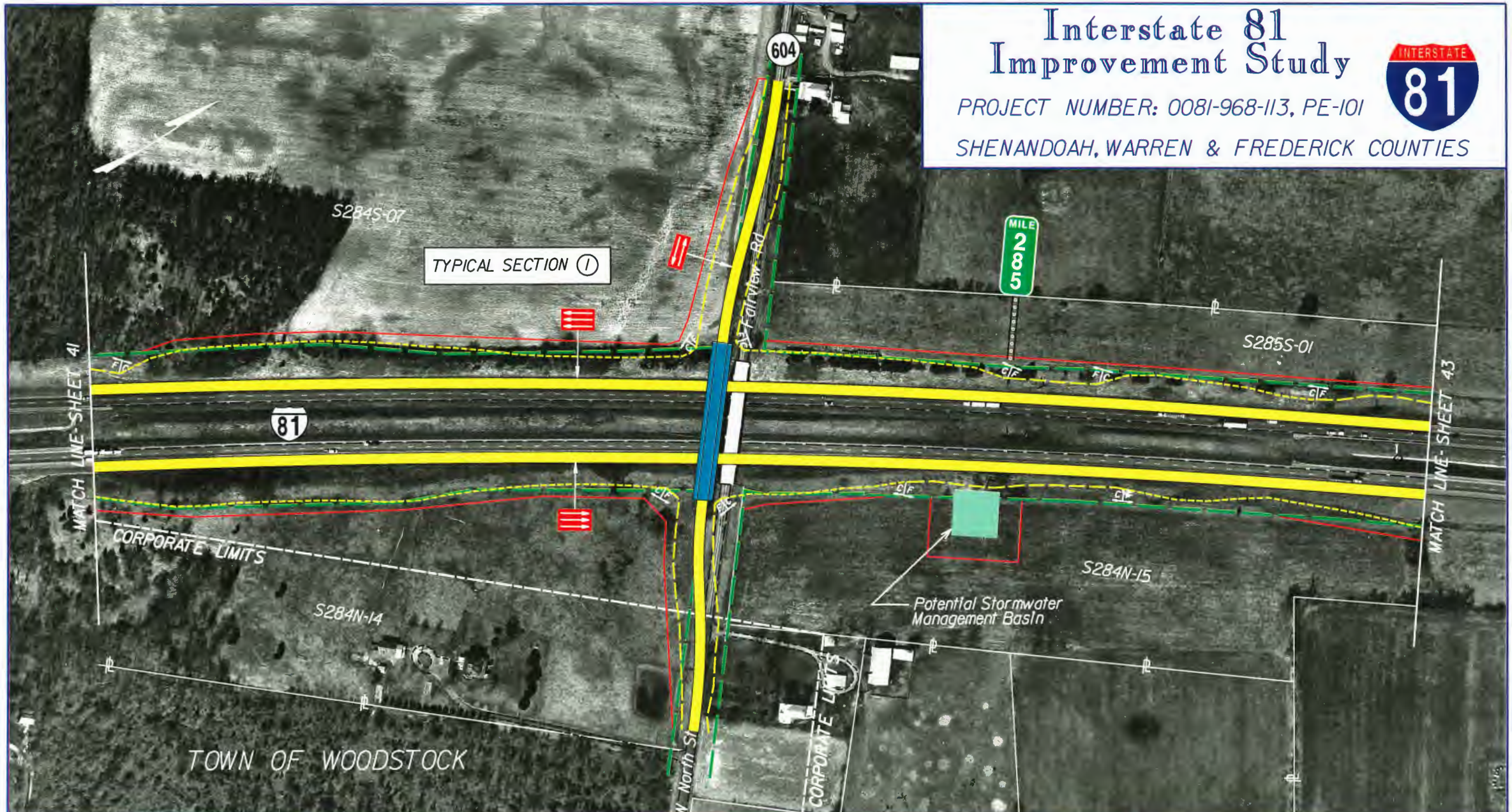
Meadow View Dr

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

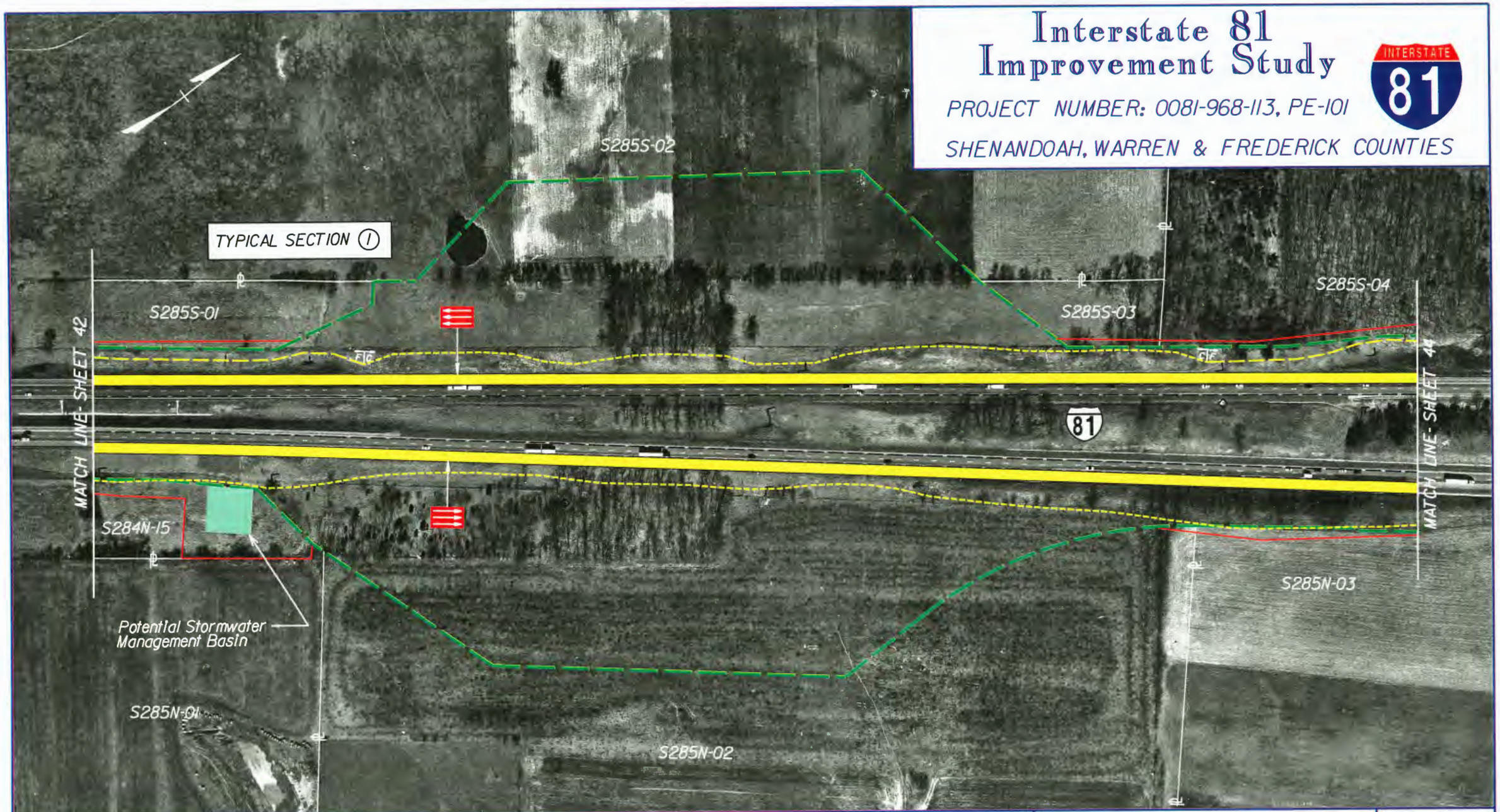
Sheet No.

42

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

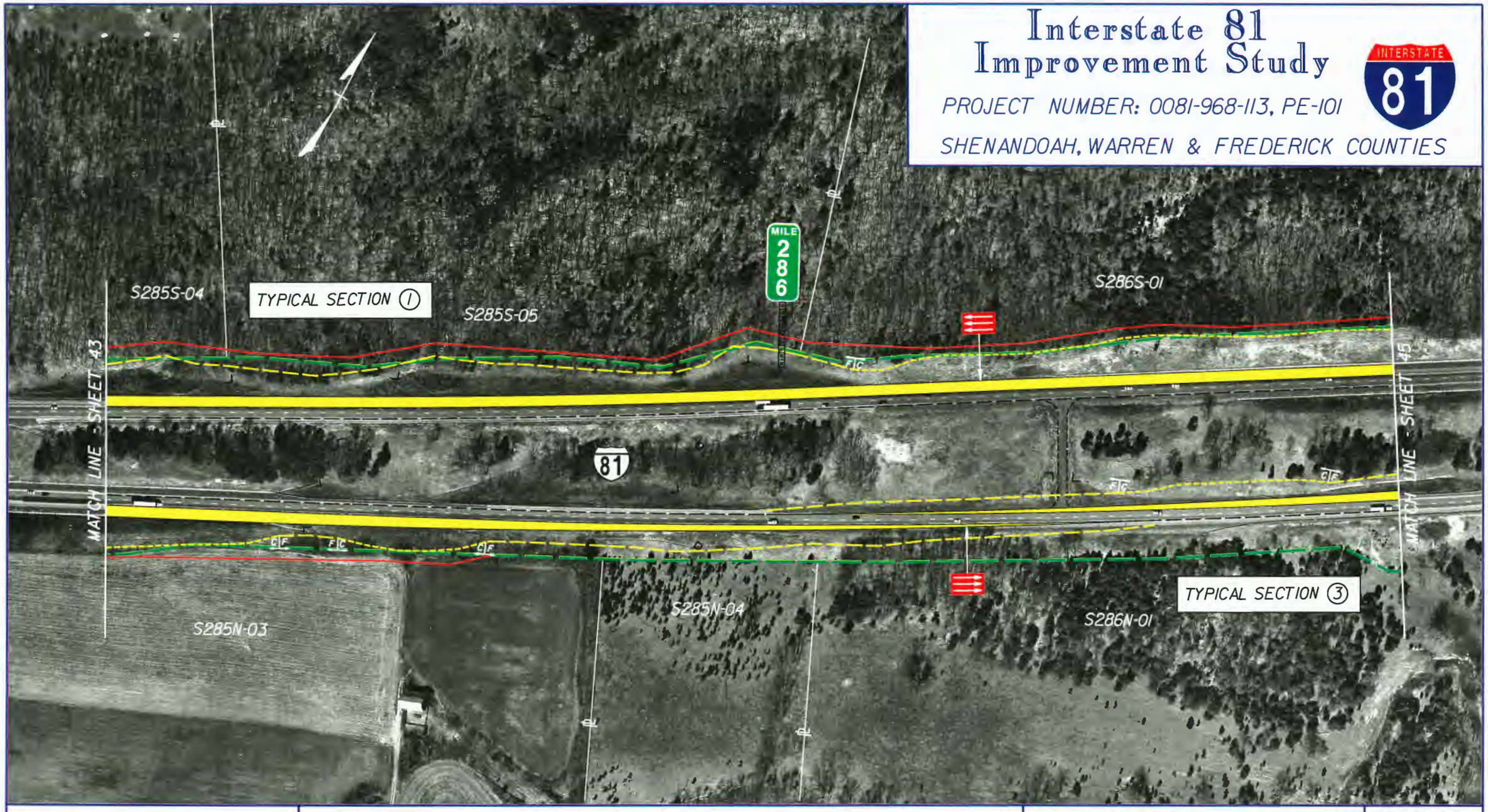
Sheet No.

43

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

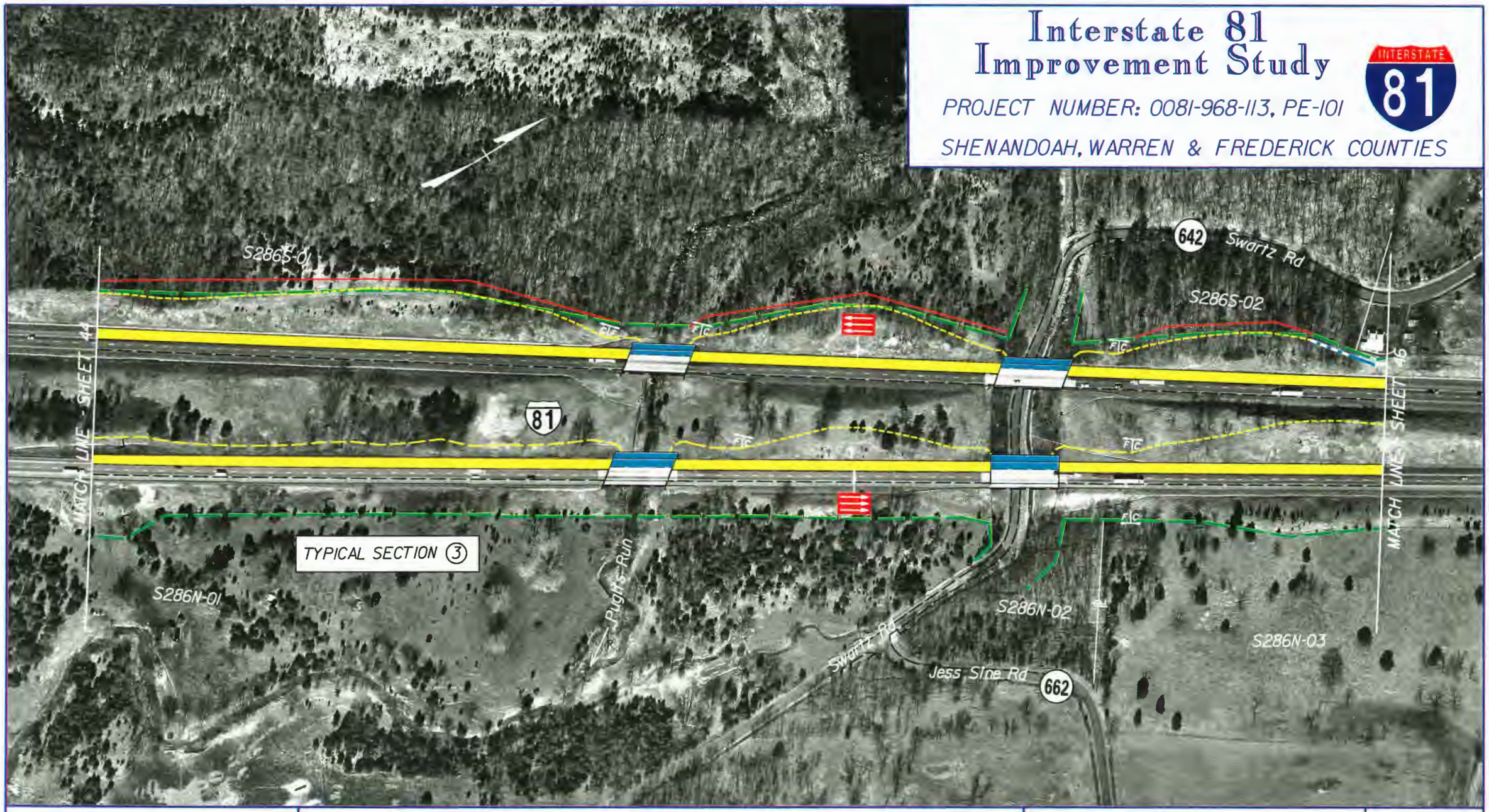
Sheet No.

44

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

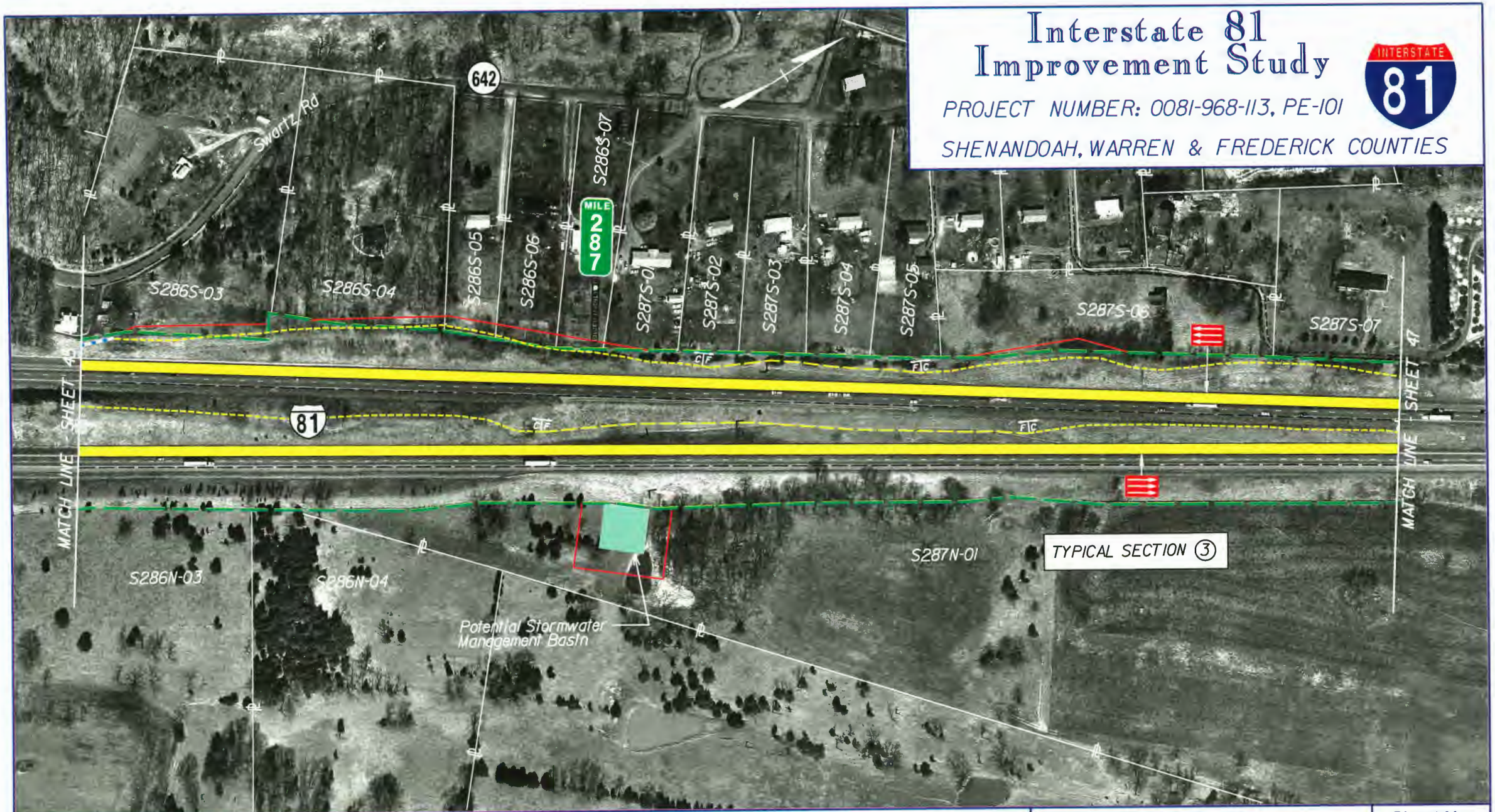
Sheet No.

45

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

46

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Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81

S287S-07

S287S-08

S287S-09

S287S-10

S287S-11

MATCH LINE - SHEET 46

MATCH LINE - SHEET 48

81

TYPICAL SECTION 3

S287N-01

S287N-02

S287S-03

S287N-05

S287N-04

S287N-06

600

Saunsville Rd

Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

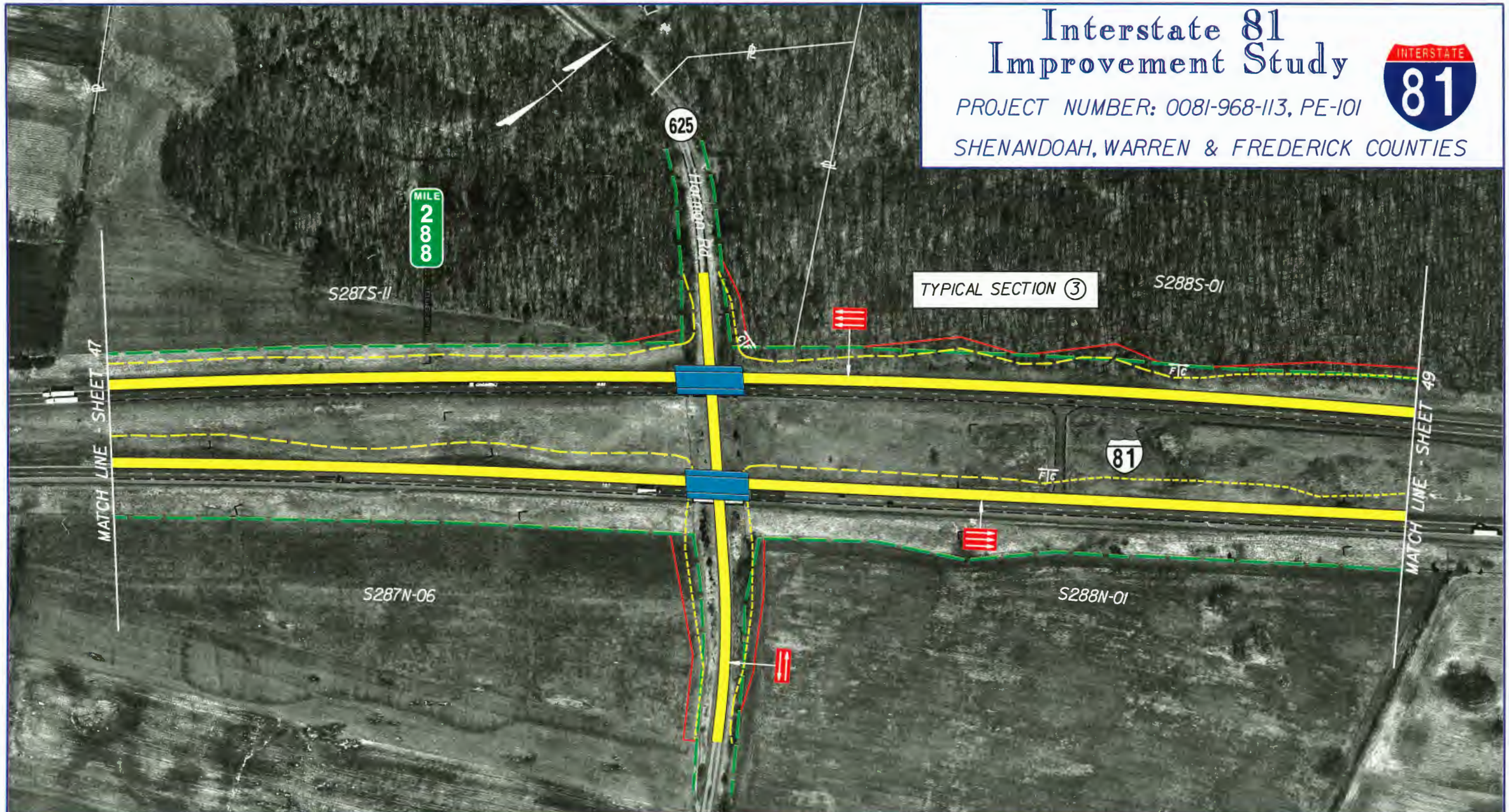
Sheet No.

47

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

48

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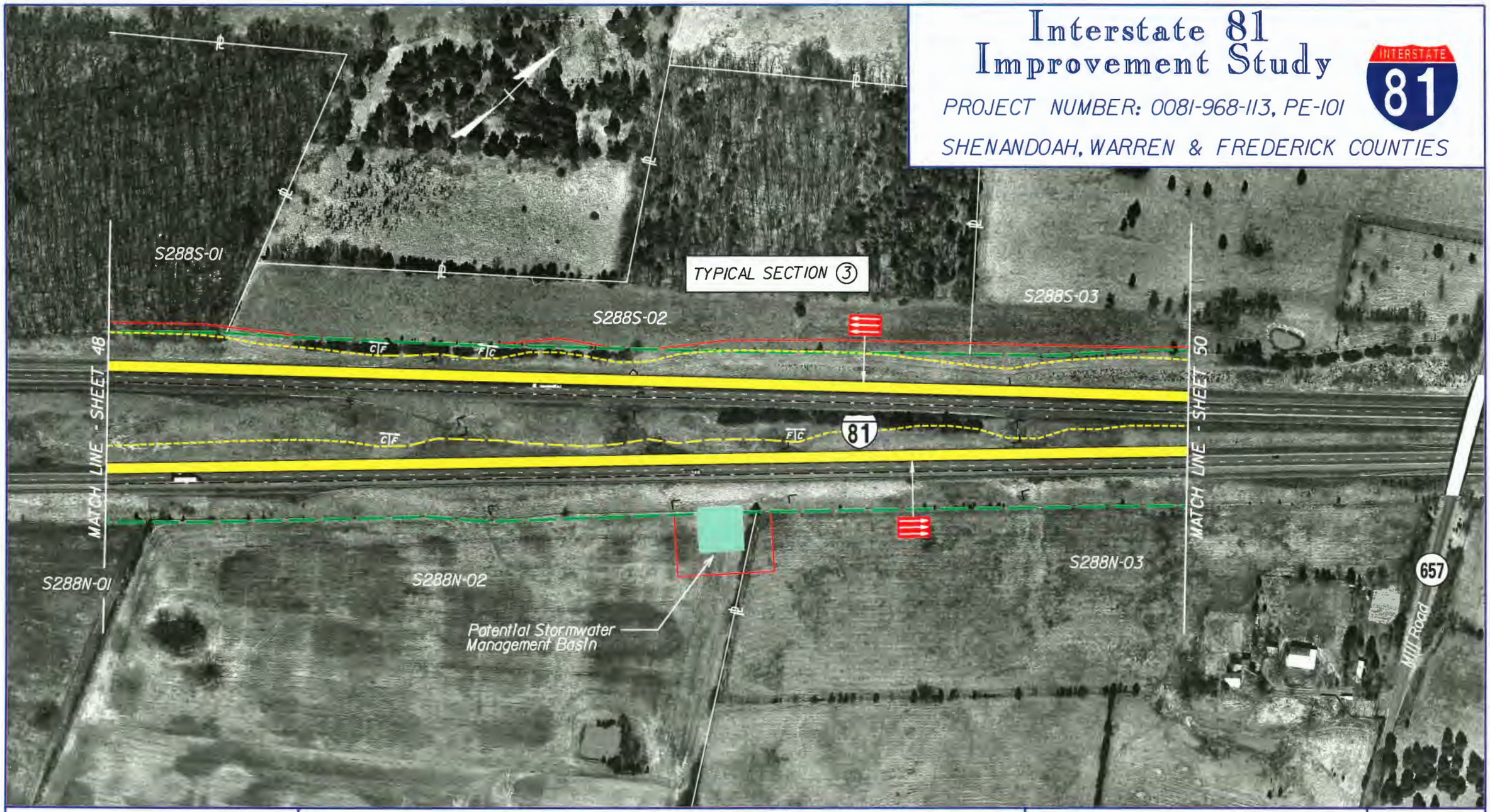
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

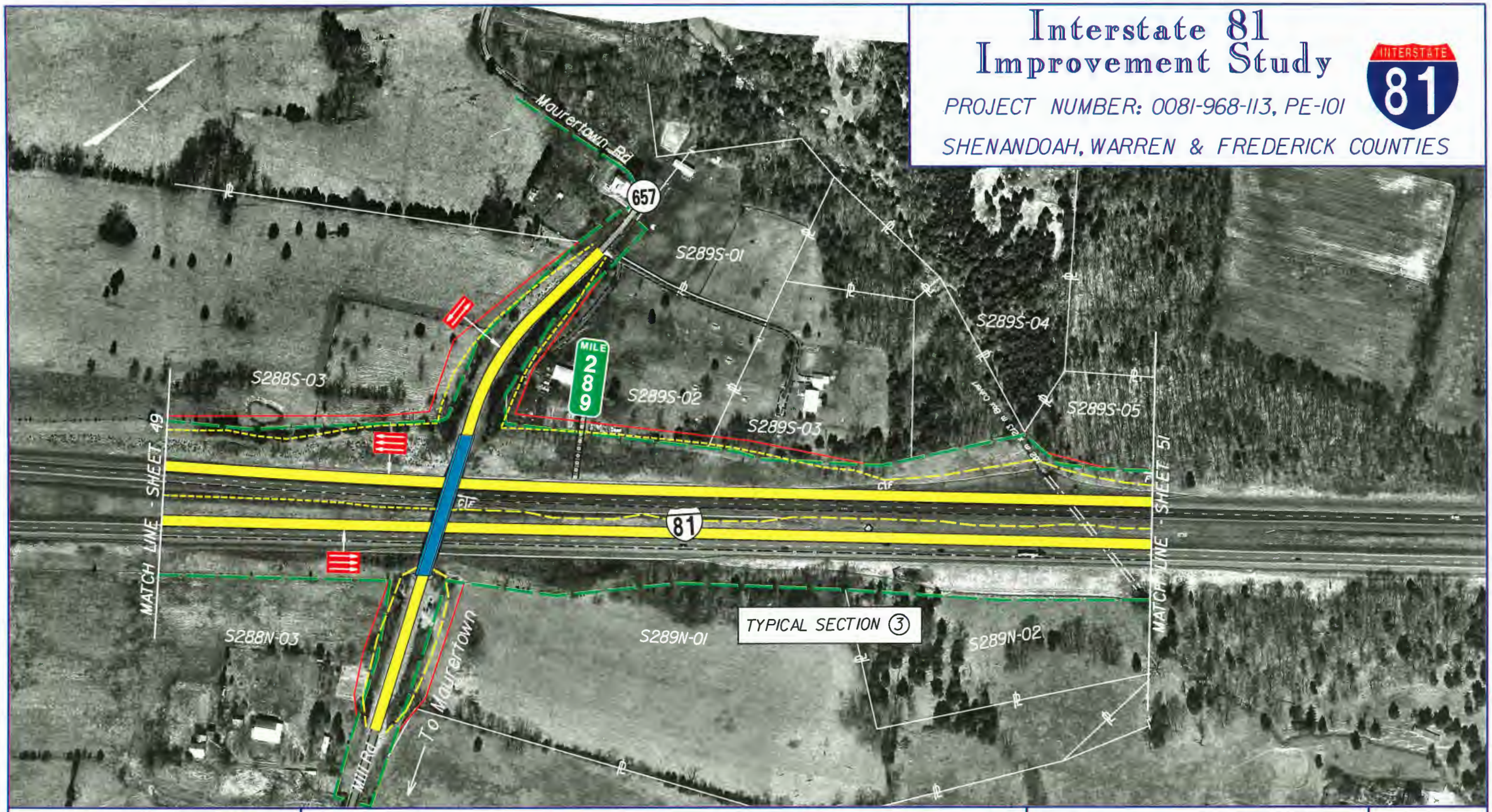
49

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

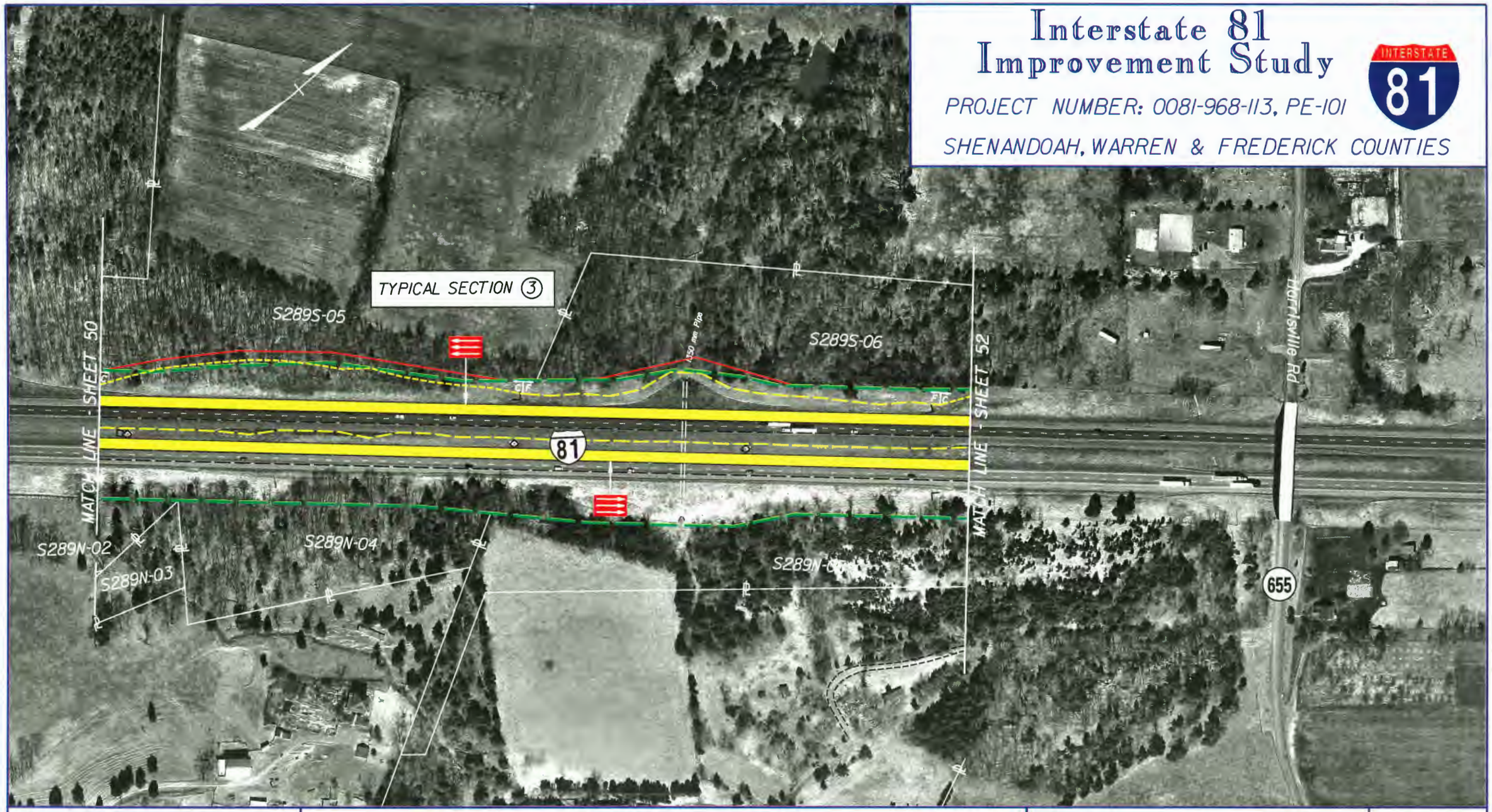
Sheet No.

50

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

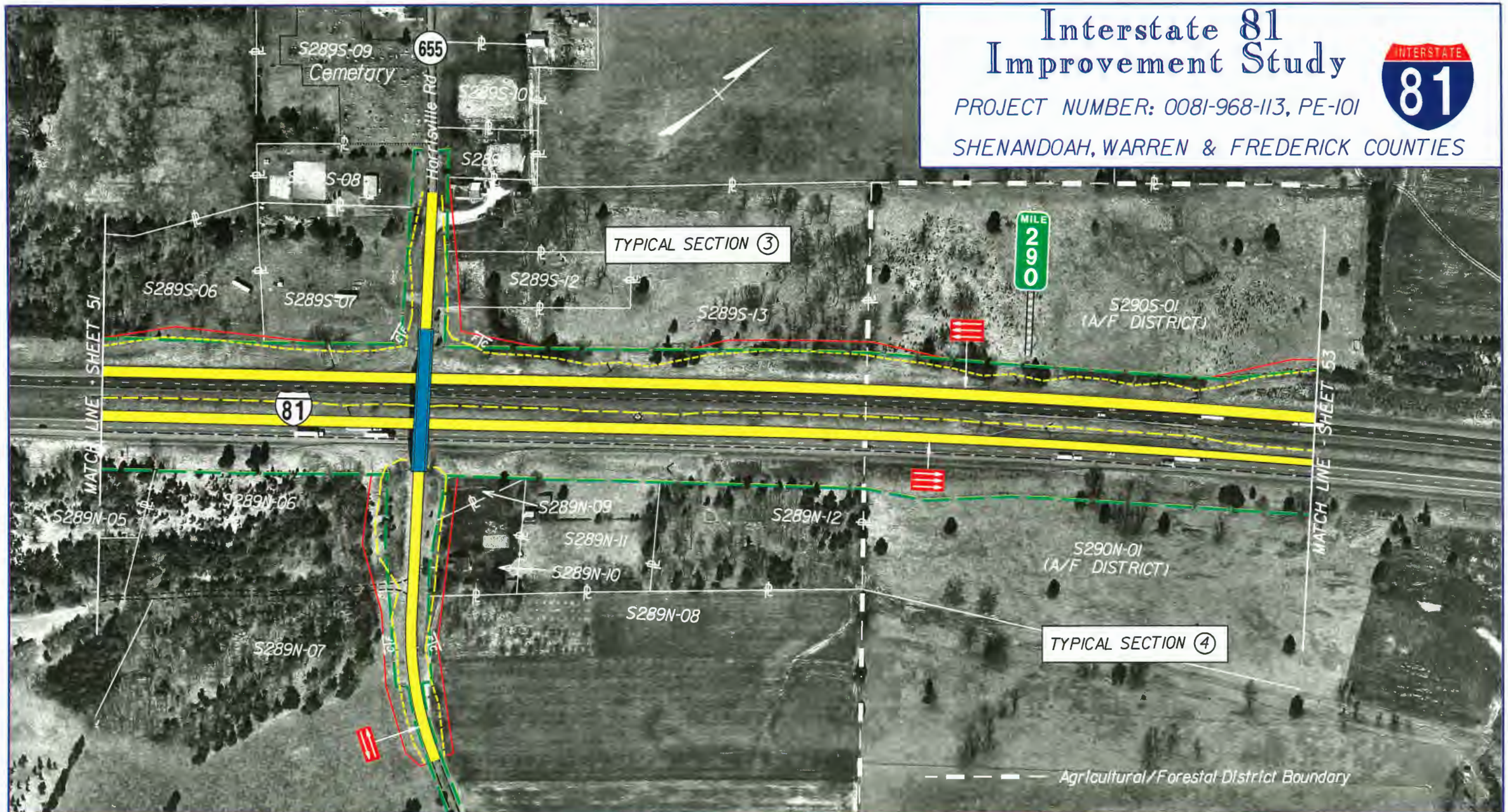
51

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

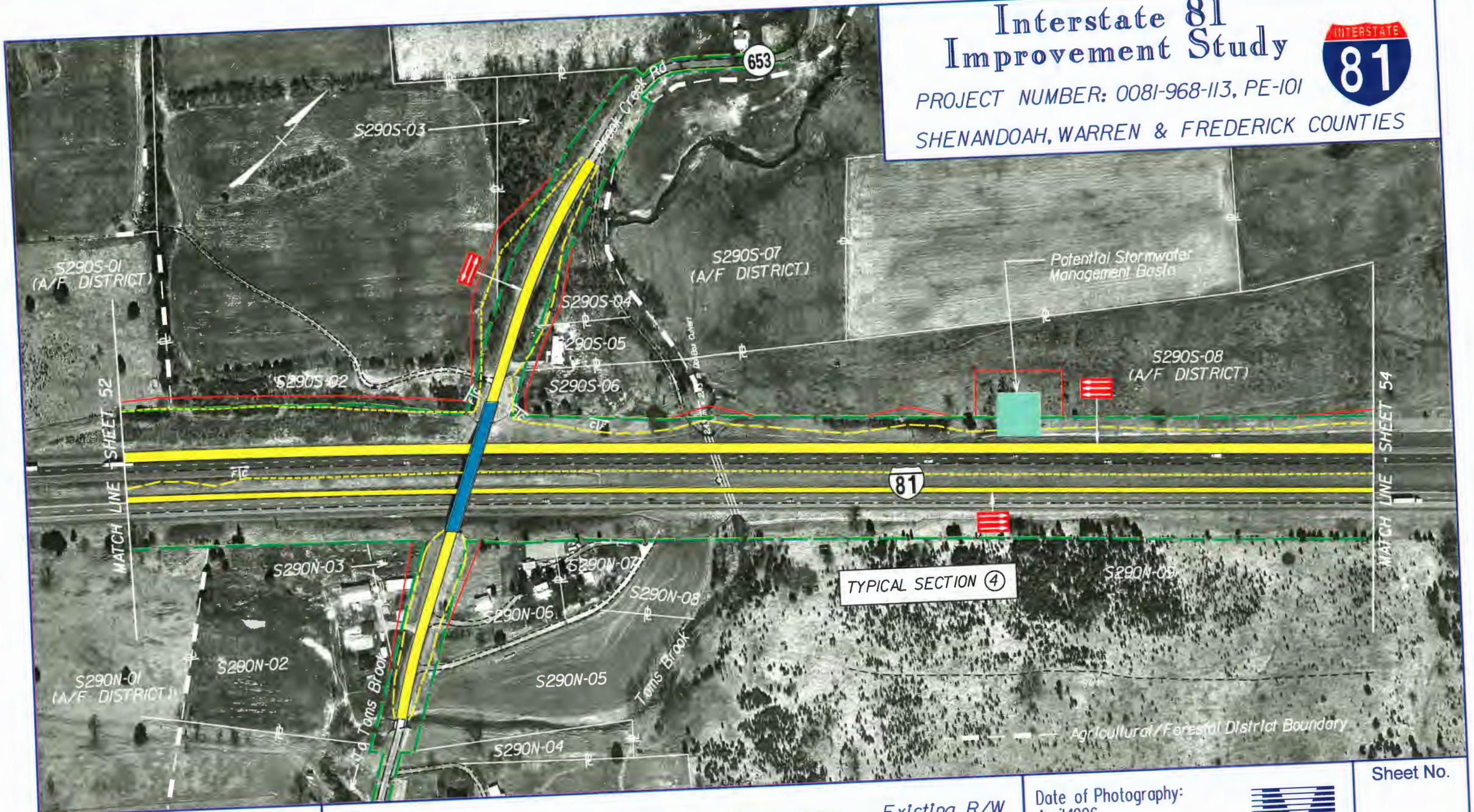
52

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

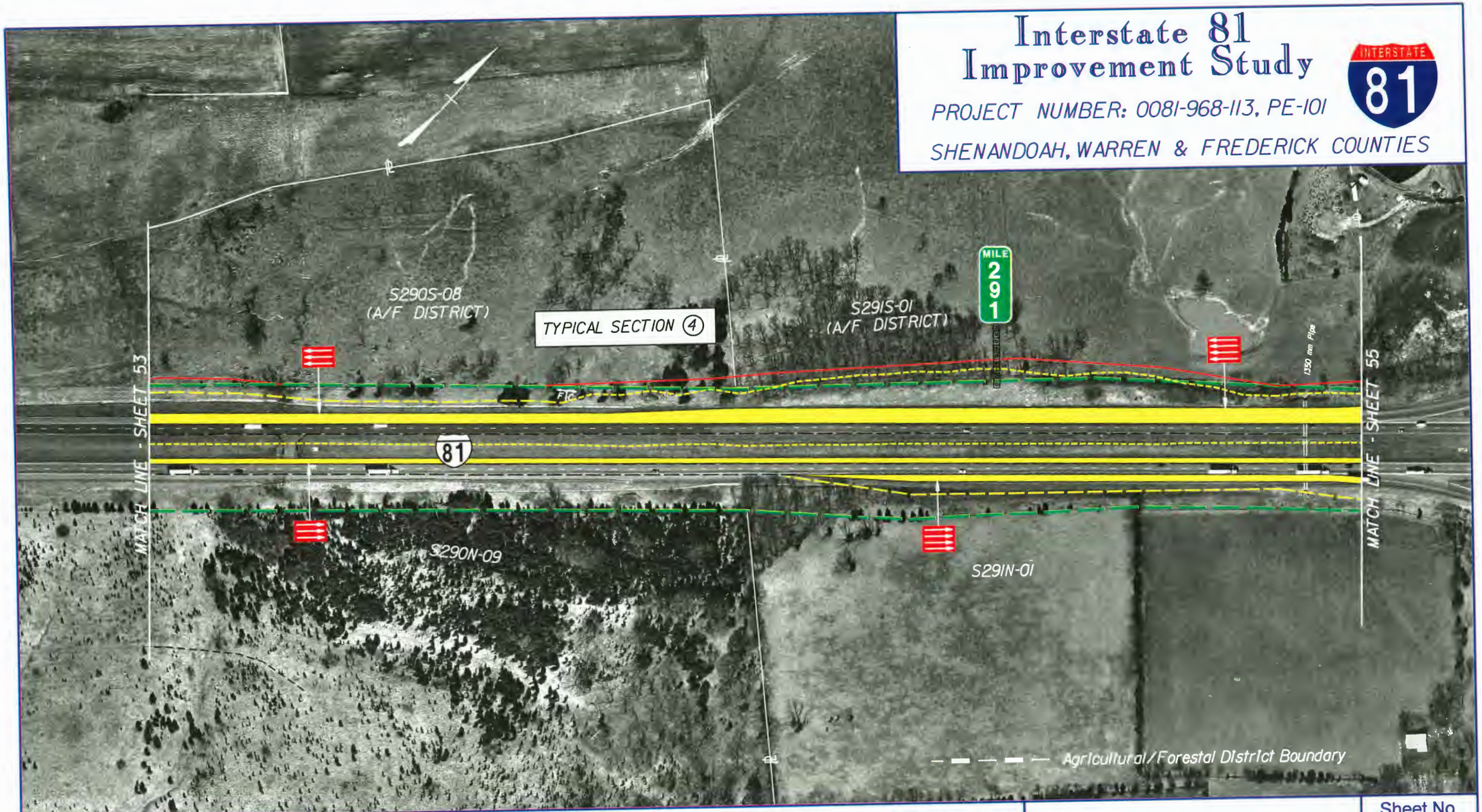
Sheet No.

53

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

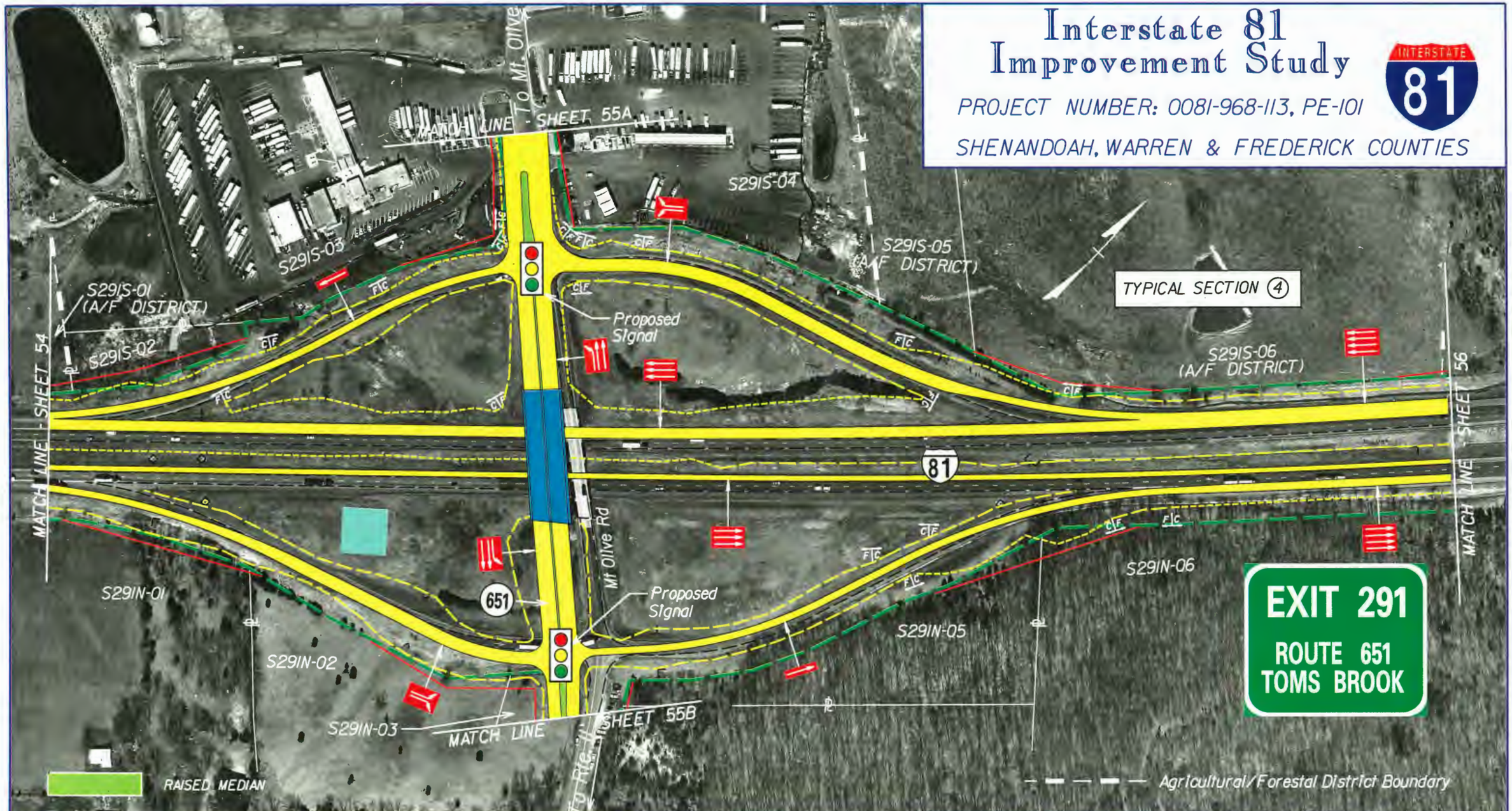
54

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

55

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

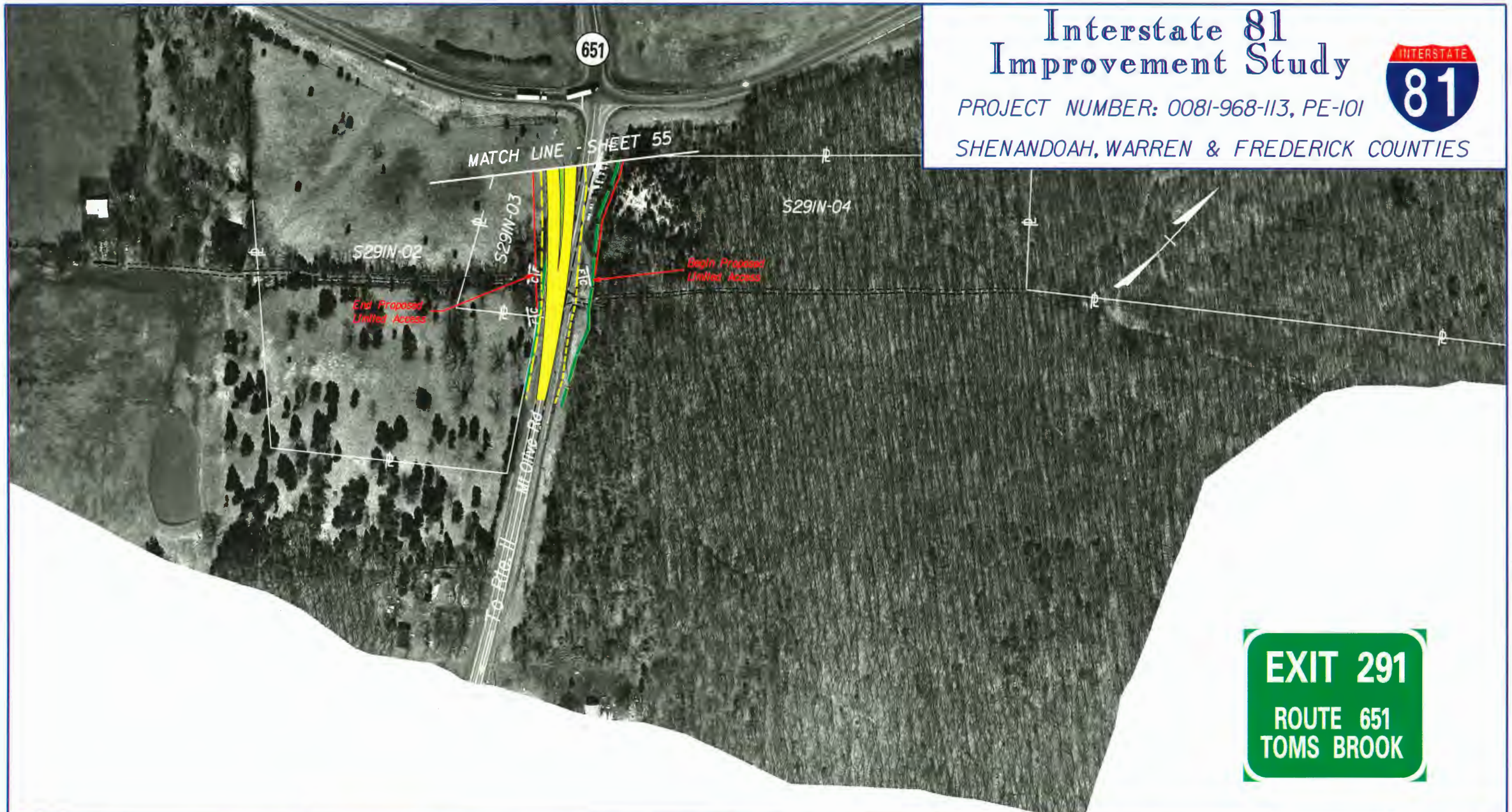
55A

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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VDOT METRIC

Sheet No.

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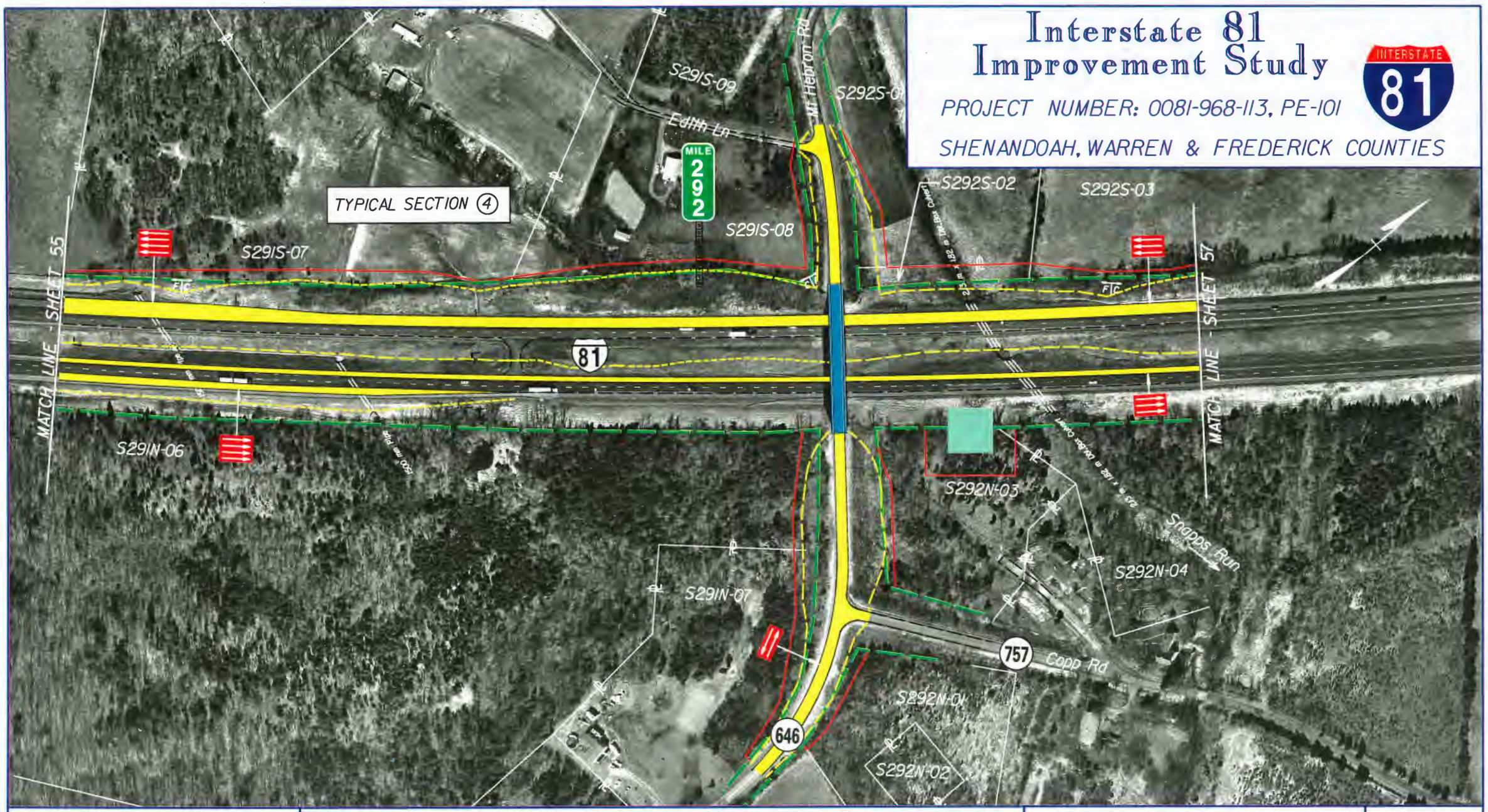
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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VDOT METRIC

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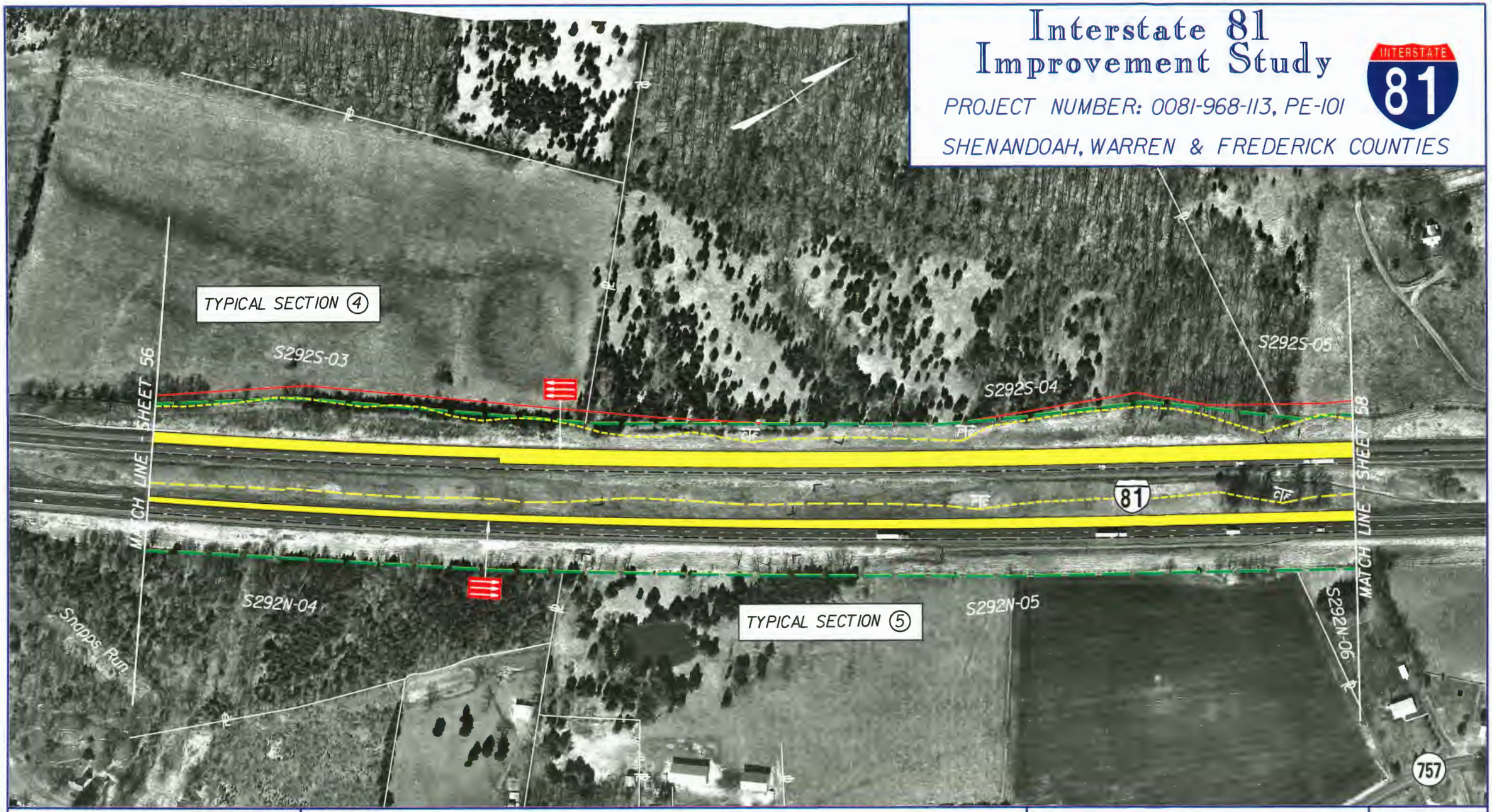
56

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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VDOT METRIC

Sheet No.

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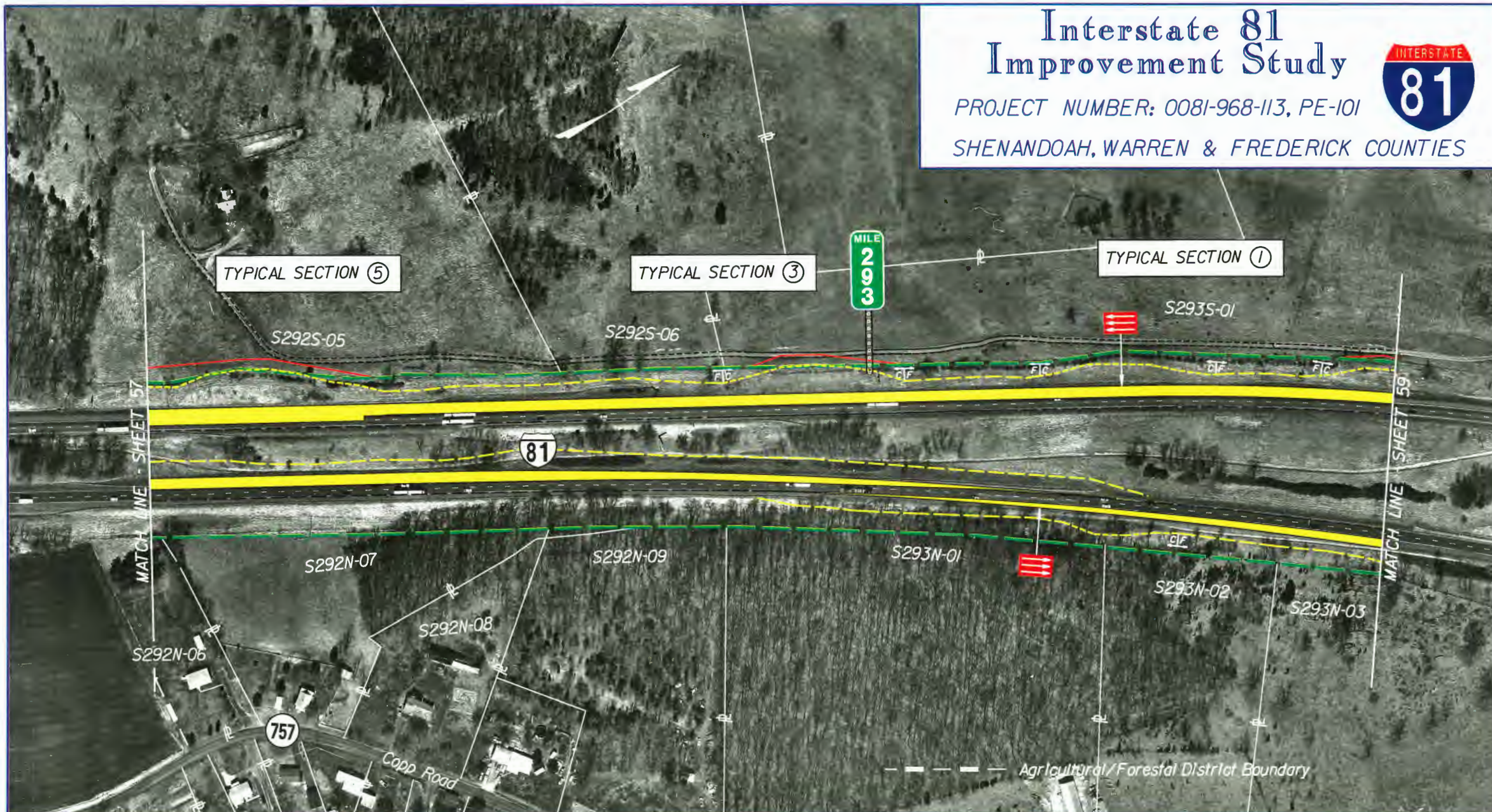
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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VDOT METRIC

Sheet No.

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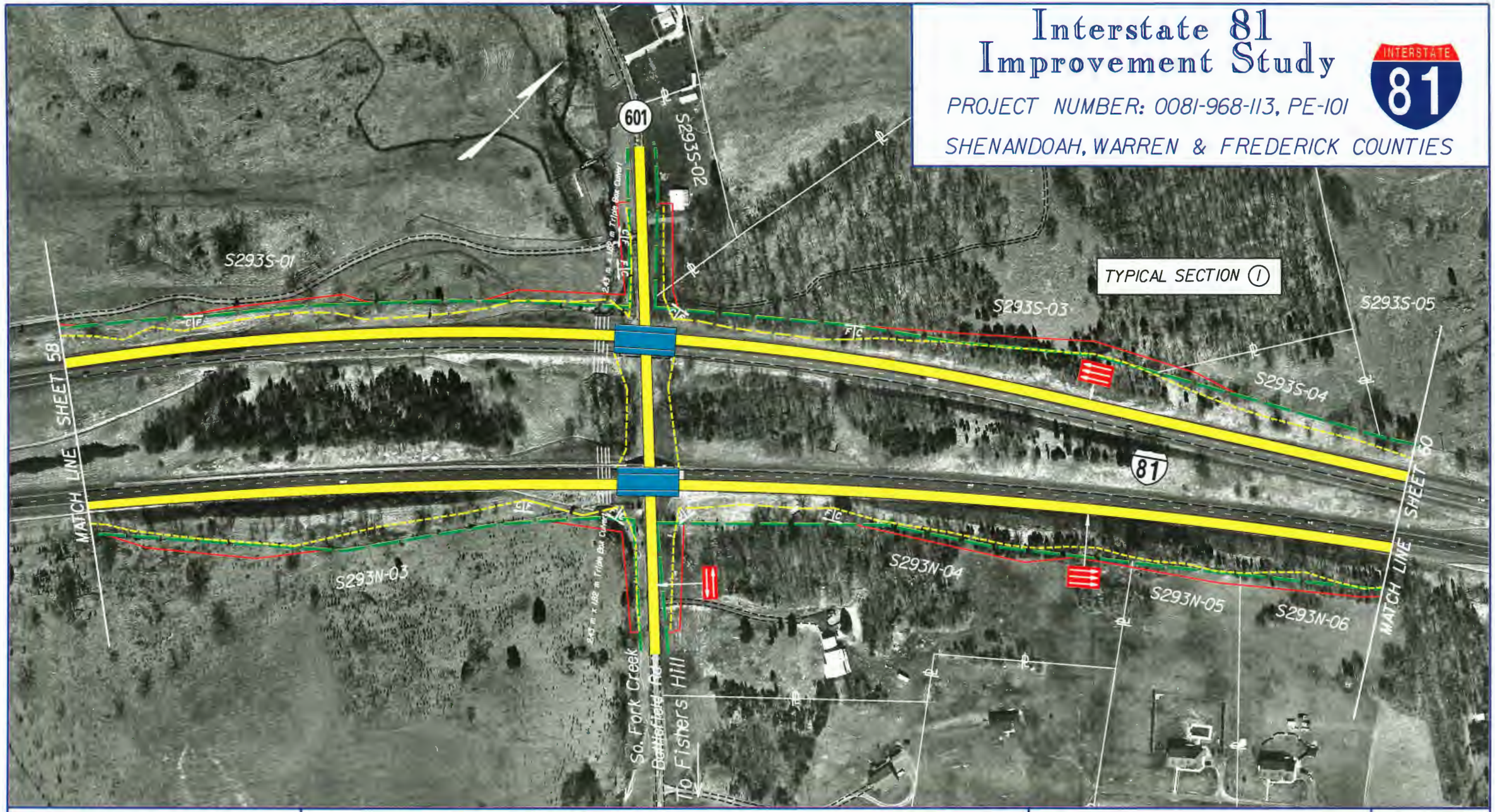
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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VDOT METRIC

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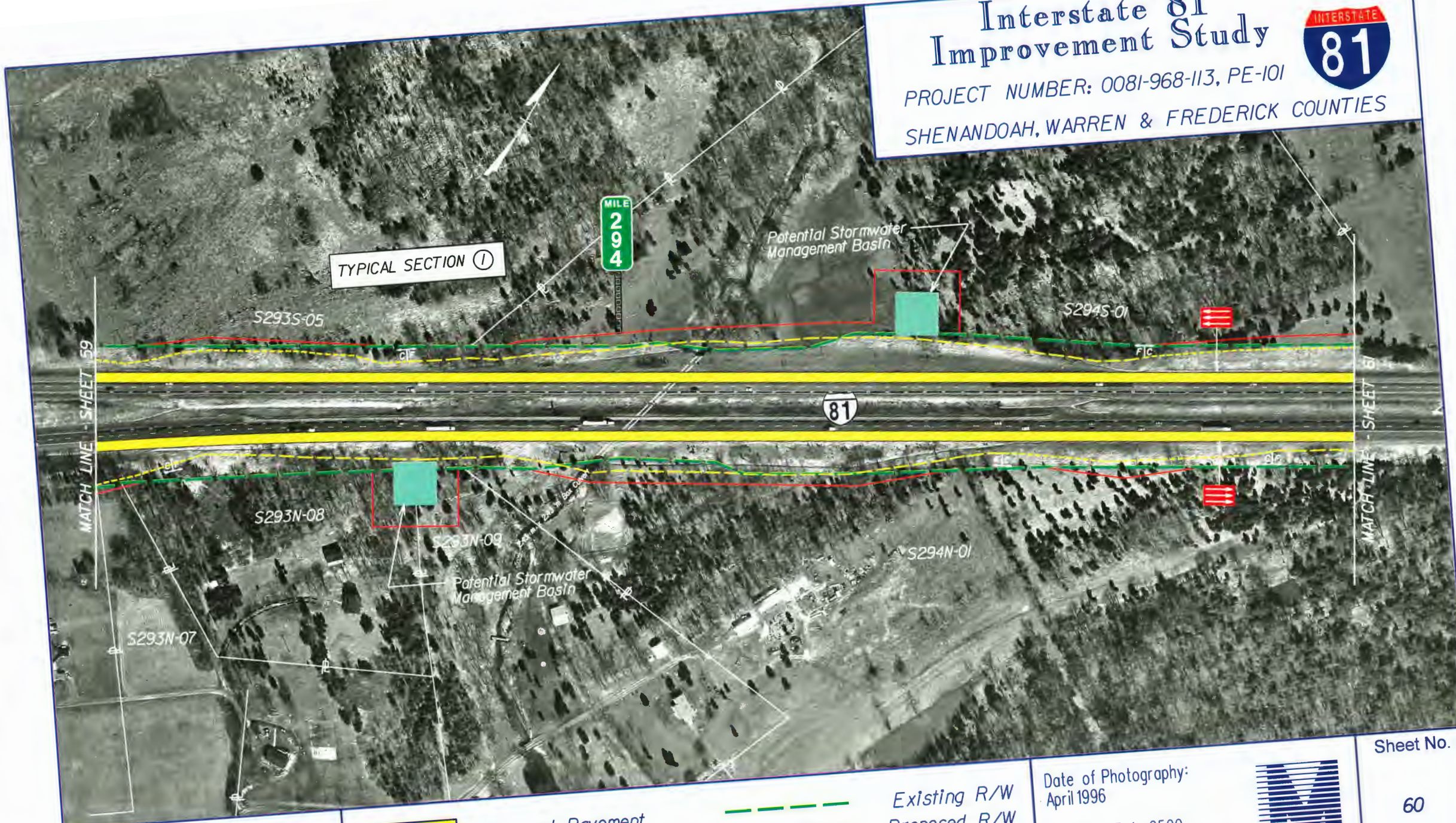
59

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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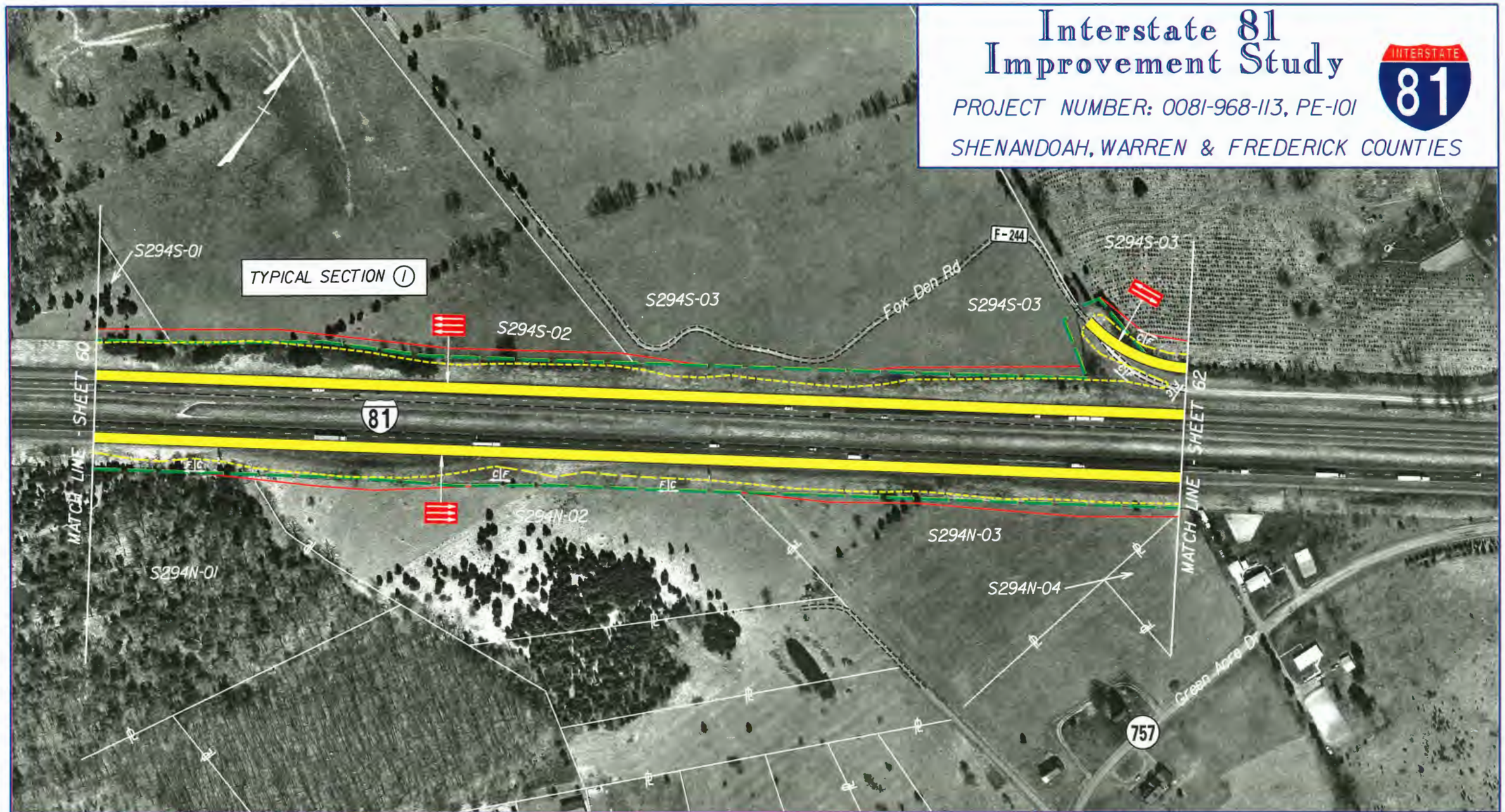
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

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Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

Virginia Department of Transportation

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Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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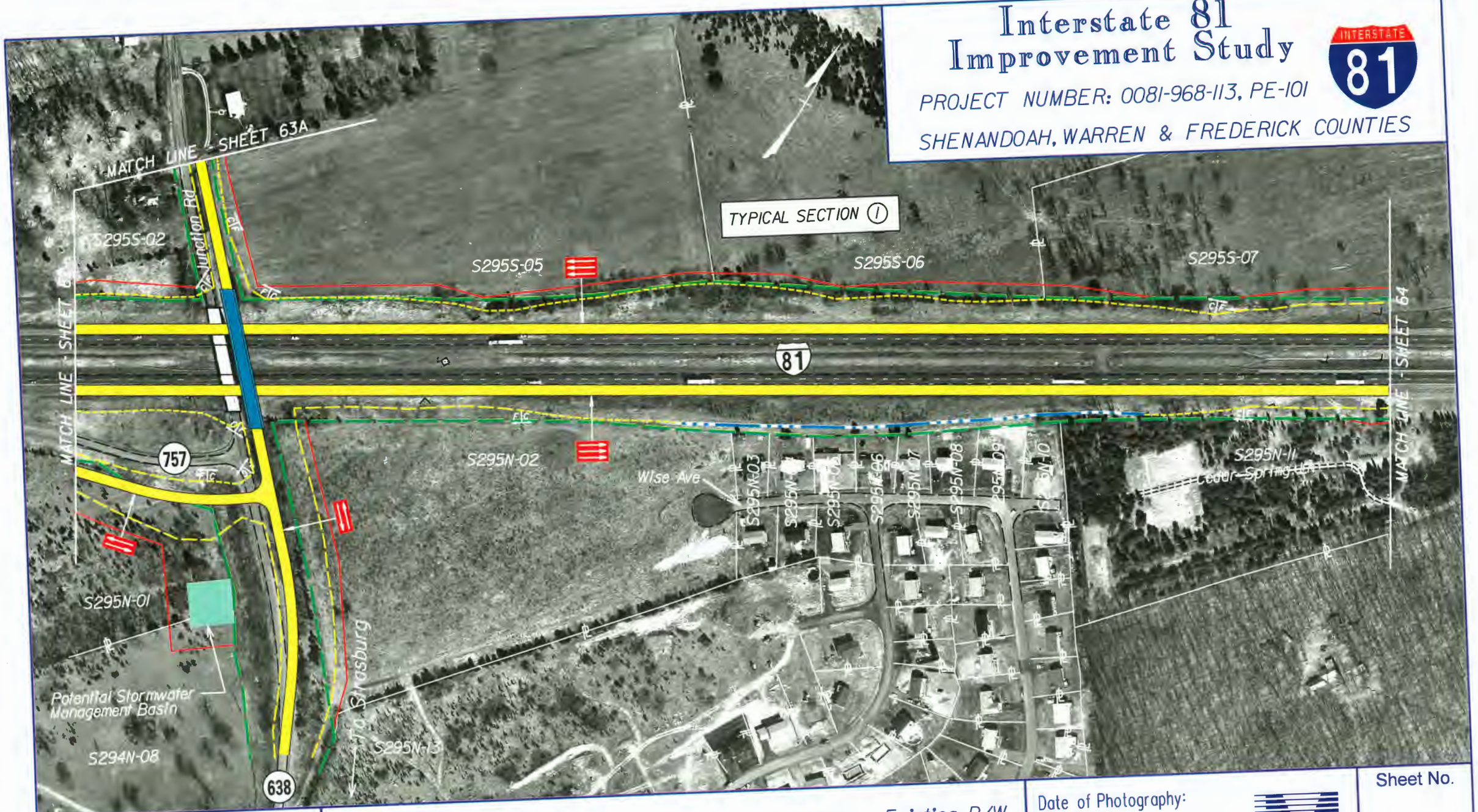
62

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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VDOT METRIC

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63

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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63A

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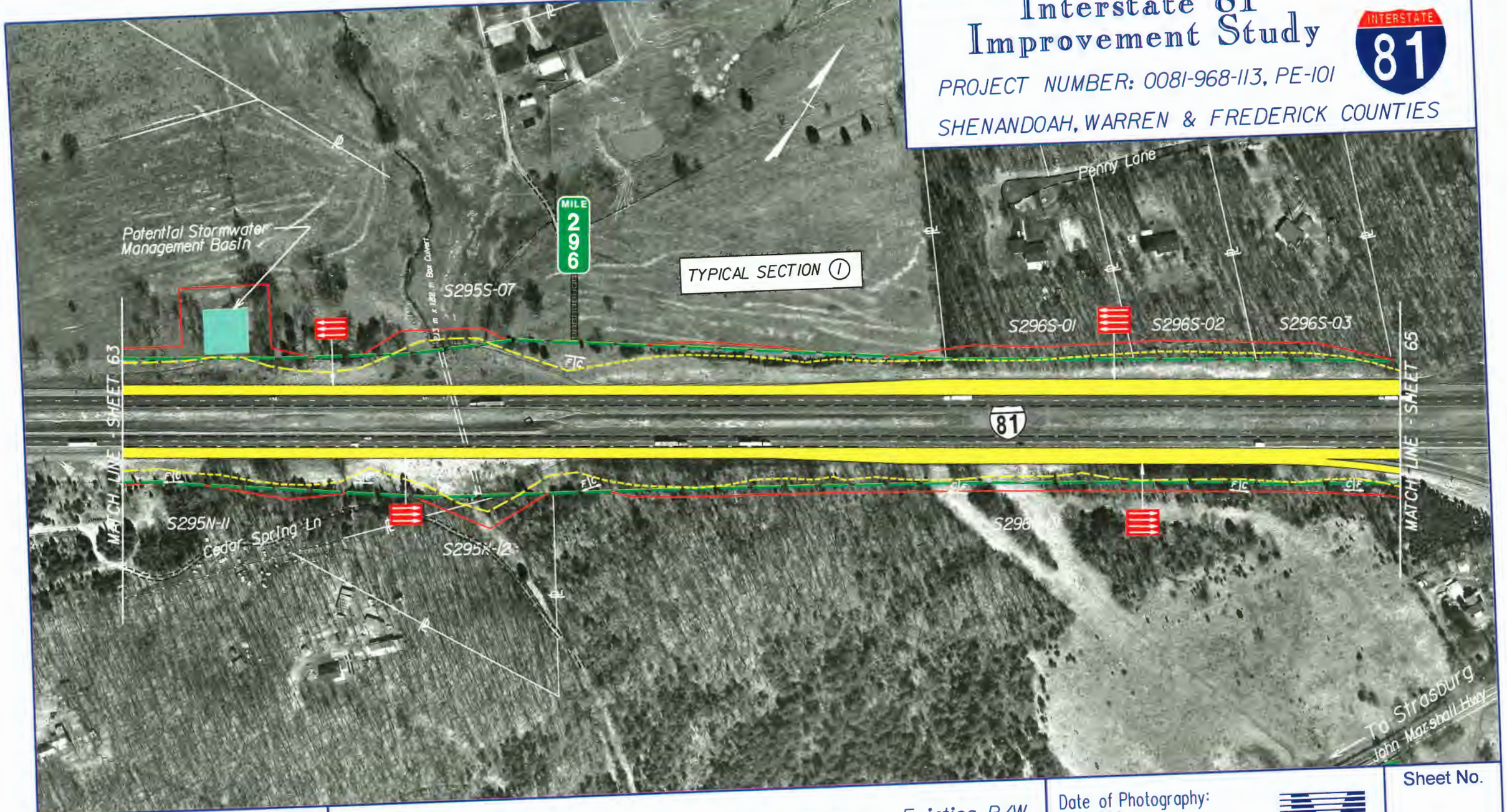
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

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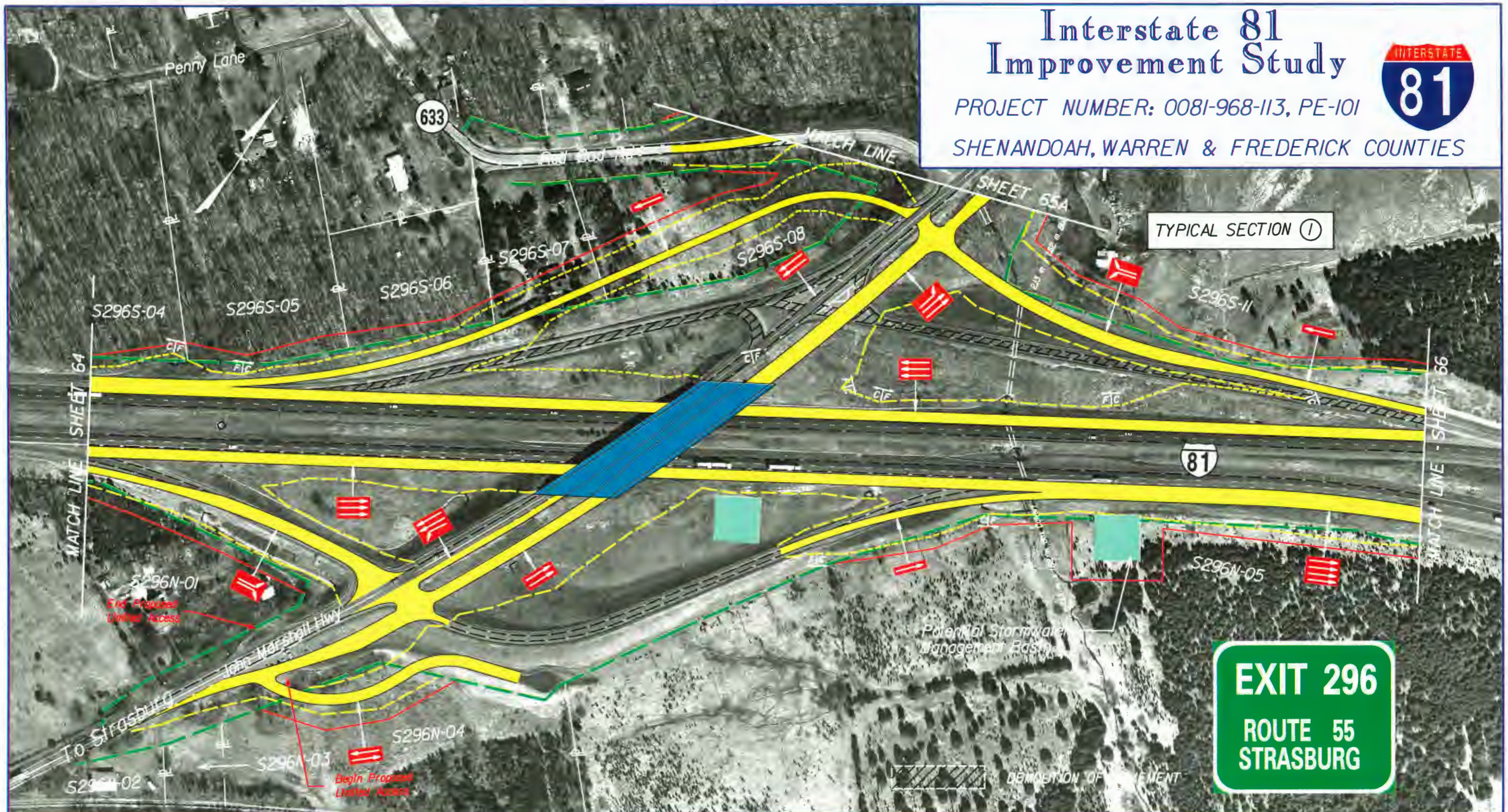
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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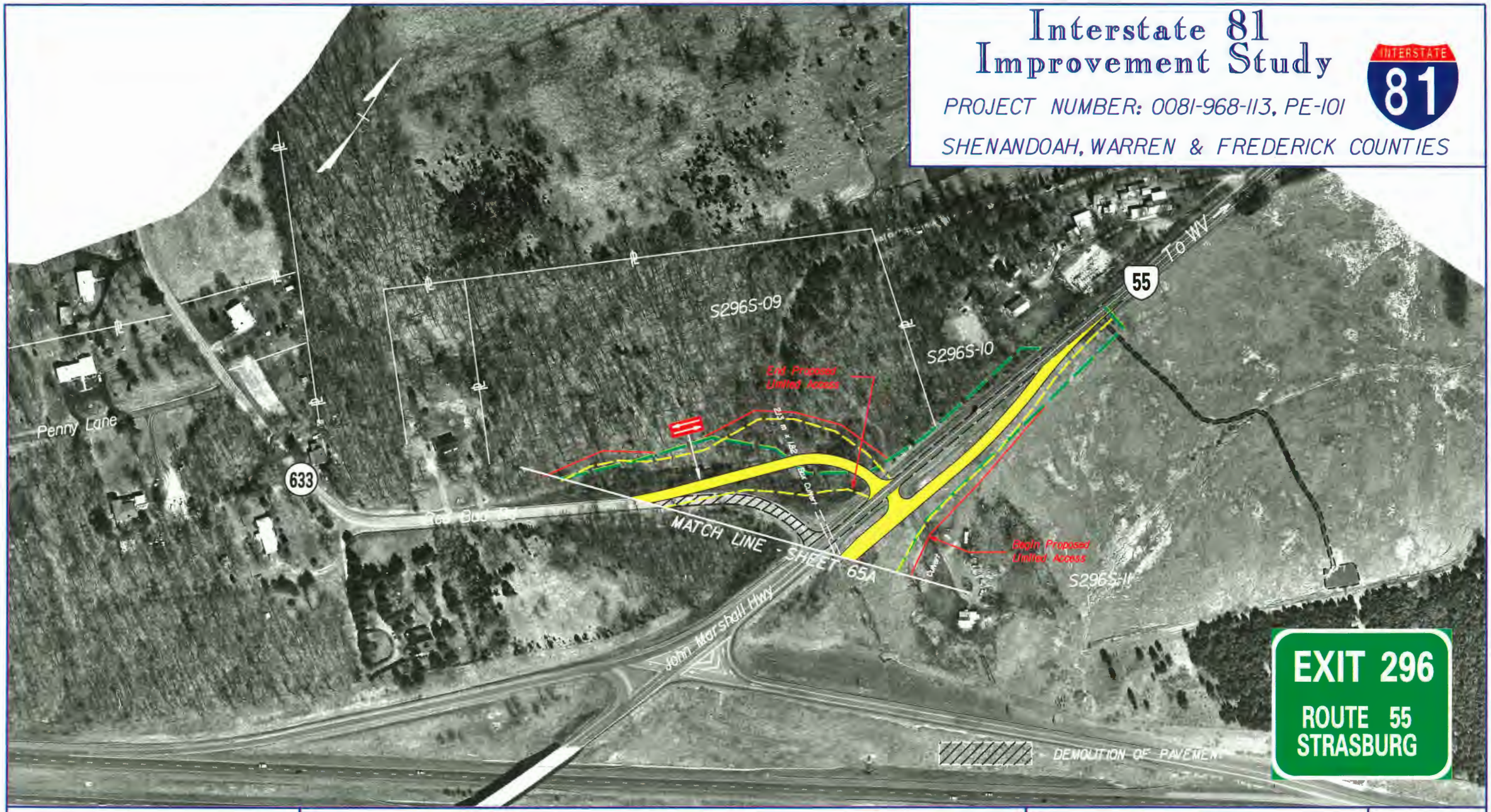
65

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

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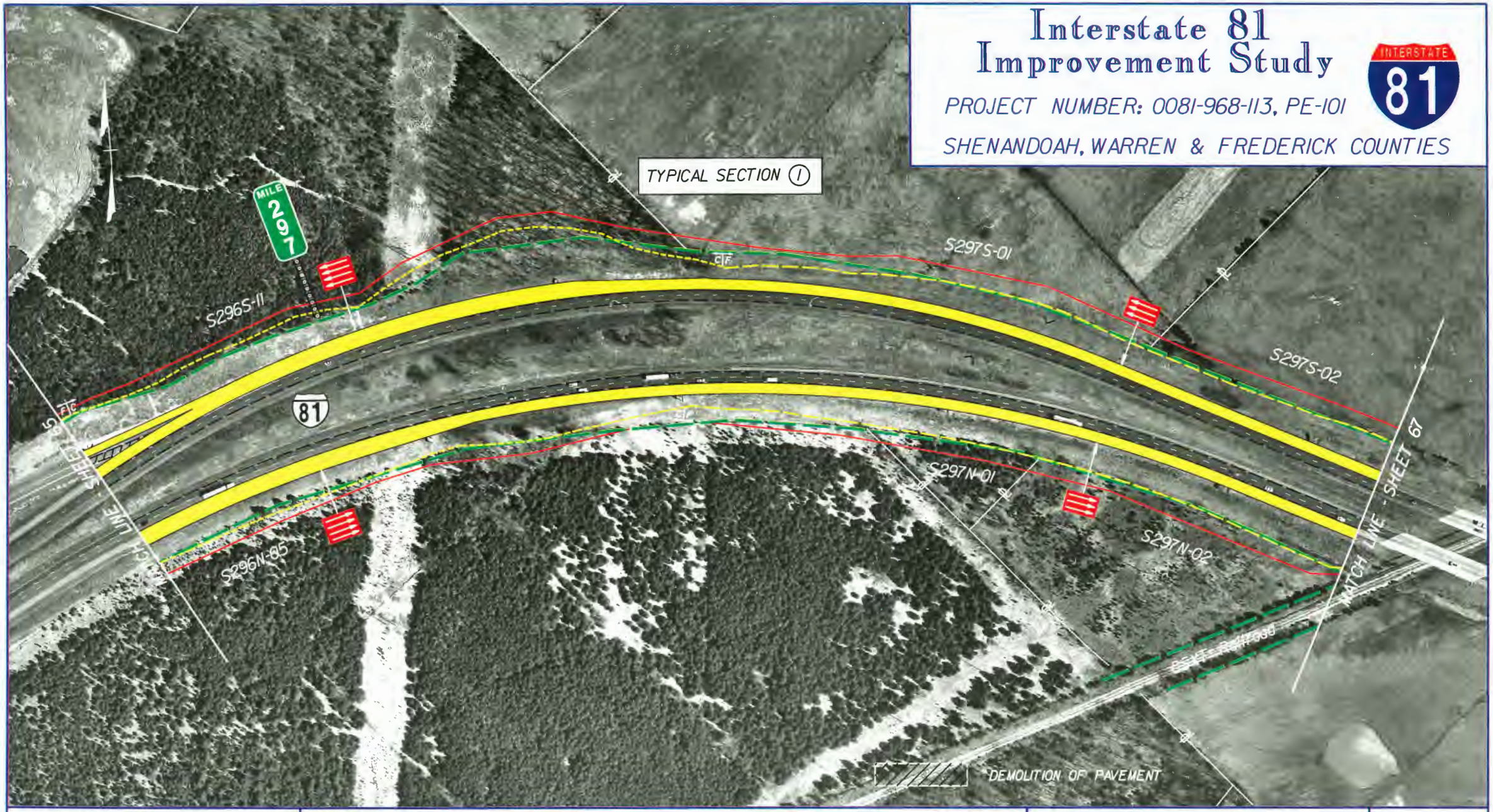
65A

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

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VDOT METRIC

Sheet No.

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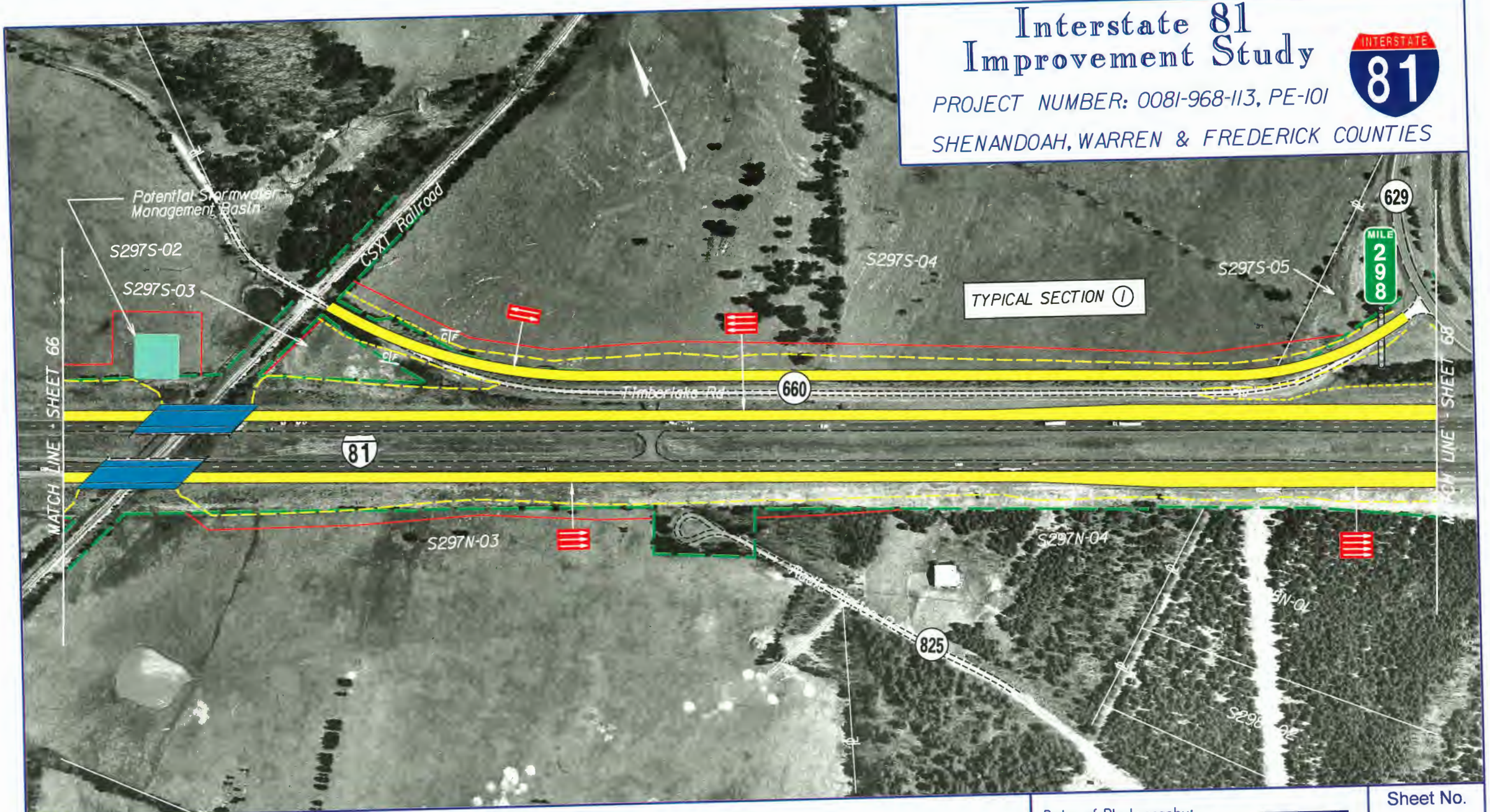
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

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Sheet No.

67

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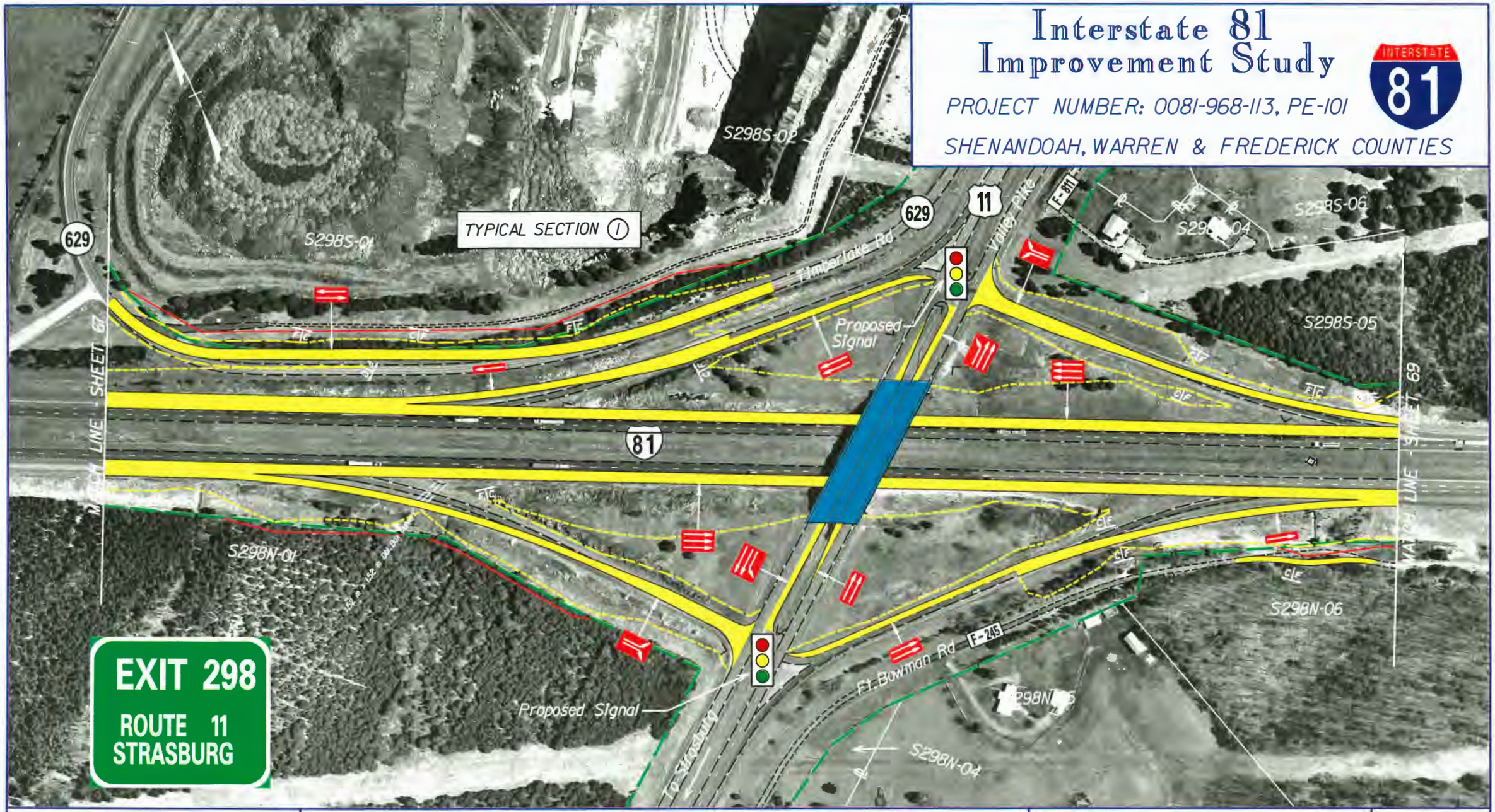
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wa

Existing R/W

Proposed R/W

ential Stormwater agement Basin

Date of Photography: April 1996

SCALE 1 : 2500

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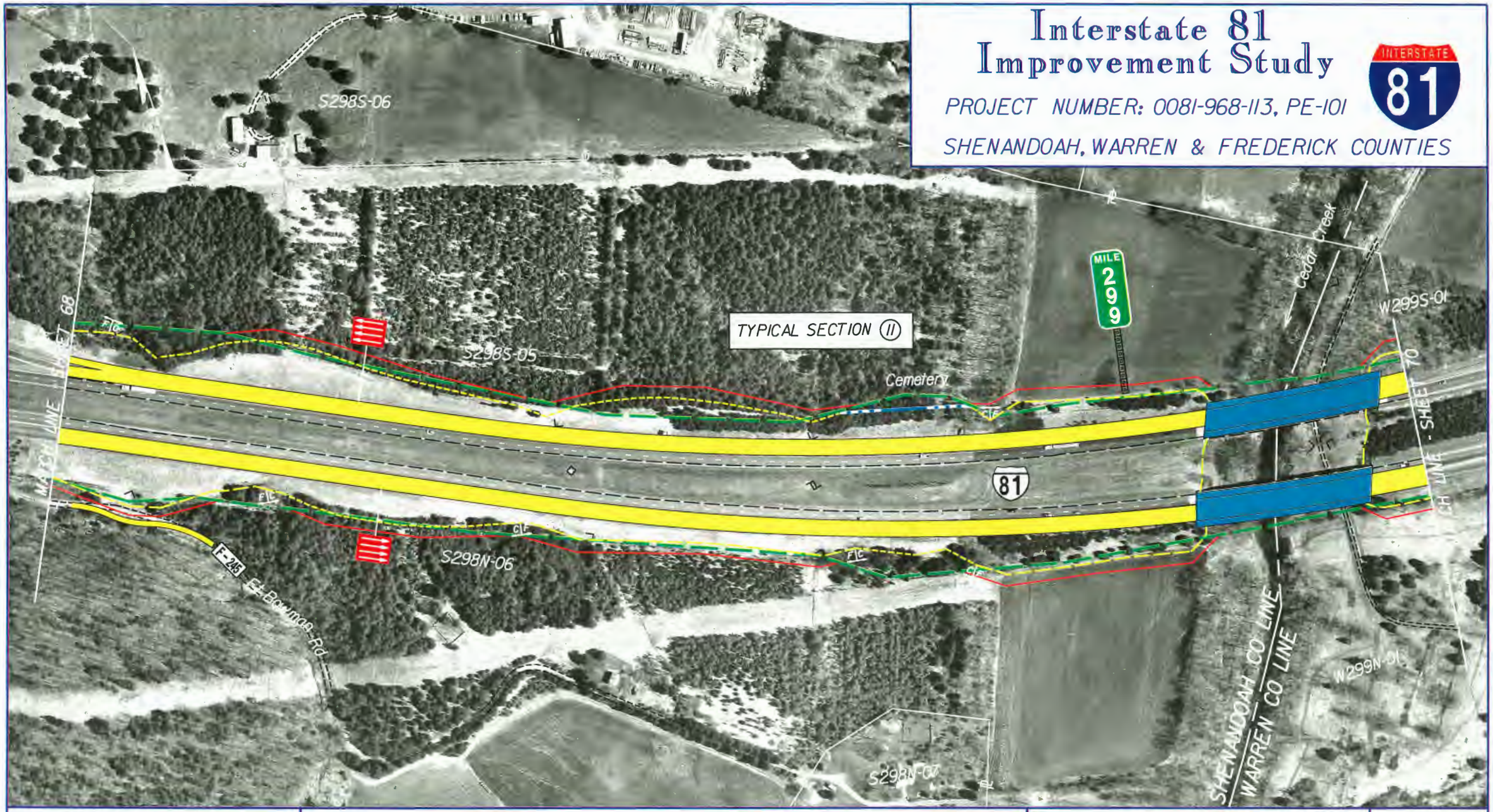
68

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

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VDOT METRIC

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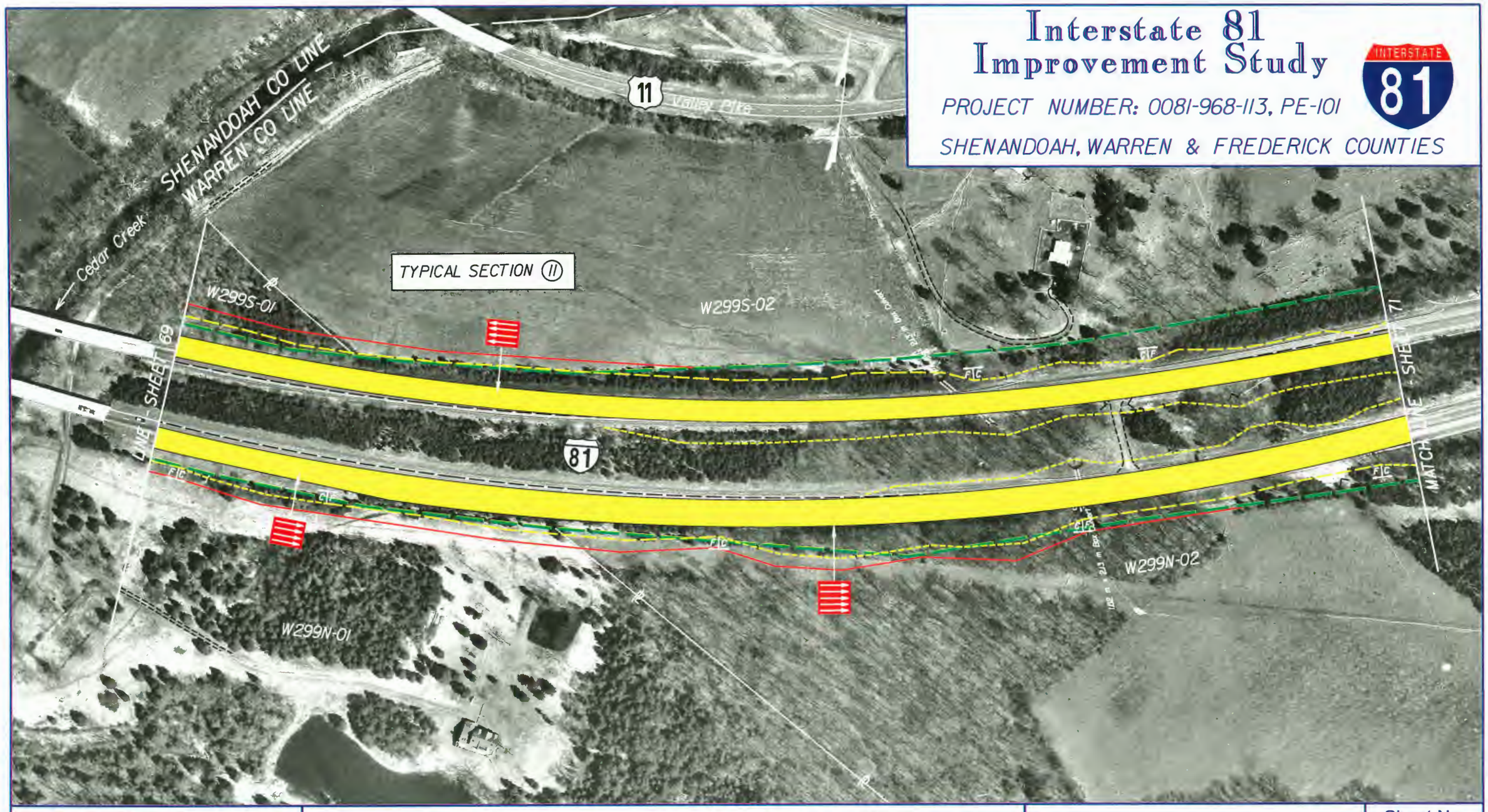
69

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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VDOT METRIC

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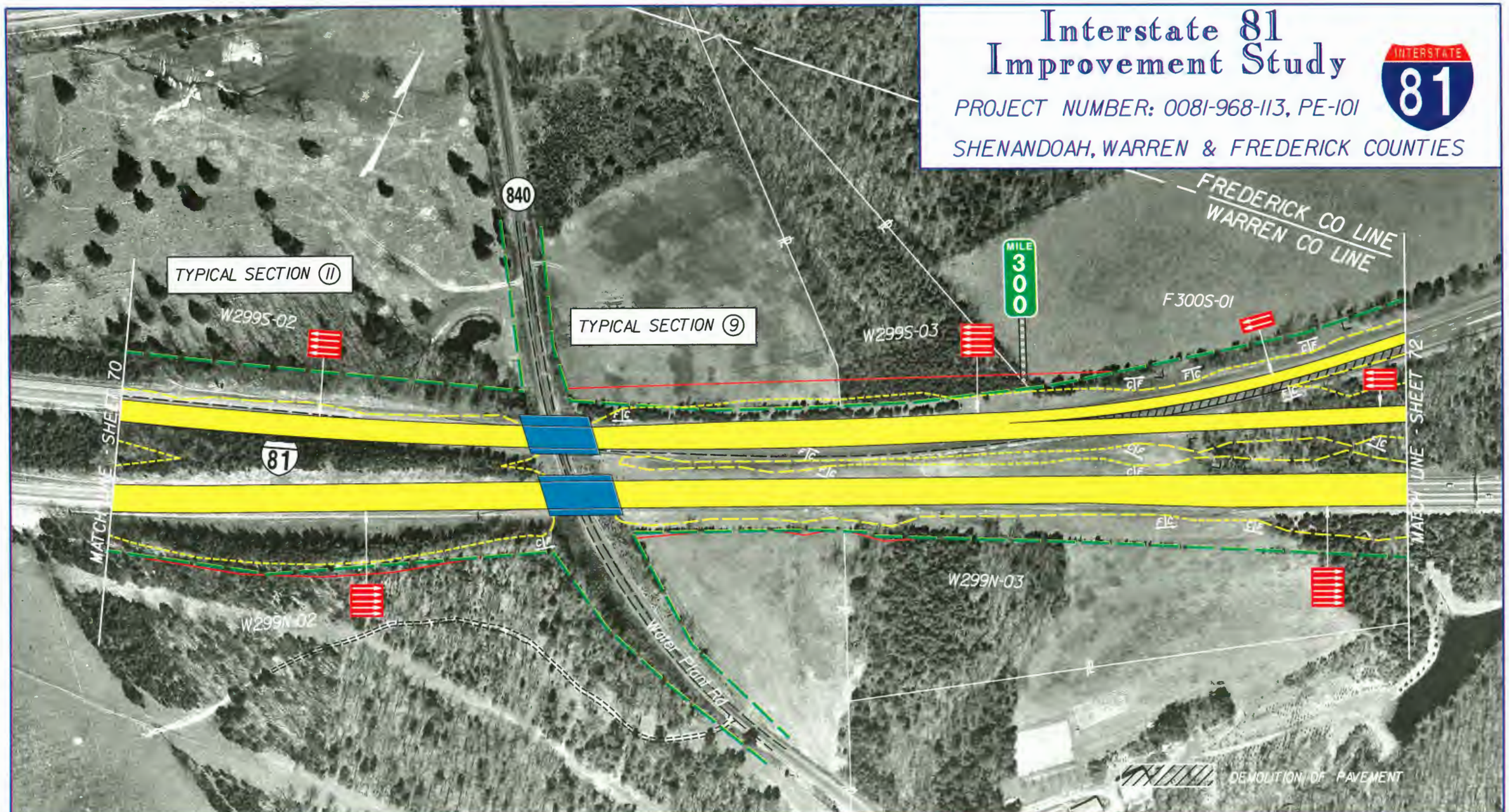
70

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

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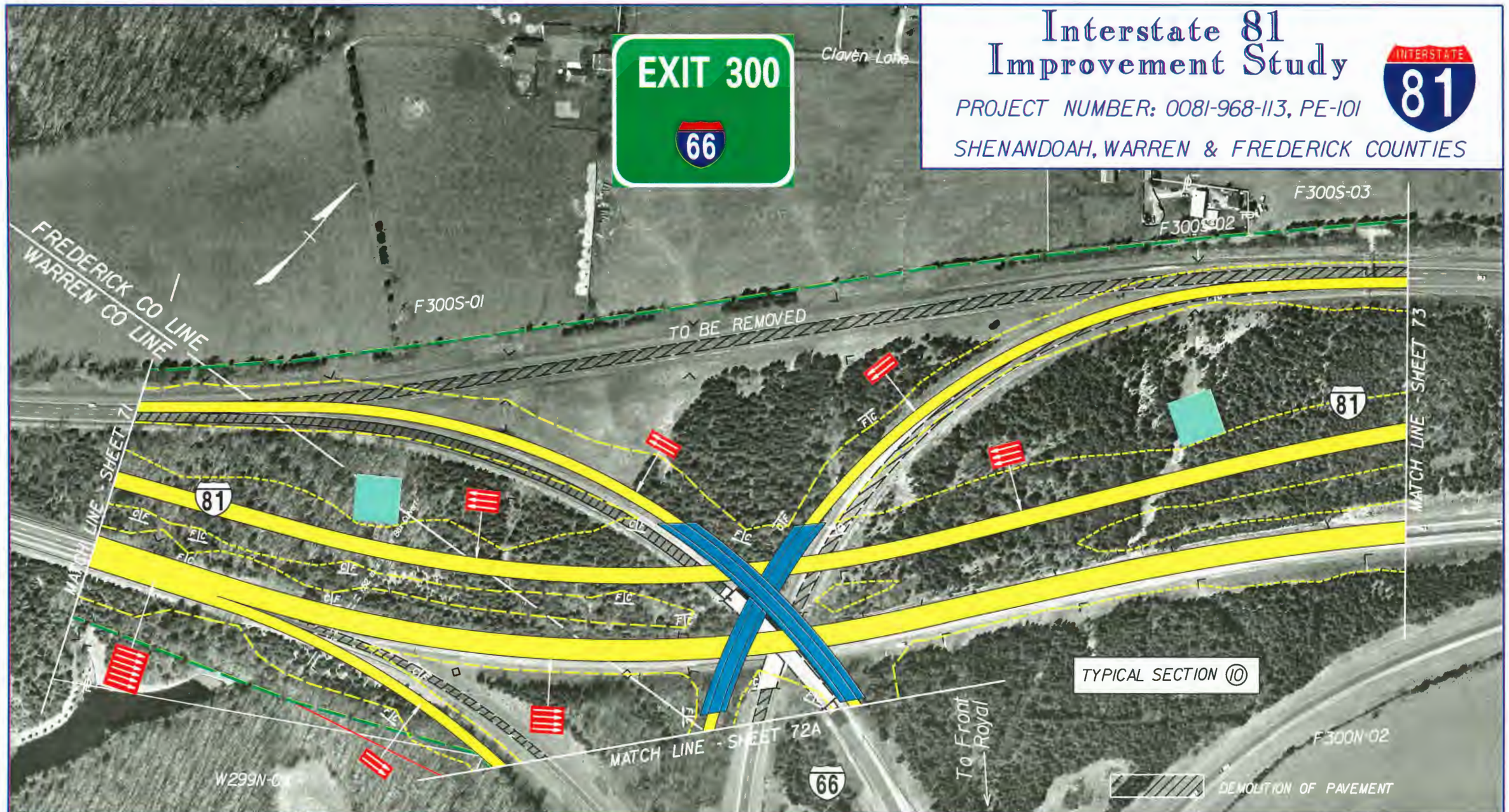
71

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

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72

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

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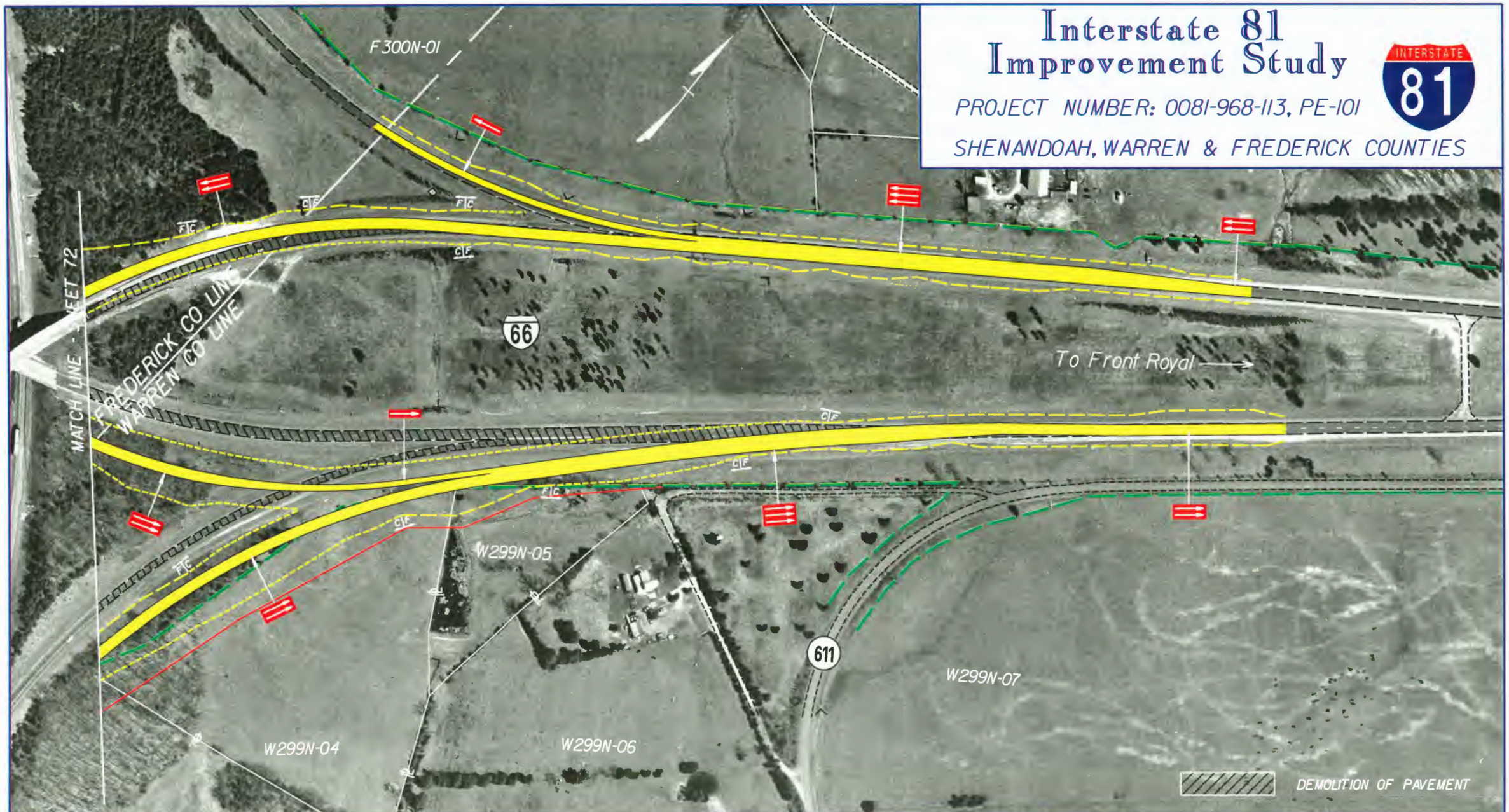

Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

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VDOT METRIC

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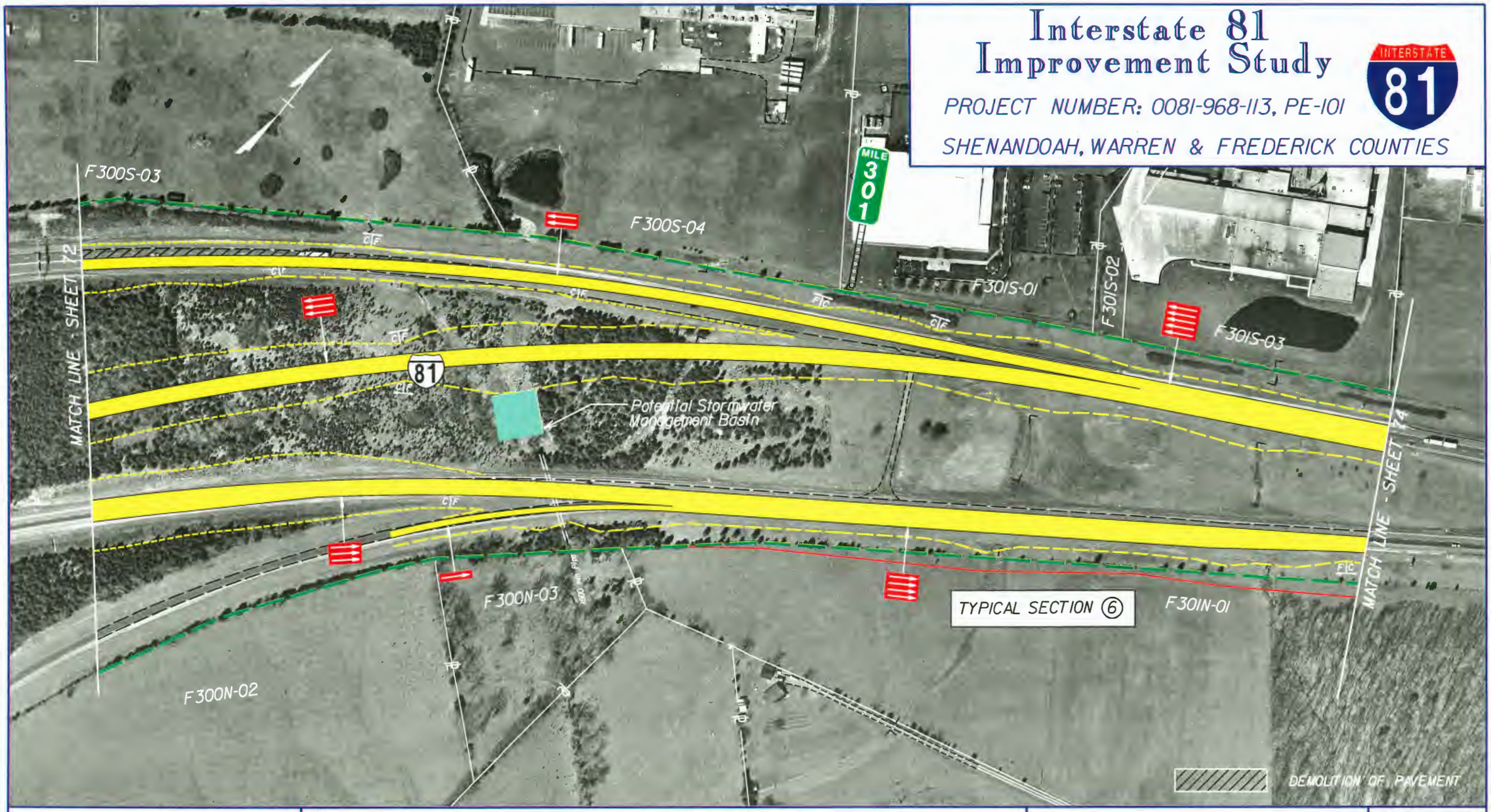
72A

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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VDOT METRIC

Sheet No.

73

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81

Potential Stormwater Management Basin

F301S-04

F301S-05

F301S-06

F301S-07

F301S-08

F301S-09

F301S-10

CORPORATE LIMITS

6th Street

MATCH LINE - SHEET 73

MATCH LINE - SHEET 75

81

F301N-01

F301N-02

F301N-03

F301N-04

F301N-05

TYPICAL SECTION 6

842

Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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VDOT METRIC

Sheet No.

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Interstate 81 Improvement Study

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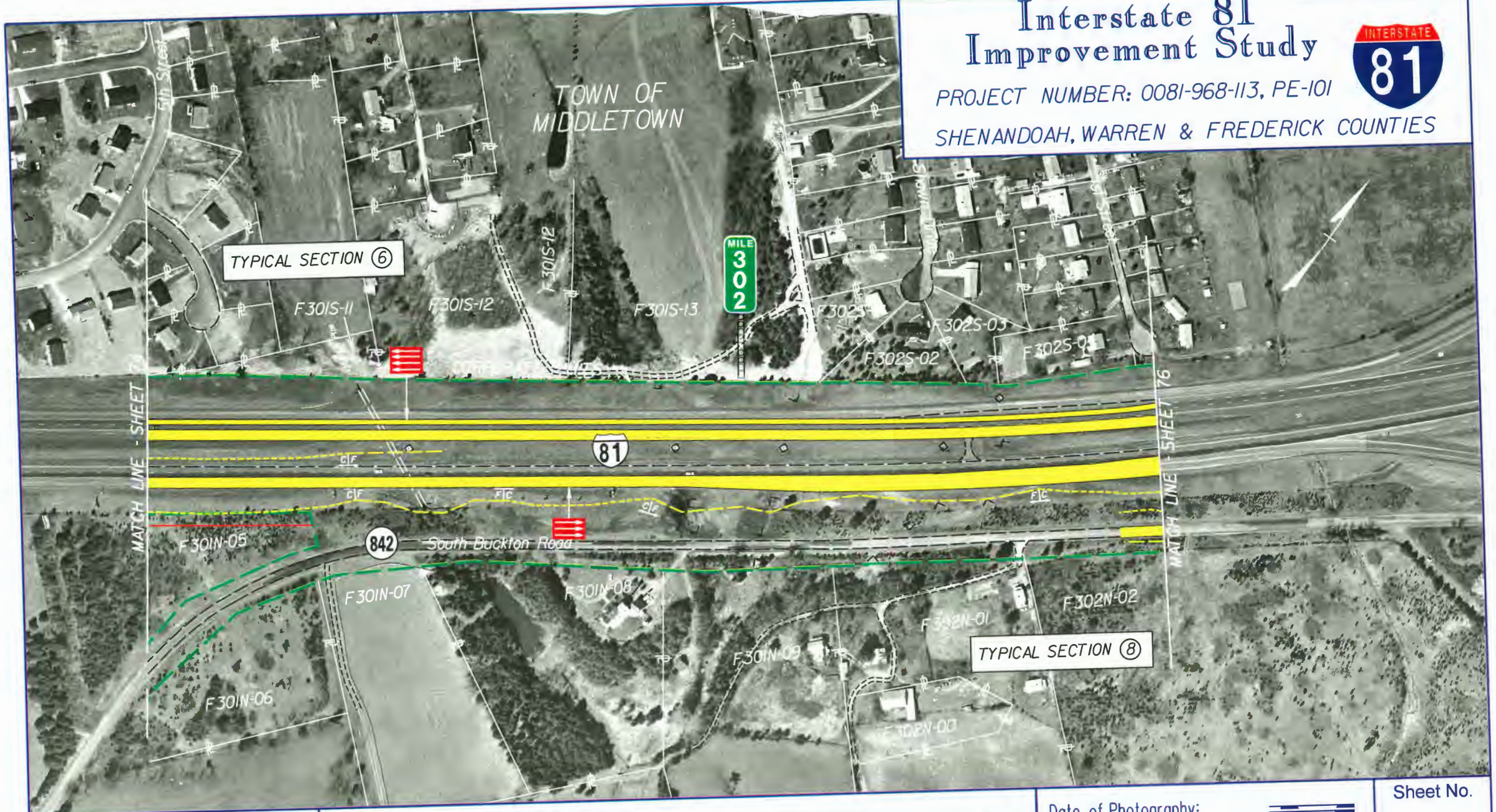
SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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VDOT METRIC

Sheet No.

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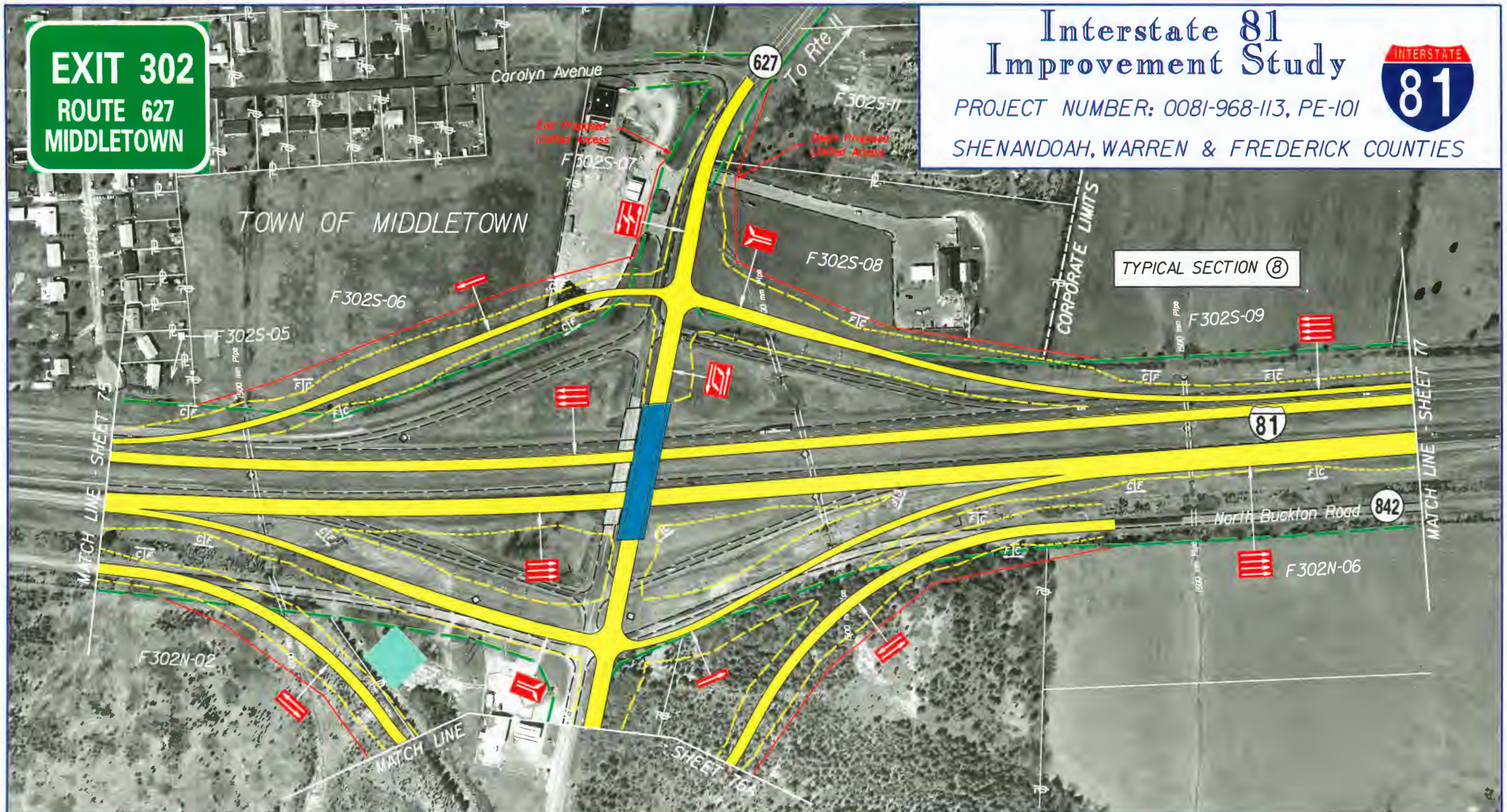
Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

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VDOT METRIC

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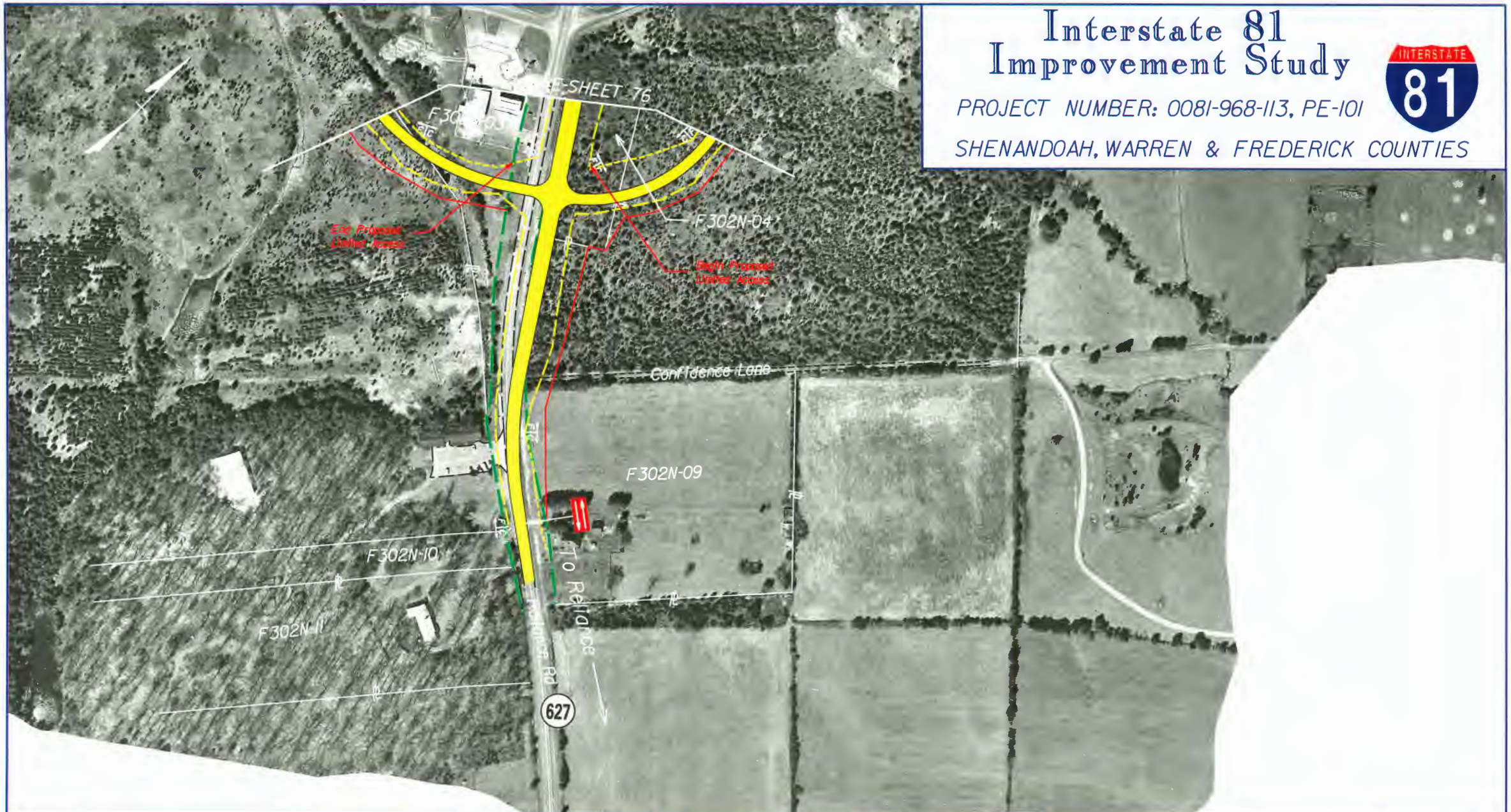
76

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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VDOT METRIC

Sheet No.

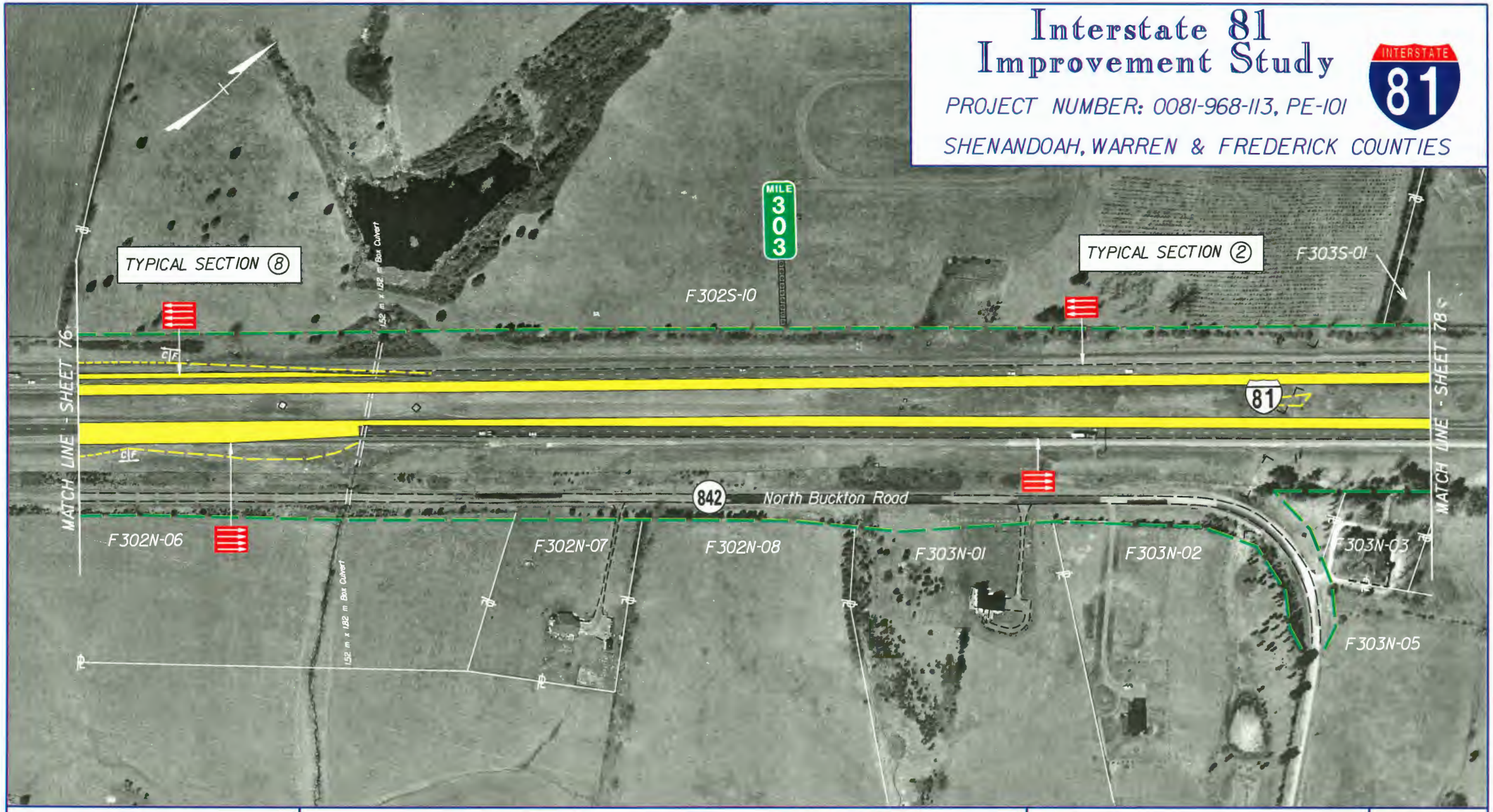
76A

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

INTERSTATE 81



Virginia Department of Transportation

VDOT

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

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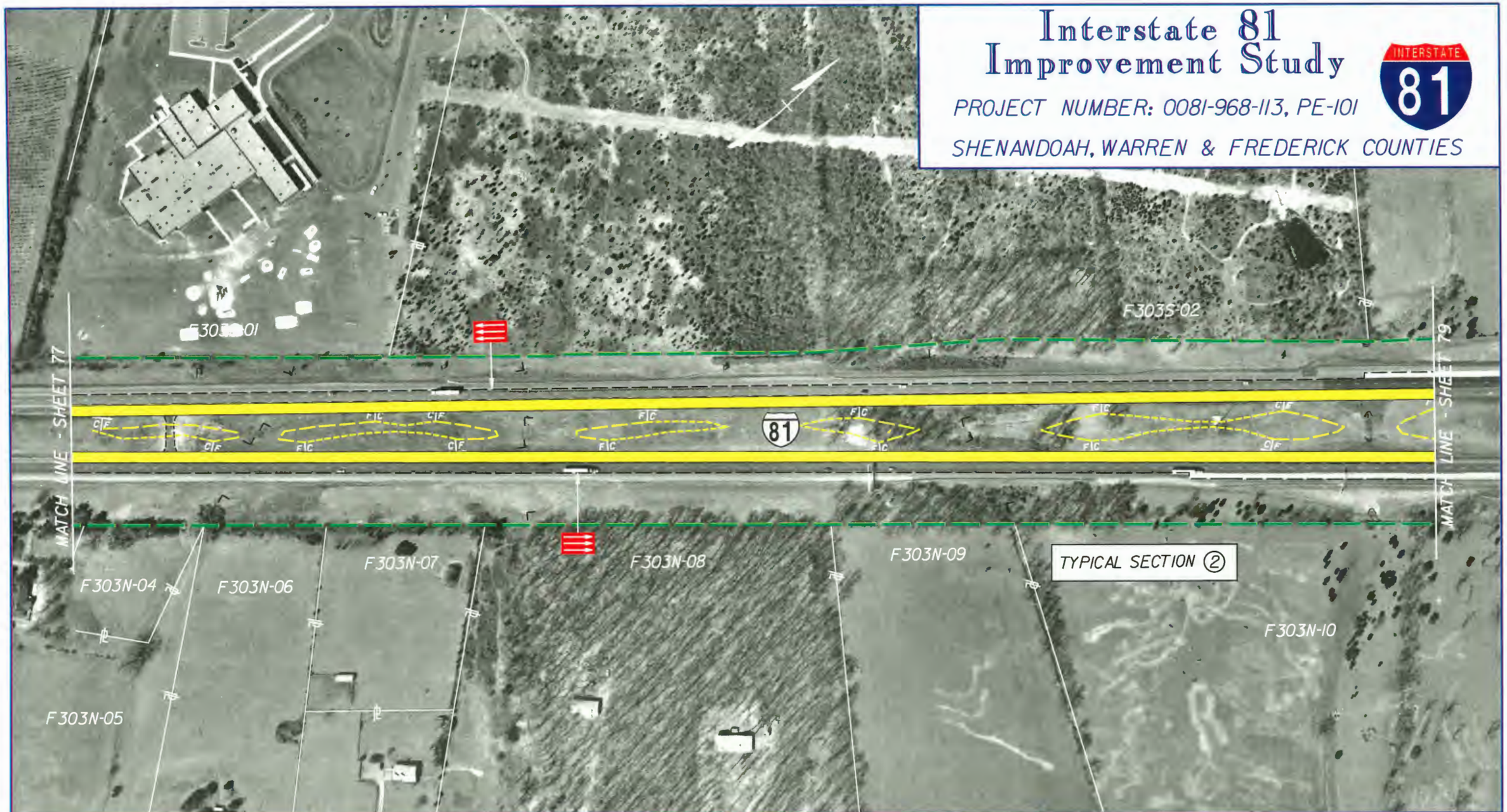

Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

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Interstate 81 Improvement Study

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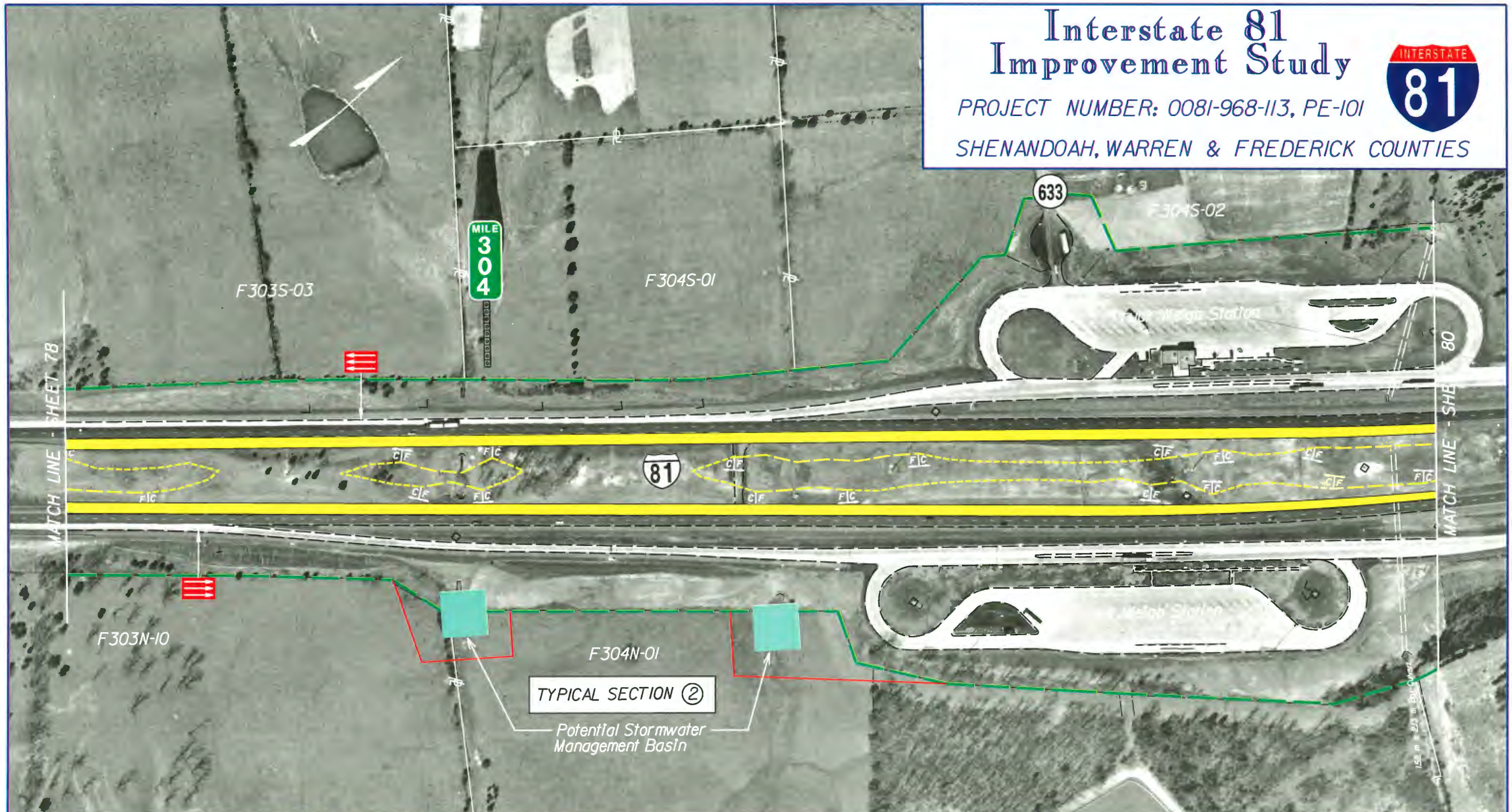

Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

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VDOT METRIC

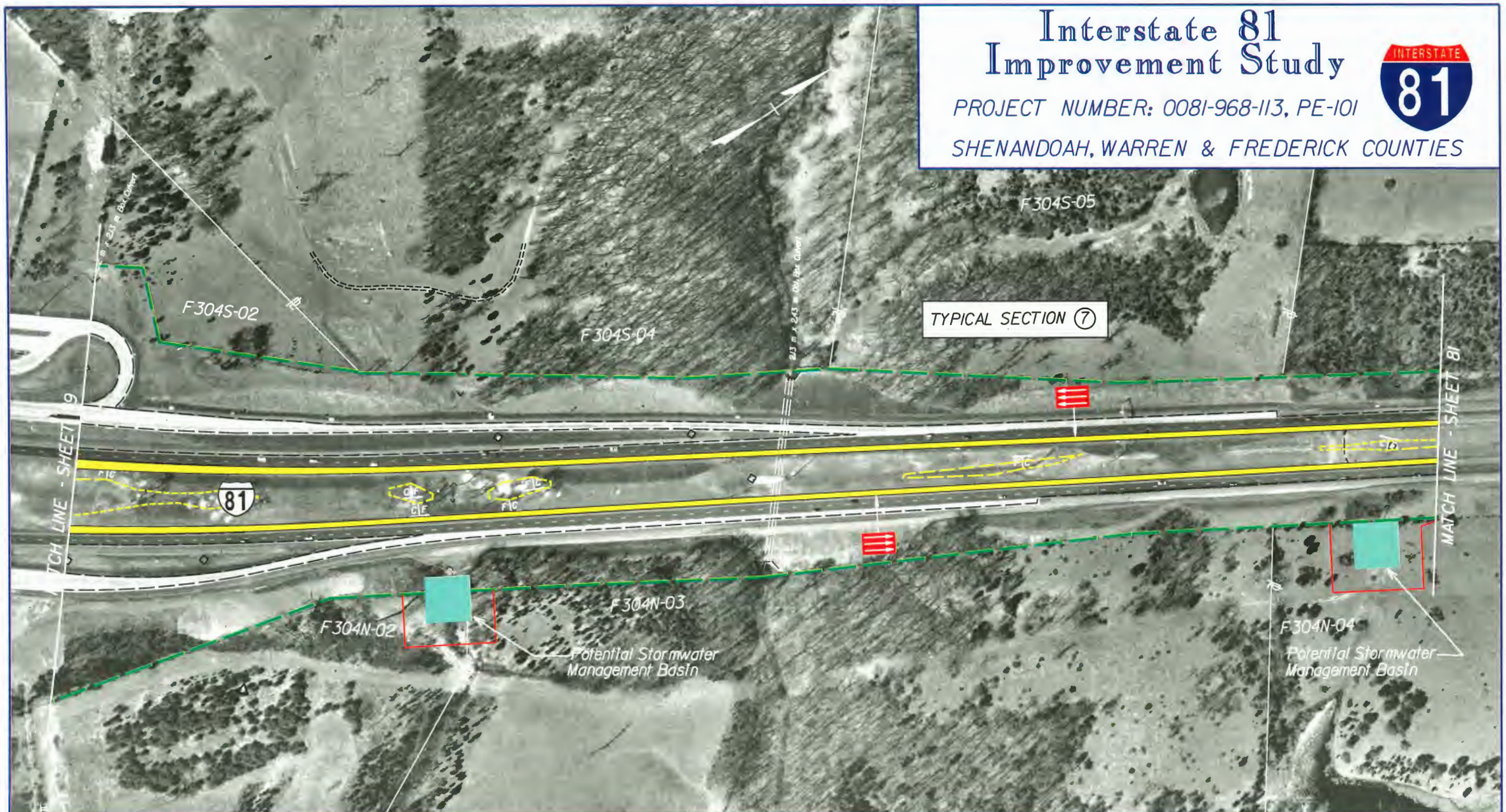
Sheet No.

79

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES



Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

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VDOT METRIC

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80

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

Virginia Department of Transportation

Proposed Pavement

Proposed Structure Work

Proposed Retaining Wall

Existing R/W

Proposed R/W

Potential Stormwater Management Basin

Date of Photography: April 1996

SCALE 1 : 2500

0 50 m 100 m

VDOT METRIC

Sheet No.

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Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S264N-01	Wright, Carroll J. or Helen D.	1	NO TAKE	
S264N-02	Williams, Clarence R. or Beverly M.	1	NO TAKE	
S264N-03	Hevener, Daryl W. or Tammy S.	1	NO TAKE	
S264N-04	Bell, Allen P. or Julia A.	1	NO TAKE	
S264N-05	Mauri, Tadashi F. or Daisey K.	1	NO TAKE	
S264N-06	Choconos, Peter M. or Marie V.	1	NO TAKE	
S264N-07	Carson, Thomas W. or Wanda S.	1	NO TAKE	
S264N-08	Newland, Jerry C. or Gloria C.	1	NO TAKE	
S264N-09	McKillip, Gladys V.	1	NO TAKE	
S264N-10	Short, Avery D., or Mary Lou	1	NO TAKE	
S264N-11	Teter, Gary B. or Susua C.	1	NO TAKE	
S264N-12	Gostsch, Ronald D. or Karen I.	2	NO TAKE	
S264N-13	Nicholson, Harvey C. or Irma C.	2	NO TAKE	
S264N-14	Armentrout, Camden C.	2	NO TAKE	
S264N-15	Trustees of Mt. Zion Evan. Luthern Church	2	NO TAKE	
S264N-16	McDaniel, Jimmie R. or June Gloria	2	NO TAKE	
S264N-17	Dively, Crain T. or Brenda L.	2	NO TAKE	
S264N-18	New Market, Town of	2	NO TAKE	
S264N-19	New Market, Town of	2	NO TAKE	
S264N-20	New Market, Town of	2	0.10	400
S264N-21	New Market, Town of	2	0.08	319
S264N-22	Jetter, George	2,3	0.30	1207
S264N-23	Bowman, Richard C. or Gretchen M.	3	NO TAKE	

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S264N-24	Suddith, Charles R. Jr. or Judy	3	0.08	330
S264N-25	Emmart, W.H. and Son, Inc.	3	0.05	216
S264S-01	Miller, John G. or Catherine C.	1	0.27	1090
S264S-05	Richardson, Jack E. or Virginia L.	2	NO TAKE	
S264S-06	Miller, John G. or Catherine C.	2	NO TAKE	
S264S-07	Payne, Robert Houston, III et al	2	NO TAKE	
S264S-08	Campbell, Elizabeth Ann Payne et al	2	NO TAKE	
S264S-09	Virginia Military Institute	2	NO TAKE	
S264S-10	Wright, Shirley F.	2	NO TAKE	
S264S-11	Wright, Shirley F.	2	NO TAKE	
S264S-12	Wright, Shirley F.	2	NO TAKE	
S264S-13	Battlefield Enterprises	3	0.05	206
S264S-14	Weissenborn, James P., Trustee	3	0.13	525
S264S-15	Shenandoah Valley Incorporated	3	0.53	2154
S264S-16	Comtols, Peter or Jane	3	0.26	1061
S264S-17	Virginia Military Institute	2,3	NO TAKE	
S264S-18	Southland Corporation	3	0.12	487
S265N-01	Mt. Jackson Motel and Truck Center,	3	0.07	270
S265N-02	Mt. Jackson Motel and Truck Center,	3,4	.76	3075
S265N-03	Johnson, Allen D., Trustee	4	NO TAKE	
S265N-04	Virginia Military Institute	4	NO TAKE	
S265N-05	Virginia Military Institute	4	NO TAKE	
S265N-06	Farrow, Thomas H. et al	4	NO TAKE	

Virginia Department of Transportation

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VDOT METRIC

Sheet No.

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Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S265N-07	Farrow, Thomas H. et al	4	0.07	281
S265N-08	Farrow, Thomas H. et al	4,5	0.01	35
S265N-09	Buhl, Henry	5	NO TAKE	
S265N-10	Buhl, Henry	5	NO TAKE	
S265N-11	Virginia Military Institute	5,6	0.12	491
S265S-01	Garber, Marianne or Billy F.	3	NO TAKE	
S265S-02	Virginia Power	3	NO TAKE	
S265S-03	Manor's Hill Development	3,4	NO TAKE	
S265S-04	Summit Point Trading Company, Inc.	4	NO TAKE	
S265S-05	Summit Point Trading Company, Inc.	4	NO TAKE	
S265S-06	Virginia Military Institute	4	NO TAKE	
S265S-07	Virginia Military Institute	4	NO TAKE	
S265S-08	Virginia Military Institute	4	NO TAKE	
S265S-09	Virginia Military Institute	4	NO TAKE	
S265S-10	Virginia Military Institute	4	NO TAKE	
S265S-11	Virginia Military Institute	4	NO TAKE	
S265S-12	Virginia Military Institute	4	NO TAKE	
S265S-13	Buhl, Henry	4,5	NO TAKE	
S266N-01	Howard, Marguerite L.	6	0.10	406
S266N-02	Rose, Lida M.	6	0.05	200
S266N-03	Streett, William John or Sharon	6	0.12	500
S266N-04	Helvey, Dorthy P.	6,7	0.35	1429
S266S-01	Virginia Military Institute	5,6	NO TAKE	

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S266S-02	Virginia Military Institute	6,7	NO TAKE	
S266S-04	Moore, Sylvia L.	7	NO TAKE	
S267N-01	Helvey, Dorthy P.	7,8	0.61	2481
S267N-02	Eaton, Lonnie F. & Sons, Inc.	8	NO TAKE	
S267S-01	Moore, Sylvia S.	7	NO TAKE	
S267S-02	Eaton, Lonnie and Sons, Inc.	7	NO TAKE	
S267S-03	Eaton, Lonnie F. & Sons, Inc.	8	0.04	162
S267S-04	Long, Harry Corp.	8	0.09	364
S267S-05	Eaton, Lonnie F. & Sons, Inc.	8,9	NO TAKE	
S268N-01	Eaton, Louise and Sons, Inc.	8,9	0.51	2053
S268N-02	Wilkins, Joseph Paul, et al	9	NO TAKE	
S268N-03	Wilkins, Gilbert F.	9,10	NO TAKE	
S268N-04	Wilkins, Joseph Paul, et al	10	NO TAKE	
S268N-05	Anderson, Samuel Clay	10,11,11A	1.80	7281
S268S-01	Wilkins, Joseph Paul, et al	9,10	NO TAKE	
S268S-02	Burch, Ken L.	10,11	1.32	5324
S268S-03	Emmart, W.H. & Son, Inc.	11	0.09	364
S269N-01	Holtzman, William B.	11A	0.37	1508
S269N-02	Burch, Ken L.	11A	0.30	1190
S269N-03	Burch, Ken L.	11,11A	0.10	405
S269N-04	Saville, David B. et al	11,11A	0.22	880
S269N-05	Burch, Ken L.	11,11A	0.49	1970
S269N-06	Mount Airy Land Trust	12,13	0.58	2361

Virginia Department of Transportation

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VDOT METRIC

Sheet No.

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File: Mkr4520Owner2.dgn
Date: 11/13/98
Time: 14:14:33

Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S269N-07	Burch, Ken L.	11A	0.21	838
S269N-08	Burch, Ken L.	11A	0.02	99
S269S-01	Skyline Group Inc.	11	0.02	84
S269S-02	Skyline Group Inc.	11	0.05	189
S269S-03	Burch, Ken L.	11	0.20	816
S269S-04	Burch, Ken L.	11	0.02	80
S269S-05	Burch, Ken L.	11,12	1.40	5642
S269S-06	Mt. Jackson Press Inc.	12	NO TAKE	
S269S-07	Mr. Jackson Press Inc.	12,13	NO TAKE	
S270N-01	Mount Airy Land Trust	13,14	1.30	5271
S270N-02	Pool, Jr., John E. et al Life Estate	14,15	NO TAKE	
S270N-03	Baker, Fred W. or Peggy M.	13	NO TAKE	
S270N-04	Nolan, Jr., James E.	13	NO TAKE	
S270N-05	Price, Jr., Elmer D. or Annis LaVerne	13	0.03	126
S270N-06	Ruby, Stanford or Wilma L.	13	0.02	70
S270N-07	Payne, James L. or Kay E.	13	0.01	32
S270S-01	Mt. Jackson Town	13,13A	NO TAKE	
S270S-02	Shen-Paco Industries Inc.	13A	0.13	546
S270S-03	Industrial Development Authority of	13,14	NO TAKE	
S270S-04	Industrial Development Authority of	14	NO TAKE	
S270S-05	Orionnet, Inc.	14	NO TAKE	
S270S-06	Merillat, Corp.	14,15	NO TAKE	
S271N-01	Custer, Maxine M. Life Estate	15	NO TAKE	
S271N-02	Shenandoah County School Board	15	NO TAKE	

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S271N-03	Dawson, Beverly E. or Ruth E.	15	NO TAKE	
S271N-04	Mauck, William F. or Rebecca M.	15	NO TAKE	
S271N-05	Foley, John H., Sr. or Eleanore L.	15	NO TAKE	
S271N-06	Unknown	15	NO TAKE	
S271N-07	Barbatsuly, Betty Lind, et al	15,16	NO TAKE	
S271S-01	Merillat Corp.	15	0.60	2397
S271S-02	Frederickson Family Partnership	15	NO TAKE	
S271S-03	Barbatsuly, Betty Lind, et al	15,16	NO TAKE	
S272N-01	Luse, Elizabeth A.	16,17	0.88	3556
S272N-02	Landis, Adam J.	17	NO TAKE	
S272N-03	Baker, Guy A. or Shirley F.	17	NO TAKE	
S272N-04	Mt. Jackson Town	17	NO TAKE	
S272N-05	Cooper, Jack D. or Margaret M.	17,18	NO TAKE	
S272N-06	Frye, Mary Frances	18	NO TAKE	
S272N-07	Hansberger, Mary C.	18	NO TAKE	
S272N-08	Valley Fertilizer and Chemical Co.	18	0.68	2743
S272S-01	Mennonite Mission Properties, Inc.	16,17	NO TAKE	
S272S-02	Dellinger, Donal E. or Kathie W.	17	NO TAKE	
S272S-03	Landis, Adam J.	17	NO TAKE	
S272S-04	Slivious, Barry S. or Carol A.	17	NO TAKE	
S272S-05	Rinker, Donald W.	17,18	0.56	2287
S272S-06	Scothern Celia I, Life Tenant	18	NO TAKE	

Virginia Department of Transportation

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VDOT METRIC

Sheet No.

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File: MV-4520Owner3.dgn
Date: 11/13/98
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Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S273N-01	Wolfkill Vault Service, Inc.	18,19	NO TAKE	
S273N-02	Stelco, Inc.	19,19B	1.85	7494
S273N-03	Bowman, Beverly D.	19B	NO TAKE	
S273N-04	Mt. Jackson Motel & Truck Ctr. Inc.	19B	NO TAKE	
S273N-05	Mt. Jackson Properties	19B	NO TAKE	
S273N-06	Mt. Jackson Motel and Truck Ctr., Inc.	19B	NO TAKE	
S273N-07	Mt. Jackson Motel and Truck Ctr., Inc.	19,19B	NO TAKE	
S273N-08	Bowman Apple Products Co., Inc.	19,19B,20	NO TAKE	
S273N-09	Richardson, Jessie S.	19B	NO TAKE	
S273N-10	Richardson, Jessie M.S.	19B	NO TAKE	
S273N-11	Cash, Shirley Ann	19B	NO TAKE	
S273N-12	Third Stevenson Properties Corp.	19B	NO TAKE	
S273S-01	Myers, Martha Ann	18,19	NO TAKE	
S273S-02	Funkhouser, Eleanor E.	19	NO TAKE	
S273S-03	Funkhouser, Eleanor E.	19	NO TAKE	
S273S-04	Funkhouser, Eleanor E.	19	NO TAKE	
S273S-05	Tisinger, Bertha G.	19,19A	NO TAKE	
S273S-06	Good, Jr., J. Warren	19,19A	1.30	5251
S273S-07	Good, III, J.W.	19,19A	1.92	7757
S273S-08	Bowers, Susie C. and Reba Wilkins	19,19A,20	0.06	251
S273S-09	Emmart, W.H. and Son, Inc.	20	NO TAKE	
S273S-10	Emmart W.H. and Sons, Inc.	20	NO TAKE	
S273S-11	Painter, Nina Jean	20	NO TAKE	

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S273S-12	Painter, Nina Jean	20	NO TAKE	
S273S-13	Luray Caverns Corporation	20	NO TAKE	
S274N-01	Bowman Apple Products Co., Inc.	20	NO TAKE	
S274N-02	Bowman Apple Products Co., Inc.	20,21	0.52	2118
S274N-03	Bowman Apple Products Co., Inc.	21	0.60	2406
S274N-04	Fleming, Thomas R. Inc.	22	NO TAKE	
S274S-01	Shirley, Denny W.	20	NO TAKE	
S274S-02	Bowman Apple Products Co., Inc.	20,21	1.36	5512
S274S-03	Myers, W.	21	NO TAKE	
S274S-04	Wealthy, Ray E. or Bonnie F.	21	NO TAKE	
S274S-05	Wealthy, Ray E. or Bonnie F.	21	NO TAKE	
S275N-01	Dirting, Charles R.	22,23,23A	0.42	1717
S275N-02	Massie, Edythe S.	23,23A,24	1.06	4275
S275S-01	Dinges, Jr., Frank C. Estate	22,23	0.60	2449
S275S-02	Massie, Sherrill V.	23	1.13	4564
S275S-03	Foltz, Joe and Mary	23	0.13	526
S276N-01	Fuller, Ellen F.	24,25	0.57	2312
S276N-02	Richman, Perry Albert et al	25	NO TAKE	
S276N-03	French, Orrin L.	25	NO TAKE	
S276N-04	Richman, Perry Albert	25,26	0.93	3776
S276S-01	Mullen, Cynthia French	23,24	0.30	1194
S276S-02	Richman, Perry A., et al	24,25	NO TAKE	
S276S-03	Richman, Perry A., et al	25,26	0.60	2442

Virginia Department of Transportation

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VDOT METRIC

Sheet No.

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File: MV4520owner4.dgn
Date: 11/13/98
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Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S276S-04	Richman, Perry A. et al	25	NO TAKE	
S277N-01	Richman, Perry Albert et al	27	NO TAKE	
S277N-02	Bowman, Nancye L.	27	0.04	148
S277N-05	Bowman, Nancye L.	27	3.00	12153
S277N-06	Dellinger, Mark E. or Ellen K.	27,28	NO TAKE	
S277S-01	Richman, Perry A., et al	27	0.14	574
S277S-02	Bowman, Nancye L.	27	NO TAKE	
S277S-03	Bowman, Nancye L.	27,28	3.24	13126
S277S-04	Frye, Charles B. or Mary Anna	28	NO TAKE	
S277S-05	Frye, Charles Bernard and Mary Anna	28	NO TAKE	
S278N-01	Edinburg, Town of	28,29	1.20	4821
S278N-02	Massie, Grace H.	29	NO TAKE	
S278N-03	Massie, Grace H.	29,30	NO TAKE	
S278N-04	Massie, Grace H.	30	NO TAKE	
S278S-01	Pence, Dean E. or Syvilla P.	28	NO TAKE	
S278S-02	Pence, Dean E. or Syvilla P.	28	NO TAKE	
S278S-03	Pence, Dean E. or Syvilla P.	28,29	NO TAKE	
S278S-04	Wholesome Food, Inc.	29	NO TAKE	
S278S-05	Wholesome Food, Inc.	29	NO TAKE	
S278S-06	Schroeder, Richard C. or Clara M.	29	NO TAKE	
S278S-07	Pence, Wesley G. or Stephanie R.	29,30	0.60	2387

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S278S-08	Crabill, Elizabeth	30	NO TAKE	
S278S-09	Wymer, Erma	30	NO TAKE	
S278S-10	Clem, Helen H.	30	NO TAKE	
S278S-11	Clem, Helen H.	30	NO TAKE	
S278S-12	Blue Ridge Homes, Inc.	30	NO TAKE	
S278S-13	Blue Ridge Homes, Inc.	30	NO TAKE	
S278S-14	Blue Ridge Homes, Inc.	30	NO TAKE	
S278S-15	Blue Ridge Homes, Inc.	30	NO TAKE	
S278S-16	Blue Ridge Homes, Inc.	30	NO TAKE	
S278S-17	Blue Ridge Homes, Inc.	30	0.18	726
S278S-18	Blue Ridge Homes, Inc.	30	0.42	1694
S279N-01	Raynor, Sallie M.	30,31	0.44	1795
S279N-02	Massie, Grace H.	31,31A	0.52	2119
S279N-03	Cook, Dwight H. or Peggy B.	31,31A	NO TAKE	
S279N-04	Cook, Dwight H. or Peggy B.	31A	0.12	475
S279N-05	Cook, Dwight H. or Peggy B.	31A	0.12	486
S279N-06	Cook, Dwight H. or Peggy B.	31,31A	0.18	745
S279N-07	Minnick, Grace B.	31,31A	NO TAKE	
S279N-08	Coleman, Kenneth R. or Judith J.	31,31A	NO TAKE	
S279N-09	Burner, Bruce L. or Debbie A.K.	31,31A	NO TAKE	
S279N-10	Didawick, David A.	32	NO TAKE	
S279N-11	Wolverton Robert A. or Brenda E.	32	NO TAKE	
S279N-12	Wolverton, Alan D. or Tamera D.	32	NO TAKE	

Virginia Department of Transportation

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VDOT METRIC

Sheet No.

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File: MLV4520Owner5.dgn
Date: 11/13/98
Time: 14:17:33

Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S279N-13	Nace, David J.	32	NO TAKE	
S279N-14	Brinker, Edgar E., Sr.	31A	0.16	647
S279N-15	Cook, Dwight H. or Peggy E.	31A	0.25	997
S279N-16	Massie, Grace M.	31A	NO TAKE	
S279S-01	Blue Ridge Homes, Inc.	30,31	NO TAKE	
S279S-02	Blue Ridge Homes, Inc.	30,31	NO TAKE	
S279S-03	Raynor, Sallie M.	31	0.14	573
S279S-04	Snarr, Thomas T. or Patricia D.	31	0.01	21
S279S-05	White, Howard or Margaret V.	31	0.32	1313
S279S-06	White, Howard, or Margaret V.	31,32	0.31	1257
S279S-07	Smoat, Orville L.	32	NO TAKE	
S279S-08	Bowman, Tommy or Susan Elaine	32	NO TAKE	
S279S-09	McClanahan, Louise	32	NO TAKE	
S279S-10	Miller, Phyllis	31	0.16	652
S279S-11	French, Christopher E. et al.	31	0.16	629
S279S-12	Trustees Valley Baptist Church	31	0.16	649
S279S-13	Snarr, Thomas T.	31	NO TAKE	
S280N-01	McClanahan, Louise	32,33	NO TAKE	
S280N-02	Shrum, Clarence G. and Flossie C.	33	NO TAKE	
S280N-03	Shrum, Clarence G. and Flossie C.	33,34	NO TAKE	
S280N-04	County of Shenandoah	34	NO TAKE	
S280N-05	Norman, Williams L. or Edna C.	35	NO TAKE	

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S280S-01	Shipe, Katherine V.	32	NO TAKE	
S280S-02	Stanley, Rowand W. and Katherine D.	32,33	NO TAKE	
S280S-03	Stanley, Rowand W. and Katherine D.	33	NO TAKE	
S280S-04	Stanley, Rowand W. and Katherine D.	33	NO TAKE	
S280S-05	Bowman, Tommy or Susan Elaine	33	NO TAKE	
S280S-06	Cooley, Clyde W. and Louise B.	33	NO TAKE	
S280S-07	Cooley, Tersey Elizabeth	33	NO TAKE	
S280S-08	Hensley, James Calvin	33	NO TAKE	
S280S-09	Hensley, James Calvin	33,34	0.76	3063
S280S-10	Zuesse, Florence Marcia	34	NO TAKE	
S280S-11	Riffee, Elton R.	34	NO TAKE	
S280S-12	Twenty-First Century Structures	34	0.44	1798
S280S-13	Riffee, Elton R. or Dorthea L.	34	NO TAKE	
S281N-01	The County of Shenandoah	35	NO TAKE	
S281N-02	Simmons, Floyd O.	35	NO TAKE	
S281N-03	Hash, Samuel J. or Gloria E.	35,36	0.24	976
S281N-04	Helsley, Martha Kay	36	NO TAKE	
S281N-05	Lineweaver, Alger L. or Betty M.	36	NO TAKE	
S281S-01	Clark, Wayne E. or Linda S.	34	NO TAKE	
S281S-02	Giles, H., William F. or Gail E.	34,35	NO TAKE	
S281S-03	Dinges, Sidney L., or Brenda A.	35	NO TAKE	
S281S-04	Zuesse, Florence Marcia	35	NO TAKE	
S281S-05	Hepner, Lloyd E.	35	NO TAKE	

Virginia Department of Transportation

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VDOT METRIC

File: Mr4520owner6.dgn
Date: 11/13/98
Time: 14:48:13

Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S281S-06	Zuesse, Florence Marcia	35	NO TAKE	
S281S-07	Clements, Brian F. or Regina S.	35	NO TAKE	
S281S-08	Hensley, James A. or Cathleen M.	35	NO TAKE	
S281S-09	Simmons, Floyd O.	35	NO TAKE	
S281S-10	Harman, Richard L., and Ronald L.	35,36	NO TAKE	
S281S-11	Harman, Richard L., and Ronald L.	36	NO TAKE	
S281S-12	Hoffman, Donald W. or Jacqueline	36	NO TAKE	
S281S-13	Gachenaur, Raymond W.	36	NO TAKE	
S281S-14	Gachenaur, Raymond W. or Sallie W.	36	NO TAKE	
S281S-15	Blevins, Clarence E. or Mary E	36	NO TAKE	
S281S-16	Hash, Samuel J. or Gloria E.	36	NO TAKE	
S282N-01	Gachenaur, Raymond W.	36,37	0.56	2252
S282N-02	Holler, Cecil H. or Barbara M.	37	NO TAKE	
S282N-03	Burnshire, Richard E. or Barbara S.	37	NO TAKE	
S282N-04	King Pumbing and Heating, Inc.	37,38	0.81	3287
S282N-05	Shipp, Clyde H. or Mary R.	38	0.04	142
S282N-06	Center, Inc.	37	0.10	405
S282N-07	Gochenour, Raymond W.	38	0.11	445
S282S-01	Vann, Sr., C.C.	36,37	NO TAKE	
S282S-01	Rice, James R. or Tammie S.	36,37	NO TAKE	
S282S-02	Ledane, Paul L. or Kathryn	37	NO TAKE	
S282S-03	KOP Development Corporation	37	0.06	260
S282S-04	KOP Development Corporation	37,38	0.48	1955
S283N-01	Gal-Tex Woodstock, Inc.	38,39	0.86	3489
S283N-02	The Williams Family Partnership	38,39	0.12	476

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S283N-03	Claytor, R.W.	39,39B	0.09	364
S283N-04	Unknown	39B	NO TAKE	
S283N-06	McDonald's Corporation	39B	0.07	303
S283N-07	French Brothers	39B	NO TAKE	
S283N-08	Holtzman, William B.	39,39A	NO TAKE	
S283N-09	Holtzman, William B.	39	0.01	22
S283N-10	Estep, Donald L. et al	39	0.20	821
S283N-11	McClanahan, Catherine E. et al	39	NO TAKE	
S283N-12	McClanahan, Catherine E. et al	39	0.11	426
S283N-13	McClanahan, Catherine E. et al	39	0.08	304
S283N-14	McClanahan, Catherine E.	39	0.14	574
S283N-15	Shen County Fair Ass'n. Inc.	39	0.40	1443
S283N-16	Shen County Fair Ass'n. Inc.	39	0.32	1285
S283N-17	Shen County Fair Ass'n. Inc.	39,40	0.01	23
S283N-18	Shen County Fair Ass'n. Inc.	40	0.93	3763
S283N-19	Foltz, Marian E. et al	40	0.22	891
S283N-20	AWA Associates	40	0.01	28
S283N-21	Sherman, Jack S. or Shirley M.	40	NO TAKE	
S283N-22	Dysart, Wilson L. or Diana S.	40	NO TAKE	
S283N-23	Dysart, Wilson L. or Diana S.	40	NO TAKE	
S283N-24	Dysart, Wilson L. or Diana S.	40	NO TAKE	
S283N-25	French Brothers	39B	0.02	95

Virginia Department of Transportation

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VDOT METRIC

Sheet No.

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Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S283N-26	French Brothers	39B	0.04	154
S283N-27	French Brothers	39B	0.04	142
S283N-28	French Brothers	39B	0.01	35
S283N-29	First Virginia Bank	39B	0.002	8
S283N-30	French, F. Douglas	39B	NO TAKE	
S283N-31	French Brothers	39B	0.04	146
S283N-32	French Brothers	39B	0.04	162
S283N-33	French Brothers	39B	0.04	163
S283S-01	Walmart	38,39,39A	0.51	2068
S283S-02	San Ann Oil and Food Stores, Inc.	39	0.18	727
S283S-03	San Ann Oil and Food Stores, Inc.	39	0.16	649
S283S-04	Exxon Corporation	39	0.15	598
S283S-05	Luttrell, Mary Louise, et al	39,39A	0.26	1049
S283S-06	Luttrell, Mary Louise, et al	39	0.42	1700
S283S-07	KOP Development Corporation	39,40	0.01	36
S283S-08	KOP Development Corporation	40	0.76	3089
S283S-09	Lifted Cloud, LLC, et al	40,41	1.56	6323
S283S-10	Walmart	40,41	0.17	706
S283S-11	Bayles, Jr., Gordon C.			
S283S-12	Foltz, Marian E.			
S283S-13	Helsley, Vicki L.			
S284N-01	ART Construction Inc.	40,41	NO TAKE	
S284N-02	Bauserman, Ralph Steven	41	NO TAKE	
S284N-03	Murden, William T. or Patricia A.	41	NO TAKE	
S284N-04	Sullivan, Rose E.	41	NO TAKE	
S284N-05	Tharpe, Tony W. or Karen Y.	41	NO TAKE	

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S284N-06	French Brothers	41	0.42	1681
S284N-07	Saylor, Daniel T. or Jane L.	41	0.04	145
S284N-08	Hearl, David M. or Marie S.	41	0.02	61
S284N-09	Coffman, Ralph R. or Clara M.	41	0.04	158
S284N-10	French Brothers Limited Partnership,	41	0.03	113
S284N-11	French Brothers Limited Partnership,	41	NO TAKE	
S284N-12	Unknown	41	NO TAKE	
S284N-13	French Brothers Limited Partnership,	41	0.32	1281
S284N-14	Swartz Sisters	41,42	1.18	4788
S284N-15	Wetzel, Mary E. Estate	42,43	1.82	7368
S284S-01	Lifted Cloud, LLC, et al	41	0.78	3169
S284S-02	Peer, Beverly et al	41	0.09	350
S284S-03	Mauck, Virgie S.	41	NO TAKE	
S284S-04	Kline, William F. & Dorothy L.	41	NO TAKE	
S284S-05	French Brothers	41	0.01	42
S284S-06	French Brothers	41	0.45	1801
S284S-07	Galladay, Dagny	41,42	1.56	6296
S285N-01	Epard, James L. and Nina F.	43	NO TAKE	
S285N-02	Epard, James L. or Nina J	43	0.02	70
S285N-03	Pine Haven Farms, Inc.	43,44	0.64	2574
S285N-04	Pine Haven Farms, Inc.	44	NO TAKE	
S285S-01	Wetzel, Mary E. Estate	42,43	0.75	3022
S285S-02	Richman, John M. or Louise K.	43	NO TAKE	
S285S-03	Epard, James L. or Nina J.	43	0.08	325

Virginia Department of Transportation

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Sheet No.

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Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S285S-04	Blackington Linda L., Trustee	43,44	0.38	1555
S285S-05	Logan, Jr., William H. et al	44	0.60	2431
S286N-01	Logan, Jr. William H. et al	44,45	NO TAKE	
S286N-02	French, Millson S. and Doris F.	45	NO TAKE	
S286N-03	Funk, Louis M. or Shelba Jean	45,46	NO TAKE	
S286N-04	Soltis, Gerald A. or Cynthia	46	NO TAKE	
S286S-01	Logan, Jr., William E. et al	44,45	1.56	6327
S286S-02	Sager, Elmer Eugene	45	0.16	643
S286S-03	Sager, Elmer Eugene	46	0.16	649
S286S-04	Haun, John E. or Linda S.	46	0.12	479
S286S-05	Kibler, Albert Irving or Ethel Marie	46	0.09	349
S286S-06	Clem, Benjamin	46	0.10	395
S286S-07	Lineweaver, Ray E.	46	0.05	209
S287N-01	Capp, Marcellus F.	46,47	0.68	2748
S287N-02	Capp, Marcellus F.	47	NO TAKE	
S287N-03	Capp, Jerry Allen or Gloria Jean Lam	47	NO TAKE	
S287N-04	Capp, Marcellous F.	47	NO TAKE	
S287N-05	Boyer, Annetta R., et al	47	NO TAKE	
S287N-06	Vann, Pauline B.	47,48	0.34	1394
S287S-01	Lineweaver, Ray E.	46	0.02	61
S287S-02	Caton, John T. or Oma T.	46	NO TAKE	

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S287S-03	Caton, John T. or Oma T.	46	NO TAKE	
S287S-04	Lineweaver, Roy E.	46	NO TAKE	
S287S-05	Sherry, James C. or Maryann S.	46	NO TAKE	
S287S-06	Martin, Donald L. or Betty R.	46	0.11	465
S287S-07	Martin, Donald L. or Betty R.	46,47	NO TAKE	
S287S-07	Orndorff, Ray C. or Christie Louella	46,47	NO TAKE	
S287S-08	Ketterman, Charles E. or Brenda K.	47	NO TAKE	
S287S-08	Martin, Donald L. or Betty R.	47	NO TAKE	
S287S-09	Peer, K.K. and W.F.	47	0.20	818
S287S-10	Copp, Marcellous F.	47	0.30	1222
S287S-11	Vann, Pauline B.	47,48	0.16	653
S288N-01	French Brothers	48,49	0.20	828
S288N-02	Bowman Apple Products Company, Inc.	49	0.50	2028
S288N-03	Melxsell, Nevin H. or Rosalie Ann	49,50	0.30	1198
S288S-01	French Brothers	48,49	0.54	2196
S288S-02	Pettitt, Alvin A. or Elizabeth A.	49	0.45	1812
S288S-03	Pettitt, Alvin A. or Elizabeth A.	49,50	0.80	3213
S289N-01	Seal, Ezra and Hilda	50	0.25	1029
S289N-02	Hudgins, Marjoire E. Life Estate	50,51	NO TAKE	

Virginia Department of Transportation

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Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S289N-03	Hudgins, Marjoire E. Life Estate	51	NO TAKE	
S289N-04	Hudgins, Marjoire E. Life Estate	51	NO TAKE	
S289N-05	Boyer, Annetta R., et al	51,52	NO TAKE	
S289N-06	Boyer, Annetta R., et al	52	0.24	982
S289N-07	Orndorff, Roy C. or Christie Louella	52	0.26	1039
S289N-08	Rasenberger, Leon L. et al	52	0.24	958
S289N-09	Barbe, Gilbert M. or Mamie P.	52	0.06	225
S289N-10	Barbe, Gilbert M.	52	0.13	543
S289N-11	Barbe, Gilbert M.	52	NO TAKE	
S289N-12	Hattle, Carl E. or Gladys	52	NO TAKE	
S289S-01	Young, Donald	50	NO TAKE	
S289S-02	Shaw, Mary Ann, et al	50	0.42	1717
S289S-03	Sibert, William Lynn	50	0.17	699
S289S-04	Carlysle, Ronald M. or Susan D.	50	NO TAKE	
S289S-05	Wilkins, Davie S. or Bessie E.	50,51	0.45	1828
S289S-06	Boyer, Annetta R. et al	51,52	0.29	1171
S289S-07	Rickard, Marwood M. or Nellie H.	52	0.02	78
S289S-08	Ketterman, Charles E. or Brenda K.	52	NO TAKE	
S289S-09	St. Johns United Church of Christ	52	NO TAKE	
S289S-10	Gochenour, Susie M.	52	NO TAKE	
S289S-11	Gochenour, Susie M.	52	NO TAKE	
S289S-12	Borden, Christine K.	52	0.07	289
S289S-13	Rickard, Nellie Maxwell	52	0.34	1387

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S290N-01	Hottle, Carl Ellis and Wife	52,53	NO TAKE	
S290N-02	Holler, Irving L. or Florence V.	53	0.001	4
S290N-03	Holler, Irving L. or Florence V.	53	0.10	414
S290N-04	Holler, Irving L. or Florence V.	53	NO TAKE	
S290N-05	Hattle, Carl E. or Gladys L.	53	NO TAKE	
S290N-06	Holler, Irving L. or Florence V.	53	0.08	306
S290N-07	Mitchell, Chas. P. or Jane M.	53	NO TAKE	
S290N-08	Holler, Irving L. or Florence V.	53	NO TAKE	
S290N-09	Weidlein, Peter P. et al	53,54	NO TAKE	
S290S-01	Gachenour, Susie M.	52,53	0.20	831
S290S-02	Tincher, Jr., Garland V. or Barbara	53	0.62	2522
S290S-03	Morris, Harry M. and Anna J.	53	0.21	855
S290S-04	Morris, Harry M. and Anna J.	53	0.09	377
S290S-05	Bowers, Jr., Carroll G.	53	0.05	213
S290S-06	Bowers, Jr., Carroll G.	53	0.06	229
S290S-07	Morris, Harry M. or Anna J.	53	NO TAKE	
S290S-08	Wakeman, P. Stanley or Wanda H.	53,54	0.84	3394
S290S-09	Morris, Harry M. or Anna J.	53	NO TAKE	
S291N-01	Morris, Harry M. or Anna J.	54,55,55B	0.14	576
S291N-02	Trustees for Shenandoah Tech. Center	55,55B	0.12	485
S291N-03	Trustees for Shenandoah Tech. Center	55,55B	0.45	1811
S291N-04	Maphis, Jack E. et al	55B	NO TAKE	
S291N-05	Maphis, Jack E. et al	55	0.13	546

Virginia Department of Transportation

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VDOT METRIC

Sheet No.

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Date: 11/13/98
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Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S291N-06	Maphis, Jack E., et al	55,56	0.45	1831
S291N-07	McChesney, Leon Eugene	56	0.37	1509
S291S-01	Wakeman, Paul Stanley and Wanda H.	54,55	0.97	3941
S291S-02	Kelbar, Inc.	55	0.24	964
S291S-03	Kelbar, Inc.	55,55A	0.25	1026
S291S-04	A.T. Williams Oil Company, Inc.	55,55A	NO TAKE	
S291S-05	A.T. Williams Oil Company, Inc.	55,55A	NO TAKE	
S291S-06	Wakeman, Paul Stanley and Wanda H.	55,55A	0.16	643
S291S-07	Bayer, John N.	56	0.51	2072
S291S-08	Artz, Samuel Larry and Edith L.	56	0.46	1852
S291S-09	Ratlief, Darlene F.	56	NO TAKE	
S292N-01	Henderson, Terry L. et al	56	0.13	544
S292N-02	Cemetery	56	NO TAKE	
S292N-03	Copp, John C.	56	0.68	2792
S292N-04	Sullivan, Nancy R.	56,57	0.01	52
S292N-05	Bauserman, Cecil L. or Nancy M.	57	NO TAKE	
S292N-06	Jones, Jr., Clarence W.	57,58	NO TAKE	
S292N-07	Copeland, Joseph G. or Brenda N.	58	NO TAKE	
S292N-08	Renze, John E. or Leslie C.	58	NO TAKE	
S292N-09	Lichliter, Marvin Allen	58	NO TAKE	
S292S-01	Vann, C.C., Sr.	56	0.28	1160
S292S-02	Copp, John C. and Bernice M.	56	0.34	1388
S292S-03	Vann, Sr., CurtisC. or Marcy A.	56,57	0.72	2899

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S292S-04	Vann, Curtis C. or Mary A.	57	0.31	1268
S292S-05	Allamong, Larry W.	57,58	0.36	1453
S292S-06	Ass'n. for the Preservation of Civil	58	NO TAKE	
S293N-01	Wilder, Jr., Alonzo	58	NO TAKE	
S293N-02	Wilder, Jr., Alonzo	58	NO TAKE	
S293N-03	Erbach, William, Sr. & Martha S.	58,59	0.43	1745
S293N-04	Miller, Marshall A. or Doris A.	59	0.43	1752
S293N-05	Stickley, Jr., Galen E. and Patricia	59	0.10	409
S293N-06	Bates, Loretta A.	59	0.15	611
S293N-07	Roller, Ronald B., et al	60	0.02	68
S293N-08	Miller, Eugen Kenneth or Janice R.	60	0.30	1201
S293N-09	Stickley, Sherley A	60	0.30	1213
S293S-01	Ass'n. for the Preservation of Civil	58,59	0.47	1901
S293S-02	Hackman, Carroll S.	59	0.16	656
S293S-03	Bly, Daniel W., et al	59	0.37	1489
S293S-04	Bly, Daniel W., et al	59	0.06	244
S293S-05	Bly, John D., et al	59,60	0.13	525
S294N-01	Stickley, Sherley A.	60,61	0.82	3331
S294N-02	Wilder, Jr., Alonzo or Janice T.	61	0.18	729
S294N-03	Sacharuna Foundation	61	0.35	1404
S294N-04	Wilder, Jr., Alonzo or Janice T.	61,62	0.01	41
S294N-05	Baker, Charles M. or Martha Virginia	62	0.43	1753

Virginia Department of Transportation

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Sheet No.

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Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S294N-06	Mumaw, Marvin L.	62	0.08	307
S294N-07	Mumaw, Marvin L. or Bonnie F.	62	0.09	353
S294N-08	Troxell, Jr., James E. or Dixie L.	62	1.47	5934
S294S-01	Miller, Jr., James Ray	60,61	1.58	6412
S294S-02	Miller, Jr., James Ray	61	0.49	1981
S294S-03	Reiley, John F. or Susan K.	61,62	1.38	5580
S294S-04	Mathers, William Larry, et al	62	0.29	1154
S295N-01	Troxell, Jr., James E or Dixie L.	62,63	2.02	8178
S295N-02	Strasburg Junction, Inc.	63	0.98	3967
S295N-03	Palmer, Michael A. or Tammy S.	63	NO TAKE	
S295N-04	Bradley, Jr. Donald R. or Patricia A	63	NO TAKE	
S295N-05	Lundy, Charlotte	63	NO TAKE	
S295N-06	Daly, Margaret F.	63	NO TAKE	
S295N-07	Strasburg Junction, Inc.	63	NO TAKE	
S295N-08	O'Barr, Bryon K. or Kelly A.	63	NO TAKE	
S295N-09	Stover, Douglas A. or Angela K.	63	NO TAKE	
S295N-10	Strasburg Junction, Inc.	63	NO TAKE	
S295N-11	Pangle, Roy Arthur or Margaret R.	63,64	0.18	709
S295N-12	Pangle, Roy Arthur or Margaret R.	64	0.18	728
S295N-13	Strasburg Junction, Inc.	63	0.006	24
S295S-01	Cook, Carl J. or Kay M.	62	1.22	4947
S295S-02	Hudson, Frances K.	62,63,63A	0.55	2240
S295S-03	Kern, Jacob C.	63A	NO TAKE	

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S295S-04	Kern, Jacob C.	63,63A	0.10	426
S295S-05	Stickley, P. Brooks, et al	63	0.83	3351
S295S-06	Kidwell, Gerald H. or Hazel R.	63	0.34	1385
S295S-07	Kidwell, Gerald H. or Hazel R.	63,64	1.41	5704
S295S-08	Kern, Ray W.	63A	0.10	411
S295S-09	Kern, Ray W.	63A	0.09	364
S296N-01	Moore, Helen J.	64,65	1.07	4320
S296N-02	Moore, Helen J.	65	NO TAKE	
S296N-03	Moore, Helen J.	65	NO TAKE	
S296N-04	Moore, Helen J.	65	0.73	2940
S296N-05	Strasburg Developers	65,66	1.94	7869
S296S-01	Tucker, Deryl L. or Margaret D.	64	0.28	1150
S296S-02	Golliday, Alex M. or Hattie F.	64	0.25	1004
S296S-03	McGowan James G. or Candice B. Stover	64	0.20	806
S296S-04	Rittenour, Allen Douglas or Phyllis	64,65	0.01	411
S296S-05	Krueger, Brian H. and Pat C.	65	0.25	1001
S296S-06	Ward, Bill M. or Ronda R.	65	0.24	979
S296S-07	Bergey, Robert H. or Marvel U.	65	0.47	1898
S296S-08	Kern, Julia C.	65,65A	2.15	8693
S296S-09	Clem, Jr., Marvin A. or Deborah Senseney	65A	0.83	3344
S296S-10	Pangle, Roy A.	65A	NO TAKE	
S296S-11	Mason, George P., et al	65,65A,66	2.60	10542
S297N-01	Miller Jean E. et al	66	0.23	940
S297N-02	Crobill, Tina L. or Conly D.	66	0.52	2102

Virginia Department of Transportation

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VDOT METRIC

Sheet No.

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Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
S297N-03	I 8166 Associates	67	0.70	2810
S297N-04	SRO/NOVA Inc.	67	0.03	106
S297S-01	Miller, Jean, et al	66	0.70	2831
S297S-02	Crobill, Tina L. or Conly D.	66,67	1.16	4702
S297S-03	Crobill, Tina L. or Conly D.	67	0.58	2329
S297S-04	Stickley, Lucy	67	2.64	10683
S297S-05	First Va. Bank Shenandoah Valley Trustee	67	0.10	419
S298N-01	Dellinger, Terry	68	0.22	873
S298N-02	Dellinger, Terry	67	NO TAKE	
S298N-03	Holtzman, William B.	68	NO TAKE	
S298N-04	Holtzman, William B.	68	NO TAKE	
S298N-05	Thomas, William I.	68	NO TAKE	
S298N-06	Belle Grove, Inc.	68,69	1.27	5157
S298N-07	O'Connel, Jr., Irvan T.	69	NO TAKE	
S298S-01	Chemstone Corporation	68	1.07	4333
S298S-02	McCan, Robert	68	NO TAKE	
S298S-03	Loving, Ray R. or Glenna M.	68	NO TAKE	
S298S-04	Loving, Ray R. or Glenna M.	68	NO TAKE	
S298S-05	O'Connell, Jr., Irvan T.	68,69	1.31	5292
S298S-06	Loving, Ray R. or Glenna M.	68,69	NO TAKE	
W299N-01	Valley Mortgage & Investment Corp.	69,70	0.87	3541
W299N-02	Hudson, Goldie L.	70,71	1.03	4185

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
W299N-03	Mitchell, Jr., Paul F. et al	71,72	0.14	552
W299N-04	Mitchell, Jr., Paul F. et al	71,72	1.47	5930
W299N-05	Cooley, Richard W.	72A	0.32	1314
W299N-06	Mitchell, Jr., Paul F. et al	72A	NO TAKE	
W299N-07	Mitchell, Jr., Paul F. et al	72A	NO TAKE	
W299S-01	Valley Mortgage & Investment Corp.	69,70	0.40	1638
W299S-02	Hudson, Goldie L.	70,71	1.09	4400
W299S-03	Mitchell, Jr., Paul F.	71	0.42	1719
F300N-01	Unknown	72A	NO TAKE	
F300N-02	Cooley, Richard Miller	72,73	NO TAKE	
F300N-03	Cooley, Richard Miller	73	NO TAKE	
F300S-01	Claytor, Robert H. and Kathryn V.	71,72	0.08	335
F300S-02	Carper, Carolene J.	72	NO TAKE	
F300S-03	Neff, Richard R.	72,73	NO TAKE	
F300S-04	Miles, Inc.	73	NO TAKE	
F301N-01	Cooley, Richard M. and Doris A	73,74	1.26	5109
F301N-02	Williams, M. Louise	74	0.16	667
F301N-03	Cooley, Richard M & Doris A.	74	0.01	48
F301N-04	Williams, M. Louise	74	0.41	1645
F301N-05	Kohne, Jr., Arvel	74,75	0.29	1172
F301N-06	Hanson, Robert	75	NO TAKE	
F301N-07	Miller, Larry W. & Dorothy E.	75	NO TAKE	
F301N-08	Leeper, Charles K.	75	NO TAKE	

Virginia Department of Transportation

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VDOT METRIC

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Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
F301N-09	Chapel Road Corporation	75	NO TAKE	
F301S-01	Switching Station Assoc. Ltd. Partnership	73	NO TAKE	
F301S-02	Frederick County, Board of	73	NO TAKE	
F301S-03	Stowe Woodward Company South	73	NO TAKE	
F301S-04	Berry, Dallas	74	NO TAKE	
F301S-05	Scarlett, Jerry L.	74	NO TAKE	
F301S-06	Berry, Dallas O., Trustee	74	NO TAKE	
F301S-07	Williams, M. Louise	74	NO TAKE	
F301S-08	Weatherholtz, Tricia L. and Martin, Mitchell L.	74	NO TAKE	
F301S-09	Brown, Geraldine D.	74	NO TAKE	
F301S-10	Snoberer, Wm. K. & Audrey L.	74	NO TAKE	
F301S-11	Snow, Eugene F. & Mary J.	75	NO TAKE	
F301S-12	Stickely, Romeo C.	75	NO TAKE	
F301S-13	F&M National Corporation	75	NO TAKE	
F302N-00	Chapel Road Corporation	75	NO TAKE	
F302N-01	Chapel Road Corporation	75	NO TAKE	
F302N-02	Chapel Road Corporation	75,76,76A	1.65	6686
F302N-03	M-Express, LLC	76,76A	3.75	15168
F302N-04	Glass, Thomas C.	76,76A	1.64	6634
F302N-05	Glass, Thomas C.	76,76A	3.89	15729
F302N-06	Gore, Frederick M. & Ruth Ann	76,77	0.05	220
F302N-07	Holt, John W.	77	NO TAKE	
F302N-08	Dill, David Richard & Mary M.	77	NO TAKE	

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
F302N-09	Chapel Road Corporation	76A	0.82	3317
F302N-10	Middletown, Town of	76A	NO TAKE	
F302N-11	Chapel Road Corporation	76A	NO TAKE	
F302S-01	Brannon, Shirley Altizer	75	NO TAKE	
F302S-02	Allen, John S.	75	NO TAKE	
F302S-03	Carper, Dennis C.	75	NO TAKE	
F302S-04	Legge, John W. and Jean S.	75	NO TAKE	
F302S-05	Willingham, John Woodrow	76	NO TAKE	
F302S-06	Fiddler, Darlene M.	76	2.34	9469
F302S-07	COHO Enterprises, Inc.	76	0.74	2995
F302S-08	Cooley, Richard G.	76	1.70	6860
F302S-09	Cooley, A. Reese E. & Als	76	0.04	170
F302S-10	Commonwealth of Virginia	77	NO TAKE	
F302S-11	Rohrbaugh, John M.	76	0.20	805
F303N-01	Cochran, J. David & Doris L.	77	NO TAKE	
F303N-02	Hong, Soon, Ok & Soon Ac	77	NO TAKE	
F303N-03	Smith, Janet H.	77	NO TAKE	
F303N-03	Swald, Sr., Robert C.	78	NO TAKE	
F303N-04	Smith, Janet H.	77,78	NO TAKE	
F303N-05	Smith, Janet H.	78	NO TAKE	
F303N-06	Greene, David R. and Bonnie J.	78	NO TAKE	
F303N-07	Campbell, David G. and Heather M.	78	NO TAKE	
F303N-08	Hammond, Ronald E.	78	NO TAKE	
F303N-09	Miller, Harry D.		NO TAKE	

Virginia Department of Transportation

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VDOT METRIC

Ownership Index Sheet

Interstate 81 Improvement Study

PROJECT NUMBER: 0081-968-113, PE-101

SHENANDOAH, WARREN & FREDERICK COUNTIES

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters
F303N-10	Cooley, William	78,79	0.27	1093
F303S-01	County School Board of Frederick	77,78	NO TAKE	
F303S-02	Hester, Jeffrey D. Trustee	78	NO TAKE	
F303S-03	Downard, Harry A. & Mary Jane	78,79	NO TAKE	
F304N-01	Lord, Lisa V.	79	1.23	4962
F304N-02	Boudreauk, John Bradl;ey & Eleanore	79,80	0.36	1470
F304N-03	Powers, T.C.	80	0.15	618
F304N-04	Powers, Tunstall C. et al	80,81	0.69	2806
F304S-01	Cline, H.A. & Opal G.	79	NO TAKE	
F304S-02	Harris, Melvin T. and Nancy L.	79	NO TAKE	
F304S-03	Sisk, Frank Elvis	80	NO TAKE	
F304S-04	Stickley, III, William	80	NO TAKE	
F304S-05	Powers, Tunstall C. et al	80	NO TAKE	

PARCEL NO.	LANDOWNER	SHEET NO.	AREA (1) Fee Taking	
			Acres	Sq. Meters

Virginia Department of Transportation

(1) NOTE: The right-of-way information shown in this study has been obtained from county tax maps and is for planning purposes only. The areas shown are approximate. As the project progresses to the design stages, more detailed property and right-of-way information will be developed.

VDOT METRIC

Sheet No.

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A. ROADWAY IMPROVEMENTS

Through most of this 41 mile study, I-81 has a wide bifurcated median that occasionally narrows to a minimum of 20.1 meters (usually at interchanges or other restricted locations).

Either 2-lane outside widening or 2-lane inside widening concepts (to provide 3 through lanes) is recommended in this study where possible. These concepts offer increased flexibility with construction sequencing and traffic maintenance during construction since 2 travel lanes must be maintained in each direction at all times.

In the areas where 2 lanes cannot be constructed in the median and inside widening is necessary, a 1-lane widening concept is recommended to provide 3 through lanes. This concept will require temporary pavement and several phases to shift traffic in order to complete the proposed roadway.

The following is a detailed description of the recommended 6-lane widening concepts throughout the corridor:

MP 263.9 – MP 268.1
The New Market Battlefield State Park is located adjacent to this segment of I-81. The entire 4.2 mile segment is within the New Market Civil War battlefield site.

Outside widening is recommended throughout this segment to maintain the rural appearance of the I-81 corridor. Inside widening would require a concrete median barrier which would have a negative impact on the aesthetics of this sensitive area.

To avoid impacts to Route 305 and the New Market Battlefield State Park, a retaining wall is necessary between I-81 and Route 305 near the southbound exit ramp to Route 211.

MP 268.1 – MP 282.2
Beginning south of the North Fork Shenandoah River, the widening scheme switches to the inside for both the northbound and the southbound lanes. The existing median is relatively wide for the next 14 miles and the 2-lane inside widening concept (3 through lanes in each direction) can be provided with no right-of-way impacts except at the interchanges.

Since the existing median is wide, inside widening can be accomplished while leaving a significant portion of the existing vegetated median untouched through a major portion of this 14 mile segment.

The segment south of the North Fork Shenandoah River is within the area of the New Market battlefield site and inside widening avoids any right-of-way impacts in this area.

MP 282.2 – MP 286.1
As the corridor nears the Town of Woodstock, the existing median narrows, and the recommended widening scheme switches to the outside. Outside widening continues through the town and northward to MP 286.1.

MP286.1 – MP 290.1
Through this segment, the widening of the southbound lane continues to the outside while the northbound lane is widened 2 lanes to the inside. This concept is used because of the existing narrow median at MP 287.5 and between MP 289 and MP 290. Also, involvement is minimized with the Toms Brook Civil War battlefield site, located east of I-81 in the vicinity of the bridges over Pugh's Run.

The Route 655 and Route 657 bridges over I-81 are being replaced in their existing location to minimize impacts to the battlefield site.

The vertical alignments of Route 600 and Route 625 are being adjusted to increase the vertical clearance beneath I-81.

MP 290.1 – MP 292.4
The widening of the southbound lane continues to the outside while the northbound lane is widened (1 lane) to the inside through this segment. The existing median is narrow and can only accommodate one additional lane within the median. The Toms Brook battlefield site is located on both sides of I-81 in the vicinity of the Route 653 bridge and east of I-81 at Route 651, Toms Brook interchange.

The Cedar Creek Civil War battlefield site is adjacent to I-81 on the west side starting at Route 646 and extending northward to the end of the segment.

The Route 646 and Route 653 bridges over I-81 are being replaced in their existing location to minimize impacts to the battlefield site.

MP 292.4 – MP 293.0
The southbound widening continues to the outside while the northbound changes from 1 lane inside widening to 2 lane inside widening through this segment, where the existing median widens. The Cedar Creek battlefield site is on either side of I-81 in this area. Between MP 292.4 and MP 292.6, the southbound lane is reconstructed to increase vertical sight distance.

MP 293.0 – MP 299.7
Widening is proposed to the outside in both directions throughout this 6.7 mile segment. The majority of the segment has a narrow median that cannot accommodate inside widening without a concrete median barrier.

A portion of the Cedar Creek battlefield site is on either side of I-81 between MP 293 and Route 601. Beginning at the Route 11 interchange and northward to the end of the study, I-81 is entirely within the Cedar Creek battlefield site.

The acceleration lane from westbound I-66 to southbound I-81 has been extended to connect with the southbound deceleration lane at Route 11. An additional through lane has been added northbound from Route 11 through the I-66 interchange. These features result in 4 lanes in each direction for I-81 through the segment between MP 298.8 and MP 299.7.

The vertical alignment of Route 601 is being adjusted to increase the vertical clearance beneath the I-81 bridges.

MP 299.7 – MP 300.0
The northbound lane is reconstructed through this area to increase vertical sight distance just north of the I-81 bridges over Route 840. The southbound lane is reconstructed through this same general area to provide a smoother transition into the relocated southbound alignment proposed northward through the I-66 interchange area. This reconstruction results in 4 new lanes of pavement in either direction through this segment.

All of this area is within the Cedar Creek battlefield site.

MP 300.0 – MP 301.0
The northbound lane is widened 3 lanes (4 through lanes total) toward the inside through the I-66 interchange area. This was done to increase capacity for northbound I-81 at the eastbound I-66 diverge area which is also affected by a 4% upgrade north of Cedar Creek. Also, the beginning of the deceleration lane from I-81 northbound to I-66 eastbound was extended back near the beginning of the 4% grade to provide easy access to the I-66 ramp.

The southbound lane of I-81 is relocated and provides 3 new lanes within this segment. The southbound lane relocation is part of the overall scheme to eliminate the existing "left-hand on" traffic movements for westbound I-66 to southbound I-81, and "left-hand off" traffic movements for southbound I-81 to eastbound I-66.

All of this area is within the Cedar Creek battlefield site.

MP 301.0 – MP 302.0
The existing median is wide at MP 301 but progressively narrows northward to MP 302 to a width that can accommodate widening of one roadway only toward the inside.

The northbound lane is widened 2 lanes to the outside to provide 3 through lanes, and the southbound lane is widened 2 lanes toward the inside to provide 3 through lanes in this area.

The southbound on-ramp acceleration lane for the Route 627 interchange will be connected to the southbound I-81 deceleration lane for the eastbound I-66 ramp.

All of this segment is within the Cedar Creek battlefield site.

MP 302.0 – MP 302.8
This segment is generally through the Route 627 interchange area at Middletown. The southbound lane is widened 2 lanes to the inside to provide 3 through lanes. Consequently, the northbound lane is relocated slightly toward the outside and is reconstructed (3 lanes) to provide sufficient median width for a depressed grassed median rather than a concrete median barrier.

All of this segment is within the Cedar Creek battlefield site.

MP 302.8 – MP 305.0
Both the northbound and southbound lanes are widened to the inside throughout this segment. This minimizes impacts to the battlefield site and to avoid any modifications to the reconstructed truck weigh station facilities.

Inside widening (2 lanes) is used between MP 302.8 and MP 304.4 to provide 3 through lanes. The existing median narrows north of the truck weigh station, and 1 lane inside widening, to provide 3 through lanes, is proposed from MP 304.4 to the end of the study at MP 305.0.

All of this segment is within the Cedar Creek battlefield site.

B. INTERCHANGE IMPROVEMENTS

Route 211 Interchange – Exit 264
The existing diamond configuration is being reconstructed with modifications to accommodate the mainline widening. The northbound off-ramp and southbound off-ramp will provide two lanes approaching Route 211 in order to provide separate left and right turn lanes at the intersection.

The I-81 bridges over Route 211 need to be replaced due to substandard vertical clearance, created by the outside widening recommendation. The grade of Route 211 will be lowered through the interchange area to provide additional vertical clearance on Route 211 beneath the bridges. The Route 211 roadway will be 2 through lanes in each direction with appropriate turn lanes. The median width on Route 211 will be of sufficient width to accommodate a bridge pier.

Route 730 Interchange – Exit 269
The existing diamond interchange configuration is to be reconstructed to provide an expanded modern diamond interchange. The ramps are spread out to provide better intersection spacing and increased sight distance at the exit ramp intersections with Route 730. Exit ramps will be 2 lanes approaching the Route 730 intersection to provide separate left and right turn lanes.

Through the interchange area, Route 730 will be widened to 1 through lane in each direction with a center turn lane to facilitate left turn movements.

Route 292/703 Interchange – Exit 273
The existing diamond interchange configuration is to be reconstructed to provide an expanded modern diamond interchange. The ramps are spread out to provide better intersection spacing and increased sight distance at the exit ramp intersections with Route 292. The exit ramps will be 2 lanes approaching the Route 614 intersection to provide separate left and right turn lanes.

Starting at Route 11 and extending westward through the I-81 interchange area, Route 292/703 will be 2 through lanes in each direction with a center left turn lane. An additional right turn lane is provided eastbound from the northbound I-81 off-ramp across the truck stop frontage.

Route 614 Interchange – Exit 277
The existing interchange at Route 614 is a half diamond configuration with a northbound off-ramp and a southbound on-ramp.

When I-81 is widened in this area, this interchange should be studied in further detail to determine whether the existing half-diamond can be eliminated or if the partial interchange should be expanded to provide a complete interchange at this location.

The current policy of the Federal Highway Administration (FHWA) requires all traffic movements be provided at interstate interchanges.

The improvements proposed in this study include a northbound on-ramp and a southbound off-ramp to provide a full movement diamond interchange configuration. The two exit ramps are 2 lanes in width approaching the Route 614 intersections to provide separate left and right turn lanes. Through the interchange area, Route 614 is widened to one through lane in each direction with a center turn lane to accommodate left turn movements.

The addition of the two new ramps (north of Route 614) as shown in the study will be subject to approval by the FHWA.

Route 185/675 Interchange – Exit 279
The existing diamond interchange configuration is to be reconstructed with modifications to accommodate the mainline widening and includes replacement of the two ramp bridges over Stony Creek. The two off-ramps will be 2 lanes approaching the Route 185 intersection to provide separate left and right turn lanes.

Route 185/675 will be widened to 2 through lanes in each direction with a center left turn lane.

Route 42 Interchange – Exit 283
The existing diamond interchange configuration will be reconstructed with modifications to accommodate the mainline widening and replacement of the Route 42 bridge over I-81. The two off-ramps will be 2 lanes approaching the Route 42 intersection to provide separate left and right turn lanes.

Most of the Route 42 improvement will include two through lanes in each direction with appropriate turn lanes. The Route 42 roadway between the signalized ramp intersections (including the bridge over I-81) will provide 2 through lanes and a continuous left turn lane in both directions. An additional right turn lane is provided eastbound between the new Wal-Mart entrance and the southbound I-81 on ramp. An additional right turn lane is also provided westbound between Motel Drive and the northbound I-81 on ramp.

Route 651 Interchange – Exit 291
The existing diamond interchange configuration is to be reconstructed to improve large truck access and overall traffic circulation at this location. The 2 off-ramps will include 2 lanes approaching the Route 651 intersection to provide separate left and right turn lanes.

Most of the Route 651 improvement will include 2 through lanes in each direction with appropriate turn lanes. The Route 651 roadway between the ramp intersections (including the bridge over I-81) will provide 2 through lanes and a continuous left turn lane in both directions. An additional right turn lane is provided on Route 651 westbound from the I-81 off-ramp to the truck stop entrance located in the northwest quadrant of the interchange. An additional right turn lane is also provided eastbound from the truck stop entrance in the southwest quadrant of the interchange to the I-81 southbound on-ramp.

Route 55 Interchange – Exit 296
The existing diamond interchange is to be reconstructed and modified to provide an improved diamond configuration. Route 55 crosses I-81 at an extreme skew angle. The ramps on the west side of I-81 are relocated farther west to relieve the skew angle and provide a better intersection with Route 55. The 2 off-ramps will be dual-laned approaching the Route 55 intersection to provide separate left and right turn lanes.

Route 55 will be widened to 4 lanes by providing a new parallel westbound lane through the interchange area.

Route 11 Interchange – Exit 298
The existing diamond interchange is retained and modified to provide an improved diamond configuration. The two off-ramps will include 2 lanes for separate left and right turn lanes approaching the Route 11 intersections. The two on-ramps will include 2 lanes to facilitate the merge of vehicles entering the ramp from northbound and southbound Route 11.

Route 11 will continue to be 2 lanes in each direction as it is today with appropriate left turn lanes added.

I-66 Interchange – Exit 300
The existing directional (interstate to interstate) interchange will be reconstructed to eliminate the existing "left-hand-on" traffic movements for westbound I-66 to southbound I-81, and "left-hand-off" traffic movements for southbound I-81 to eastbound I-66.

The acceleration lane from westbound I-66 to southbound I-81 extends to connect with the southbound deceleration lane at the Route 11 off-ramp.

An additional through lane has been added northbound from Route 11 to north of the 2-level I-66 bridges. This will increase capacity for northbound I-81 at the eastbound I-66 diverge area which is impacted by a 4% upgrade north of Cedar Creek. The beginning of the deceleration lane from I-81 northbound to I-66 eastbound is located near the beginning of the 4% grade to facilitate the traffic movement to eastbound I-66.

Route 627 Interchange – Exit 302
It is proposed to reconstruct the existing diamond interchange to provide an expanded, modern diamond configuration. The ramps are spread out to provide better intersection spacing and increased sight distance at the exit ramp intersections with Route 627. The exit ramp will be 2 lanes wide approaching the Route 627 intersection to provide separate left and right turn lanes.

Through the interchange area, Route 627 will be widened to 1 through lane in each direction with a center left turn lane.

C. BRIDGE RECOMMENDATIONS AND COST

MP	Structure Number	Description	Recom-mendation	Remarks	Total Width (m)	Total Length (m)	Total Area (m^2)	Square Meter Cost*	Total Bridge Cost
264	2000	I-81N/ Rte. 211	C,H,V	Vertical clearance below 16'-6", piers in design clear zone	19.0	60.0	1140	886	$1,010,500
264	2001	I-81S/ Rte. 211	C,H,V	Vertical clearance below 16'-6", piers in design clear zone	19.0	58.0	1102	886	976,900
267	6315	Rte. 767/ I-81	C,H,L	Bridge piers interfere with widening of I-81	14.2	108.0	1534	1036	1,588,900
269	2010	I-81N/ N.Fork Shenandoah R.	C		22.6	210.6	4759	994	4,729,200
269	2011	I-81S/ N.Fork Shenandoah R.	C		22.6	203.3	4595	994	4,566,200
269	6326	Rte. 730/ I-81	C,H	Bridge piers interfere with widening of I-81	17.2	92.4	1590	956	1,519,500
270	6327	Rte. 720/ I-81	H,L	Bridge piers interfere with widening of I-81	10.2	97.5	994	990	984,000
271	2012	I-81N/ Norfolk Southern Rwy.	C,H,V	Horizontal and vertical clearances below minimums required for railroad	19.0	73.3	1392	880	1,225,000
271	2013	I-81S/ Norfolk Southern Rwy.	C,H,V	Horizontal and vertical clearances below minimums required for railroad	19.0	72.7	1381	880	1,214,900
272	2014	I-81N/ Mill Cr., Rte. 263	C,G,H	Insufficient superevelation on bridge, piers in design clear zone	19.0	101.6	1931	899	1,735,200
272	2015	I-81S/ Mill Cr., Rte. 263	C,G,H	Insufficient superevelation on bridge, piers in design clear zone	19.0	107.2	2037	899	1,830,100
273	6324	Rte. 292/ I-81	C,H,V	Bridge piers interfere with widening of I-81, vertical clearance below 16'-6"	24.4	116.2	2836	1151	3,264,300
274	6325	Rte. 796/ I-81	H,V	Bridge piers interfere with widening of I-81, vertical clearance below 16'-6"	9.4	103.9	977	1050	1,026,200
275	6323	Rte. 707/ I-81	H,V	Bridge piers interfere with widening of I-81, vertical clearance below 16'-6"	9.4	107.0	1006	1078	1,084,400
277	2020	I-81N/ Rte.614	H,R	Piers in design clear zone, replace bridge due to inadequate sight distance	19.0	52.1	990	942	962,700
277	2021	I-81S/ Rte.614	H,R	from ramp interchange on Route 614	19.0	53.8	1022	942	962,700
279	2022	I-81N/ Stony Cr. & Rte. 185	C,H,V	Bridge piers interfere with widening of I-81, vertical clearance below 16'-6"	19.0	138.9	2639	890	2,346,800
279	2023	I-81S/ Stony Cr. & Rte. 185	C,H,V	Bridge piers interfere with widening of I-81, vertical clearance below 16'-6"	19.0	139.1	2643	890	2,351,300
279	2026	Ramp A/ Stony Cr.	C		13.6	70.7	962	741	712,700
279	2027	Ramp C/ Stony Cr.	C		10.0	68.0	680	733	498,200
281	2024	I-81N/ Narrow Passage Cr.	C		19.0	102.1	1940	928	1,798,700
281	2025	I-81S/ Narrow Passage Cr.	C		19.0	102.8	1953	928	1,810,700
282	6330	Rte. 605/ I-81	H,V	Bridge piers interfere with widening of I-81, vertical clearance below 16'-6"	14.4	102.8	1480	999	1,478,000
283	1068	Rte. 42/ I-81	C,H	Bridge piers interfere with widening of I-81	29.0	99.2	2877	1161	2,956,500
284	6329	Rte. 816/ I-81	C,H,V	Bridge piers interfere with widening of I-81, vertical clearance below 16'-6"	10.2	107.5	1097	1046	1,147,800
285	6328	Rte. 604/ I-81	C,H,V	Bridge piers interfere with widening of I-81, vertical clearance below 16'-6"	13.0	95.5	1242	954	1,185,200
286	2018	I-81N/ Pugh's Run	G	Transverse section cross slope less than 2%, crown point location incorrect	19.0	50.0	950	795	755,300
286	2019	I-81S/ Pugh's Run	G	Transverse section cross slope less than 2%, crown point location incorrect	19.0	50.0	950	795	755,300

(this sheet) Subtotal = $46,477,000

Legend
- C: Replace bridge due to condition of structure (significant element on bridge rates 5 or below)
- G: Replace bridge due to geometric incompatibility (see remarks)
- H: Replace bridge due to insufficient horizontal clearance
- L: Replace bridge due to inventory load rating below 36 tons (based on HS20-44 truck)
- R: Replace bridge (see remarks)
- V: Replace bridge due to insufficient vertical clearance

* see individual bridge reports for detailed derivation of square meter costs

Note: See individual bridge reports for additional details

C. (cont'd) BRIDGE RECOMMENDATIONS AND COST

MP	Structure Number	Description	Recom-mendation	Remarks	Total Width (m)	Total Length (m)	Total Area (m^2)	Square Meter Cost*	Total Bridge Cost
286	2016	I-81N/ Rte. 642 & Dry Run	C		19.0	55.0	1045	931	971,800
286	2017	I-81S/ Rte. 642 & Dry Run	C		19.0	51.2	973	931	905,400
287	2002	I-81N/ Rte. 600	H,V	Vertical clearance below 14'-6", piers in design clear zone	19.0	39.1	743	815	$606,400
287	2003	I-81S/ Rte. 600	H,V	Vertical clearance below 14'-6", piers in design clear zone	19.0	39.2	745	815	607,100
288	2004	I-81N/ Rte. 625	H,V	Vertical clearance below 14'-6", piers in design clear zone	19.0	37.9	1005	800	803,800
288	2005	I-81S/ Rte. 625	H,R	Replace bridge for consistency with NBL bridge, piers in design clear zone	19.0	42.3	804	800	643,000
289	6316	Rte. 657/ I-81	H	Bridge piers interfere with the widening of I-81	10.2	88.0	898	960	862,400
290	6317	Rte. 655/ I-81	H,V	Bridge piers interfere with the widening of I-81, vertical clearance below 16'-6"	10.2	84.0	857	917	785,500
290	6318	Rte. 653/ I-81	H,V	Bridge piers interfere with the widening of I-81, vertical clearance below 16'-6"	9.4	85.6	805	944	759,500
291	6319	Rte. 651/ I-81	C,H,V	Bridge piers interfere with the widening of I-81, vertical clearance below 16'-6"	29.2	87.0	2540	885	2,247,100
292	6320	Rte. 646/ I-81	H	Bridge piers interfere with the widening of I-81	10.2	92.9	948	972	921,400
293	2006	I-81N/ Rte. 601	C,G,H,V	Bridge piers interfere with the widening of I-81, vertical clearance below 16'-6",	19.0	41.3	785	771	604,500
293	2007	I-81S/ Rte. 601	C,G,H,V	insufficient superevelation on bridge	19.0	40.2	764	771	588,800
295	6321	Rte. 638/ I-81	H,L	Bridge piers interfere with the widening of I-81	10.2	91.3	932	700	897,900
296	1067	Rte. 55/ I-81	C,H,V	Bridge piers interfere with the widening of I-81, vertical clearance below 16'-6"	32.5	138.2	4490	1405	6,308,900
297	2008	I-81N/ CSX T RR	C		19.0	67.4	1281	921	1,179,200
297	2009	I-81S/ CSX T RR	C		19.0	66.8	1269	921	1,168,700
298	1064/65	Rte. 11/ I-81	C,H,V	Bridge piers interfere with the widening of I-81, vertical clearance below 16'-6"	34.9	97.8	3413	1025	3,498,000
299	2900	I-81N/ Cedar Cr.	C		22.6	117.9	2663	913	2,430,700
299	2901	I-81S/ Cedar Cr.	C		22.6	117.9	2663	913	2,430,700
300	2800	I-81N/ Rte. 840	C		26.2	43.0	1126	789	888,200
300	2801	I-81S/ Rte. 840	C		22.6	43.6	985	789	540,300
300	2028	I-66W/ I-66E & I-81	C,L		15.4	170.3	2623	1157	3,034,200
300	2029	I-66E/ I-81	C,H	Bridge piers interfere with the widening of I-81	15.4	126.0	1940	1286	2,494,900
302	6167	Rte. 627/ I-81	H	Bridge piers interfere with the widening of I-81	17.2	79.5	1367	851	1,162,600

(this sheet) Subtotal = $37,341,000
(previous sheet) Subtotal = $46,477,000

Total Cost = **$83,818,000**

Legend
- C: Replace bridge due to condition of structure (significant element on bridge rates 5 or below
- G: Replace bridge due geometric incompatibility (see remarks)
- H: Replace bridge due to insufficient horizontal clearance
- L: Replace bridge due to inventory load rating below 36 tons (based on HS20-44 truck)
- R: Replace bridge (see remarks)
- V: Replace bridge due to insufficient vertical clearance

* see individual bridge reports for detailed derivation of square meter costs
Note: See individual bridge reports for additional details

C. (cont'd) BRIDGE COSTS BY ROADWAY SEGMENT

Segment	Description From	Description To	Structure Number	Bridge Cost	Rounded Total Cost	Engineering and Contingency	Total for Segment
1	Begin Project	Exit 264	----	$0	$0	$0	$0
	Interchange at Exit 264		2000	1,010,500			
			2001	976,900	2,000,000	500,000	2,500,000
2	Exit 264	Exit 269	6315	1,588,900			
			2010	4,729,200			
			2011	4,566,200	10,900,000	2,725,000	13,625,000
	Interchange at Exit 269		6326	1,519,500	1,500,000	375,000	1,875,000
3	Exit 269	Exit 273	6327	984,000			
			2012	1,225,000			
			2013	1,214,900			
			2014	1,735,200			
			2015	1,830,100	7,000,000	1,750,000	8,750,000
	Interchange at Exit 273		6324	3,264,300	3,300,000	825,000	4,125,000
4	Exit 273	Exit 277	6325	1,026,200			
			6323	1,084,400	2,100,000	525,000	2,625,000
	Interchange at Exit 277		2020	962,700			
			2021	962,700	1,900,000	475,000	2,375,000
5	Exit 277	Exit 279	----	0	0	0	0
	Interchange at Exit 279		2022	2,346,800			
			2023	2,351,300			
			2026	712,700			
			2027	498,200	5,900,000	1,475,000	7,375,000
6	Exit 279	Exit 283	2024	1,798,700			
			2025	1,810,700			
			6330	1,478,000	5,100,000	1,275,000	6,375,000
	Interchange at Exit 283		1068	2,956,500	3,000,000	750,000	3,750,000

C. (cont'd) BRIDGE COSTS BY ROADWAY SEGMENT

Segment	Description From	Description To	Structure Number	Bridge Cost	Rounded Total Cost	Engineering and Contingency	Total for Segment
7	Exit 283	Exit 291	6329	$1,147,800			
			6328	1,185,200			
			2018	755,300			
			2019	755,300			
			2016	971,800			
			2017	905,400			
			2002	606,400			
			2003	607,100			
			2004	803,800			
			2005	643,000			
			6316	862,400			
			6317	785,500			
			6318	759,500	$10,800,000	$2,700,000	$13,500,000
	Interchange at Exit 291		6319	2,247,100	2,300,000	575,000	2,875,000
8	Exit 291	Exit 296	6320	921,400			
			2006	604,500			
			2007	588,800			
			6321	897,900	3,000,000	750,000	3,750,000
	Interchange at Exit 296		1067	6,308,900	6,300,000	1,575,000	7,875,000
9	Exit 296	Exit 298	2008	1,179,200			
			2009	1,168,700	2,400,000	600,000	3,000,000
	Interchange at Exit 298		1064/1065	3,498,000	3,500,000	875,000	4,375,000
10	Exit 298	Exit 300	2900	2,430,700			
			2901	2,430,700			
			2800	888,200			
			2801	540,300	6,300,000	1,575,000	7,875,000
	Interchange at Exit 300 (I-66)		2028	3,034,200			
			2029	2,494,900	5,500,000	1,375,000	6,875,000
11	Exit 300	Exit 302	----	0	0	0	0
	Interchange at Exit 302		6167	1,162,600	1,200,000	300,000	1,500,000
12	Exit 302	End Project	----	0	0	0	0
						Total Cost:	**$105,000,000**