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Traffic Technical Memo

PROJECT: Reevaluation of Hampton Roads Crossing Study FEIS: CBA 9 – Segments 1 & 3

SUBJECT: DRAFT Traffic Model Update – Methodology and Findings

DATE: February 2, 2012

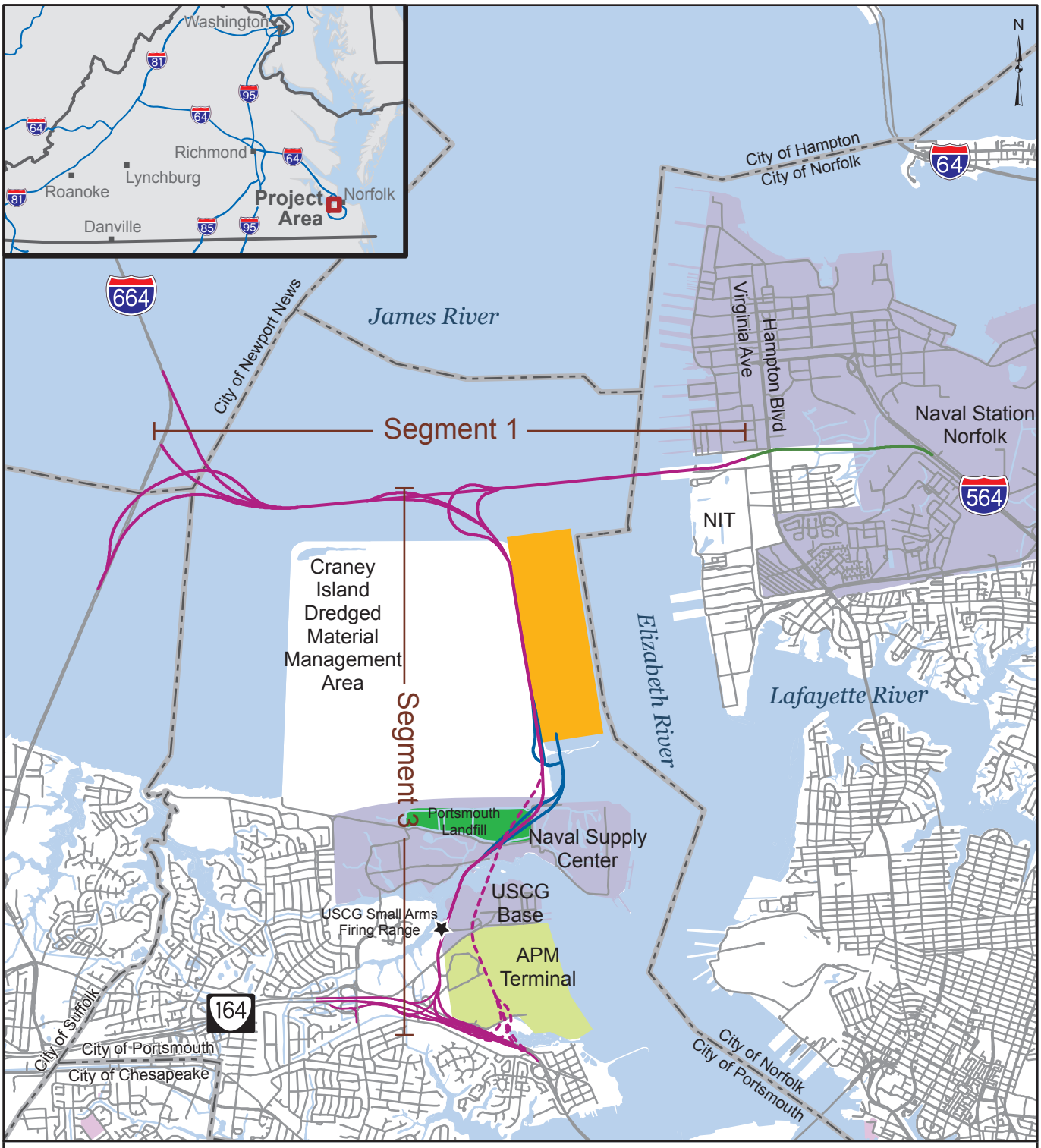
This Technical Memo summarizes the methods used for the traffic analysis reevaluation of the Hampton Roads Crossing Study (HRCS) selected alternative, Candidate Build Alternative 9 (CBA 9), Segments 1 & 3. In accordance with the requirements of the National Environmental Policy Act (NEPA) and related regulations, the results of the overall project reevaluation will be documented in an Environmental Assessment (EA). For this reevaluation, the traffic data presented in the 2001 HRCS Final Environmental Impact Statement (FEIS) was updated, as was the traffic data for the air and noise analyses. To develop updated traffic volumes, the Hampton Roads Regional Travel Demand Model was used, as instructed by VDOT, for the intermediate year of 2018 and the design year of 2034. The latest adopted Regional Model is 2030, thus 2034 volumes were derived from the growth rate calculated from 2018 to 2030. Two scenarios were examined for the reevaluation: the Build Alternative and the No-Build Alternative

The Build Alternative is made up of five independent segments and, as stated in the 2001 HRCS FEIS, can be constructed in segments with each segment contributing to project purpose and need and each segment having logical termini and independent utility.[1] For this project, VDOT is reevaluating two of the five segments of the selected alternative, as described below and illustrated in Figure 1. This project is now locally referred to as Patriot's Crossing.

The segments of the selected alternative being reevaluated consist of HRCS Segment 1 and Segment 3 for a combined length of 15 miles.

> **Segment 1**: Extends on new alignment from the I-664/Monitor-Merrimac Memorial Bridge Tunnel in Hampton Roads, Virginia to its connection with the planned I-564 Connector at Virginia Avenue near Naval Station Norfolk in Norfolk, Virginia. Segment 1 would have four lanes (two in each direction) along the new roadway, bridge, and tunnel. The length of Segment 1 is approximately 6.3 miles. Segment 1 was originally considered the Third Crossing in Hampton Roads.

[1] Federal Highway Administration and the Virginia Department of Transportation. *Hampton Roads Crossing Study: Final Environmental Impact Study and Section 4(f) Evaluation*. March 2001. Page S-14.



Legend

- HRCS CBA 9 - Segments 1 & 3
- VA Port Authority Craney Island Interchange
- Planned I-564 Connector
- Craney Island Expansion Area
- Original Alignment of Segment 3 No Longer Under Consideration

Figure 1: Project Location Map

0 0.5 1 2

Miles

HRCS EA

- **Segment 3**: Extends on new alignment from Segment 1 to a new connection to VA 164 in Portsmouth, Virginia. Segment 3 would have four lanes (two in each direction) along the new roadway. The length of Segment 3 is approximately 5.7 miles. The southern half of Segment 3, from Craney Island southward to Route 164, was previously under study by the Virginia Port Authority as part of their Craney Island Road and Rail Connector.

The eastern study limit for Segment 1 was shortened to Virginia Avenue because it would now connect at this point with the planned I-564 Intermodal Connector currently under study. The widening of I-664 on the Peninsula and the Southside, including the Monitor-Merrimac Memorial Bridge Tunnel multimodal component of the selected alternative, are *not* included in this reevaluation because they are not part of this phase of construction. In the years following the completion of the HRCS FEIS, the 576-acre A.P. Moller-Maersk ContainerTerminal (APM Terminal) was constructed along the Elizabeth River in Portsmouth. A portion of this facility is now located within the original alignment of Segment 3, thereby necessitating a westward shift of the alignment to avoid impacting this port facility.

The No-Build Alternative provides a baseline of conditions against which to compare the Build Alternative. Under the No-Build Alternative, none of the five segments of CBA 9 would be constructed. Most existing roads would generally remain in their present configurations. It is assumed that roadway and transit projects committed and funded for construction and included in the CTB's FY 2011-2016 Six-Year Improvement Program (SYIP) would be implemented in the future.

SUMMARY OF FINDINGS: NO-BUILD ALTERNATIVE

- Traffic volumes for the I-64 Hampton Road Bridge Tunnel are expected to increase 15 percent from 2000 to 2018 and 32 percent from 2000 to 2034.

- Total trips between the Peninsula and Southside are expected to increase from 175,200 in 2000 to 277,323 in 2034, a 58 percent increase.

- Traffic volumes for the I-664 Monitor-Merrimac Memorial Bridge Tunnel are expected to increase 34 percent from 2000 to 2018 and 62 percent from 2000 to 2034.

- Traffic volumes for the US 17 James River Bridge are expected to increase 72 percent from 2000 to 2018 and 129 percent from 2000 to 2018.

- Truck volumes on the Hampton Roads Bridge Tunnel and the Monitor-Merrimac Memorial Bridge Tunnel are expected to increase along with the total vehicle volumes. The heavy vehicle percentage is expected to stay the same for these facilities.

SUMMARY OF FINDINGS: BUILD ALTERNATIVE

- Overall Vehicle Miles Traveled (VMT) in the Hampton Roads region is expected to increase in both 2018 and 2034 as a result of the proposed project. This indicates that the Build Alternative will increase mobility and travel throughout the area.

- The greatest impact as a result of the Build Alternative is seen on I-64 at the Hampton Roads Bridge Tunnel. Compared to the No-Build Alternative, the Build Alternative is expected to see an 11 percent decline or improvement in its V/C ratio as a result of the project in 2018 and a 12 percent decline in 2034.

HAMPTON ROADS REGIONAL TRAVEL DEMAND MODEL

The Hampton Roads Regional Travel Demand Model was obtained from VDOT and represents the 2030 Hampton Roads Long Range Transportation Plan (updated in 2010). The year 2000 model was used for the base year for this study as this is the latest available base year model. For the future years, 2018 and 2034, the Hampton Roads Regional Travel Demand Model was used to develop traffic volumes. CBA 9 – Segment 1 (Patriot's Crossing Project) and CBA 9 – Segment 3 (the Craney Island Connector Project) are not in the 2018 or 2034 models; thus, for the No-Build Alternative, the models were not modified. For the Build Alternative, both the 2018 and 2030 Travel Demand Models were modified to include the Segment 1 and Segment 3 network links. No other changes were made to the models.

COMPARISON TO HRCS FEIS

The volumes obtained from the current 2018 no-build Hampton Roads Regional Travel Demand Model were compared to the volumes shown for the 2018 No-Build Alternative in the HRCS FEIS. The comparison is shown in Table 1. Most of the facilities are within ten percent of the previously published volumes; however, some of the facilities show a greater difference when compared to the FEIS volumes. This is to be expected because the EIS volumes were developed from a 1994 Travel Demand Model whereas the volumes contained in this reevaluation document are from an updated model that has more current background traffic, land use projections, and committed transportation projects. Due to unknown assumptions and procedures regarding the previous traffic analyses done for the FEIS and the use of a different travel demand model, additional comparisons between the FEIS traffic data and the current EA analyses were not conducted.

TABLE 1: COMPARISON OF EIS AND EA 2018 NO-BUILD VOLUMES

Facility	No-Build Scenarios		
	EIS 2018	EA 2018	% Change from EIS to EA
I-64 Hampton Roads Bridge Tunnel	118,000	98,900	-19%
I-664 Monitor Merrimac Memorial Bridge Tunnel	76,000	81,100	6%
US 17 James River Bridge	49,000	49,200	0%
I-64 (I-664 – Mercury Blvd.)	153,000	173,500	12%
I-664 (I-64 – Downtown Newport News)	77,000	82,200	6%
VA 143 Jefferson Avenue (I-664 – Mercury Blvd.)	34,000	31,600	-8%
VA 337 Hampton Blvd. (Lafayette River–Midtown Tunnel)	56,000	42,500	-32%
I-64 (I-564 – I-264)	158,000	156,200	-1%
I-64 (I-464 – I-664)	117,000	84,700	-38%
I-264 Downtown Tunnel	104,000	108,500	4%
US 58 Midtown Tunnel	55,000	60,500	9%
VA 164 Western Freeway (I-664 – Midtown Tunnel)	63,000	70,600	11%

Source: Hampton Roads Regional Travel Demand Model and Michael Baker Jr., Inc.

TRUCK TRAFFIC AND TRUCK PERCENTAGES

Truck volumes were developed based on VDOT traffic and vehicle classification counts conducted in 2010, as well as from projected truck traffic due to developments on Craney Island and the Craney Island Eastward Expansion Project. The Craney Island truck traffic was obtained from the *Craney Island Marine Terminal: Interchange Modification Report*.[2] Truck volumes are expected to increase along with non-truck traffic causing no change to the actual percentage of trucks on the roadways.

The development on Craney Island and the construction of CBA 9 – Segment 3 is expected to generate truck traffic on CBA 9 - Segment 1 and provide access to the Monitor-Merrimac Memorial Bridge Tunnel to the west and the I-564 Intermodal Connector to the east. Truck traffic is also predicted to increase from 2018 to 2034 due to greater expansion of the Virginia Port Authority's port facilities. It is important to note the difference in truck traffic on the two existing bridge-tunnel facilities; the I-64 Hampton Roads Bridge Tunnel and the Monitor-Merrimac Memorial Bridge Tunnel. The higher truck percentages on the Monitor-Merrimac Memorial Bridge Tunnel are due to the height restrictions in the westbound direction of the Hampton Roads Bridge Tunnel. Truck percentages for selected facilities are presented in Table 2.

NETWORK CAPACITY

A volume-to-capacity ratio (V/C) is a measure of the amount of traffic on a given roadway in relation to the amount of traffic the roadway was designed to handle. Simply put, the V/C ratio represents the percentage of capacity used on the roadway. For example, a V/C ratio of 0.50 represents that the roadway is at 50 percent capacity. The Volume to Capacity Ratios (V/C) were developed for all analyzed roadways within the study area using the volumes obtained from the Hampton Roads Regional Travel Demand Model and the per lane capacities calculated from the Hampton Roads Crossing Study. For the 2018 No-Build scenario, the data shows that eight of the 13 facilities analyzed are expected to have V/C ratios above 1.0, indicating that the roadway is over capacity. The remaining five facilities have V/C ratios approaching 1.0, an indication that these facilities are reaching their capacity and congestion is an issue.

For the 2034 No-Build Alternative, traffic congestion is expected to increase with 11 of the 14 facilities projected to have V/C ratios greater than 1.0 and only one facility with a V/C ratio less than 0.91. The V/C ratios and resulting levels of service are presented in Tables 3, 4, and 5.

2000 LEVELS OF SERVICE

A Level of Service analysis was conducted for the base year using the most recent Hampton Roads Regional Travel Demand Model for the year 2000. The Highway Capacity Manual (HCM 2000) was used to evaluate the operation of the key roadways in the study area. The analysis yields a Level of Service (LOS) that can range from LOS A through LOS F, where LOS A indicates free flow conditions and LOS F indicates forced flow beyond the capacity of the that particular facility. A brief description of each Level of Service and the corresponding V/C ratios for freeway facilities are as follows:

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[2] Kimley-Horn and Associates, Inc. for the Virginia Port Authority. *Craney Island Marine Terminal: Interchange Modification Report*. March 2010. Page 1.

TABLE 2: TRUCK PERCENTAGES FOR 2018 AND 2034

Year	Traffic Data	Hampton Roads Bridge Tunnel (I-64)	Monitor Merrimac Memorial Bridge Tunnel (I-664)	Segment 1 (East of Segment 3)	Segment 3 (South of Segment 1)
2018 No-Build	ADT	98,900	81,100	-	-
	Heavy Truck Volume	1,980	3,920	-	-
	(% of ADT)	2%	5%	-	-
	Medium Truck Volume	1,980	2,820	-	-
	(% of ADT)	2%	3%	-	-
2018 Build	ADT	87,400	113,800	78,800	45,300
	Heavy Truck Volume	1,750	5,480	4,130	2,660
	(% of ADT)	2%	5%	5%	6%
	Medium Truck Volume	1,750	3,620	2,710	1,560
	(% of ADT)	2%	3%	3%	3%
2034 No-Build	ADT	113,800	98,100	-	-
	Heavy Truck Volume	2,280	5,260	-	-
	(% of ADT)	2%	5%	-	-
	Medium Truck Volume	2,280	3,370	-	-
	(% of ADT)	2%	3%	-	-
2034 Build	ADT	100,400	134,700	90,400	53,600
	Heavy Truck Volume	2,010	6,930	5,440	3,970
	(% of ADT)	2%	5%	6%	7%
	Medium Truck Volume	2,010	4,630	3,110	1,840
	(% of ADT)	2%	3%	3%	3%

Source: Hampton Roads Regional Travel Demand Model and Michael Baker Jr., Inc.

TABLE 3: BASE YEAR 2000 CAPACITY ANALYSIS

Facility	2000			
	2000 ADT	2000 Pk Hr Per Lane Volume	2000 Pk Hr V/C Ratio	2000 Pk Hr LOS
I-64 Hampton Roads Bridge Tunnel	86,200	2,160	1.27	F
I-664 MMBT (North of Segment 1)	60,400	1,510	0.86	D
I-664 MMBT (South of Segment 1)	60,400	1,510	0.86	D
Segment 3 (Segment 1 - VA 164)	NA	NA	NA	NA
Segment 1 (West of Segment 3)	NA	NA	NA	NA
Segment 1 (East of Segment 3)	NA	NA	NA	NA
US 17 James River Bridge*	28,600	720	0.42	B
I-64 (I-664 to Mercury Blvd.)	135,900	2,270	1.01	F
I-664 (I-64 - Downtown Newport News)	60,800	1,010	0.55	C
Jefferson Avenue (I-664 - Mercury Blvd.)*	28,700	480	0.58	C
I-64 (I-564 - I-264)	140,400	2,340	1.08	F
I-64 (I-464 - I-664)	63,800	1,600	0.71	D
VA 164 Western Freeway (I-664 – Midtown Tunnel)	21,700	540	0.27	A
I-264 (Newtown Rd - Witchduck Rd)	202,400	2,530	1.19	F
VA 337 Hampton Blvd. (Lafayette River–Midtown Tunnel)*	44,100	1,100	1.29	F
I-264 Downtown Tunnel	106,800	2,670	1.57	F
US 58 Midtown Tunnel*	45,800	2,290	1.43	F

* indicates a non-freeway facility. Freeway V/C ratio and equivalent LOS used for continuity

Source: Hampton Roads Regional Travel Demand Model and Michael Baker Jr., Inc.

TABLE 4: 2018 NO-BUILD AND BUILD CAPACITY ANALYSIS

Facility	2000	2018							
	2000 Pk Hr LOS	No Build ADT	No Build Pk Hr Per Lane Volume	No Build Pk Hr V/C Ratio	No Build Pk Hr LOS	Build ADT	Build Pk Hr Per Lane Volume	Build Pk Hr V/C Ratio	Build Pk Hr LOS
I-64 Hampton Roads Bridge Tunnel	F	98,900	2,470	1.45	F	87,400	2,190	1.29	F
I-664 MMBT (North of Segment 1)	D	81,100	2,030	1.16	F	113,800	2,850	1.63	F
I-664 MMBT (South of Segment 1)	D	81,100	2,030	1.16	F	58,200	1,460	0.83	D
Segment 3 (Segment 1 - VA 164)	NA	NA	NA	NA	NA	45,300	1,130	0.58	C
Segment 1 (West of Segment 3)	NA	NA	NA	NA	NA	61,200	1,530	0.78	D
Segment 1 (East of Segment 3)	NA	NA	NA	NA	NA	78,800	1,970	1.01	F
US 17 James River Bridge*	B	49,200	1,230	0.72	D	52,100	1,300	0.76	D
I-64 (I-664 to Mercury Blvd.)	F	173,500	2,890	1.28	F	173,100	2,890	1.28	F
I-664 (I-64 - Downtown Newport News)	C	82,200	1,370	0.74	D	91,100	1,520	0.82	D
Jefferson Avenue (I-664 - Mercury Blvd.)*	C	31,600	530	0.64	C	35,500	590	0.72	D
I-64 (I-564 - I-264)	F	156,200	2,600	1.20	F	160,100	2,670	1.23	F
I-64 (I-464 - I-664)	D	84,700	2,120	0.94	E	82,900	2,070	0.92	E
VA 164 Western Freeway (I-664 – Midtown Tunnel)	A	70,600	1,770	0.89	E	63,100	1,580	0.79	D
I-264 (Newtown Rd - Witchduck Rd)	F	235,200	2,940	1.38	F	235,700	2,950	1.39	F
VA 337 Hampton Blvd. (Lafayette River–Midtown Tunnel)*	F	42,500	1,060	1.25	F	40,800	1,020	1.20	F
I-264 Downtown Tunnel	F	108,500	2,710	1.59	F	103,700	2,590	1.52	F
US 58 Midtown Tunnel*	F	60,500	3,030	1.89	F	49,100	2,460	1.54	F

* indicates a non-freeway facility. Freeway V/C ratio and equivalent LOS used for continuity

Source: Hampton Roads Regional Travel Demand Model and Michael Baker Jr., Inc.

TABLE 5: 2034 NO-BUILD AND BUILD CAPACITY ANALYSIS

	2000	2018								2034							
Facility	2000 Pk Hr LOS	No Build ADT	No Build Pk Hr Per Lane Volume	No Build Pk Hr V/C Ratio	No Build Pk Hr LOS	Build ADT	Build Pk Hr Per Lane Volume	Build Pk Hr V/C Ratio	Build Pk Hr LOS	No Build ADT	No Build Pk Hr Per Lane Volume	No Build Pk Hr V/C Ratio	No-Build Pk Hr LOS	Build ADT	Build Pk Hr Per Lane Volume	Build Pk Hr V/C Ratio	No-Build Pk Hr LOS
I-64 Hampton Roads Bridge Tunnel	F	98,900	2,470	1.45	F	87,400	2,190	1.29	F	113,800	2,850	1.68	F	100,400	2,510	1.48	F
I-664 MMBT (North of Segment 1)	D	81,100	2,030	1.16	F	113,800	2,850	1.63	F	98,100	2,450	1.40	F	134,700	3,370	1.93	F
I-664 MMBT (South of Segment 1)	D	81,100	2,030	1.16	F	58,200	1,460	0.83	D	98,100	2,450	1.40	F	68,000	1,700	0.97	E
Segment 3 (Segment 1 - VA 164)	NA	NA	NA	NA	NA	45,300	1,130	0.58	C	NA	NA	NA	NA	53,600	1,340	0.69	D
Segment 1 (West of Segment 3)	NA	NA	NA	NA	NA	61,200	1,530	0.78	D	NA	NA	NA	NA	74,100	1,850	0.95	E
Segment 1 (East of Segment 3)	NA	NA	NA	NA	NA	78,800	1,970	1.01	F	NA	NA	NA	NA	90,400	2,260	1.16	F
US 17 James River Bridge*	B	49,200	1,230	0.72	D	52,100	1,300	0.76	D	65,400	1,640	0.96	E	70,600	1,770	1.04	F
I-64 (I-664 to Mercury Blvd.)	F	173,500	2,890	1.28	F	173,100	2,890	1.28	F	197,800	3,300	1.47	F	192,600	3,210	1.43	F
I-664 (I-64 - Downtown Newport News)	C	82,200	1,370	0.74	D	91,100	1,520	0.82	D	101,200	1,690	0.91	E	107,600	1,790	0.97	E
Jefferson Avenue (I-664 - Mercury Blvd.)*	C	31,600	530	0.64	C	35,500	590	0.72	D	34,900	580	0.70	D	40,300	670	0.81	D
I-64 (I-564 - I-264)	F	156,200	2,600	1.20	F	160,100	2,670	1.23	F	168,600	2,810	1.29	F	173,300	2,890	1.33	F
I-64 (I-464 - I-664)	D	84,700	2,120	0.94	E	82,900	2,070	0.92	E	96,300	2,410	1.07	F	94,300	2,360	1.05	F
VA 164 Western Freeway (I-664 – Midtown Tunnel)	A	70,600	1,770	0.89	E	63,100	1,580	0.79	D	83,700	2,090	1.05	F	74,900	1,870	0.94	E
I-264 (Newtown Rd - Witchduck Rd)	F	235,200	2,940	1.38	F	235,700	2,950	1.39	F	255,700	3,200	1.51	F	257,300	3,220	1.52	F
VA 337 Hampton Blvd. (Lafayette River–Midtown Tunnel)*	F	42,500	1,060	1.25	F	40,800	1,020	1.20	F	46,900	1,170	1.38	F	43,700	1,090	1.28	F
I-264 Downtown Tunnel	F	108,500	2,710	1.59	F	103,700	2,590	1.52	F	124,900	3,120	1.84	F	119,000	2,980	1.75	F
US 58 Midtown Tunnel*	F	60,500	3,030	1.89	F	49,100	2,460	1.54	F	70,800	3,540	2.21	F	57,600	2,880	1.80	F

* indicates a non-freeway facility. Freeway V/C ratio and equivalent LOS used for continuity

Source: Hampton Roads Regional Travel Demand Model and Michael Baker Jr., Inc.

LOS A represents free-flow. Vehicles can maneuver within the traffic stream and easily maintain the posted speed limit. The V/C ratio ranges from 0.01 to 0.29 for LOS A.

LOS B represents a stable flow. A spatial separation of vehicles allows easy maneuverability, and drivers can maintain the posted speed. The V/C ratio ranges from 0.30 to 0.47 for LOS B.

LOS C is still stable traffic flow, but maneuverability and speeds are more restricted with higher traffic volumes. The V/C ratio ranges from 0.48 to 0.68 for LOS C.

LOS D approaches unstable flow. Temporary restrictions to the traffic flow may cause substantial drops in operating speed and drivers have little freedom to maneuver. The V/C ratio ranges from 0.69 to 0.88 for LOS D.

LOS E represents the capacity of the facility. Traffic flow is unstable, vehicles are unable to pass, and there may be momentary stoppages in traffic flow. The V/C ratio ranges from 0.89 to 1.00 for LOS E.

LOS F describes a forced flow condition with low operating speeds and traffic volumes exceeding capacity. This is often described as stop-and-go conditions. A V/C ratio over 1.00 is LOS F.

The capacity analysis for the year 2000 is presented in Table 3. As shown in the table, seven of the studied facilities operated at a LOS F with a V/C ratio above 1.0 in the year 2000. The I-64 Hampton Roads Bridge Tunnel had a V/C ratio of 1.27 and a LOS F while the I-664 Monitor-Merrimac Memorial Bridge Tunnel had a V/C ratio of 0.86 with a LOS D.

2018 LEVELS OF SERVICE

To evaluate the future operation of the highway network, a capacity analysis was performed using the same methodology used to evaluate the year 2000 operations. The same factors were used for the calculations with the exceptions of the peak hour volumes. The 2018 peak hour volumes were obtained using the latest Hampton Roads Regional Travel Demand Model.

The capacity analysis for the 2018 No-Build and Build Alternatives are presented in Table 4. As shown in the table, the Hampton Roads Bridge Tunnel remains at a LOS F as a result of the Build project; however, the V/C ratio decreases from 1.45 to 1.29, an 11 percent decrease. The Monitor-Merrimac Memorial Bridge Tunnel (north of Segment 1) is expected to see increased congestion and operate at a LOS F for both the No-Build and Build Alternatives, as the Build Alternative attracts vehicle trips to this facility. The section of the Monitor-Merrimac Memorial Bridge Tunnel south of Segment 1 is anticipated to see a decrease in congestion as a result of the Build project improving from a LOS F to a LOS D. Other facilities are also expected to see increased congestion when compared to the 2000 Levels of Service: US 17 (James River Bridge) is expected to operate at LOS D for both 2018 No-Build and Build Alternatives. I-664, from I-64 to Mercury Boulevard, is projected to operate at LOS D for both 2018 alternatives. I-64, from I-464 to I-664, is expected to operate at LOS E for both the No-Build and Build 2018 scenarios. VA 164 (Western Freeway) is expected to operate at a LOS E for the No-Build Alternative but improve to LOS D under the Build Alternative. Although many of the roadways are projected to operate at LOS F in 2018, four of the facilities with LOS F in the No-Build and Build Alternative scenarios are expected to see reductions in their V/C ratios.

The newly constructed CBA 9 – Segment 1 is expected to operate at LOS D west of CBA 9 – Segment 3 and LOS F east of CBA 9 – Segment 3. CBA 9 – Segment 3 is projected to operate at LOS C.

2034 LEVELS OF SERVICE

The capacity analysis for the 2034 design year was performed using the same methodology used to evaluate the year 2000 and 2018 operations. The 2034 volumes were calculated using the growth rate from the most recent 2018 and 2030 Hampton Roads Travel Demand Models.

The results show that in the future year 2034, all but three of the studied roadways are expected to operate with V/C ratio over 1.0 under the No-Build Alternative, indicating LOS F. VA 164 is the only facility that is expected to see an improved LOS as a result of the Build Alternative; however, six roadways are projected to see reductions in V/C ratios as a result of implementation of the Build Alternative (although remaining at LOS F).

Similar to the 2018 analysis, the Hampton Roads Bridge Tunnel will remain at a LOS F as a result of the Build Alternative; however, the V/C ratio decreases from 1.68 to 1.48, a reduction of 12 percent. The portion of the Monitor-Merrimac Memorial Bridge Tunnel north of Segment 1 is expected see increased congestion and operate with a LOS F in both the No-Build and Build Alternatives, as the Build Alternative attracts vehicle trips to this facility. The section of the Monitor-Merrimac Memorial Bridge Tunnel south of Segment 1 is anticipated to improve from a LOS F to a LOS E as a result of the Build project.

The results of the 2034 capacity analysis are shown in Table 5.

TRAVEL TIME

Travel times for ten major origin-destination pairs in the region were developed using the Hampton Roads Regional Travel Demand Model for 2018 and 2030. For each alternative and scenario, the network path with the shortest travel time was calculated for each origin-destination pair. The results are shown in Table 6.

TABLE 6: TRAVEL TIME ANALYSIS RESULTS

From	To	2018 NB Travel Time	2018 Build Travel Time	2018 Time Savings	2030 NB Travel Time	2030 Build Travel Time	2030 Time Savings
I-64/I-664 Interchange	Norfok Naval Base[1]	26	19	7	29	21	8
I-64/I-664 Interchange	Norfolk International Terminals[2]	25	19	6	29	22	8
I-64/I-664 Interchange	I-64/I-264 Interchange	30	28	3	34	30	4
I-64/I-664 Interchange	I-64/I-464 Interchange	38	36	3	43	38	4
I-64/I-664 Interchange	Downtown Norfolk[3]	30	30	0	36	33	2
Downtown Newport News[4]	Norfok Naval Base[1]	32	13	19	36	15	21
Downtown Newport News[4]	Norfolk International Terminals[2]	32	13	18	35	16	20
Downtown Newport News[4]	I-64/I-264 Interchange	33	23	9	36	25	11
Downtown Newport News[4]	I-64/I-464 Interchange	32	31	2	37	33	3
Downtown Newport News[4]	Downtown Norfolk[3]	26	24	2	30	27	3
Total Time Savings for All Destinations				70			84

All time shown in minutes
1. Intersection of Hampton Boulevard and Admiral Taussig Boulevard
2. Intersection of Hampton Boulevard and International Terminal Boulevard
3. Intersection of City Hall Avenue and St. Paul Boulevard
4. Intersection of 26th Street and Warwick Boulevard

Source: Hampton Roads Regional Travel Demand Model and Michael Baker Jr., Inc.

As shown in Table 6, all but one of the travel times for the selected origin-destination pairs are expected to decrease as a result of the project in 2018 and all of the travel times will decrease in 2030. The greatest time savings are seen traveling from Downtown Newport News to the Norfolk Naval Base and Norfolk International Terminals; as CBA 9 – Segment 1 and CBA 9 – Segment 3 will provide a direct link between these locations.

VEHICLE MILES TRAVELED (VMT)

The total vehicles miles traveled (VMT) were calculated for each facility type within each jurisdiction for the entire Hampton Roads Region for the years 2018 and 2030. The current Hampton Roads Regional Travel Demand Model was used for the No-Build Alternative scenarios and was modified to include Patriot's Crossing (Segments 1 and 3) for the Build Alternative scenarios. The results of the analysis are shown in Table 7. The total VMT for the Hampton Roads Region for the Build scenarios are expected to increase when compared to the No-Build scenarios for both 2018 and 2030. The new crossings are expected to generate additional trips across Hampton Roads by providing extra capacity.

TABLE 7: 2018 AND 2034 VEHICLE MILES TRAVELED (VMT)

2018 No Build VMT Summary

Facility Type	Gloucester	Isle of Wight	James City County	York County	Cheasapeake	Hampton	Newport News	Norfolk	Poquoson	Portsmouth	Suffolk	Virginia Beach	Williamsburg	Grand Total
Interstate/Freeway	0	288,580	1,077,249	1,078,616	2,931,262	1,993,685	2,391,448	3,252,141	0	922,181	928,205	2,560,625	0	17,423,992
Principal Arterial	507,617	347,043	396,180	997,939	1,036,188	369,782	1,179,165	1,650,418	0	231,346	1,513,403	1,402,750	127,449	9,759,279
Minor Arterial	55,052	592,058	389,999	201,942	1,365,324	1,082,162	1,123,857	999,449	76,809	369,064	697,757	3,540,994	127,976	10,622,443
Collector	123,449	338,269	326,569	340,627	410,447	236,436	414,022	168,609	34,576	24,296	342,970	521,592	48,465	3,330,327
Grand Total	**686,118**	**1,565,949**	**2,189,997**	**2,619,124**	**5,743,222**	**3,682,064**	**5,108,491**	**6,070,617**	**111,385**	**1,546,888**	**3,482,335**	**8,025,961**	**303,890**	**41,136,041**

2018 Build VMT Summary

Facility Type	Gloucester	Isle of Wight	James City County	York County	Cheasapeake	Hampton	Newport News	Norfolk	Poquoson	Portsmouth	Suffolk	Virginia Beach	Williamsburg	Grand Total
Interstate/Freeway	0	304,266	1,095,305	1,086,892	2,873,054	1,952,298	2,696,488	3,400,505	0	1,182,808	814,742	2,564,675	0	17,971,034
Principal Arterial	510,367	345,435	373,782	984,710	1,050,806	363,480	1,155,737	1,633,337	0	225,440	1,512,510	1,404,804	128,792	9,689,200
Minor Arterial	55,450	608,130	395,123	212,954	1,369,206	1,072,111	1,137,273	988,694	75,646	368,695	689,294	3,560,538	127,501	10,660,615
Collector	119,746	337,248	325,848	350,696	406,410	236,652	419,686	163,134	36,262	24,311	335,008	517,380	49,560	3,321,941
Grand Total	**685,563**	**1,595,079**	**2,190,057**	**2,635,252**	**5,699,477**	**3,624,539**	**5,409,185**	**6,185,670**	**111,907**	**1,801,255**	**3,351,555**	**8,047,396**	**305,853**	**41,642,790**

2030 No Build VMT Summary

Facility Type	Gloucester	Isle of Wight	James City County	York County	Cheasapeake	Hampton	Newport News	Norfolk	Poquoson	Portsmouth	Suffolk	Virginia Beach	Williamsburg	Grand Total
Interstate/Freeway	0	355,398	1,305,762	1,247,532	3,354,520	2,226,114	2,788,772	3,483,501	0	1,035,574	1,078,459	2,778,875	0	19,654,506
Principal Arterial	575,249	418,312	463,374	1,138,723	1,203,265	418,836	1,312,806	1,747,767	0	246,081	1,708,475	1,579,967	146,376	10,959,230
Minor Arterial	64,500	687,168	503,726	236,532	1,582,809	1,189,440	1,252,121	1,074,529	94,068	409,893	854,679	4,028,557	157,885	12,135,907
Collector	189,868	427,744	422,808	413,929	513,112	259,570	454,392	172,771	41,204	28,847	483,679	588,636	59,586	4,056,146
Grand Total	**829,617**	**1,888,623**	**2,695,670**	**3,036,716**	**6,653,705**	**4,093,960**	**5,808,091**	**6,478,568**	**135,272**	**1,720,394**	**4,125,291**	**8,976,035**	**363,847**	**46,805,789**

2030 Build VMT Summary

Facility Type	Gloucester	Isle of Wight	James City County	York County	Cheasapeake	Hampton	Newport News	Norfolk	Poquoson	Portsmouth	Suffolk	Virginia Beach	Williamsburg	Grand Total
Interstate/Freeway	0	379,838	1,294,887	1,239,799	3,303,532	2,163,363	3,032,713	3,659,315	0	1,296,433	942,697	2,780,866	0	20,093,445
Principal Arterial	574,636	417,067	467,779	1,146,935	1,182,548	412,865	1,347,635	1,746,279	0	237,468	1,705,183	1,573,882	147,560	10,959,837
Minor Arterial	64,521	696,305	513,235	236,631	1,588,556	1,189,880	1,276,265	1,064,435	94,155	402,560	839,884	4,037,120	158,654	12,162,201
Collector	189,721	425,349	422,759	413,024	508,580	266,242	462,875	165,924	41,241	25,943	477,708	587,302	58,928	4,045,597
Grand Total	**828,878**	**1,918,560**	**2,698,660**	**3,036,388**	**6,583,216**	**4,032,350**	**6,119,489**	**6,635,953**	**135,396**	**1,962,405**	**3,965,472**	**8,979,170**	**365,143**	**47,261,080**

Source: Hampton Roads Regional Travel Demand Model and Michael Baker Jr., Inc.