



EXISTING CONDITIONS - FREEWAY CAPACITY ANALYSIS RESULTS

DRAFT: MARCH 2021









Introduction

The Highway Capacity Software 7 (HCS7) Freeway Facilities module was used to analyze the existing condition AM and PM peak hour operations along the study area roadways. The volumes from the *Regional Connector Study Corridor Conditions Report (report dated 2019, data in the report is from August 2017 to July 2018)* were used for the analyses and the study area roadways were divided into the following segments for the analyses:

I-64 Eastbound/Westbound

- Segment 1 Mercury Boulevard Interchange to the Hampton Roads Bridge Tunnel
- Segment 2 Hampton Roads Bridge Tunnel to the I-564/I-64 Interchange

I-664 Northbound/Southbound

- Segment 1 I-64/I-664 Interchange to the Monitor Merrimac Memorial Bridge Tunnel
- Segment 2 Monitor Merrimac Memorial Bridge Tunnel to the I-264/I-664 Interchange

State Route 164 Eastbound/Westbound

- Segment 1 I-664/SR 164/US 17 Interchange to the Cedar Lane/SR 164 Interchange
- Segment 2 Cedar Lane/SR 164 Interchange to the US 58/SR 164 Interchange

I-564 Eastbound/Westbound

- Admiral Taussig Boulevard to the I-564/I-64 Interchange
- It is important to note that at the time the data for these analyses was collected, construction for the Intermodal Connector project was not yet complete. Lanes were open to traffic on the Intermodal Connector in January 2021.

Each segment was analyzed as a Freeway Facility in HCS7 and identified as either a Basic, Merge, Diverge, Weave, or Overlap segment. As well, all facilities were analyzed in accordance with the VDOT Traffic Operational and Safety Analysis Manual (TOSAM, February 2020). In instances where traffic conditions were either controlled by a tunnel or the beginning of analysis period is oversaturated, the following parameters were modified.

Capacity Adjustment Factors

- Definition: Factors that can adjust the capacity downwards to represent field measurements
- Condition Applied: Capacity Adjustment Factors were only applied at the Hampton Roads Bridge Tunnel and Monitor Merrimac Memorial Bridge Tunnel

Seeding Intervals

- Definition: Additional periods added prior to the analysis period to populate the model to better represent conditions during the analysis period
- Condition Applied: Seeding intervals were applied when network oversaturation was observed prior to or at the beginning of the analysis period

Unmet Demand

- Definition: The number of vehicles that are destined to travel through a network at a specific time but cannot do so due to capacity constraints
- Condition Applied: Unmet Demand was applied when network oversaturation was observed during any seeding or analysis period

Capacity Adjustment Factors

Capacity Adjustment Factors were used to decrease the capacity of both the Hampton Roads Bridge Tunnel (HRBT) on I-64 and the Monitor Merrimac Memorial Tunnel (MMBT) on I-664 due to the absence of shoulders and reduced lane width within the tunnels. The tunnels are known to be the main bottleneck along both facilities and the default HCM capacity value of 2,200 passenger cars per lane per hour (pc/ln/hr) does not apply. Although the HCM does not specify capacity adjustments for tunnels, the Existing Conditions Report and continuous count station data were used to determine that the capacity of the HRBT is approximately 3,400 vehicles per hour (1700 pc/ln/hr) in the eastbound direction and approximately 3,100 vehicles (1550 pc/ln/hr) in the westbound direction. These capacities correspond with an adjustment factor between 0.70 and 0.78. Based on additional review and calibration within the HCS7 I-64 modules, a capacity adjustment factor of 0.72, or an adjusted capacity of 3,168 passenger cars per hour (1584 pc/ln/hr), was used for both directions.

The I-664 Monitor Merrimac Memorial Tunnel does not have continuous count stations immediately on either side; however, the tunnel does share similar properties with the Hampton Roads Bridge Tunnel. Initially, the same 0.72 capacity adjustment factor used for the HRBT was applied to the MMMBT, but this was determined to be too aggressive based on a review within the HCS7 I-664 modules. Because the length of the MMMBT is shorter than the HRBT by about 2,900 feet, the capacity adjustment factor was adjusted upwards based on the length comparison and subsequent reviews of the HCS7 I-664 outputs. A capacity adjustment factor of 0.78, or an adjusted capacity of 3,432 passenger cars per hour (1716 pc/ln/hr), was calculated for the I-664 MMBT.

Seeding Intervals

During analysis periods where oversaturated conditions were observed prior to or at the start of the analysis period, seeding intervals were added to the analysis to simulate the oversaturated condition and calibrate the analysis to existing conditions. The INRIX Congestion Scan module and knowledge of the study area were used to determine if a network was oversaturated at or before the analysis period. Figure 1 presents an example image from the INRIX Congestion Scan module for I-64 between 2:00 PM and 6:00PM (August 2017 to July 2018). INRIX Congestion Scans for the remaining corridors are presented in Figure 44 through Figure 47.







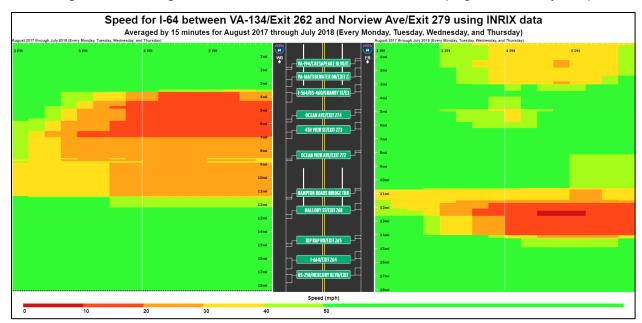


Figure 1: INRIX Congestion Scan - I-64 Between 2:00 PM and 6:00 PM (August 2017 to July 2018)

The Congestion Scan represents the speed along segments and is visualized based on a scale from green to red. Green areas show segments where traffic is moving freely and red shows areas where traffic is congested or restricted. Although congestion relative to the baseline is typically anticipated to occur during peak volume events, oversaturation in the network was assumed when the INRIX Congestion scans showed segments with consistent speed reductions between time periods and when speed reduction progressed upstream of the previous slowdown. Seeding intervals were used in the analyses of the following roadways based on their corresponding INRIX Congestion Scan:

- AM I-64 Eastbound: Segment 1 Mercury Boulevard Interchange to the HRBT
- PM I-64 Eastbound: Segment 1 Mercury Boulevard Interchange to the HRBT
- PM I-64 Westbound: Segment 2 HRBT to the I-564/I-64 Interchange
- PM I-664 Southbound: Segment 1 I-64/I-664 Interchange to the MMBT

The congestion scans obtained from INRIX for the study area roadways are presented in Figure 44 through Figure 47.

Unmet Demand

Using the INRIX Congestion Scan data, the unmet demand can be estimated. As mentioned previously, unmet demand is the number of vehicles that are destined to travel through a network at a specific time but cannot do so due to capacity constraints. Unmet demand is calculated using the following formula:

Unmet Demand_{Time Period} = Length of Queue_{Time Period} / Length of Car x Number of Lanes

Demand = Volume_{Time Period} + (Unmet Demand_{Previous Time Period} - Unmet Demand_{Time Period})

Length of Car = 25 Feet

The length of queue, or unmet demand, was determined by assuming the location of back of queue using the INRIX Congestion Scan Module. For the HCS7 analyses, it was assumed that the back of queue, or unmet demand, was located where vehicles began to travel less than 20 MPH. Unmet Demand was applied to the mainline volumes in the following freeway analyses:

- AM I-64 Eastbound: Segment 1 Mercury Boulevard Interchange to the HRBT
- PM I-64 Eastbound: Segment 1 Mercury Boulevard Interchange to the HRBT
- PM I-64 Westbound: Segment 2 HRBT to the I-564/I-64 Interchange
- PM I-664 Southbound: Segment 1 I-64/I-664 Interchange to the MMBT

Ramp volumes from the Existing Conditions Report were used for the HCS7 Freeway analyses and only adjusted when significant congestion was observed on the crossroad and applied to the following freeway analyses:

- PM I-64 Eastbound: Segment 1 Mercury Boulevard Interchange to the HRBT
 - o US 60 On-Ramp onto Eastbound I-64
- PM I-664 Southbound: Segment 1 I-64/I-664 Interchange to the MMMBT
 - US 60 On-Ramp onto Southbound I-664

Existing Conditions HCS Calibration

HCS7 Freeway Facilities module is a deterministic tool based on methodologies outlined in the Highway Capacity Manual and the results from this tool are fully determined by initial input conditions and parameters. The VDOT Traffic Operations and Safety Manual (TOSAM) states that: "As a deterministic tool, HCS shall not be used to analyze oversaturated conditions; however, the Freeway Facilities module of HCS may be used for the preliminary evaluation of alternatives on Freeways".

INRIX data was used to determine the validity of the Existing Condition Results. Average speed data from INRIX was used as a reliability threshold for the results review. Although the HCS analyses and INRIX data covered the same areas, the segmented travel time along each corridor were not used in the review as freeway segments analyzed in HCS have different start/end points than data available from INRIX. However, the total travel times for each corridor were used to determine the average speed of overall analysis segment. Table 1 and 2 summarize the AM and PM, travel times and average speeds, respectively, for each data set.





Table 1: AM Peak Hour – Travel Times and Average Speeds

	HCS		INRIX		
DIRECTION	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)	
I-64 BETWEEN I-564 AND HRBT					
EASTBOUND	5.07	57.56	5.71	58.21	
WESTBOUND	8.30	54.76	11.56	47.23	
I-64 BETWEEN HRBT AND MERCURY BOULEVARD					
EASTBOUND	17.80	27.36	19.31	24.86	
WESTBOUND	6.67	56.3	5.21	62.19	
I-664 BETWEEN I-64 AND TUNNEL					
NORHTBOUND	6.48	62.29	5.37	61.68	
SOUTHBOUND	8.46	60.28	5.01	66.11	
I-664 BETWEEN TUNNEL AND I-264					
NORTHBOUND	16.92	54.24	16.1	54.71	
SOUTHBOUND	12.01	62.27	13.76	64.01	
I-564					
EASTBOUND	2.85	59.73	3.01	52.82	
WESTBOUND	4.28	42.07	5.18	35.56	
STATE ROUTE 164					
EASTBOUND	8.60	58.58	7.81	50.7	
WESTBOUND	7.52	60.75	6.78	57.52	

Table 2: PM Peak Hour – Travel Times and Average Speeds

	HCS		INRIX			
DIRECTION	Travel Time (min)	Average Speed (MPH)	Travel Time (min)	Average Speed (MPH)		
	I-64 BETWEEN I-564 AND HRBT					
EASTBOUND	5.08	57.44	7.08	46.95		
WESTBOUND	23.85	19.06	25.67	21.27		
I-64 BETWEEN HRBT AND MERCURY BOULEVARD						
EASTBOUND	21.68	22.47	18.76	25.59		
WESTBOUND	6.6	56.9	5.29	61.25		
I-664 BETWEEN I-64 AND TUNNEL						
NORHTBOUND	6.56	61.53	5.85	56.62		
SOUTHBOUND	16.75	30.45	12.94	25.6		
I-664 BETWEEN TUNNEL AND I-264						
NORTHBOUND	14.71	60.7	15.97	55.15		
SOUTHBOUND	11.73	63.75	15.91	55.36		
I-564						
EASTBOUND	2.85	59.73	3.37	47.18		
WESTBOUND	3.01	59.82	3.12	59.04		
STATE ROUTE 164						
EASTBOUND	8.55	58.92	6.63	59.73		
WESTBOUND	7.56	60.43	7.63	51.11		

Although the VDOT TOSAM does not specify calibration thresholds for HCS, it was assumed that the HCS results for average speed should be within ±20% of the average speed data from INRIX based on TOSAM requirements for the calibration of microsimulation traffic models. It should be noted that if the HCS results exceed the target threshold for this study, the results can still be used for preliminary screening as the results of the future alternatives are not reviewed independently, but instead, the analysis results for each alternative are compared relative to each other. Discrepancies for analysis segments that did not meet the calibration threshold are explained later in this section. Table 3 and 4 compares the Average Speed from HCS and INRIX.

Table 3: AM Peak Hour – Average Segment Speed Comparison – INRIX Data and HCS Results

DIRECTION I-64 BETWEEN I-564 A	INRIX / HCS Average Speed (% DIFF) AND MALORY STREET			
EASTBOUND	1%			
WESTBOUND	16%			
I-64 BETWEEN MALORY STEET AND MERCURY BOULEVARD				
EASTBOUND	10%			
WESTBOUND	9%			
I-664 BETWEEN I-64 AND TUNNEL				
NORTHBOUND	1%			
SOUTHBOUND	9%			
I-664 BETWEEN TUNNEL AND I-264				
NORTHBOUND	1%			
SOUTHBOUND	3%			
I-564				
EASTBOUND	13%			
WESTBOUND	18%			
STATE ROUTE 164				
EASTBOUND	16%			
WESTBOUND	6%			



Table 4: PM Peak Hour – Average Segment Speed Comparison – INRIX Data and HCS Results

DIRECTION	INRIX / HCS Average Speed (% DIFF)			
I-64 BETWEEN I-564 AND MALORY STREET				
EASTBOUND	22%			
WESTBOUND	10%			
I-64 BETWEEN MALORY STEET AND MERCURY BOULEVARD				
EASTBOUND	12%			
WESTBOUND	7%			
I-664 BETWEEN I-64 AND TUNNEL				
NORTHBOUND	9%			
SOUTHBOUND	19%			
I-664 BETWEEN TUNNEL AND I-264				
NORTHBOUND	10%			
SOUTHBOUND	15%			
I-564				
EASTBOUND	27%			
WESTBOUND	1%			
STATE ROUTE 164				
EASTBOUND	1%			
WESTBOUND	18%			

Based on the review of the data, all of the HCS analysis results were within the target threshold of 20% with the exception of two segments:

1. PM I-64 Westbound: Segment 2 – Hampton Roads Bridge Tunnel to the I-564/I-64 Interchange

The average speed for this segment reported in the HCS results is 22% higher than the INRIX data (approximately 11 MPH). This difference can be attributed to the fact that the data for the INRIX segment at the end of the corridor accounts for the segment of I-64 between the I-564 interchange and the VA-194/Chesapeake Blvd Interchange where there is a considerable amount of congestion. Because the study area for the Regional Connector Study ends at the I-564 interchange with I-64, the HCS analysis does not account for the downstream congestion in the vicinity of the Chesapeake Boulevard interchange.

2. PM I-564 Eastbound/Westbound - Admiral Taussig Boulevard to the I-564/I-64 Interchange

The average speed for this segment reported in the HCS results is 27% higher than the INRIX data (approximately 12 MPH). This difference can be attributed to the fact that the data for the INRIX segment at the end of the I-564 corridor includes the segment beyond the US 460 crossroad where congestion occurs in the vicinity of the Chesapeake Boulevard interchange that is not accounted for in the HCS analysis because it is outside of the study area.

Capacity Analysis Results

The results of the HCS7 Freeway Facilities Capacity Analyses are presented in tabular and graphical form following this discussion. Maps displaying the LOS for each freeway component are shown in Figure 2 through Figure 18. The corresponding freeway component densities are displayed in Figure 19 through Figure 35. Figure 36 through Figure 43 present the detailed analysis results in tabular format. A summary of the results for each freeway corridor is below:

I-64: I-564/I-64 Interchange to Mercury Boulevard Interchange

During the AM and PM peak hours, I-64 experiences congestion as vehicles approach the HRBT in both the eastbound and westbound directions. The eastbound direction between Rip Rap Road and the HRBT operates at a LOS F in both the AM and PM peak hours due to the reduced capacity of the tunnel. The remainder of the eastbound I-64 corridor, east of the tunnel, operates with travel speeds above 55 MPH, however the density of vehicles results in a LOS D.

The westbound direction along this segment of I-64 operates at a LOS F during the PM peak hour due to the tunnel's reduced capacity with impacts to operations as far upstream as the I-564/I-64 interchange. During the AM peak hour for the westbound direction, there is minimal slowdown from the HRBT to the Mercury Boulevard interchange, with operating speeds above 60 MPH and LOS between B and C.

I-664 Northbound/Southbound: I-64/I-664 Interchange to the I-264/I-664 Interchange

I-664 generally operates with acceptable vehicle speeds during both the AM and PM peak hours, except for the southbound I-664 segment between the US 60 interchange and the MMBT during the PM peak hour, which operates at a LOS F with vehicle speeds between 15 MPH and 20 MPH due to the reduced capacity of the tunnel. During the AM peak hour traveling along northbound I-664, vehicles experience delay at the tunnel but the congestion does not impact operations upstream due to the distance between the tunnel and the upstream interchange at College Drive. Vehicle speeds prior to the tunnel and on the bridge are above 45 MPH, resulting in a LOS C along these segments.

Other areas along I-664 that have a higher density of vehicles with a LOS D during the AM and PM peak hours but operate within the speed limit are between the I-64/SR164/US17 Interchange and the I-264/I-664 Interchange. Between the I I-64/I-664 Interchange and US 60, the density going southbound on I-664 is between a LOS A and C with speeds being maintained above 60 MPH until they approach the US 60 merge area. The Northbound I-664 density is maintained between LOS B and C, although minimal congestion and slow-downs are observed because traffic flow into this segment of I-664 is generally controlled by the MMBT.

State Route 164: I-64/SR164/US17 Interchange to the US 58/SR164 Interchange

Roadway segments along State Route 164 operate between a LOS C and LOS A during the peak hours. Operating speeds along Route 164, east the I-64/SR164/US17 interchange are within a 60 MPH range. Most of the heavy traffic volume exchanges take place along the eastern segments of the corridor at the I-64/SR164/US17 Interchange or along the western segments of the corridor at US 58/SR164 interchange. These areas operate at LOS B and LOS C during both peak hours.







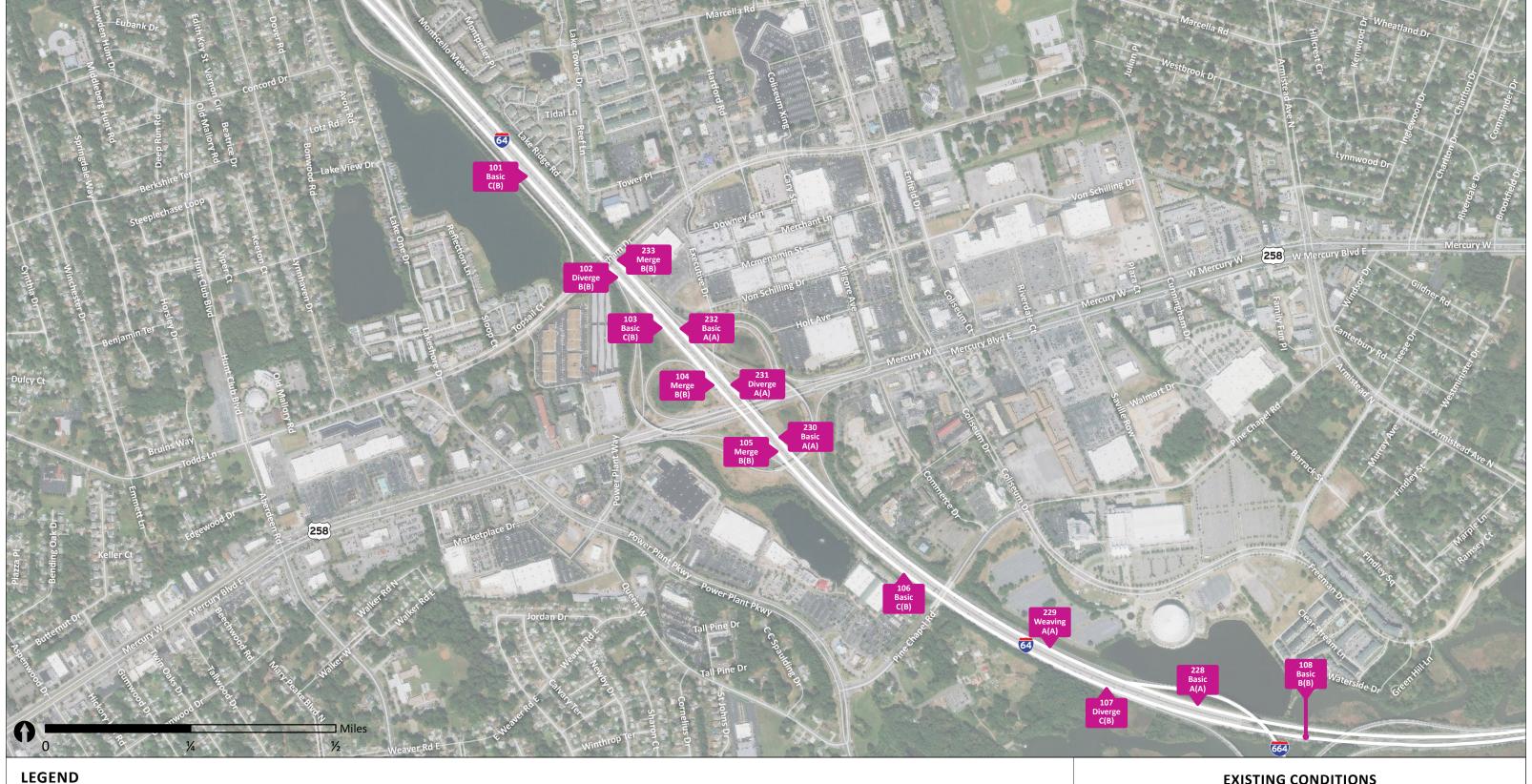
I-564: Admiral Taussig Boulevard to the I-564/I-64 Interchange

I-564 has generally acceptable operations during the AM and PM peak hours. The westbound segment just west of I-64 operates at LOS F during the AM peak hour, however, the remainder of the of the corridor operates at LOS B during the AM peak hour. Speeds from the HCS analysis are maintained near 65 MPH, however, vehicles slow down as they exit onto Admiral Taussig Boulevard below 30 MPH as shown in the INRIX data. This is because arterial operations outside the study area control the vehicle flow onto Admiral Taussig Boulevard. Eastbound I-564 during the PM peak hour does degrade from a LOS B to LOS C as vehicles approach the I-64 interchange because of vehicles merging from Terminal Boulevard onto I-564. The PM peak hour speeds on the Eastbound I-564 segment approaching the terminus of the study area is less than 35 MPH due to downstream operations on I-64.









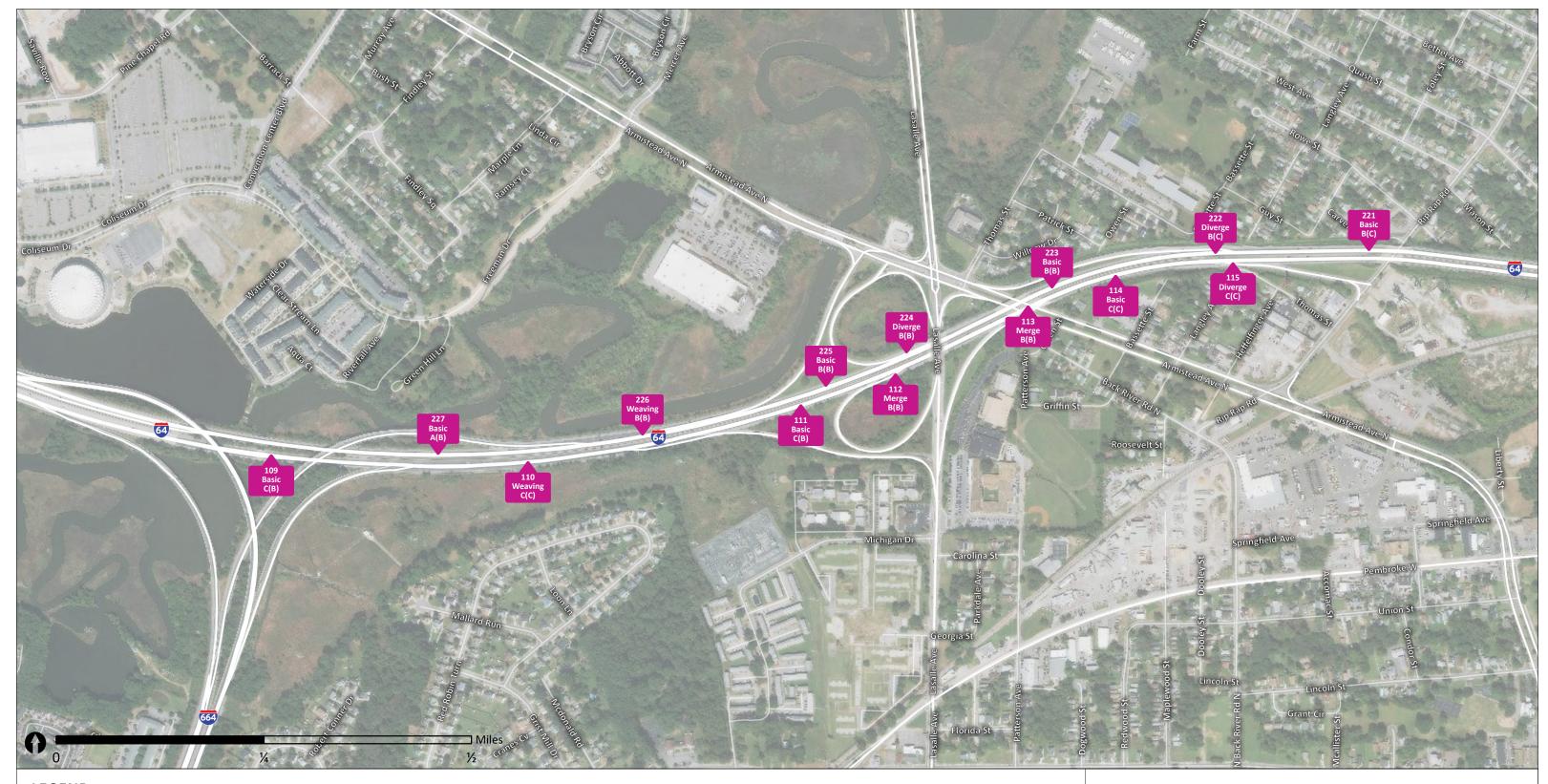
228 Basic A(A) Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 2



REGIONAL CONNECTORS STUDY





Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 3



REGIONAL CONNECTORS STUDY





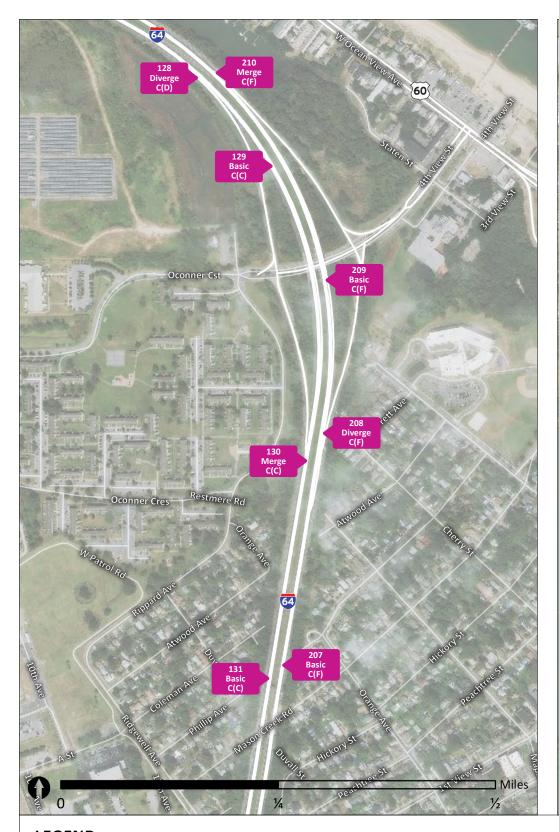
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FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

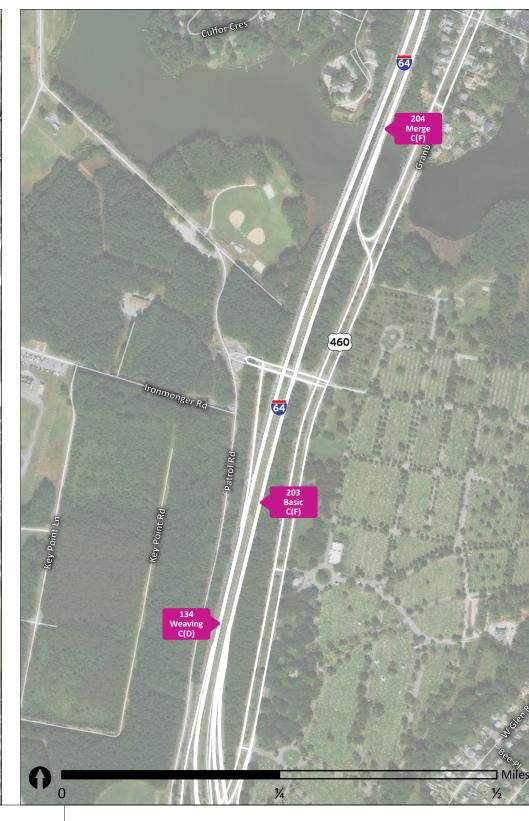
FIGURE 4



REGIONAL CONNECTORS STUDY









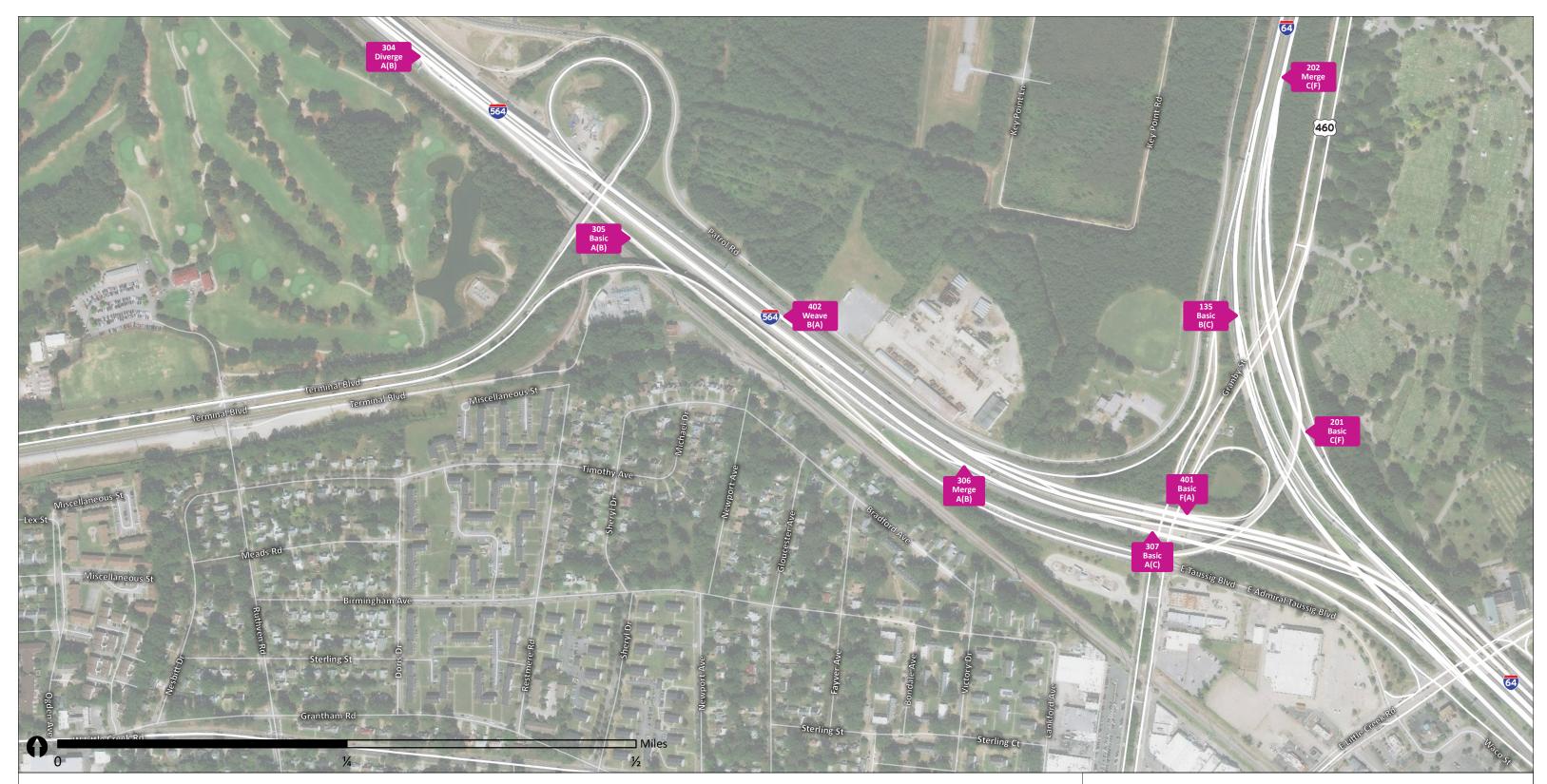
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FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 5









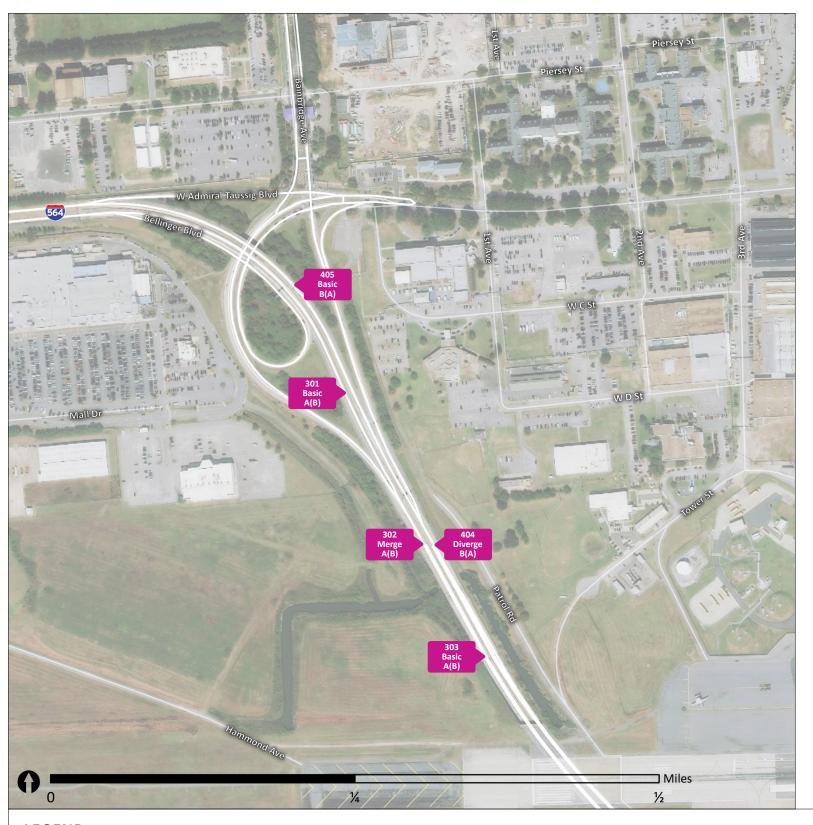
Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 6



REGIONAL CONNECTORS STUDY





228 Basic A(A)

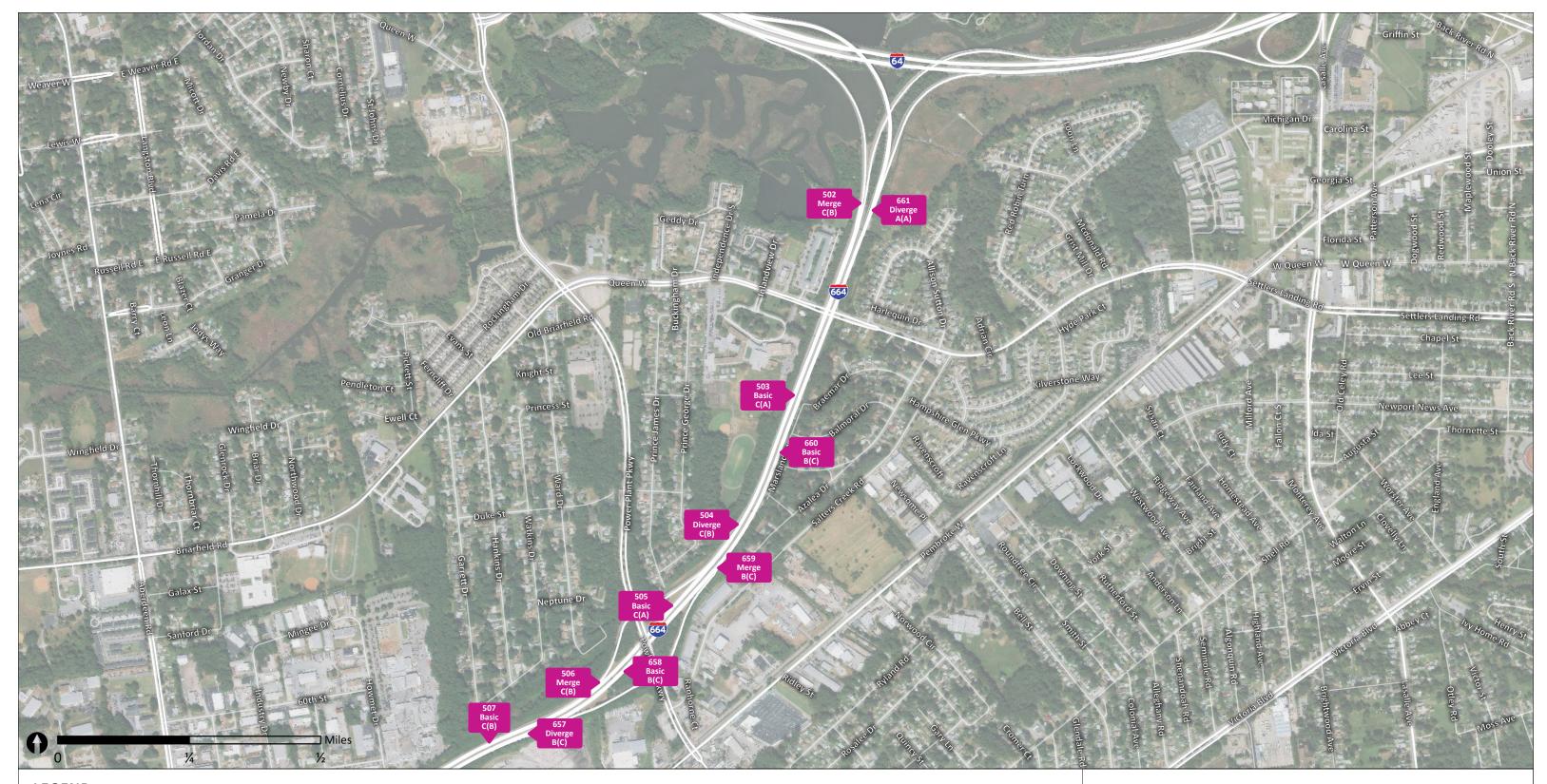
Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 7



REGIONAL CONNECTORS STUDY





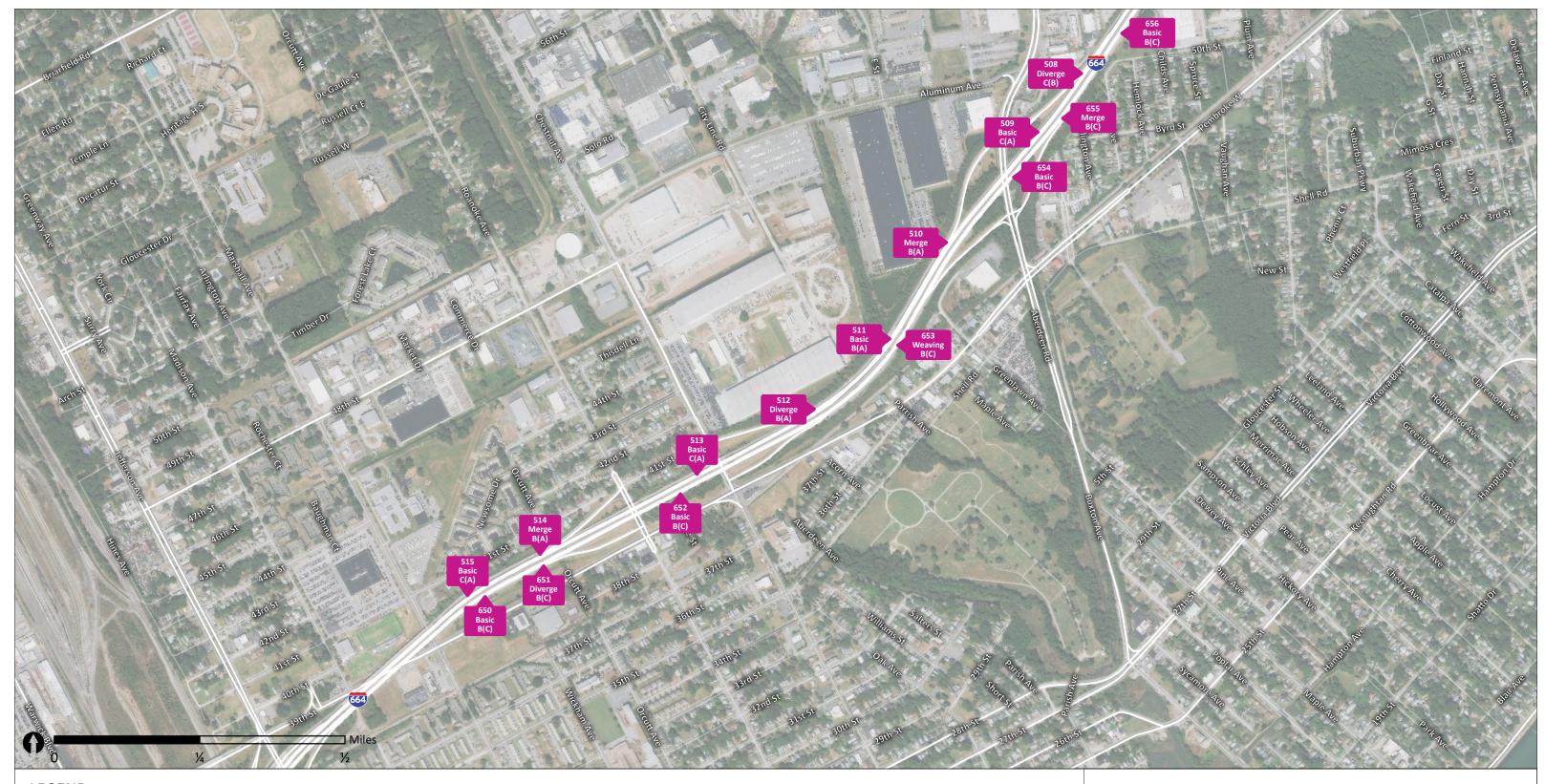
Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 8









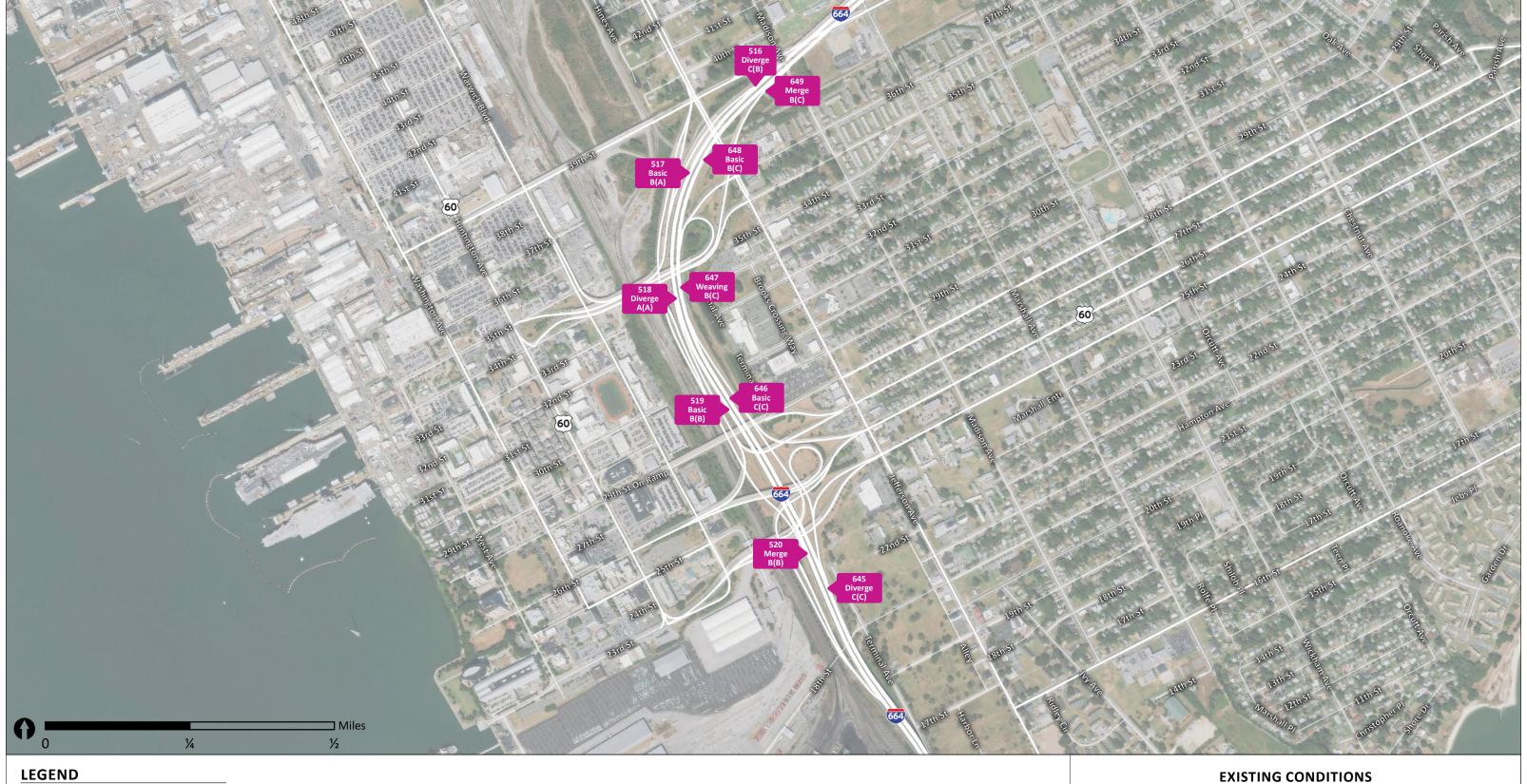
Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 9







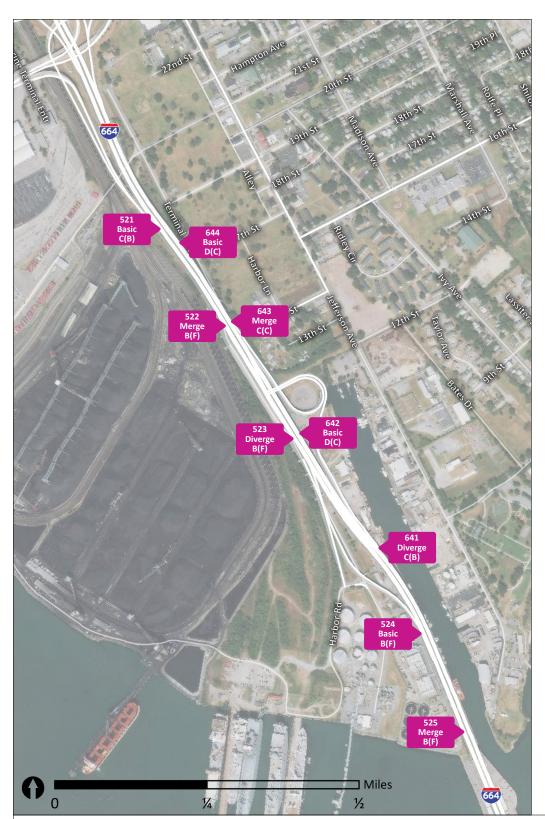
228 Basic A(A) Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

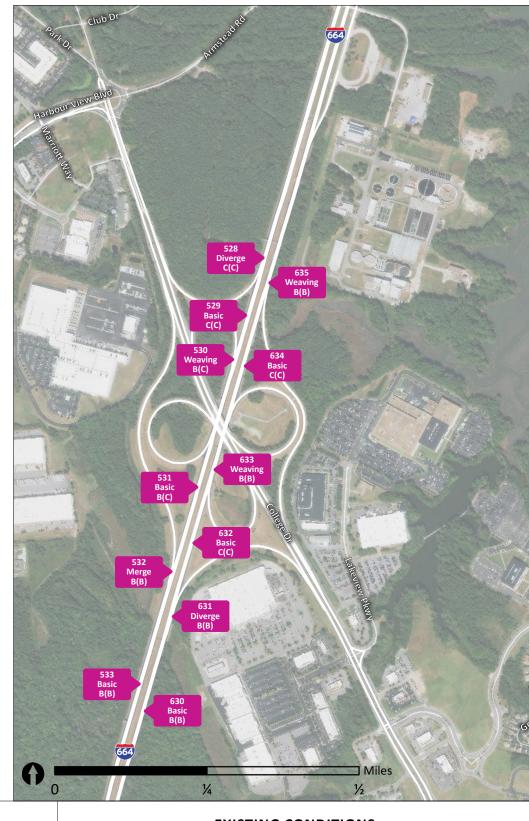
FIGURE 10











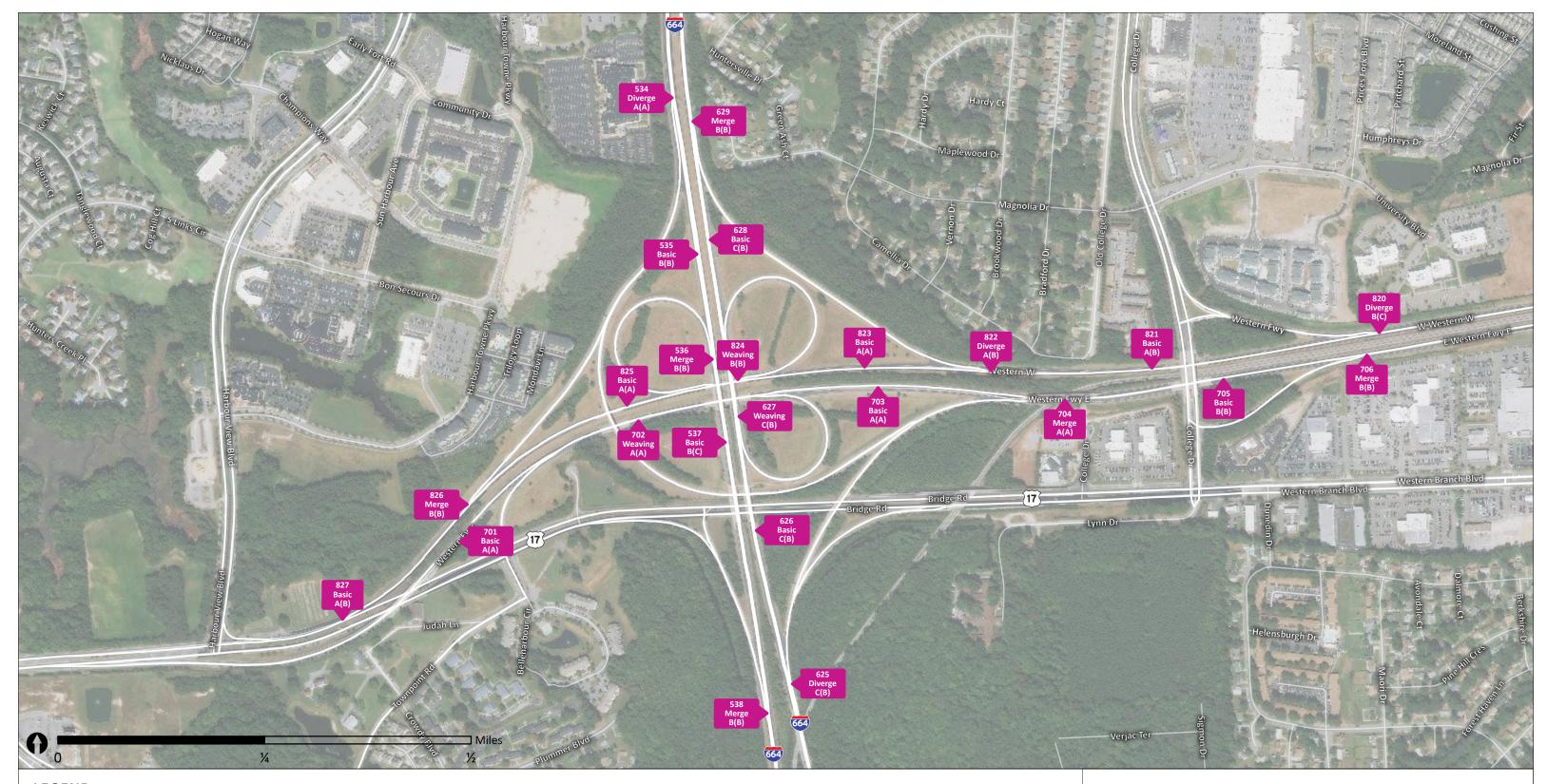
228 Basic A(A) Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 11









Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

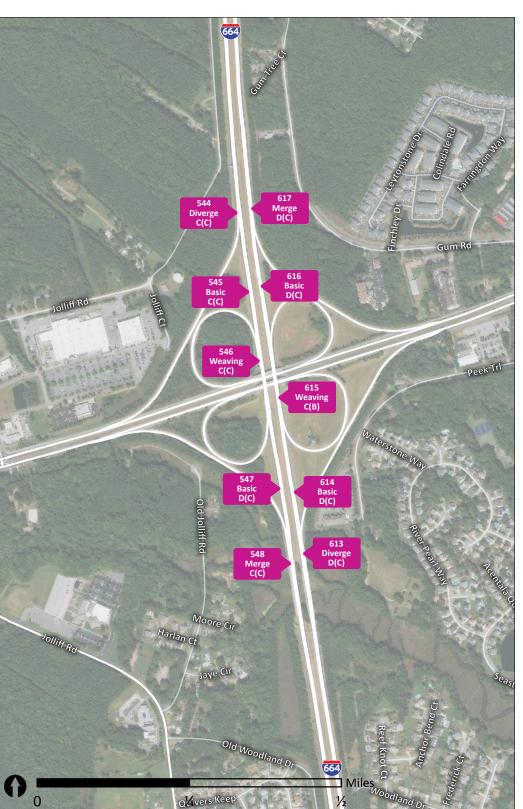
FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 12











228 Basic A(A)

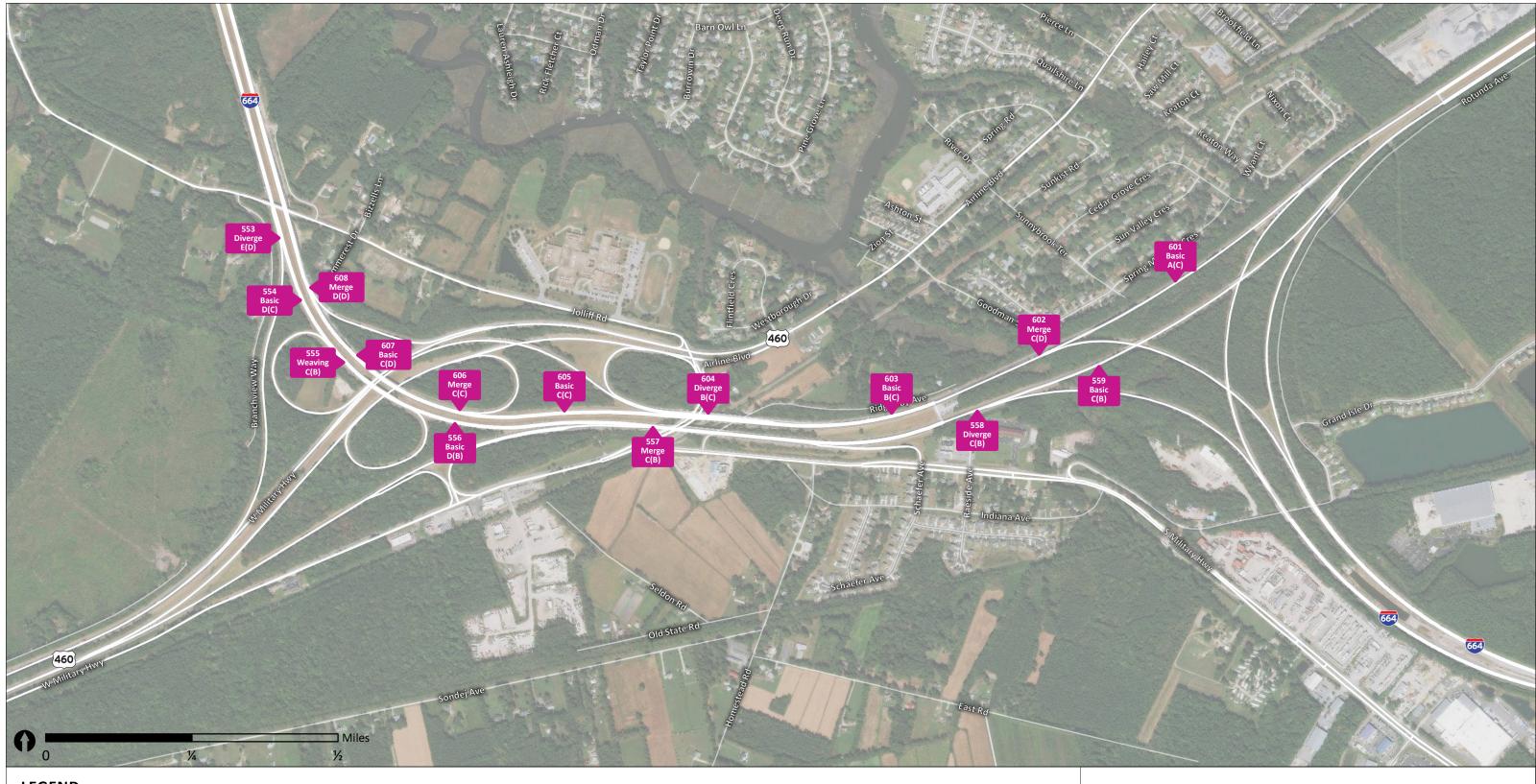
Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 13







228 Basic A(A) Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 14



REGIONAL CONNECTORS STUDY





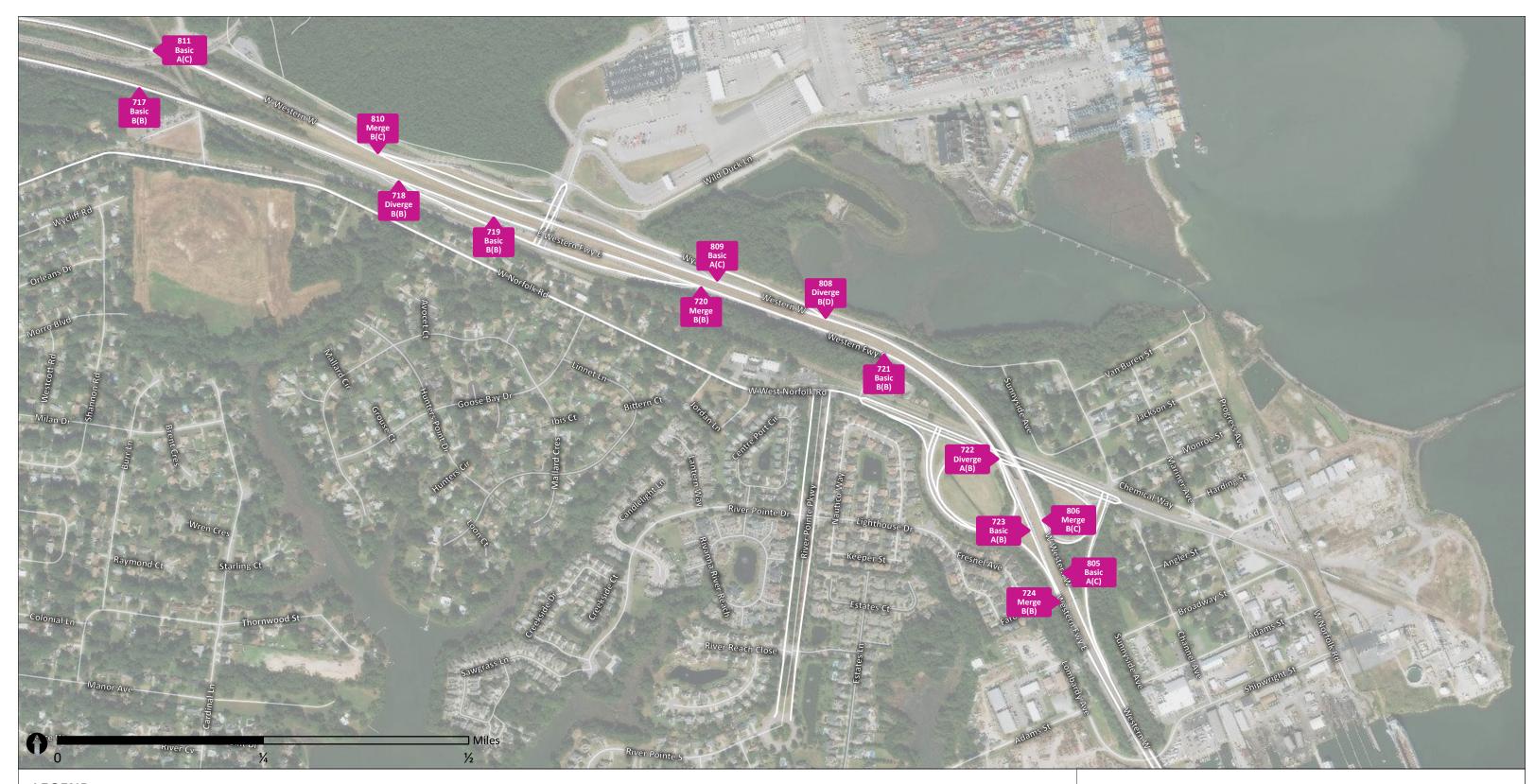
Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 15



REGIONAL CONNECTORS STUDY





Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 16









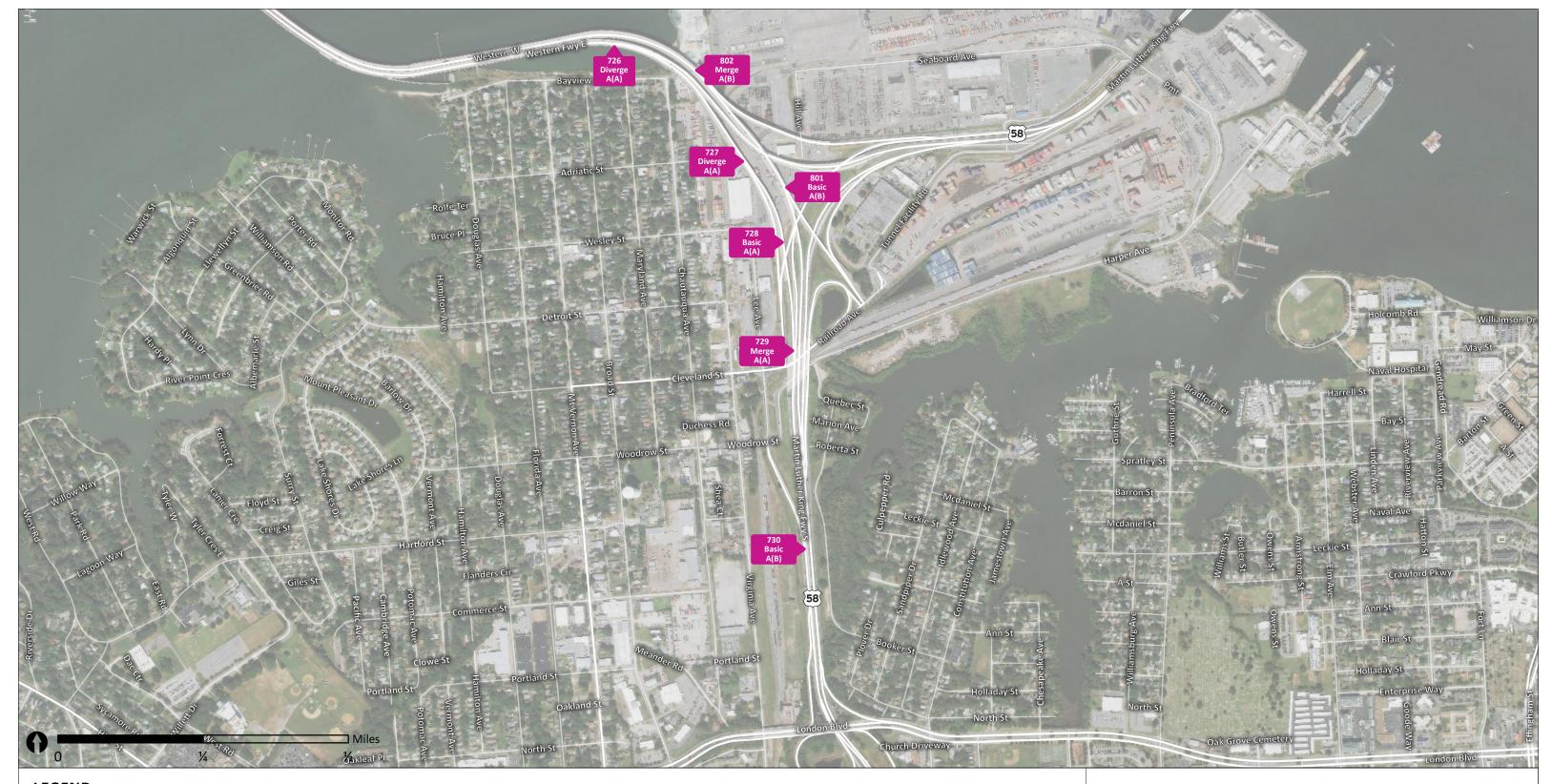
Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 17



REGIONAL CONNECTORS STUDY



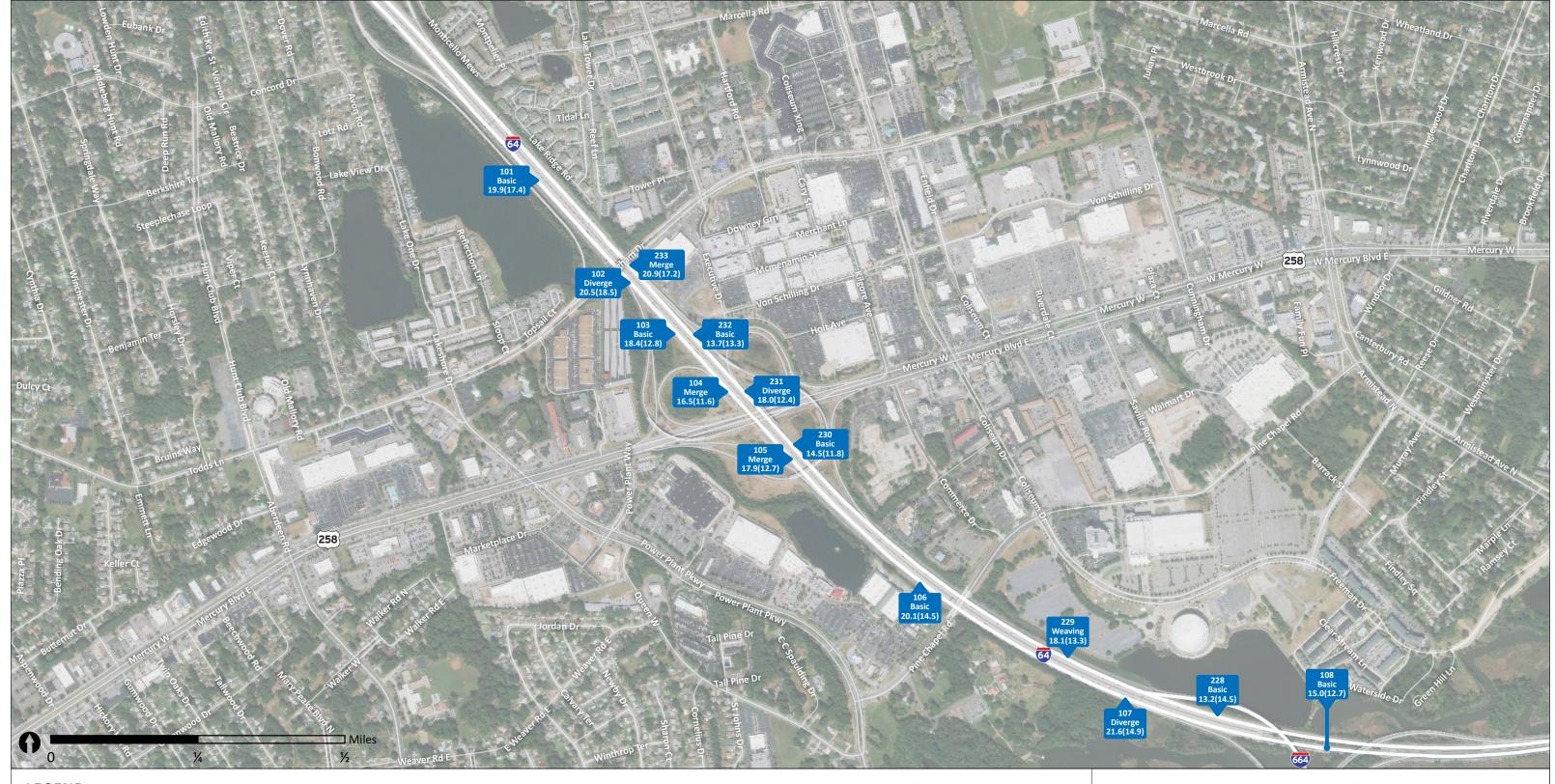
228 Basic A(A) Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) LOS

FREEWAY CAPACITY ANALYSIS RESULTS LEVEL OF SERVICE

FIGURE 18







228 Basic 13.2(14.5) Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 19









Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 20



REGIONAL CONNECTORS STUDY





Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

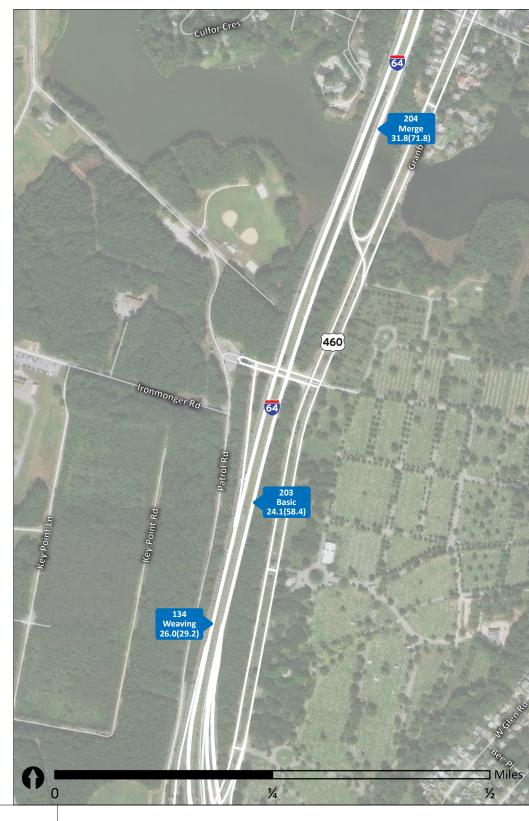
FIGURE 21



REGIONAL CONNECTORS STUDY









Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 22







228 Basic 13.2(14.5) Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

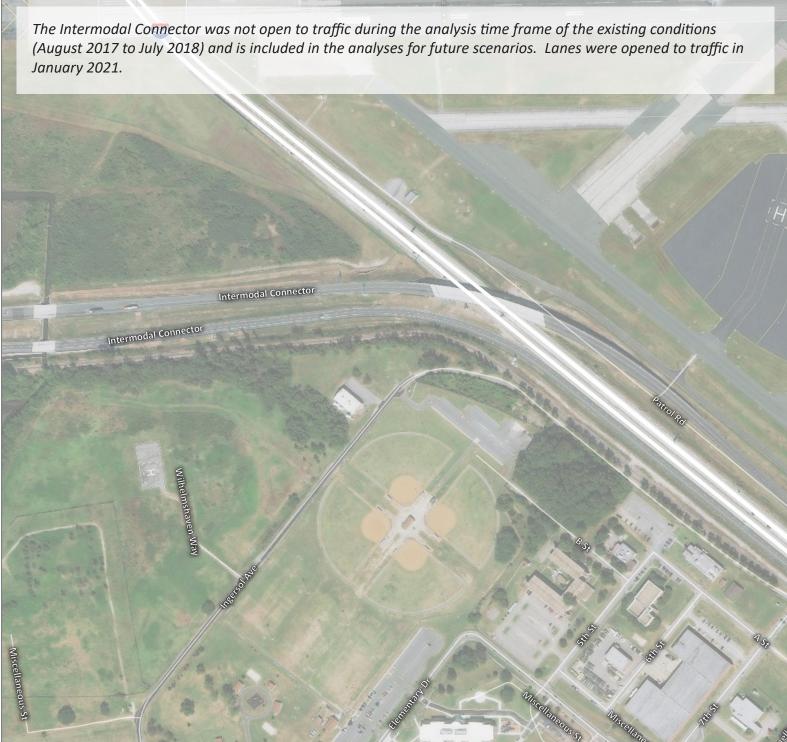
FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 23



REGIONAL CONNECTORS STUDY







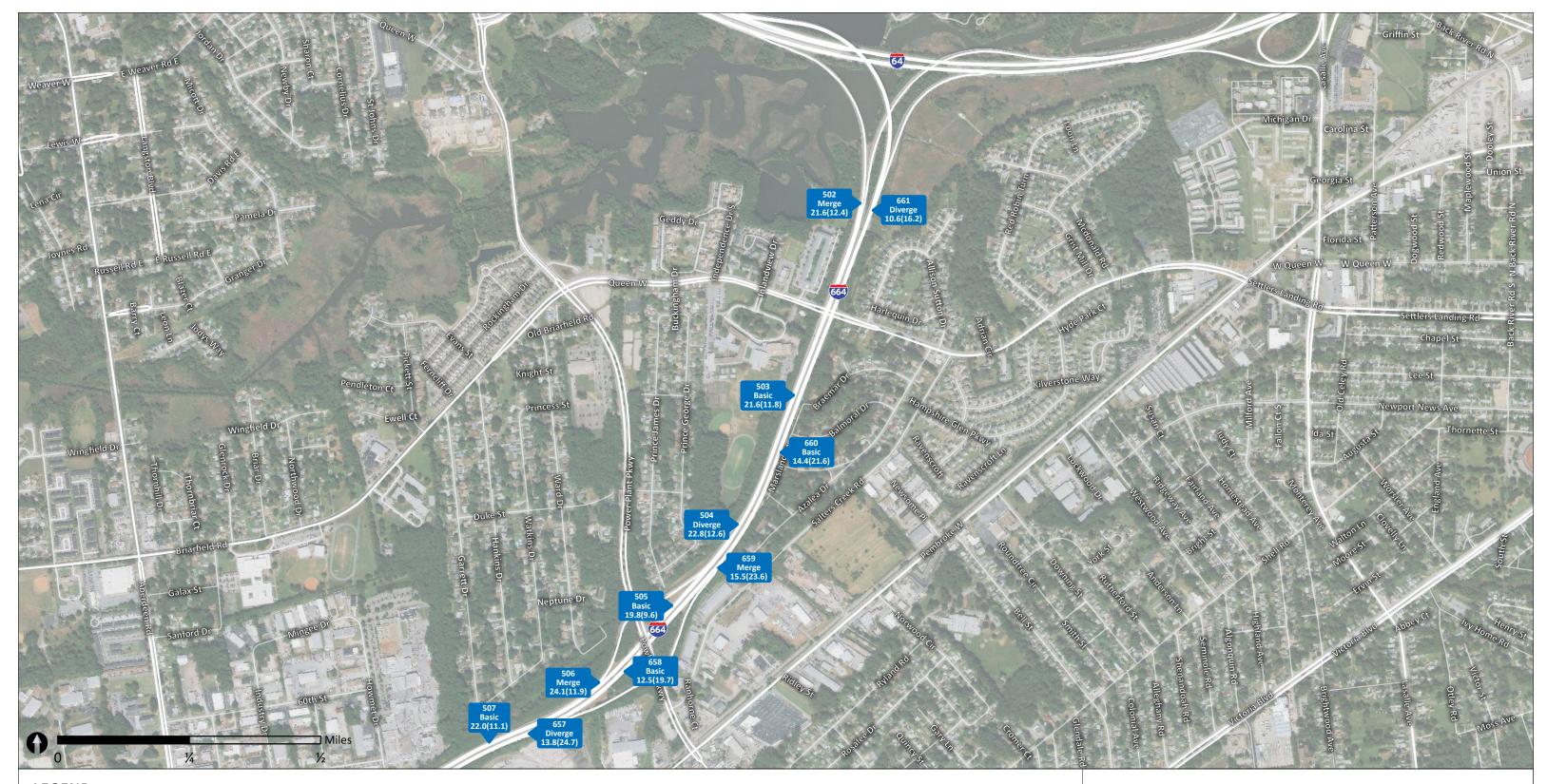
Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 24









Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 25









Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 26







228 Basic 13.2(14.5)

Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 27













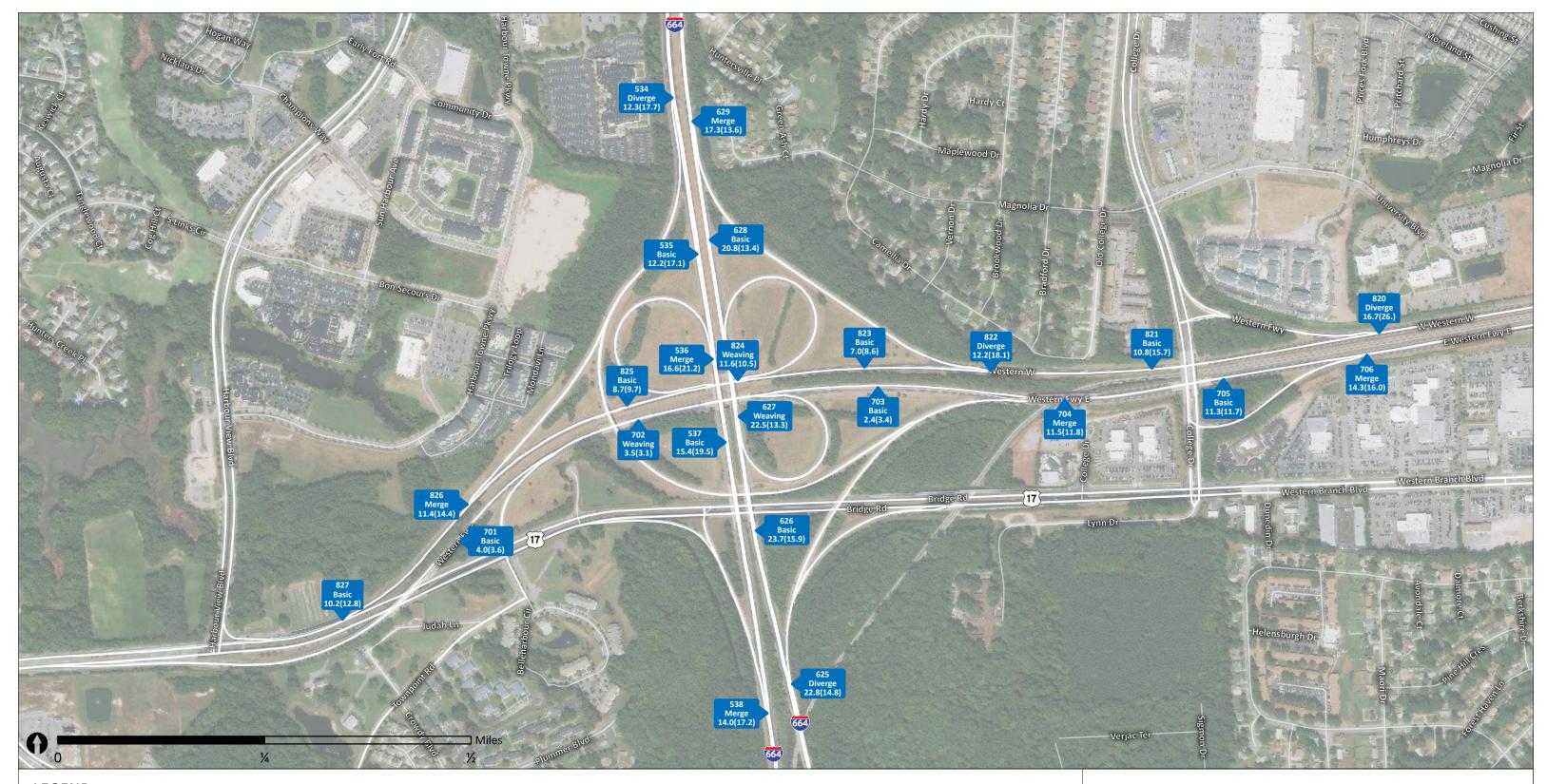
Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 28









Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 29











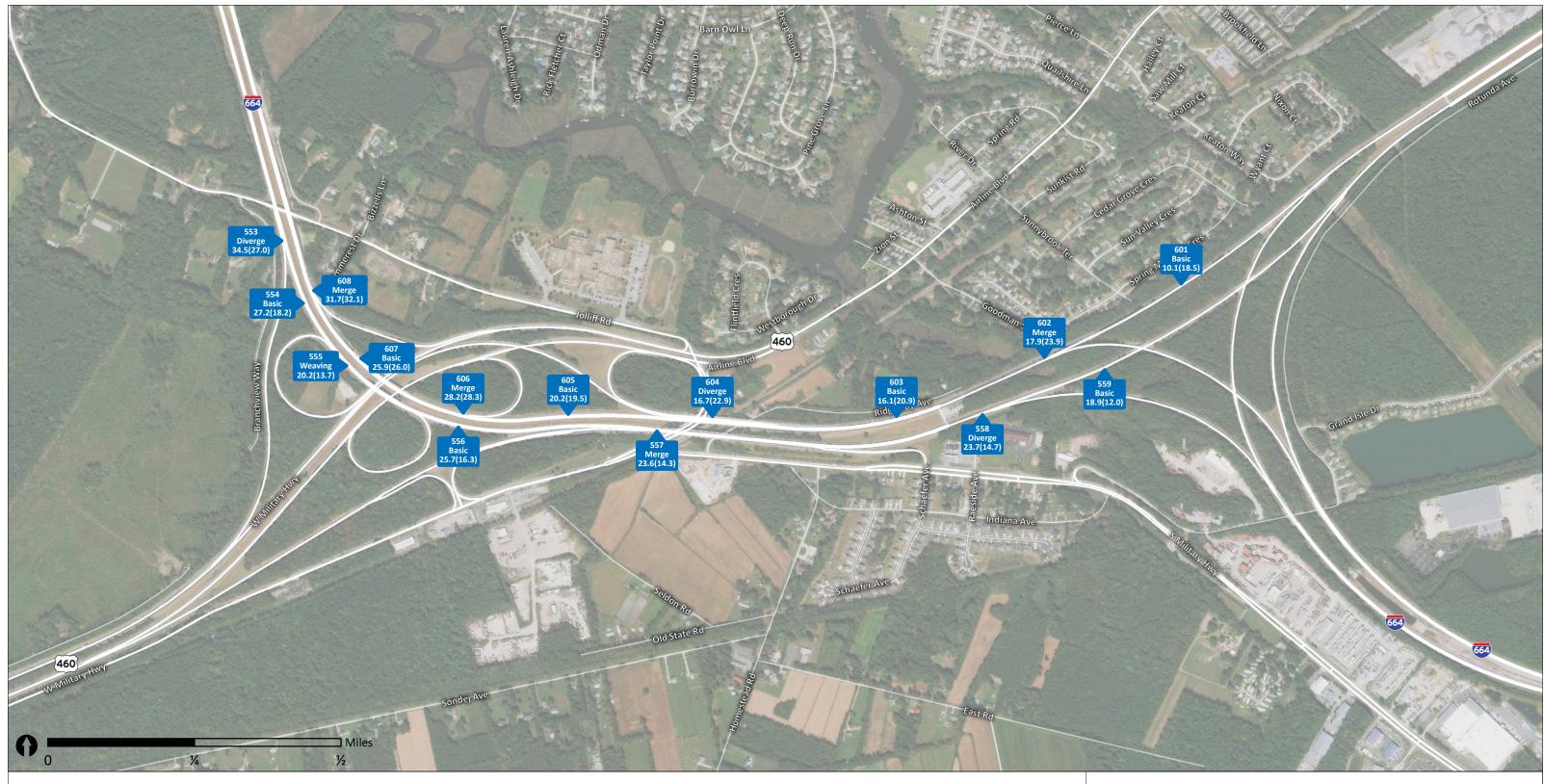
228 Basic 13.2(14.5) Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 30







228 Basic 13.2(14.5)

Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 31









Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 32







228 Basic 13.2(14.5) Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 33









Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 34



REGIONAL CONNECTORS STUDY





Analysis ID Number HCS 7 Freeway Analysis Type AM (PM) Density (pc/mi/ln)

FREEWAY CAPACITY ANALYSIS RESULTS DENSITY

FIGURE 35









Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time	Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time
101		Basic	500	С	19.9	62.0	0.09	201		Basic	20000	С	22.2	62.0	3.67
102		Diverge	1500	В	20.5	60.4	0.28	202	1564	Merge	1500	С	26.4	56.7	0.30
103		Basic	1015	С	18.4	61.8	0.19	203		Basic	1870	С	24.1	61.7	0.34
104	Mercury Blvd	Merge	1500	В	16.5	58.8	0.29	204	Granby St	Merge	1500	С	31.8	54.6	0.31
105		Merge	1500	В	17.9	57.8	0.29	205		Basic	1465	D	28.4	61.0	0.27
106		Basic	500	С	20.1	61.2	0.09	206	Naval Station	Diverge	1500	С	30.2	57.5	0.30
107		Diverge	1500	С	21.6	57.6	0.30	207		Basic	2590	С	23.0	61.8	0.48
108		Basic	1335	В	15.0	57.1	0.27	208		Diverge	1500	С	25.8	55.5	0.31
109	1664	Basic	300	С	18.3	60.7	0.06	209	4th View St	Basic	2210	С	21.0	61.7	0.41
110	1004	Weaving	3100	С	21.3	48.0	0.73	210		Merge	1500	С	26.2	56.0	0.30
111		Basic	700	С	17.1	61.4	0.13	211		Basic	4785	С	23.6	62.0	0.88
112		Merge	1035	В	19.2	57.2	0.21	212	Ocean View	Diverge	1500	С	28.1	52.0	0.33
113	LaSalle Ave	Merge	500	В	19.6	57.2	0.10	213	Ave	Basic	8575	С	23.7	60.2	1.62
114	Lasalle Ave	Overlap	1000	С	20.2	55.5	0.20	214	HRBT	Merge	9000	D	32.9	43.3	2.36
115		Diverge	500	С	20.2	55.5	0.10	215		Basic	500	С	23.0	62.0	0.09
116		Basic	6420	В	13.7	62.0	1.18	215		Basic	500	С	23.0	62.0	0.09
117	Rip Rap Rd	Diverge	1500	В	133.2	6.4	2.68	216	Mallon (Ct	Diverge	1500	С	24.5	58.2	0.29
118		Basic	1360	С	121.4	8.6	1.81	217	Mallory St	Basic	900	В	14.0	61.5	0.17
119	Settlers	Weaving	2060	В	112.8	7.4	3.15	218		Weaving	1275	В	17.6	49.1	0.30
120	Landing	Basic	835	С	118.0	9.3	1.03	219	Settlers Land- ing Rd	Basic	1750	В	16.5	60.9	0.33
121	Mallory St	Merge	1500	С	94.3	15.4	1.11	220	ilig Nu	Merge	1500	В	26.4	56.3	0.30
122	HRBT	Basic	12700	Е	35.4	41.1	3.51	221		Basic	5770	В	23.9	62.0	1.06
123		Basic	4270	D	31.2	52.0	0.93	222	Rte 134	Diverge	1500	В	24.5	60.5	0.28
124		Diverge	1500	D	31.2	52.0	0.33	223	Kte 134	Basic	1500	В	21.9	61.9	0.28
125	Ocean View Ave	Basic	170	D	26.7	57.7	0.03	224	LaCalla Aus	Diverge	1500	В	22.3	60.8	0.28
126	Ave	Merge	1500	С	29.0	55.4	0.31	225	LaSalle Ave	Basic	420	В	20.8	61.7	0.08
127		Basic	5770	D	26.0	61.8	1.06	226		Weaving	2400	В	23.6	41.0	0.67
128		Diverge	1500	С	29.2	55.1	0.31	227	1664	Basic	1700	Α	17.7	61.2	0.32
129	4th View St	Basic	2275	С	21.8	61.7	0.42	228		Basic	800	А	13.2	61.9	0.15
130		Merge	1500	С	25.8	55.9	0.30	229		Weaving	3895	А	18.1	46.4	0.95
131		Basic	3470	С	23.2	61.9	0.64	230		Basic	900	А	14.5	61.7	0.17
132	Naval Station	Merge	1500	С	28.0	55.1	0.31	231		Diverge	1500	А	18.0	62.0	0.27
133		Basic	3770	D	25.0	61.9	0.69	232	Mercury Blvd	Basic	1235	А	13.7	62.0	0.23
134	I564/Granby	Weaving	2225	С	26.0	44.1	0.57	233		Merge	1500	В	20.9	58.2	0.29
135	St	Basic	500	В	13.4	60.0	0.09	234	20	Basic	1000	В	19.5	61.9	0.18

FREEWAY CAPACITY ANALYSIS RESULTS I-64 AM

FIGURE 36









Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time	Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time
101		Basic	500	В	17.4	62.0	0.09	201		Basic	20000	В	15.3	62.0	3.67
102		Diverge	1500	В	18.5	58.3	0.29	202	1564	Merge	1500	В	35.2	46.6	0.37
103		Basic	1015	В	12.8	61.5	0.19	203		Basic	1870	F	58.4	36.7	0.58
104	Mercury Blvd	Merge	1500	В	11.6	59.7	0.29	204	Granby St	Merge	1500	F	71.8	26.4	0.65
105		Merge	1500	В	12.7	58.7	0.29	205		Basic	1465	F	86.4	17.0	0.98
106		Basic	500	В	14.5	61.3	0.09	206	Naval Station	Diverge	1500	F	90.2	15.6	1.09
107		Diverge	1500	В	14.9	60.4	0.28	207		Basic	2590	F	100.3	13.4	2.20
108		Basic	1335	В	12.7	57.1	0.27	208		Diverge	1500	F	100.6	13.4	1.27
109	1664	Basic	300	В	15.3	60.7	0.06	209	4th View St	Basic	2210	F	111.6	10.8	2.33
110	1004	Weaving	3100	С	21.5	46.7	0.75	210		Merge	1500	F	91.9	16.4	1.04
111		Basic	700	В	17.2	61.3	0.13	211		Basic	4785	F	93.0	16.2	3.36
112		Merge	1035	В	19.6	57.1	0.21	212	Ocean View	Diverge	1500	F	92.3	16.3	1.05
113	LaSalle Ave	Merge	500	В	20.1	57.1	0.10	213	Ave	Basic	8575	F	95.6	15.3	6.37
114	15	Overlap	1000	С	20.8	55.4	0.21	214	HRBT	Basic	9000	Е	35.6	41.1	2.49
115		Diverge	500	С	20.8	55.4	0.10	215		Basic	500	С	23.6	62.0	0.09
116		Basic	6420	В	54.0	24.4	2.99	215		Basic	500	D	30.5	52.0	0.11
117	Rip Rap Rd	Diverge	1500	В	139.4	5.3	3.20	216	Mallon (C+	Diverge	1500	С	29.7	53.3	0.32
118		Basic	1360	В	130.2	6.9	2.24	217	Mallory St	Basic	900	В	16.6	60.8	0.17
119	Settlers	Weaving	2060	В	131.8	5.6	4.18	218		Weaving	1275	В	17.6	50.3	0.29
120	Landing	Basic	835	С	121.2	8.6	1.10	219	Settlers Land- ing Rd	Basic	1750	В	16.4	61.0	0.33
121	Mallory St	Merge	1500	С	94.4	15.4	1.11	220	ii ig nu	Merge	1500	В	23.3	56.8	0.30
122	HRBT	Basic	12700	D	35.4	41.1	3.51	221	7	Basic	5770	С	21.3	62.0	1.06
123		Basic	4270	D	33.2	52.0	0.93	222	Dt- 124	Diverge	1500	С	22.6	58.5	0.29
124		Diverge	1500	D	33.2	52.0	0.33	223	Rte 134	Basic	1500	В	18.9	61.7	0.28
125	Ocean View Ave	Basic	170	D	28.2	57.7	0.03	224	LaCalla Aa	Diverge	1500	В	20.6	57.0	0.30
126	Ave	Merge	1500	С	30.8	55.0	0.31	225	LaSalle Ave	Basic	420	В	17.9	60.9	0.08
127		Basic	5770	D	27.6	61.3	1.07	226		Weaving	2400	В	17.9	46.5	0.59
128		Diverge	1500	D	30.7	55.3	0.31	227	1664	Basic	1700	В	17.9	61.4	0.31
129	4th View St	Basic	2275	С	24.3	61.7	0.42	228		Basic	800	Α	14.5	57.5	0.16
130		Merge	1500	С	28.0	55.5	0.31	229		Weaving	3895	Α	13.3	51.2	0.86
131		Basic	3470	С	25.2	61.9	0.64	230		Basic	900	А	11.8	61.8	0.17
132	Naval Station	Merge	1500	D	33.8	53.8	0.32	231		Diverge	1500	Α	12.4	59.0	0.29
133		Basic	3770	D	30.2	60.2	0.71	232	Mercury Blvd	Basic	1235	А	13.3	61.7	0.23
134	I564/Granby	Weaving	2225	D	29.2	46.4	0.54	233		Merge	1500	В	17.2	58.4	0.29
135	St	Basic	500	С	24.0	60.3	0.09	234	20	Basic	1000	В	16.2	61.5	0.18

FREEWAY CAPACITY ANALYSIS RESULTS I-64 PM

FIGURE 37













Density

12.0

12.2

16.6

15.4

14.0

14.0

25.9

23.7

26.1

22.6

21.3

27.2

38.2

34.5

27.2

20.2

23.6

22.2

20.5

67.0

65.1

66.8

62.3

66.2

66.9

67.0

67.0

60.4

66.0

60.0

65.7

55.6

57.8

55.1

58.0

61.2

59.0

65.1

60.6

66.1

56.8

65.7

Travel

Time

0.26

0.26

0.20

0.27

0.12

0.25

0.14

0.41

0.28

0.90

0.28

0.10

0.35

0.08

0.29

0.29

0.44

0.31

0.14

0.28

0.08

0.40

0.13

0.28

0.17

0.30

0.17

Length (ft)

1550

1500

1190

1500

1500

1500

1500

1710

2510

1500

710

1500

2060

1500

1500

1000

В

C

C

C

D

Ε

В

Туре

Basic

Diverge

Basic

Merge

Basic

Merge

Basic

Diverge

Basic

Merge

Basic

Diverge

Basic

Weaving

Basic

Merge

Diverge

Basic

Merge

Basic

Diverge

Basic

Weaving

Merge

Diverge

Basic

Diverge

Basic

Seg ID Cross Street

US 17 / SR 164

13

Pughsville Rd

17

Portsmouth

Dock Landing

26

US 58/US 460

164

533

534

535

536

537

538

539

540

541

542

543

544

545

546

547

548

549

550

551

552

553

554

555

556

557

558

559

560

561

Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time
601		Basic	2640	Α	10.1	67.0	0.45
602	164	Merge	1500	С	17.9	60.5	0.28
603		Basic	685	В	16.1	65.9	0.12
604		Diverge	1500	В	16.7	64.7	0.26
605		Basic	1715	С	20.2	66.8	0.29
606	US 58/US 460	Merge	1500	С	28.2	59.3	0.29
607	03 38/03 460	Basic	395	С	25.9	64.6	0.07
608		Merge	1500	D	31.7	56.9	0.30
609		Basic	1260	D	28.7	62.8	0.23
610	Dealet andbeac	Diverge	1500	С	30.9	58.2	0.29
611	Dock Landing Rd	Basic	2520	D	27.2	63.8	0.45
612	na na	Merge	1500	D	35.4	55.3	0.31
613		Diverge	1450	D	33.0	59.3	0.28
614	Doubour state	Basic	495	D	28.0	63.3	0.09
615	Portsmouth Blvd	Weaving	1650	С	24.0	54.8	0.34
616	Diva	Basic	575	D	29.8	62.0	0.11
617		Merge	1500	D	36.2	55.5	0.31
618		Basic	5345	D	34.0	58.9	1.03
619		Diverge	1500	D	35.4	56.7	0.30
620	Pughsvilel Rd	Basic	945	D	27.7	63.4	0.17
621	rugi isvilei nu	Merge	1500	D	32.8	55.9	0.31
622		Basic	165	D	29.5	62.2	0.03
623		Merge	1500	С	23.0	61.9	0.28
624		Basic	480	С	21.4	66.0	0.08
625		Diverge	1500	С	22.8	62.4	0.27
626		Basic	1015	С	23.7	65.7	0.18
627	US 17/SR 164	Weaving	1710	С	22.5	52.0	0.37
628		Basic	645	С	20.8	64.8	0.11
629		Merge	1500	В	17.3	62.9	0.27
630		Basic	3900	В	16.3	66.9	0.66

el e	Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time	Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time	
5	631		Diverge	1500	В	17.5	62.2	0.27	501		Basic	1000	С	21.5	66.7	0.17	
3	632		Basic	540	С	21.1	66.1	0.09	502	1664	Merge	1500	С	21.6	66.7	0.26	
2	633	College Dr	Weaving	1695	В	16.6	59.4	0.32	503		Basic	1090	С	21.6	66.7	0.19	
5	634		Basic	50	С	20.7	65.1	0.01	504	Davidantaia	Diverge	1500	С	22.8	63.0	0.27	
	635		Weaving	2365	В	19.7	56.7	0.47	505	Powhatan Pkwy	Basic	1660	С	19.8	66.7	0.28	
	636		Basic	1125	С	26.0	64.5	0.20	506	1 KVV y	Merge	1500	С	24.1	60.8	0.28	
	637		Merge	1500	С	28.4	59.1	0.29	507		Basic	3600	С	22.0	66.5	0.62	
	638		Basic	18800	С	43.7	44.9	4.76	508		Diverge	1500	С	23.3	62.8	0.27	
3	639	MMBT	Basic	7600	D	35.1	43.7	1.98	509	Aberdeen Rd	Basic	1995	С	19.6	66.8	0.34	
	640		Basic	500	F	35.0	47.9	0.12	510		Merge	750	В	16.7	67.0	0.13	
5	641		Diverge	1500	С	29.9	55.1	0.31	511		Basic	1000	В	16.7	67.0	0.17	
L	642	Terminal Ae	Basic	1700	D	24.5	65.2	0.30	512		Diverge	750	В	16.7	67.0	0.13	
3	643		Merge	1130	С	27.7	58.7	0.22	513	Roanoke Ave	Basic	2590	С	18.4	67.0	0.44	
9	644		Basic	740	D	30.0	54.3	0.15	514		Merge	1290	В	14.4	67.0	0.22	
1	645		Diverge	1130	С	30.0	54.3	0.24	515		Basic	1550	С	19.1	67.0	0.26	
L	646	US 60	Basic	1900	С	21.2	65.9	0.33	516		Diverge	1290	С	2.0	60.1	0.24	
L	647		Weaving	1975	В	18.5	53.5	0.42	517	35th St	Basic	1055	В	14.0	66.0	0.18	
3	648	1-66	Basic	1080	В	15.5	65.8	0.19	518		Diverge	1500	Α	14.8	63.5	0.27	ĺ
	649	Jefferson Ave	Merge	1070	В	11.4	65.9	0.18	519		Basic	1960	В	16.3	66.8	0.33	ĺ
7	650		Basic	1660	В	11.3	66.9	0.28	520		Merge	1500	В	13.7	67.0	0.25	ĺ
	651		Diverge	1070	В	12.1	62.8	0.19	521	US 60	Basic	1000	С	20.6	66.9	0.17	Ī
3	652	Roanoke Ave	Basic	1950	В	11.8	60.8	0.36	522		Merge	1500	В	14.7	67.0	0.25	Ī
3	653		Weaving	2815	В	10.2	60.0	0.53	523		Diverge	1200	В	15.0	66.1	0.21	ĺ
3	654		Basic	1250	В	11.1	66.7	0.21	524	Terminal Blvd	Basic	1500	В	14.1	66.9	0.25	
7	655	Aberdeen Rd	Merge	1500	В	13.9	63.0	0.27	525		Merge	1500	В	15.4	62.7	0.27	ĺ
3	656		Basic	2010	В	13.0	66.8	0.34	526	MMBT	Basic	7600	D	33.7	43.0	2.01	
$\overline{}$	657		Diverge	1500	В	13.8	63.4	0.27	527		Basic	16610	С	23.2	62.0	3.04	
	658	Powhatan	Basic	1900	В	12.5	66.8	0.32	528		Diverge	1500	С	24.8	58.2	0.29	ĺ
7	659	Pkwy	Merge	1500	В	15.5	62.2	0.27	529		Basic	740	С	20.5	65.6	0.13	ĺ
5	660		Basic	1500	В	14.4	66.6	0.26	530	College Dr	Weaving	1805	В	17.2	56.0	0.37	
	661	164	Diverge	1500	Α	10.6	67.0	0.25	531		Basic	990	В	17.2	65.9	0.17	
	662		Basic	2640	С	17.3	67.0	0.45	532		Merge	1500	В	12.0	66.8	0.26	

FREEWAY CAPACITY ANALYSIS RESULTS I-664 AM

FIGURE 38













(ft)

1550

1500

1190

1500

1500

1500

1500

1710

1500

710

1500

2060

1500

1500

1000

В

C

C

C

C

D

Α

В

Туре

Basic

Diverge

Basic

Merge

Basic

Merge

Basic

Diverge

Basic

Merge

Basic

Diverge

Basic

Weaving

Merge

Diverge

Basic

Merge

Basic

Diverge

Basic

Weaving

Merge

Diverge

Basic

Diverge

Basic

eg ID Cross Street

US 17 / SR 164

13

Pughsville Rd

17

Portsmouth

Dock Landing

26

US 58/US 460

164

Travel

Time

0.26

0.27

0.20

0.28

0.12

0.26

0.14

0.41

0.29

0.91

0.29

0.10

0.36

0.09

0.29

0.29

0.43

0.29

0.12

0.28

0.08

0.39

0.13

0.27

0.17

0.28

0.17

Speed

67.0

64.2

66.7

61.7

66.1

66.8

67.0

59.8

65.2

59.7

65.6

53.9

64.8

58.0

59.6

65.3

60.8

60.2

63.3

61.5

61.6

66.3

Density

17.0

17.1

21.2

19.5

17.2

27.7

25.5

27.8

22.0

23.2

27.5

25.2

27.0

18.2

13.7

14.3

13.0

16.9

Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time
601		Basic	2640	С	18.5	67.0	0.45
602	164	Merge	1500	D	23.9	58.3	0.29
603		Basic	685	С	20.9	65.5	0.12
604		Diverge	1500	С	22.9	60.8	0.28
605		Basic	1715	С	19.5	66.5	0.29
606	US 58/US 460	Merge	1500	С	28.3	59.2	0.29
607	03 38/03 460	Basic	395	D	26.0	64.5	0.07
608		Merge	1500	D	32.1	56.7	0.30
609		Basic	1260	D	29.1	62.5	0.23
610	Deal Landina	Diverge	1500	С	31.4	57.8	0.29
611	Dock Landing Rd	Basic	2520	D	25.8	64.6	0.44
612	Nu	Merge	1500	D	31.3	57.0	0.30
613		Diverge	1450	С	30.5	58.6	0.28
614	Doubou outle	Basic	495	С	21.7	65.3	0.09
615	Portsmouth Blvd	Weaving	1650	В	17.9	57.5	0.33
616	Diva	Basic	575	С	22.1	65.4	0.10
617		Merge	1500	С	27.6	59.1	0.29
618		Basic	5345	D	25.2	64.9	0.94
619		Diverge	1500	С	29.1	56.1	0.30
620	Pughsvilel Rd	Basic	945	С	18.7	65.5	0.16
621	Pugi isvilei ku	Merge	1500	С	22.2	59.0	0.29
622		Basic	165	С	19.5	64.9	0.03
623		Merge	1500	В	14.8	66.5	0.26
624		Basic	480	В	14.8	66.9	0.08
625		Diverge	1500	В	14.8	67.0	0.25
626		Basic	1015	В	15.9	67.0	0.17
627	US 17/SR 164	Weaving	1710	В	13.3	57.2	0.34
628		Basic	645	В	13.4	65.5	0.11
629		Merge	1500	В	13.6	66.7	0.26
630		Basic	3900	В	13.6	67.0	0.66

vel ne	Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time	Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time	Seg ID
45	631		Diverge	1500	В	13.6	67.0	0.25	501		Basic	1000	В	12.2	67.0	0.17	533
29	632		Basic	540	С	17.9	67.0	0.09	502	1664	Merge	1500	В	12.4	63.5	0.27	534
12	633	College Dr	Weaving	1695	В	13.4	61.3	0.31	503		Basic	1090	Α	11.8	66.6	0.19	535
28	634		Basic	50	С	17.5	65.6	0.01	504	Doughatan	Diverge	1500	В	12.6	62.2	0.27	536
29	635		Weaving	2365	В	15.3	59.3	0.45	505	Powhatan Pkwy	Basic	1660	Α	9.6	66.6	0.28	537
29	636		Basic	1125	С	20.2	66.5	0.19	506	,	Merge	1500	В	11.9	62.6	0.27	538
07	637		Merge	1500	В	22.4	60.7	0.28	507		Basic	3600	В	11.1	66.9	0.61	539
30	638		Basic	16610	С	21.1	63.8	2.96	508		Diverge	1500	В	11.9	62.7	0.27	540
23	639	MMBT	Basic	7600	D	29.2	46.4	1.86	509	Aberdeen Rd	Basic	1995	Α	9.7	66.7	0.34	541
29	640		Basic	500	D	26.0	52.0	0.11	510		Merge	750	Α	8.8	63.5	0.13	542
14	641		Diverge	1500	В	24.5	55.1	0.31	511		Basic	1000	Α	8.8	63.5	0.18	543
30	642	Terminal Ae	Basic	1700	С	19.5	66.1	0.29	512		Diverge	750	Α	8.6	64.6	0.13	544
28	643		Merge	1130	С	22.8	60.1	0.21	513	Roanoke Ave	Basic	2590	Α	9.2	66.8	0.44	545
)9	644		Basic	740	С	25.0	55.0	0.15	514		Merge	1290	Α	7.7	63.9	0.23	546
33	645		Diverge	1130	С	25.0	55.0	0.23	515		Basic	1550	Α	9.8	66.7	0.26	547
10	646	US 60	Basic	1900	С	19.6	66.0	0.33	516		Diverge	1290	В	10.7	61.6	0.24	548
29	647		Weaving	1975	С	21.5	52.0	0.43	517	35th St	Basic	1055	Α	8.9	66.2	0.18	549
94	648	Jefferson Ave	Basic	1080	С	19.7	65.7	0.19	518		Diverge	1500	Α	9.4	63.1	0.27	550
30	649	Jelielsoli Ave	Merge	1070	С	20.3	66.8	0.18	519		Basic	1960	В	9.4	66.8	0.33	551
16	650		Basic	1660	С	20.3	66.9	0.28	520		Merge	1500	В	8.8	62.3	0.27	552
29	651		Diverge	1070	С	21.6	63.0	0.19	521	US 60	Basic	1000	В	29.1	52.8	0.22	553
03	652	Roanoke Ave	Basic	1950	С	21.5	60.8	0.36	522		Merge	1500	В	120.8	7.4	2.30	554
26	653		Weaving	2815	С	21.9	53.3	0.60	523		Diverge	1200	В	132.5	6.5	2.09	555
08	654		Basic	1250	С	20.6	66.5	0.21	524	Terminal Blvd	Basic	1500	В	134.6	6.2	2.74	556
25	655	Aberdeen Rd	Merge	1500	С	25.2	61.2	0.28	525		Merge	1500	В	121.7	8.6	1.98	557
17	656		Basic	2010	С	23.2	66.2	0.35	526	MMBT	Basic	7600	D	37.6	41.6	2.08	558
34	657	Davidantaia	Diverge	1500	С	24.7	62.4	0.27	527		Basic	16610	С	20.0	67.0	2.82	559
11	658	Powhatan Pkwy	Basic	1900	С	19.7	66.7	0.32	528		Diverge	1500	С	22.9	58.4	0.29	560
26	659	1 1111	Merge	1500	С	23.6	60.9	0.28	529		Basic	740	С	19.4	65.6	0.13	561
56	660		Basic	1500	С	21.6	66.5	0.26	530	College Dr	Weaving	1805	С	21.6	53.2	0.39	
	661	164	Diverge	1500	А	16.2	66.7	0.26	531		Basic	990	С	23.5	65.6	0.17	
	662		Basic	2640	С	25.1	65.4	0.46	532		Merge	1500	В	17.0	66.8	0.26	

FREEWAY CAPACITY ANALYSIS RESULTS I-664 PM

FIGURE 39









Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time
301		Basic	1670	Α	1.3	52.0	0.36
302	Bellinger Blvd	Merge	1500	Α	2.1	61.2	0.28
303		Basic	6175	Α	2.1	62.0	1.13
304		Diverge	1500	Α	2.2	58.0	0.29
305	Terminal Blvd	Basic	2400	Α	1.7	61.8	0.44
306		Merge	1500	Α	5.9	57.5	0.30
307		Basic	235	А	5.5	60.9	0.04

	Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time
	401	164	Basic	1500	F	104.9	11.7	1.46
1	402	Terminal Blvd	Weaving	2045	В	18.8	43.2	0.54
1	403		Basic	8160	В	12.6	62.0	1.50
1	404	Bellinger Blvd	Diverge	1500	В	13.8	56.6	0.30
	405		Basic	2640	В	12.3	61.8	0.49

FREEWAY CAPACITY ANALYSIS RESULTS I-564 AM

FIGURE 40









Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time
301		Basic	1670	В	13.5	52.0	0.36
302	Bellinger Blvd	Merge	1500	В	15.0	61.2	0.28
303		Basic	6175	В	15.0	62.0	1.13
304		Diverge	1500	В	16.1	57.8	0.29
305	Terminal Blvd	Basic	2400	В	11.6	61.8	0.44
306		Merge	1500	В	19.9	57.2	0.30
307		Basic	235	С	18.4	60.8	0.04

Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time
401	164	Basic	1500	Α	5.2	62.0	0.275
402	Terminal Blvd	Weaving	2045	А	5.1	48.2	0.482
403		Basic	8160	А	2.3	62.0	1.496
404	Bellinger Blvd	Diverge	1500	А	2.3	62.0	0.275
405		Basic	2640	Α	2.4	62.0	0.484

FREEWAY CAPACITY ANALYSIS RESULTS I-564 PM

FIGURE 41









Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time	Seg ID	Cross Street	Туре	Length (ft)
701		Basic	2140	Α	4.0	63.8	0.38	801		Basic	1060
702	US 17 / 1664	Weaving	2670	Α	3.5	61.3	0.49	802	US 58	Merge	1500
703	0317/1004	Basic	940	Α	2.4	63.2	0.17	803		Basic	3780
704		Merge	1500	Α	11.5	62.7	0.27	804		Diverge	1500
705		Basic	615	В	11.3	63.2	0.11	805	Norfolk Blvd	Basic	800
706	College Dr	Merge	1500	В	14.3	60.9	0.28	806		Merge	1265
707		Basic	1380	В	13.7	63.1	0.25	807		Overlap	235
708	Towne Point	Diverge	1500	В	15.9	54.8	0.31	808		Diverge	1265
709	Rd	Basic	1905	В	12.2	62.8	0.34	809	VA Intl Gate- way Blvd	Basic	2305
710		Merge	1500	С	23.0	59.2	0.29	810	way bivu	Merge	1500
711		Basic	1370	С	21.6	62.9	0.25	811		Basic	1295
712		Diverge	1500	С	23.8	57.3	0.30	812		Diverge	1500
713		Basic	1000	В	13.8	62.5	0.18	813	Cedar Lane	Basic	1180
714	Cedar Ln	Merge	1500	Α	20.7	61.0	0.28	814		Merge	1500
715		Basic	110	Α	19.9	62.7	0.02	815		Basic	1430
716		Merge	1125	В	25.8	59.3	0.22	816		Diverge	1500
717		Basic	1500	В	23	66.1	0.26	817	Towne Point Rd	Basic	1810
718		Diverge	1125	В	27.6	55.3	0.23	818	Nu	Merge	1500
719	VA Intl Gate- way Blvd	Basic	2270	В	22.8	66.3	0.39	819		Basic	1330
720	vvay biva	Merge	1035	В	26.3	59.1	0.20	820	College Drive	Diverge	1500
721		Basic	780	В	27.6	56.2	0.16	821		Basic	1010
722		Diverge	1035	Α	27.6	56.2	0.21	822		Diverge	1500
723	Norfolk Rd	Basic	605	Α	23.1	64.1	0.11	823		Basic	1245
724		Merge	1500	В	34.9	51.5	0.33	824	110 17/1004	Weaving	1605
725		Basic	3600	В	31.7	56.7	0.72	825	US 17/I664	Basic	1415
726	NALK For any	Diverge	1500	А	35.7	50.4	0.34	826		Merge	1030
727	MLK Freeway	Diverge	1390	А	19.4	51.9	0.30	827		Basic	2640
728		Basic	1600	Α	14.6	53.2	0.34				
729	Railroad Ave	Merge	1500	А	16.5	54.2	0.31				
730	US 58	Basic	2640	Α	16.6	53.8	0.56				

el ie	Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time
8	801		Basic	1060	Α	8.5	57.0	0.21
9	802	US 58	Merge	1500	Α	6.7	55.2	0.31
7	803		Basic	3780	А	8.6	57.0	0.75
7	804		Diverge	1500	В	13.3	55.1	0.31
1	805	Norfolk Blvd	Basic	800	А	10.3	65.2	0.14
8	806		Merge	1265	В	12	61.4	0.23
5	807		Overlap	235	В	12.3	59.3	0.05
1	808		Diverge	1265	В	12.3	59.3	0.24
4	809	VA Intl Gate- way Blvd	Basic	2305	Α	10.2	66.6	0.39
9	810	way biva	Merge	1500	В	11.4	60.7	0.28
5	811		Basic	1295	Α	10.3	66.3	0.22
0	812		Diverge	1500	Α	11.8	59.0	0.29
8	813	Cedar Lane	Basic	1180	Α	8.7	66.1	0.20
8	814		Merge	1500	В	10.9	60.1	0.28
2	815		Basic	1430	Α	9.7	66.4	0.24
2	816		Diverge	1500	Α	11.9	54.9	0.31
6	817	Towne Point Rd	Basic	1810	Α	8.4	66.2	0.31
3	818	i Nu	Merge	1500	В	15.4	60.5	0.28
9	819		Basic	1330	В	13.9	66.3	0.23
0	820	College Drive	Diverge	1500	В	16.7	56.0	0.30
6	821		Basic	1010	Α	10.8	65.6	0.17
1	822		Diverge	1500	Α	12.2	59.0	0.29
1	823		Basic	1245	Α	7.0	66.1	0.21
3	824	110 17/1664	Weaving	1605	В	11.6	48.5	0.38
2	825	US 17/I664	Basic	1415	Α	8.7	65.4	0.25
4	826		Merge	1030	В	11.4	66.0	0.18
0	827		Basic	2640	Α	10.2	66.6	0.45
4								
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FREEWAY CAPACITY ANALYSIS RESULTS ROUTE 164 AM

FIGURE 42









Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time	Seg ID	Cross Street	Туре	Length (ft)	
701		Basic	2140	Α	3.6	63.8	0.38	801		Basic	1060	I
702	702 703 US 17 / 1664	Weaving	2670	Α	3.1	62.9	0.48	802	US 58	Merge	1500	I
703		Basic	940	Α	3.4	63.3	0.17	803		Basic	3780	l
704		Merge	1500	Α	11.8	62.6	0.27	804		Diverge	1500	l
705		Basic	615	В	11.7	63.2	0.11	805	Norfolk Blvd	Basic	800	l
706	College Dr	Merge	1500	В	16	60.7	0.28	806		Merge	1265	l
707		Basic	1380	В	15.4	63.0	0.25	807		Overlap	235	I
708	708 Towne Point 709 Rd 710	Diverge	1500	В	18	53.8	0.32	808		Diverge	1265	I
709		Basic	1905	Α	10.1	62.7	0.35	809	VA Intl Gate- way Blvd	Basic	2305	I
710		Merge	1500	В	13.5	60.2	0.28	810	vvay biva	Merge	1500	I
711		Basic	1370	В	12.8	63.0	0.25	811		Basic	1295	I
712		Diverge	1500	В	14.3	57.2	0.30	812		Diverge	1500	l
713		Basic	1000	Α	4.6	62.5	0.18	813	Cedar Lane	Basic	1180	l
714	Cedar Ln	Merge	1500	Α	9.1	62.0	0.27	814		Merge	1500	l
715		Basic	110	Α	8.9	62.9	0.02	815		Basic	1430	l
716		Merge	1125	В	13.2	61.0	0.21	816]	Diverge	1500	l
717		Basic	1500	В	12.1	66.3	0.26	817	Towne Point Rd	Basic	1810	l
718		Diverge	1125	В	14.5	55.3	0.23	818	Nu	Merge	1500	l
719	9 VA Intl Gate- way Blvd	Basic	2270	В	12	66.3	0.39	819		Basic	1330	l
720	way biva	Merge	1035	В	13.8	60.9	0.19	820	College Drive	Diverge	1500	l
721		Basic	780	В	15.0	56.2	0.16	821		Basic	1010	l
722		Diverge	1035	В	15	56.2	0.21	822		Diverge	1500	l
723	Norfolk Rd	Basic	605	В	12.2	64.1	0.11	823		Basic	1245	l
724	24	Merge	1500	В	17	53.5	0.32	824	US 17/I664	Weaving	1605	I
725	;	Basic	3600	В	15.9	56.9	0.72	825	031//1004	Basic	1415	I
726	MI / Eroover	Diverge	1500	А	17.5	51.6	0.33	826]	Merge	1030	ĺ
727	727 MLK Freeway	Diverge	1390	А	11.1	52.2	0.30	827		Basic	2640	ĺ
728		Basic	1600	Α	8.3	53.2	0.34					
729	Railroad Ave	Merge	1500	Α	12.2	54.3	0.31					
730	US 58	Basic	2640	В	12.2	53.8	0.56					

<i>r</i> el ne	Seg ID	Cross Street	Туре	Length (ft)	LOS	Density	Speed	Travel Time
8	801		Basic	1060	В	17.1	57.0	0.21
8	802	US 58	Merge	1500	В	14.1	54.9	0.31
.7	803		Basic	3780	С	18.0	57.0	0.75
7	804	Norfolk Blvd	Diverge	1500	С	28.1	55.0	0.31
.1	805		Basic	800	С	22.0	65.1	0.14
8	806		Merge	1265	С	25.5	59.6	0.24
5	807		Overlap	235	D	25.6	59.4	0.04
2	808	VA Intl Gate- way Blvd	Diverge	1265	D	25.6	59.4	0.24
5	809		Basic	2305	С	22.5	66.4	0.39
8	810	way bivu	Merge	1500	С	25.7	59	0.29
5	811		Basic	1295	С	22.8	66.2	0.22
0	812	Cedar Lane	Diverge	1500	С	25.7	59.0	0.29
.8	813		Basic	1180	С	21.1	66.1	0.20
.7	814		Merge	1500	С	24.9	58.5	0.29
2	815		Basic	1430	С	21.9	66.2	0.25
1	816	Towne Point Rd	Diverge	1500	С	26.9	53.9	0.32
6	817		Basic	1810	В	17.1	66.1	0.31
.3	818	i Nu	Merge	1500	С	24.2	59.4	0.29
9	819		Basic	1330	С	21.6	66.2	0.23
.9	820	College Drive	Diverge	1500	С	26.0	55.2	0.31
.6	821		Basic	1010	В	15.7	65.5	0.18
1	822		Diverge	1500	В	18.1	58.0	0.29
.1	823		Basic	1245	А	8.6	66.0	0.21
2	824	110 47/1004	Weaving	1605	В	10.5	53.3	0.34
'2	825	US 17/I664	Basic	1415	А	9.7	65.8	0.24
3	826		Merge	1030	В	14.4	59.8	0.20
0	827		Basic	2640	В	12.8	66.6	0.45
4								

FREEWAY CAPACITY ANALYSIS RESULTS ROUTE 164 PM

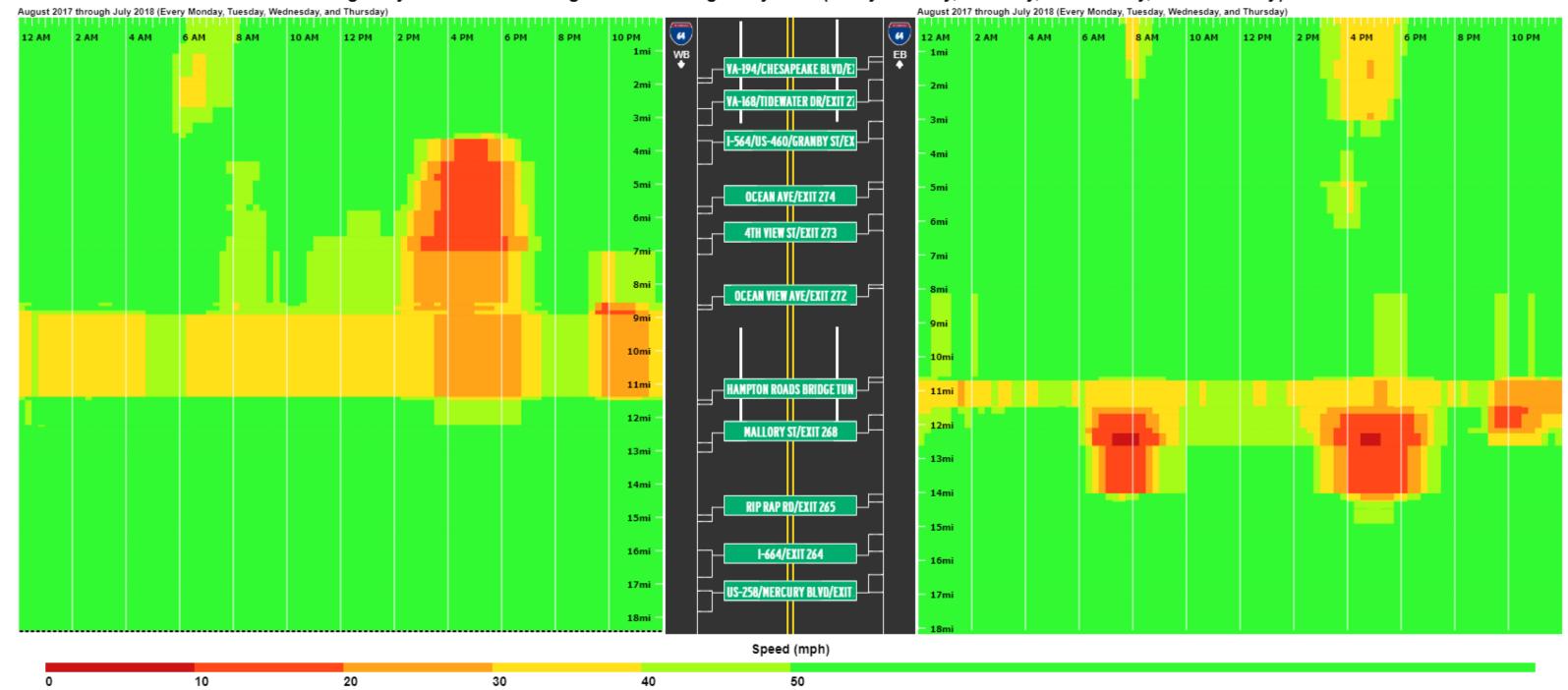
FIGURE 43





Speed for I-64 between VA-134/Exit 262 and Norview Ave/Exit 279 using INRIX data

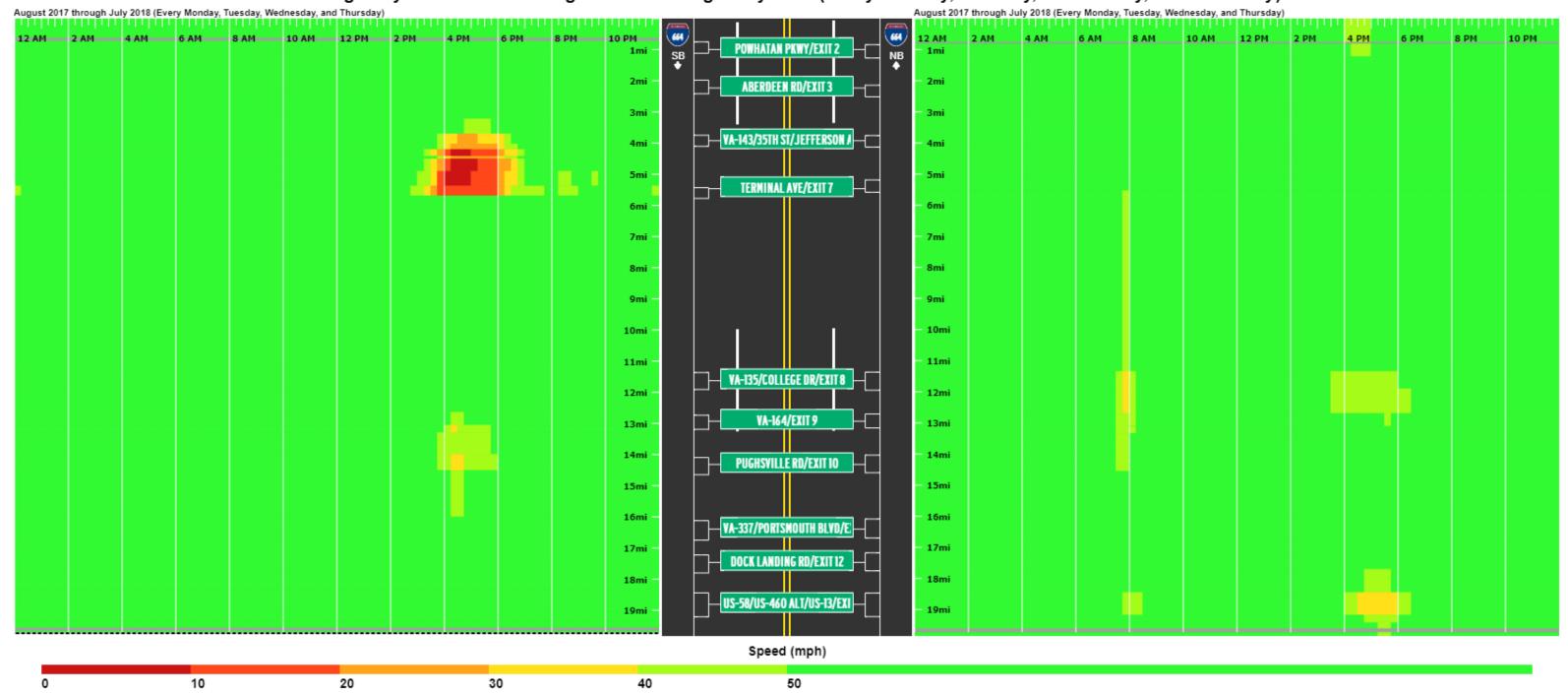
Averaged by 15 minutes for August 2017 through July 2018 (Every Monday, Tuesday, Wednesday, and Thursday)





Speed for I-664 using INRIX data

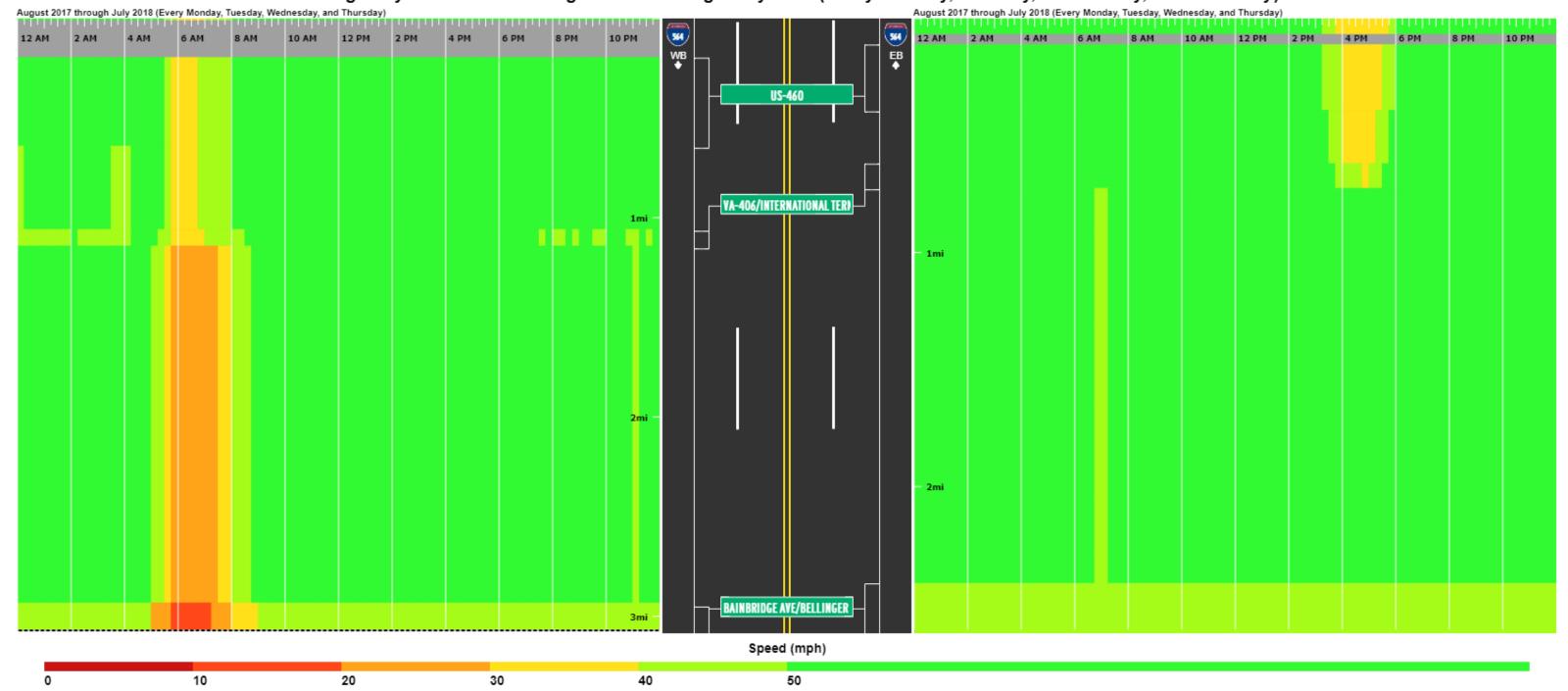
Averaged by 15 minutes for August 2017 through July 2018 (Every Monday, Tuesday, Wednesday, and Thursday)





Speed for I-564 using INRIX data

Averaged by 15 minutes for August 2017 through July 2018 (Every Monday, Tuesday, Wednesday, and Thursday)





Speed for VA-164 using INRIX data

Averaged by 15 minutes for July 2017 through August 2018 (Every Tuesday, Wednesday, and Thursday)

