

STONEFIELD

August 11, 2021

Neptune Township Planning Board
25 Neptune Boulevard
PO Box 1125
Neptune, NJ 07754

AUG 16 2021

**RE: Weave Analysis Report
Proposed Mixed-Use Development
NJSH Route 35 & Asbury Avenue
Block 701, Lot 1
Neptune Township, Monmouth County, New Jersey
SE&D Job No. PRI-200142**

Dear Board Members:

Stonefield Engineering and Design, LLC ("Stonefield") has prepared this analysis to calculate the existing demand, anticipated future demand, and capacity of the weaving maneuver between vehicles traveling to and from NJSH Route 35, Asbury Avenue, and the Route 35/Asbury Avenue interchange. The subject property is bounded by Asbury Avenue to the north, NJSH Route 35 to the south, Hollow Brook to the east, and the Route 35/Asbury Avenue interchange to the west in Neptune Township, Monmouth County, New Jersey. The subject property is designated as Block 701, Lot 1 as depicted on the Neptune Township Tax Map. The site has approximately 510 feet of frontage along NJSH Route 35 and approximately 1,200 feet of frontage along Asbury Avenue. The subject property is presently occupied by a vacant Coca-Cola manufacturing and distribution center. Existing access is provided via one (1) asphalt curb-cut along NJSH Route 35. Under the proposed development program, 8,133 square feet retail with one (1) drive-through lane and one (1) bypass lane, a 20,442-square-foot discount supermarket, a 3,316-square-foot fast-food restaurant with two (2) drive-through lanes, and a 4,500-square-foot convenience market with six (6) fueling stations (12 fueling positions) would be constructed. Access to the site is proposed via one (1) right-in/right-out driveway and one (1) full-movement driveway along NJSH Route 35 and two (2) full-movement driveways along Asbury Avenue.

Methodology

Stonefield Engineering & Design, LLC has prepared this weave analysis in accordance with the recommended guidelines and practices outlined in the Highway Capacity Manual (HCM), 6th Edition, and the Highway Capacity Software (HCS7). Our office completed a data collection effort to identify the existing conditions of the adjacent roadway network and determined the trip generation for the proposed mixed-use development in the Traffic Impact Study prepared by our office, dated May 28, 2021 ("Traffic Impact Study").

Chapter 13 of the HCM provides the Level of Service criteria associated with a weaving segment. For a weaving segment, Level of Service A indicates operations with a density-based capacity of less than 10 passenger car equivalents per mile per lane, while Level of Service F exceeds the capacity of the segment when the density exceeds 43 passenger car equivalents per mile per lane on freeway weaving segments. A summary of the Level of Service criteria can be found within the Technical Appendix. A one-sided weaving segment was utilized for analysis purposes which includes segments in which no weaving maneuvers require more than two (2) lane changes to be completed successfully and one in which the on-ramp and the off-ramp are located on the same side of the roadway. Appended **Figure 1** shows the one-sided weaving segment and the corresponding weaving maneuvers associated with NJSH Route 35, Asbury Avenue, and the Route 35/Asbury Avenue interchange.

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2021 Existing Condition

Weaving maneuver counts were collected during the weekday morning, weekday evening, and Saturday midday peak hours when traffic activity on the adjacent roadways is at a maximum and could be potentially impacted by the development of the site. Weaving maneuver counts were collected at the Route 35 and Asbury Avenue interchange during the following times:

- ◆ Thursday, August 5, 2021, from 7:30 a.m. to 8:30 a.m. and from 4:45 p.m. to 5:45 p.m.
- ◆ Saturday, August 7, 2021, from 3:30 p.m. to 4:30 p.m.

The study time periods were chosen as they are representative of the peak periods of both the adjacent roadway network and the proposed development. The 2021 Existing weekday morning, weekday evening, and Saturday midday peak hour volumes are summarized on appended **Figure 2**.

2023 No-Build Condition

The 2021 Existing Condition traffic volume data was grown to a future horizon year of 2023, which is a conservative estimate for when the proposed mixed-use development is expected to be fully constructed. In accordance with industry guidelines, the existing traffic volumes at the study intersections were increased by 1.25% annually for two (2) years. These volumes are summarized on appended **Figure 3**. The 1.25% background growth rate was obtained from the New Jersey Department of Transportation (NJDOT) Annual Background Growth Rate Table.

A Level of Service/Capacity analysis was conducted for the 2023 No-Build Condition during the weekday morning, weekday evening, and Saturday midday peak hours. The Route 35 and Asbury Avenue weaving segment is calculated to operate at Level of Service C during the weekday morning peak hour, at Level of Service E during the weekday evening peak hour, and at Level of Service D during the Saturday midday peak hour.

Trip Generation and Distribution

Trip generation projections for the proposed mixed-use development were prepared utilizing NJDOT's Highway Access Permit System (HAPS) and ITE's Trip Generation Manual, 10th Edition. It is noted that the HAPS does not contain data for the enter/exit trip distribution for its land uses. Therefore, the enter/exit trip distribution for each land use was obtained from the ITE's Trip Generation Manual, 10th Edition. Trip generation rates associated with Land Use 820 "Shopping Center," Land Use 854 "Discount Supermarket," Land Use 934 "Fast Food Restaurant with Drive Through Window," and Land Use 960 "Super Convenience Market/Gas Station" were cited for the proposed 8,133 square feet of retail, 20,442-square-foot discount supermarket, 3,316-square-foot fast food restaurant with drive-through service, and 4,500-square-foot convenience store with fuel sales, respectively. **Table I** provides the weekday morning, weekday evening, and Saturday midday peak hour traffic volumes after applying reductions for time-of-day factors, internal capture, and pass-by traffic. The complete time-of-day factor, internal capture, and pass-by traffic reductions can be found in the Traffic Impact Study.

TABLE I – PROPOSED TRIP GENERATION (ADJUSTED)

Land Use Code	Land Use	Amount	Weekday Morning Peak Hour			Weekday Evening Peak Hour			Saturday Midday Peak Hour		
			Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
820	Shopping Center	8,133 SF	5	3	8	44	49	93	43	39	82
854	Discount Supermarket	20,442 SF	1	1	2	98	98	196	110	109	219
934	Fast Food Restaurant with Drive Through	3,316 SF	86	83	169	89	81	170	67	64	131
960	Super Convenience Store/Gas Station	4,500 SF	187	187	374	156	156	312	139	138	277
ITE Trip Generation Total			279	274	553	387	384	771	359	350	709
Internal Capture Trip Reduction			-37	-37	-74	-137	-137	-274	-159	-159	-318
Land Use 820 Pass-By Trip Reduction			-	-	-	-8	-8	-16	-4	-4	-8
Land Use 854 Pass-By Trip Reduction			-	-	-	-12	-12	-24	-	-	-
Land Use 934 Pass-By Trip Reduction			-32	-32	-64	-28	-28	-56	-22	-22	-44
Land Use 960 Pass-By Trip Reduction			-128	-128	-256	-85	-85	-170	-41	-41	-82
Total New Vehicular Trips			82	77	159	117	114	231	133	124	257

The “new” trips associated with the proposed development were distributed according to a gravity model prepared for the site. The “pass-by” trips associated with the proposed development were distributed according to the existing travel patterns along the adjacent roadway and the access management plan of the site. The Total Site-Generated Traffic Volumes are illustrated on **Figure 4**.

2023 Build Condition

The site-generated trips were added to the 2023 No-Build Traffic Volumes to calculate the 2023 Build Traffic Volumes and are shown on appended **Figure 5**.

A Level of Service/Capacity analysis was conducted for the 2023 Build Condition during the weekday morning, weekday evening, and Saturday midday peak hours. **Tables 2 and 3** show the No-Build and Build Condition Levels of Service and the density-based capacity values associated with the weaving segment for the weekday morning, weekday evening, and Saturday midday peak hours. The Route 35 and Asbury Avenue weaving segment is calculated to operate generally consistently with the findings in the No-Build Condition during each of the peak hours studied.

ROUTE 35 & ASBURY AVENUE INTERCHANGE

X (n) = Level of Service (density-based capacity in passenger car equivalents/mile/lane)

TABLE 2 – 2023 NO-BUILD CONDITION

Land Use	Weekday Morning Peak Hour	Weekday Evening Peak Hour	Saturday Midday Peak Hour
Route 35 & Asbury Avenue Weaving Segment	C (26.6)	E (37.3)	D (32.8)

TABLE 3 – 2023 BUILD CONDITION

Land Use	Weekday Morning Peak Hour	Weekday Evening Peak Hour	Saturday Midday Peak Hour
Route 35 & Asbury Avenue Weaving Segment	C (27.6)	E (38.4)	D (33.7)

NJDOT Weaving Area Standards

The capacity analysis was conducted to evaluate the Level of Service during the weekday morning, weekday evening, and Saturday midday peak hours. Based on the NJDOT State Highway Access Management Code for weaving segments:

“LOS will be measured by weaving speed and non-weaving speed and shall conform with the values shown in the LOS Criteria for Weaving Sections as found in the current edition of the HCM. LOS shall not deteriorate below a LOS E in the full build condition standards.”

Based on the capacity analysis conducted during the 2023 Build Condition, the Route 35 and Asbury Avenue interchange weaving segment would operate at LOS E or better during the peak hours studied. As such, the weaving segment would be in compliance with the weaving area standards of the State Highway Access Management Code. Further, the density-based capacity is expected to increase by less than 4% during the weekday morning peak hour and less than 3% during the weekday evening and Saturday midday peak hours compared to the No-Build Condition.

Conclusions

This analysis was prepared to calculate the existing demand, anticipated future demand, and capacity of the weaving maneuver between vehicles traveling to and from NJSH Route 35, Asbury Avenue, and the Route 35/Asbury Avenue interchange. The analysis findings, which have been based on industry-standard guidelines, indicate the weaving segment operates at acceptable Levels of Service per the NJDOT State Highway Access Management Code during the Build Condition and the trip generation of the proposed mixed-use would not have a significant impact on the traffic operations of the weaving segment.

Please do not hesitate to contact our office if there are any questions.

Best regards,



Matthew J. Seckler, PE, PP, PTOE
Stonefield Engineering and Design, LLC



John R. Corak, PE
Stonefield Engineering and Design, LLC

TECHNICAL APPENDIX

LEVEL OF SERVICE/AVERAGE CONTROL DELAY CRITERIA

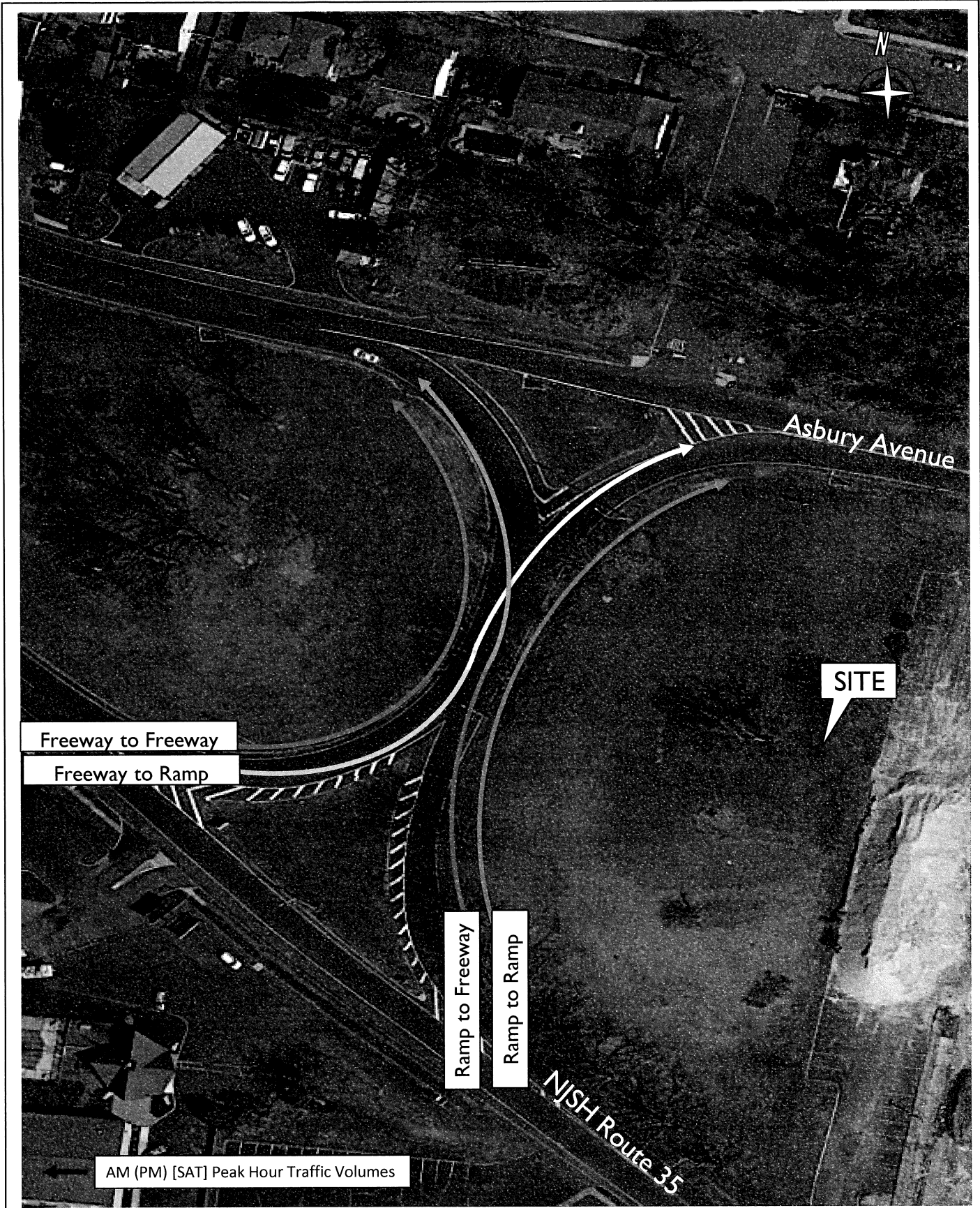
LEVEL OF SERVICE/AVERAGE CONTROL DELAY CRITERIA

Weaving is generally defined as the crossing of two or more traffic streams travelling in the same direction along a significant length of highway without the aid of traffic control devices. As defined within the Highway Capacity Manual 2010 (HCM 2010), the Level of Service in a weaving segment is related to the density in the segment in an all-freeway analysis. Weaving segment Level of Service is a qualitative measure describing operation conditions within a weaving segment based on service measures such as merging volumes, roadway configuration, and traveling speed.

For a weaving segment, LOS A indicates operations with less than 10 passenger car equivalents per mile per lane, while LOS F describes operations with more than 43 passenger vehicle equivalents per mile per lane.

Level of Service (LOS)	Weaving Segment (passenger car equivalents/mile/lane)
A	<10
B	>10 and <=20
C	>20 and <=28
D	>28 and <=35
E	>35 and <=43
F	>43

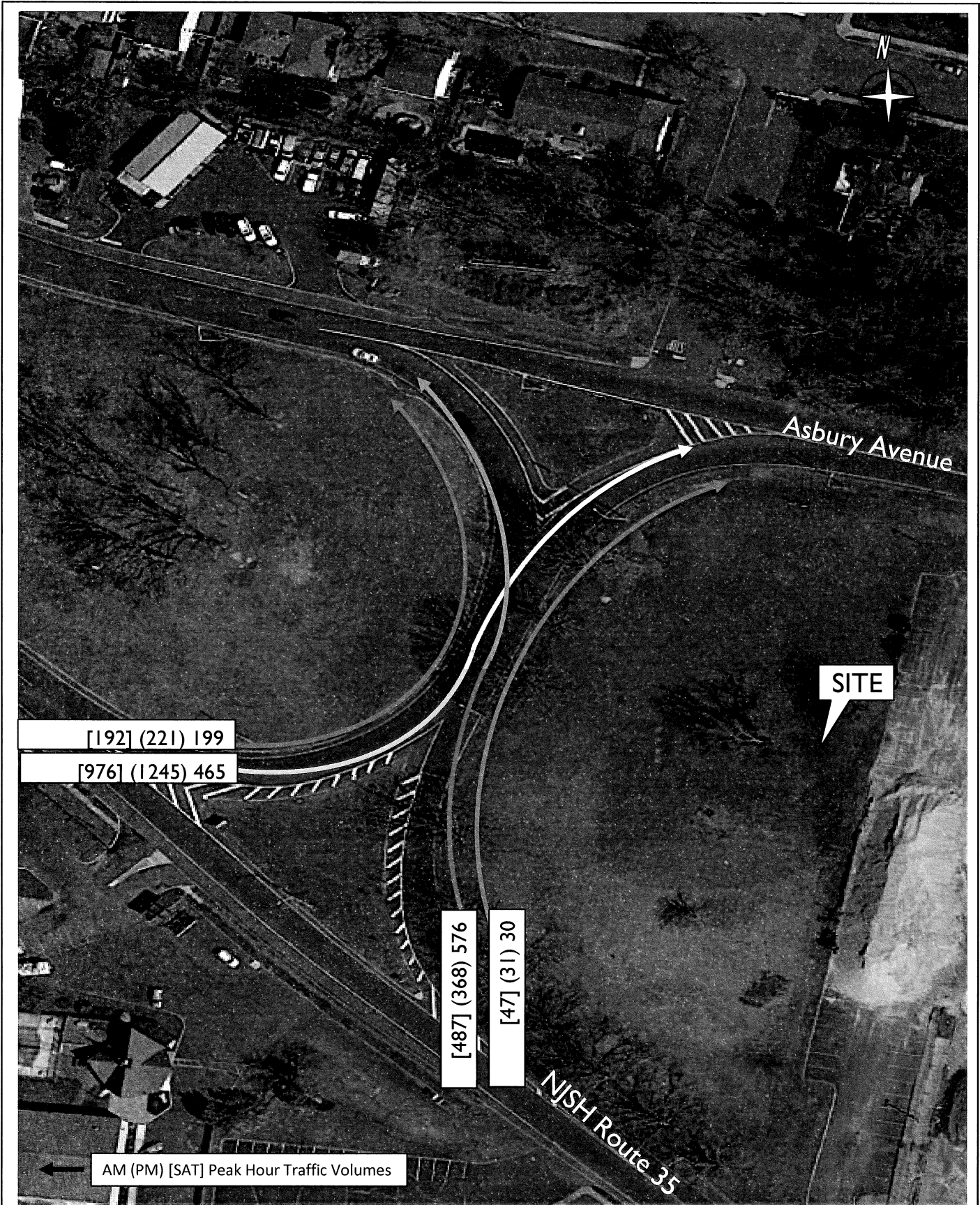
FIGURES



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Proposed Mixed-Use Development
 NJSH Route 35 & Asbury Avenue
 Neptune Township, Monmouth County, New Jersey
 Weave Analysis Report

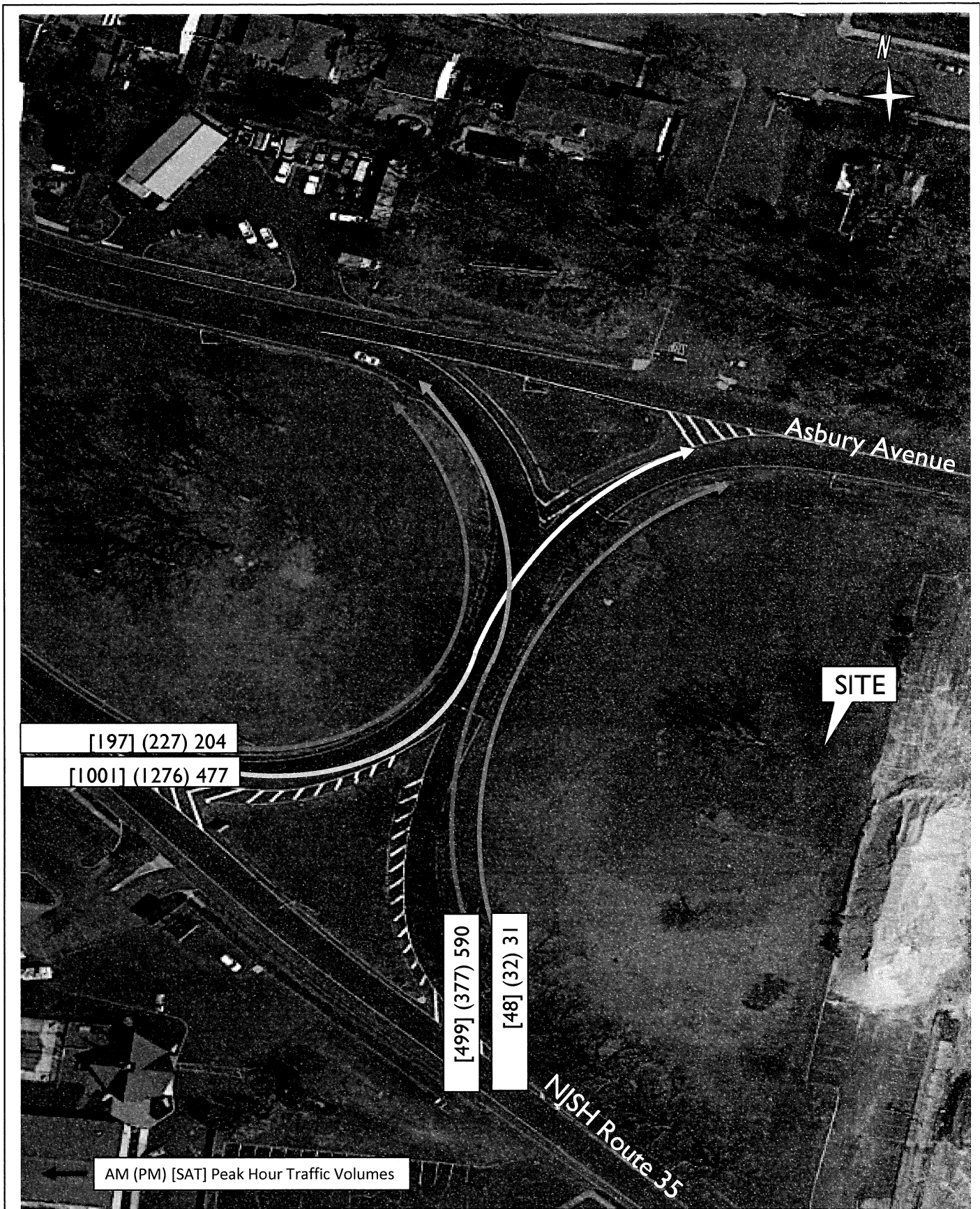
FIGURE I
 Route 35 & Asbury Avenue
 Weaving Maneuvers



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**Proposed Mixed-Use Development
NJSH Route 35 & Asbury Avenue
Neptune Township, Monmouth County, New Jersey
Weave Analysis Report**

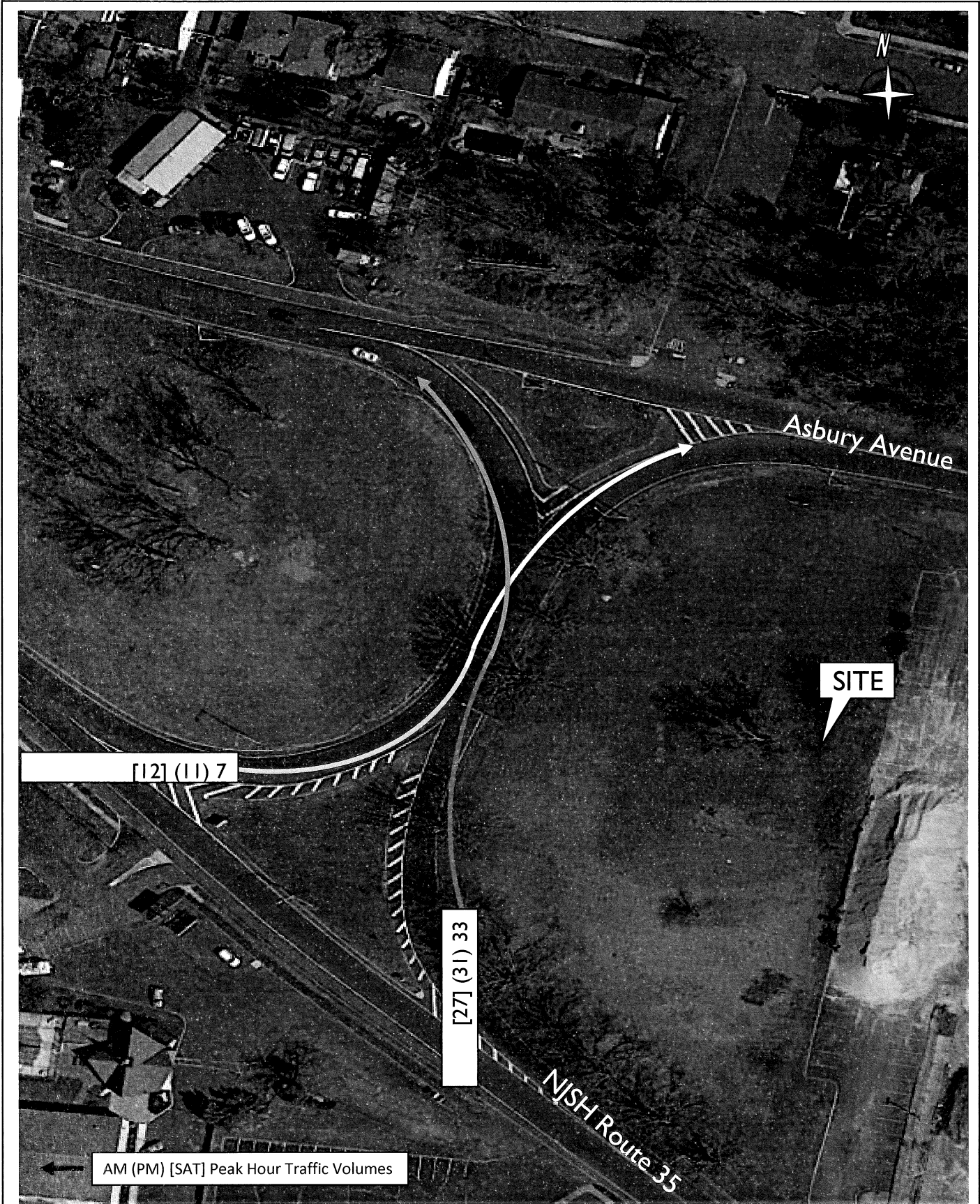
**FIGURE 2
2021 Existing Traffic
Volumes**



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Proposed Mixed-Use Development
 NJSH Route 35 & Asbury Avenue
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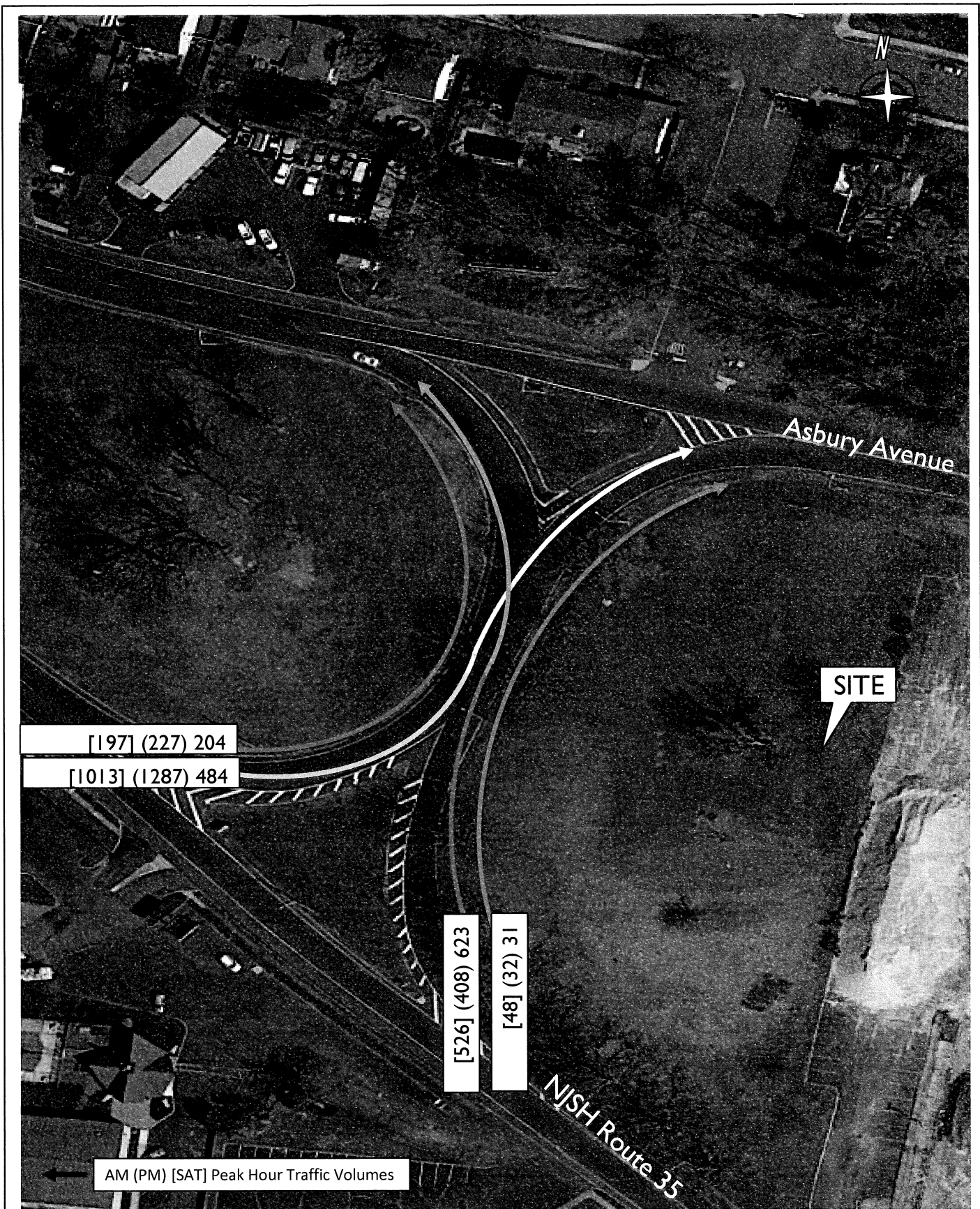
FIGURE 3
 2021 No-Build Traffic
 Volumes



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Proposed Mixed-Use Development
NJSH Route 35 & Asbury Avenue
 Neptune Township, Monmouth County, New Jersey
Weave Analysis Report

FIGURE 4
Total Site-Generated
Traffic Volumes



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Proposed Mixed-Use Development
 NJSH Route 35 & Asbury Avenue
 Neptune Township, Monmouth County, New Jersey
 Weave Analysis Report

FIGURE 5
 2021 Build Traffic Volumes

WEAVE ANALYSIS DETAIL SHEETS

HCS7 Freeway Weaving Report

Project Information

Analyst	NK	Date	8/10/2021
Agency	SE&D	Analysis Year	2023
Jurisdiction	SE&D	Time Period Analyzed	NBAM
Project Description	Proposed Mixed-Use Development		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Short Length (L _s), ft	146	Number of Maneuver Lanes (N _{wl}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC _{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC _{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC _{RR}), lc	0
Interchange Density (ID), int/mi	0.80	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V _i), veh/h	204	590	31	477
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90
Total Trucks, %	6.00	7.00	5.00	7.00
Heavy Vehicle Adjustment Factor (f _{HV})	0.943	0.935	0.952	0.935
Flow Rate (v _i), pc/h	240	701	36	567
Weaving Flow Rate (v _w), pc/h	1268	Freeway Max Capacity (c _{FL}), pc/h/ln		2200
Non-Weaving Flow Rate (v _{NW}), pc/h	276	Density-Based Capacity (c _{NW}), pc/h/ln		1307
Total Flow Rate (v), pc/h	1544	Demand Flow-Based Capacity (c _{DW}), pc/h		2923
Volume Ratio (VR)	0.821	Weaving Segment Capacity (c _w), veh/h		2465
Minimum Lane Change Rate (LC _{MIN}), lc/h	1268	Adjusted Weaving Area Capacity, pc/h		2631
Maximum Weaving Length (L _{MAX}), ft	11813	Volume-to-Capacity Ratio (v/c)		0.59

Speed and Density

Non-Weaving Vehicle Index (I _{NW})	3	Average Weaving Speed (S _w), mi/h	28.4
Non-Weaving Lane Change Rate (LC _{NW}), lc/h	0	Average Non-Weaving Speed (S _{NW}), mi/h	32.2
Weaving Lane Change Rate (LC _w), lc/h	1268	Average Speed (S), mi/h	29.0
Total Lane Change Rate (LC _{All}), lc/h	1268	Density (D), pc/mi/ln	26.6
Weaving Intensity Factor (W)	1.244	Level of Service (LOS)	C

HCS7 Freeway Weaving Report

Project Information

Analyst	NK	Date	8/10/2021
Agency	SE&D	Analysis Year	2023
Jurisdiction	SE&D	Time Period Analyzed	NBPM
Project Description	Proposed Mixed-Use Development		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Short Length (L _s), ft	146	Number of Maneuver Lanes (N _{wl}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC _{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC _{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC _{RR}), lc	0
Interchange Density (ID), int/mi	0.80	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V _i), veh/h	227	377	32	1276
Peak Hour Factor (PHF)	0.96	0.96	0.96	0.96
Total Trucks, %	1.00	1.00	1.00	0.00
Heavy Vehicle Adjustment Factor (f _{HV})	0.990	0.990	0.990	1.000
Flow Rate (v _i), pc/h	239	397	34	1329
Weaving Flow Rate (v _w), pc/h	1726	Freeway Max Capacity (c _{FL}), pc/h/ln		2200
Non-Weaving Flow Rate (v _{NW}), pc/h	273	Density-Based Capacity (c _{NW}), pc/h/ln		1265
Total Flow Rate (v), pc/h	1999	Demand Flow-Based Capacity (c _w), pc/h		2781
Volume Ratio (VR)	0.863	Weaving Segment Capacity (c _w), veh/h		2505
Minimum Lane Change Rate (LC _{MIN}), lc/h	1726	Adjusted Weaving Area Capacity, pc/h		2514
Maximum Weaving Length (L _{MAX}), ft	12368	Volume-to-Capacity Ratio (v/c)		0.80

Speed and Density

Non-Weaving Vehicle Index (I _{NW})	3	Average Weaving Speed (S _w), mi/h	26.6
Non-Weaving Lane Change Rate (LC _{NW}), lc/h	0	Average Non-Weaving Speed (S _{NW}), mi/h	27.8
Weaving Lane Change Rate (LC _w), lc/h	1726	Average Speed (S), mi/h	26.8
Total Lane Change Rate (LC _{All}), lc/h	1726	Density (D), pc/mi/ln	37.3
Weaving Intensity Factor (W)	1.587	Level of Service (LOS)	E

HCS7 Freeway Weaving Report

Project Information

Analyst	NK	Date	8/10/2021
Agency	SE&D	Analysis Year	2023
Jurisdiction	SE&D	Time Period Analyzed	NBSAT
Project Description	Proposed Mixed-Use Development		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Short Length (L _s), ft	146	Number of Maneuver Lanes (N _{wl}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC _{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC _{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC _{RR}), lc	0
Interchange Density (ID), int/mi	0.80	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V _i), veh/h	197	499	48	1001
Peak Hour Factor (PHF)	0.98	0.98	0.98	0.98
Total Trucks, %	1.00	0.00	2.00	2.00
Heavy Vehicle Adjustment Factor (f _{HV})	0.990	1.000	0.980	0.980
Flow Rate (v _i), pc/h	203	509	50	1042
Weaving Flow Rate (v _w), pc/h	1551	Freeway Max Capacity (c _F L), pc/h/ln		2200
Non-Weaving Flow Rate (v _{NW}), pc/h	253	Density-Based Capacity (c _{NW} L), pc/h/ln		1268
Total Flow Rate (v), pc/h	1804	Demand Flow-Based Capacity (c _w), pc/h		2791
Volume Ratio (VR)	0.860	Weaving Segment Capacity (c _w), veh/h		2511
Minimum Lane Change Rate (LC _{MIN}), lc/h	1551	Adjusted Weaving Area Capacity, pc/h		2544
Maximum Weaving Length (L _{MAX}), ft	12329	Volume-to-Capacity Ratio (v/c)		0.71

Speed and Density

Non-Weaving Vehicle Index (I _{NW})	3	Average Weaving Speed (S _w), mi/h	27.2
Non-Weaving Lane Change Rate (LC _{NW}), lc/h	0	Average Non-Weaving Speed (S _{NW}), mi/h	29.5
Weaving Lane Change Rate (LC _w), lc/h	1551	Average Speed (S), mi/h	27.5
Total Lane Change Rate (LC _{All}), lc/h	1551	Density (D), pc/mi/ln	32.8
Weaving Intensity Factor (W)	1.458	Level of Service (LOS)	D

HCS7 Freeway Weaving Report

Project Information

Analyst	NK	Date	8/10/2021
Agency	SE&D	Analysis Year	2023
Jurisdiction	SE&D	Time Period Analyzed	BAM
Project Description	Proposed Mixed-Use Development		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Short Length (L _s), ft	146	Number of Maneuver Lanes (N _{WL}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC _{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC _{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC _{RR}), lc	0
Interchange Density (ID), int/mi	0.80	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V _i), veh/h	204	623	31	484
Peak Hour Factor (PHF)	0.90	0.90	0.90	0.90
Total Trucks, %	6.00	7.00	5.00	7.00
Heavy Vehicle Adjustment Factor (f _{HV})	0.943	0.935	0.952	0.935
Flow Rate (v _i), pc/h	240	740	36	575
Weaving Flow Rate (v _w), pc/h	1315	Freeway Max Capacity (c _{FL}), pc/h/ln		2200
Non-Weaving Flow Rate (v _{NW}), pc/h	276	Density-Based Capacity (c _{NW}), pc/h/ln		1301
Total Flow Rate (v), pc/h	1591	Demand Flow-Based Capacity (c _w), pc/h		2902
Volume Ratio (VR)	0.827	Weaving Segment Capacity (c _w), veh/h		2454
Minimum Lane Change Rate (LC _{MIN}), lc/h	1315	Adjusted Weaving Area Capacity, pc/h		2618
Maximum Weaving Length (L _{MAX}), ft	11892	Volume-to-Capacity Ratio (v/c)		0.61

Speed and Density

Non-Weaving Vehicle Index (I _{NW})	3	Average Weaving Speed (S _w), mi/h	28.2
Non-Weaving Lane Change Rate (LC _{NW}), lc/h	0	Average Non-Weaving Speed (S _{NW}), mi/h	31.7
Weaving Lane Change Rate (LC _w), lc/h	1315	Average Speed (S), mi/h	28.8
Total Lane Change Rate (LC _{All}), lc/h	1315	Density (D), pc/mi/ln	27.6
Weaving Intensity Factor (W)	1.280	Level of Service (LOS)	C

HCS7 Freeway Weaving Report

Project Information

Analyst	NK	Date	8/10/2021
Agency	SE&D	Analysis Year	2023
Jurisdiction	SE&D	Time Period Analyzed	BPM
Project Description	Proposed Mixed-Use Development		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Short Length (Ls), ft	146	Number of Maneuver Lanes (Nwl), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC _{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC _{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC _{RR}), lc	0
Interchange Density (ID), int/mi	0.80	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V _i), veh/h	227	408	32	1287
Peak Hour Factor (PHF)	0.96	0.96	0.96	0.96
Total Trucks, %	1.00	1.00	1.00	0.00
Heavy Vehicle Adjustment Factor (f _{HV})	0.990	0.990	0.990	1.000
Flow Rate (v _i), pc/h	239	429	34	1341
Weaving Flow Rate (v _w), pc/h	1770	Freeway Max Capacity (c _{FL}), pc/h/ln		2200
Non-Weaving Flow Rate (v _{NW}), pc/h	273	Density-Based Capacity (c _{NW}), pc/h/ln		1262
Total Flow Rate (v), pc/h	2043	Demand Flow-Based Capacity (c _{DW}), pc/h		2771
Volume Ratio (VR)	0.866	Weaving Segment Capacity (c _w), veh/h		2499
Minimum Lane Change Rate (LC _{MIN}), lc/h	1770	Adjusted Weaving Area Capacity, pc/h		2508
Maximum Weaving Length (L _{MAX}), ft	12408	Volume-to-Capacity Ratio (v/c)		0.81

Speed and Density

Non-Weaving Vehicle Index (I _{NW})	3	Average Weaving Speed (S _w), mi/h	26.5
Non-Weaving Lane Change Rate (LC _{NW}), lc/h	0	Average Non-Weaving Speed (S _{NW}), mi/h	27.4
Weaving Lane Change Rate (LC _w), lc/h	1770	Average Speed (S), mi/h	26.6
Total Lane Change Rate (LC _{All}), lc/h	1770	Density (D), pc/mi/ln	38.4
Weaving Intensity Factor (W)	1.618	Level of Service (LOS)	E

HCS7 Freeway Weaving Report

Project Information

Analyst	NK	Date	8/10/2021
Agency	SE&D	Analysis Year	2023
Jurisdiction	SE&D	Time Period Analyzed	BSAT
Project Description	Proposed Mixed-Use Development		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Short Length (L _s), ft	146	Number of Maneuver Lanes (N _{wl}), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LC _{RF}), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LC _{FR}), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LC _{RR}), lc	0
Interchange Density (ID), int/mi	0.80	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (V _i), veh/h	197	526	48	1013
Peak Hour Factor (PHF)	0.98	0.98	0.98	0.98
Total Trucks, %	1.00	0.00	2.00	2.00
Heavy Vehicle Adjustment Factor (f _{HV})	0.990	1.000	0.980	0.980
Flow Rate (v _i), pc/h	203	537	50	1055
Weaving Flow Rate (v _w), pc/h	1592	Freeway Max Capacity (c _{FL}), pc/h/ln		2200
Non-Weaving Flow Rate (v _{NW}), pc/h	253	Density-Based Capacity (c _{NWL}), pc/h/ln		1265
Total Flow Rate (v), pc/h	1845	Demand Flow-Based Capacity (c _w), pc/h		2781
Volume Ratio (VR)	0.863	Weaving Segment Capacity (c _w), veh/h		2505
Minimum Lane Change Rate (LC _{MIN}), lc/h	1592	Adjusted Weaving Area Capacity, pc/h		2539
Maximum Weaving Length (L _{MAX}), ft	12368	Volume-to-Capacity Ratio (v/c)		0.73

Speed and Density

Non-Weaving Vehicle Index (I _{NW})	3	Average Weaving Speed (S _w), mi/h	27.1
Non-Weaving Lane Change Rate (LC _{NW}), lc/h	0	Average Non-Weaving Speed (S _{NW}), mi/h	29.1
Weaving Lane Change Rate (LC _w), lc/h	1592	Average Speed (S), mi/h	27.4
Total Lane Change Rate (LC _{All}), lc/h	1592	Density (D), pc/mi/ln	33.7
Weaving Intensity Factor (W)	1.489	Level of Service (LOS)	D