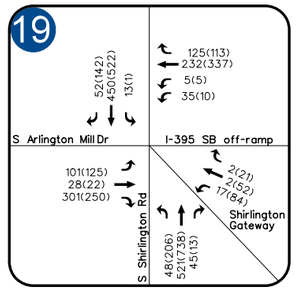
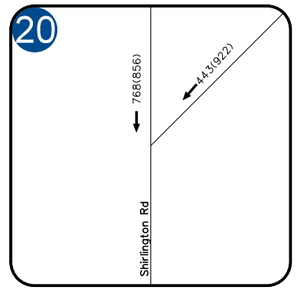
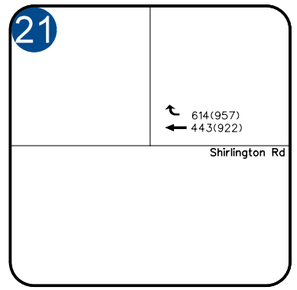
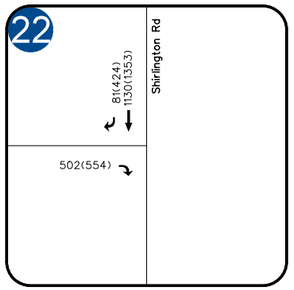
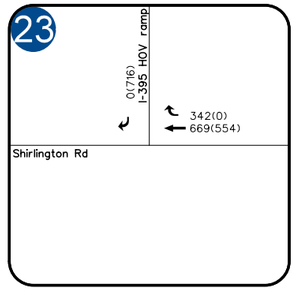
APPENDIX G – Future 2040 Traffic Volumes

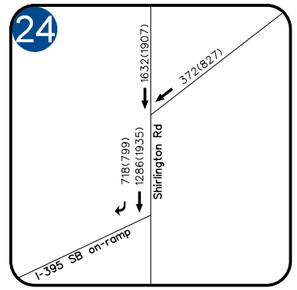


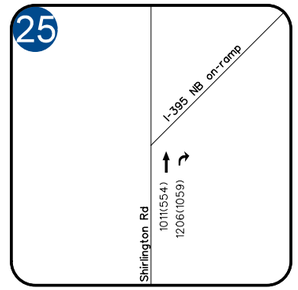


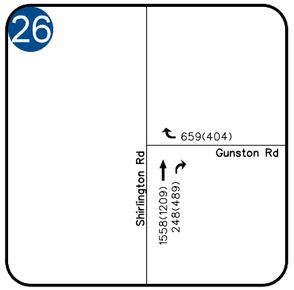


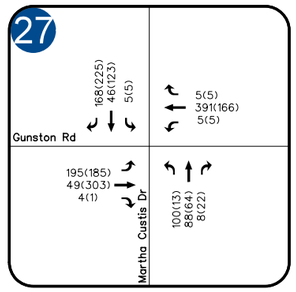


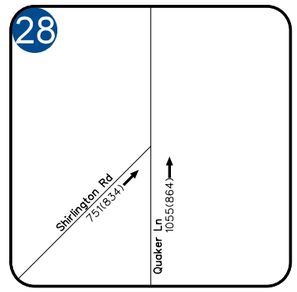


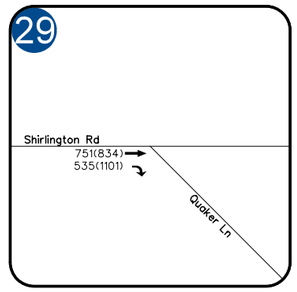


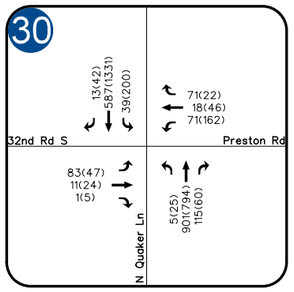


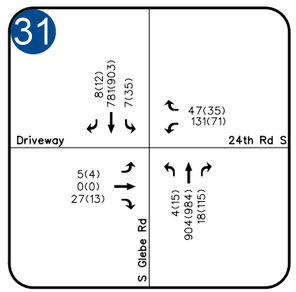


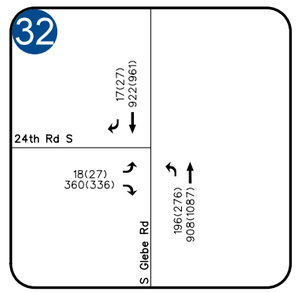


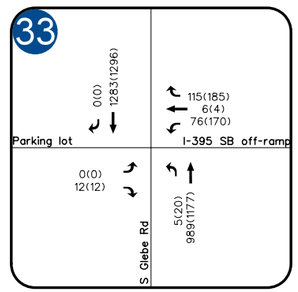


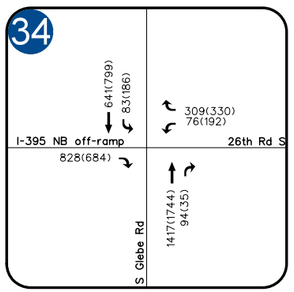












I-395 EXPRESS LANES NORTHERN EXTENSION

LEGEND

- XX INSET NUMBER
- ← xx(xx) AM(PM) PEAK HOUR TRAFFIC VOLUMES
- XX EXISTING INTERSECTION NUMBER — NO BUILD ROADWAY
- XX FUTURE INTERSECTION NUMBER — BUILD ROADWAY

395 ExpressLanes

VDOT

DRPT

2040 Build AM (PM) Peak Hour Volumes

Figure 6-30

2040 Intersection Analysis Results - AM

Study Intersection	Movement	Volume Input	ID	2040 No Build			2040 SHybrid1			2040 SHybrid2		
				Volume Output	VISSIM Delay[1]	Max Q[2] (ft)	Volume Output	VISSIM Delay[1]	Max Q[2] (ft)	Volume Output	VISSIM Delay[1]	Max Q[2] (ft)
Shirlington Rd at S Arlington Mill Dr (Signalized)	EBL	101	500	103	49.3	105	103	49.6	100	103	49.8	110
	EBT	28	500	23	45.2	105	23	45.6	100	23	45.7	110
	EBR	301	500	307	5.4	120	307	5.4	115	307	5.4	115
	EB	430	500	433	18.0	120	433	18.1	115	433	18.1	115
	WBL	17	500	13	73.5	55	13	73.5	55	13	73.5	55
	WBT	2	500	4	77.8	40	4	65.4	40	4	65.4	40
	WBR	2	500	4	65.4	40	4	77.8	40	4	77.8	40
	WB	21	500	21	72.8	55	21	72.8	55	21	72.8	55
	RampWBL	40	500	15	48.7	250	15	47.4	240	15	48.5	260
	RampWBT	232	500	242	47.2	250	243	47.8	240	242	46.7	260
	RampWBR	125	500	120	20.4	155	120	19.6	140	120	18.7	135
	RampWB	397	500	377	38.8	250	378	38.8	240	377	37.9	260
	NBL	48	500	55	34.5	280	56	32.4	270	59	35.7	315
	NBT	521	500	423	36.0	280	423	34.3	270	443	35.4	315
	NBR	45	500	36	6.8	20	36	5.5	30	38	7.7	20
	NB	614	500	514	33.8	280	515	32.0	270	540	33.5	315
	SBL	13	500	13	35.5	345	13	35.2	345	13	36.5	350
	SBT	450	500	426	45.0	355	425	44.9	355	425	44.5	360
	SBR	52	500	49	37.1	355	49	37.2	355	49	36.9	360
	SB	515	500	488	43.9	355	487	43.9	355	487	43.6	360
	Overall	1977	500	1833	34.2	-	1834	33.7	-	1858	33.9	-
S Shirlington Rd at Campbell Ave (Signalized)	EBR	502	505	496	7.5	190	496	26.1	220	496	24.9	225
	EB	502	505	496	7.5	190	496	26.1	220	496	24.9	225
	WBL	372	505	346	15.9	150	346	40.6	215	346	40.7	215
	WB	372	505	346	15.9	150	346	40.6	215	346	40.7	215
	SBT	1130	505	936	26.3	515	937	23.3	495	947	19.4	330
	SBR	81	505	101	2.5	0	101	2.5	0	102	13.3	315
	SB	1211	505	1037	24.0	515	1038	21.3	495	1049	18.8	330
	Overall	2085	505	1879	18.2	-	1880	26.1	-	1891	24.4	-
N Quaker Ln at Gunston Rd (Unsignalized)	EBL	388	515							199	29.9	280
	EB	388	515							199	29.9	280
	WBR	659	515	514	21.0	285	512	21.3	280	582	14.8	280
	WB	659	515	514	21.0	285	512	21.3	280	582	14.8	280
	NBT	1558	515	1561	10.5	885	1561	9.8	510	1573	18.8	570
	NBR	248	515	99	11.2	885	100	12.6	510	100	21.9	540
	NB	1806	515	1660	10.5	885	1661	10.0	510	1673	19.0	570
	Overall	2853	515	2174	13.0	-	2173	12.7	-	2454	18.9	-
N Quaker Ln at Shirlington Rd (Signalized)	EBL	751	2005				619	34.3	345	625	31.5	340
	EB	751	2005				619	34.3	345	625	31.5	340
	NBT	1055	2005				1041	10.5	305	1046	12.6	365
	NB	1055	2005				1041	10.5	305	1046	12.6	365
	Overall	1806	2005				1660	19.3	-	1671	19.7	-
N Quaker Ln at Preston Rd (Signalized)	EBL	83	520	42	29.4	145	43	27.3	135	43	26.6	125
	EBT	11	520	50	29.6	145	50	29.6	135	50	28.9	125
	EBR	1	520	1	5.0	145	1	11.9	135	1	8.1	125
	EB	95	520	93	29.2	145	94	28.4	135	94	27.6	125
	WBL	71	520	77	27.1	160	76	26.5	160	76	25.0	165
	WBT	18	520	10	24.1	160	10	25.3	160	11	23.6	165
	WBR	71	520	73	16.3	160	73	15.2	160	73	14.2	165
	WB	160	520	160	22.0	160	159	21.2	160	160	20.0	165
	NBL	5	520	2	8.7	5	2	6.8	10	2	6.9	10
	NBT	901	520	924	11.2	235	924	8.3	215	924	8.0	220
	NBR	115	520	93	8.3	235	93	7.6	215	93	6.9	220
	NB	1021	520	1019	11.0	235	1019	8.3	215	1019	7.9	220
	SBL	39	520	39	9.3	50	39	8.0	45	39	7.7	50
	SBT	587	520	493	5.6	140	493	5.3	130	495	5.1	135
	SBR	13	520	10	5.1	140	10	5.6	125	10	5.6	135
	SB	639	520	542	5.8	140	542	5.5	130	544	5.3	135
	Overall	1915	520	1814	11.3	-	1814	9.6	-	1817	9.2	-

1. indicates approximate level of service (LOS) and average delay in seconds per vehicle from VISSIM.
2. Avg Q referS to Average queue in feet, from VISSIM.
3. Glebe Rd, Shirlington Rd, Quaker Lane are assumed to be oriented in North-South direction.

2040 Intersection Analysis Results - PM

Study Intersection	Movement	Volume Input	ID	2040 No Build			2040 SHybrid1			2040 SHybrid2		
				Volume Output	VISSIM Delay[1]	Max Q[2] (ft)	Volume Output	VISSIM Delay[1]	Max Q[2] (ft)	Volume Output	VISSIM Delay[1]	Max Q[2] (ft)
Shirlington Rd at S Arlington Mill Dr (Signalized)	EBL	125	500	127	63.3	135	124	87.7	150	127	60.1	135
	EBT	22	500	21	54.9	135	21	101.9	150	21	60.7	135
	EBR	250	500	251	4.5	95	243	93.6	320	251	11.0	165
	EB	397	500	399	25.9	135	388	92.2	320	399	29.2	165
	RampWBL	15	500	0	0.0	310	0	0.0	310	0	0.0	290
	RampWBT	337	500	292	54.1	310	308	53.4	310	305	51.8	290
	RampWBR	113	500	97	38.7	250	100	37.7	270	100	31.1	210
	RampWB	465	500	389	50.2	310	408	49.5	310	405	46.7	290
	WBL	84	500	83	93.1	240	84	119.5	255	84	97.0	240
	WBT	52	500	54	83.5	205	19	96.4	215	19	86.6	195
	WBR	21	500	19	86.3	205	55	96.3	215	55	89.1	195
	WB	157	500	156	88.9	240	158	108.7	255	158	93.0	240
	NBL	206	500	220	59.5	765	213	59.6	640	195	53.7	475
	NBT	738	500	809	43.5	765	789	42.8	640	712	36.3	475
	NBR	13	500	14	26.3	5	14	25.5	5	12	19.1	5
	NB	957	500	1043	46.7	765	1016	46.1	640	919	39.7	475
	SBL	1	500	2	31.6	375	2	70.3	390	2	42.0	380
	SBT	522	500	525	52.9	385	506	80.8	400	509	54.2	395
	SBR	142	500	146	47.3	390	142	55.5	400	143	45.1	395
	SB	665	500	673	51.6	390	650	75.2	400	654	52.2	395
	Overall	2641	500	2660	47.8	-	2620	64.5	-	2535	45.7	-
S Shirlington Rd at Campbell Ave (Signalized)	EBR	554	505	558	12.1	245	544	40.2	285	542	42.2	285
	EB	554	505	558	12.1	245	544	40.2	285	542	42.2	285
	WBL	827	505	714	75.5	2640+	698	69.8	720	693	69.6	650
	WB	827	505	714	75.5	2640+	698	69.8	720	693	69.6	650
	SBT	1353	505	1405	29.0	710	1416	79.8	835	1350	49.0	700
	SBR	424	505	436	6.2	55	433	37.2	585	418	42.8	695
	SB	1777	505	1841	23.6	710	1849	69.8	835	1768	47.5	700
	Overall	3158	505	3113	33.4	-	3091	64.6	-	3003	51.6	-
N Quaker Ln at Gunston Rd (Unsignalized)	EBL	609	515							553	40.0	590
	EB	609	515							553	40.0	590
	WBR	404	515	403	10.7	250	403	10.9	245	404	6.4	175
	WB	404	515	403	10.7	250	403	10.9	245	404	6.4	175
	NBT	1209	515	1175	28.4	1405	1184	17.6	545	1177	24.7	585
	NBR	489	515	487	43.2	1405	488	54.4	545	485	43.6	585
	NB	1698	515	1662	32.7	1405	1672	28.3	545	1662	30.2	585
	Overall	2711	515	2065	28.4	-	2075	24.9	-	2619	28.6	-
N Quaker Ln at Shirlington Rd (Signalized)	EBL	834	2005				816	44.6	485	799	46.4	640
	EB	834	2005				816	44.6	485	799	46.4	640
	NBT	864	2005				861	22.9	405	865	16.1	360
	NB	864	2005				861	22.9	405	865	16.1	360
	Overall	1698	2005				1677	33.5	-	1664	30.7	-
N Quaker Ln at Preston Rd (Signalized)	EBL	47	520	46	38.3	120	46	32.7	120	46	29.1	130
	EBT	24	520	25	31.6	120	25	31.1	120	25	29.9	130
	EBR	5	520	4	13.6	120	4	13.6	120	4	10.7	130
	EB	76	520	75	34.7	120	75	31.1	120	75	28.4	130
	WBL	162	520	164	47.0	250	164	33.5	245	163	33.8	230
	WBT	46	520	46	50.4	250	46	34.2	245	45	33.6	230
	WBR	22	520	20	55.1	250	20	21.5	245	20	24.8	230
	WB	230	520	230	48.4	250	230	32.6	245	228	33.0	230
	NBL	25	520	25	55.9	75	25	13.6	45	25	13.0	45
	NBT	794	520	751	77.5	455	794	12.6	260	796	12.7	255
	NBR	60	520	56	61.6	455	57	11.0	260	58	11.7	255
	NB	879	520	832	75.8	455	876	12.5	260	879	12.7	255
	SBL	200	520	188	23.4	375	186	15.4	310	185	14.9	320
	SBT	1331	520	1265	11.3	440	1261	10.9	455	1236	11.3	455
	SBR	42	520	40	11.8	440	39	10.9	455	38	13.1	450
	SB	1573	520	1493	12.9	440	1486	11.5	455	1459	11.8	455
	Overall	2758	520	2630	36.5	-	2667	14.2	-	2641	14.4	-

1. indicates approximate level of service (LOS) and average delay in seconds per vehicle from VISSIM.
2. Avg Q referS to Average queue, from VISSIM.
3. Glebe Rd, Shirlington Rd, Quaker Lane are assumed to be oriented in North-South direction.

APPENDIX H – Traffic Modeling Results

MEMORANDUM

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Date: **April 20, 2018 (Revised October 16, 2018)**

To: **VDOT**

From: **RK&K**

CC: **File**

Re: **I-395 and S. Shirlington Road Interchange Safety and Operations Phase 2 Study - Existing Conditions *VISSIM* Model Calibration; UPC/CSC-107831; Activity Code: 616**

1. PURPOSE AND INTRODUCTION

The RK&K, LLP (RK&K) / WSP USA (WSP) team was tasked to conduct a safety and operations study at the I-395 (Henry H. Shirley Memorial Highway) and S. Shirlington Road interchange. The Phase 1 of this project included data collection, identifying safety and operational issues; and identified improvements with either spot or technology improvements. The Phase 2 (hereby referred to Shirlington Road Study or this study) includes a much wider scope such as operational analysis of existing and future conditions; prepare a conceptual drawing and analyze multiple alternative improvements. The purpose of this memorandum is to document the calibration procedures that were used in developing the existing condition models in *VISSIM* and is expected to supplement the documentation for future No Build and Build alternative analyses. The alternatives for this study are focused on improvements to the existing local street network and ramp and collector-distributor road network. No changes to the I-395 mainline are anticipated.

Microscopic simulation tools can model complex transportation system designs and traffic operations. All simulation models must be calibrated in order to produce accurate Measures of Effectiveness and test future concepts. Calibration ensures that the model replicates field conditions within acceptable tolerances.

2. STUDY NETWORK AND EXISTING CONDITIONS

I-395 is a major north-south corridor in Northern Virginia (NoVA) & DC Metropolitan region, serving as a prime connection between I-95/I-495 interchanges to Washington, DC. I-395 is classified as an Interstate (2014 VDOT classification) and is currently an eight-lane divided highway, with an additional reversible two-lane HOV facility in the study area. The 2016 estimated VDOT I-395 Annual Average Daily Traffic (AADT) is approximately 215,000 vehicles per day (vpd). Shirlington Road and Quaker Lane are both classified as Minor Arterials with a respective estimated 2016 AADT of 18,000 vpd and 24,000 vpd.

The study area (**Figure 1**) is a subset of the much wider study area previously used for the Interstate 395 Express Lanes Northern Extension, Traffic, and Transportation Technical Report, Project Number: 0395-969-205, P101; UPC: 108313; Federal Project Number: NHPP-395-4(189) dated September 2016. The

interstate network of the study area includes I-395 from Route 7 (King Street) to Route 120 (S Glebe Road) including the Shirlington Road/Quaker Lane rotary interchange (hereby referred to as the study interchange). Below is the list of study intersections studied in this study that include the locations analyzed in the I-395 Express Lanes project:

1. S Shirlington Road at S Arlington Mill Dr; Signalized
2. S Shirlington Road at Campbell Avenue; Signalized
3. Shirlington Rotary at HOV Ramp; Un-Signalized
4. N Quaker Lane at Gunston Road; Un-Signalized
5. Martha Custis Drive at Gunston Road; Un-Signalized
6. N Quaker Lane at Preston Road; Signalized
7. S Glebe Road at 24th Rd S (North of Glebe Road); Signalized
8. S Glebe Road at 24th Rd S (South of Glebe Road); Signalized
9. S Glebe Road at SB I-395 Off-Ramp; Signalized
10. S Glebe Road at NB I-395 Off-Ramp; Signalized
11. S Shirlington Road at Four Mile Run Drive; Signalized*
12. Campbell Avenue at S Quincy Street; Signalized*

*Intersections were not part of the I-395 Express Lane project.

Currently, there are operational Ramp Meters at each of three (3) interchanges in the study area. In general, the Ramp Meters are operational along northbound on-ramps during the morning hours and along southbound on-ramps during the evening hours. Below is a list of Ramp Meter sites in the study area, followed by the operating timeframe and lane control strategy.

1. Southbound Route 7 to I-395 Northbound (AM, Single Lane)
2. Northbound Route 7 to I-395 Northbound (AM, Dual Lane)
3. Shirlington Road/Quaker Lane rotary to I-395 Northbound (AM, Dual Lane)
4. Southbound S Glebe Road to I-395 Northbound (AM, Single Lane)
5. Northbound S Glebe Road to I-395 Northbound (AM, Single Lane)
6. Shirlington Road/Quaker Lane rotary to I-395 Southbound (PM, Single Lane)
7. Northbound Route 7 to I-395 Southbound (PM, Single Lane)
8. Southbound Route 7 to I-395 Southbound (PM, Single Lane)

2.1. Traffic Data

As mentioned earlier in this memorandum, Phase 1 of the study included data collection including turning movement counts at the intersections, tube counts along the I-395 mainline and the interchange ramp locations. **Figure 2** presents the peak hour volumes in the study area. **Attachment A** includes the raw traffic count data in electronic format.

Additionally, this study included conducted supplemental field data collection and observations to determine queue lengths (included in Attachment A) at the study intersections. The queue summary is presented in further sections of this memorandum. Travel time runs were also conducted along the S Glebe Road, S Shirlington Road, and N Quaker Lane study corridors for calibration purposes. The I-395 mid-weekday (Tuesday, Wednesday, and Thursday) travel time data was obtained from RITIS/INRIX database between September 12th through 28th of 2017 between 7AM-9AM and 4PM-6PM. The later hours of the peak period (8AM-9AM & 5PM-6PM) were noticed to have higher travel times along the I-395 corridor indicating the greater extent of congestion compared to the first hour of the period. **Table 1** presents the peak directional summary of obtained RITIS/INRIX travel time data along I-395 and

Attachment B includes the raw I-395 travel time data in electronic format. The summary of obtained I-395 data is presented in later sections of this report. In general, the typical traffic conditions in the study area are impacted by the downstream I-395 operations and arterial network congestion outside of the study area. As shown in **Figure 3**, during the morning peak hours, along the I-395 northbound general purpose lanes spill back from downstream interchanges (Route 27, Route 1/Route 110 & DC Line) reaches the study area. Similarly, during the evening peak hours, along the I-395 southbound general purpose lanes, congestion of downstream Route 420 (Seminary Road) interchange spills back towards the Quaker Lane rotary interchange. **Attachment C** includes the existing signal timings used for the analyses.

Table 1: Summary of I-395 Peak Directional Travel Times

Direction	INRIX ID	VISSIM ID	Segment	Travel Times (Secs)[1,2]		
				Minimum	Average	Maximum
I-395 Northbound (AM)	110P04124	1	NB Between King St Ramps	91	115	194
	110P04125	2	NB Between Quaker Ln Ramps	28	40	65
	110+04126	3	NB Weaving Btwn Quaker Ln & S Glebe Rd	62	92	139
	110P04126	4	NB Btwn S Glebe Rd NB Ramps	57	74	119
	110+04127	5	NB North of S Glebe Rd	111	144	244
	Total Northbound			*350*	*465*	*761*
I-395 Southbound (PM)	*110N04126*	6	SB Btwn S Glebe Rd SB Ramps	88	104	122
	110-04125	7	SB Weaving Btwn Quaker Ln & S Glebe Rd	78	90	110
	110N04125	8	SB Btwn Quaker Ln Ramps	38	42	51
	110-04124	9	SB Btwn Quaker Ln & King St	21	22	27
	110N04124	10	SB Between King St Ramps	133	149	189
	Total Southbound			*357*	*407*	*499*

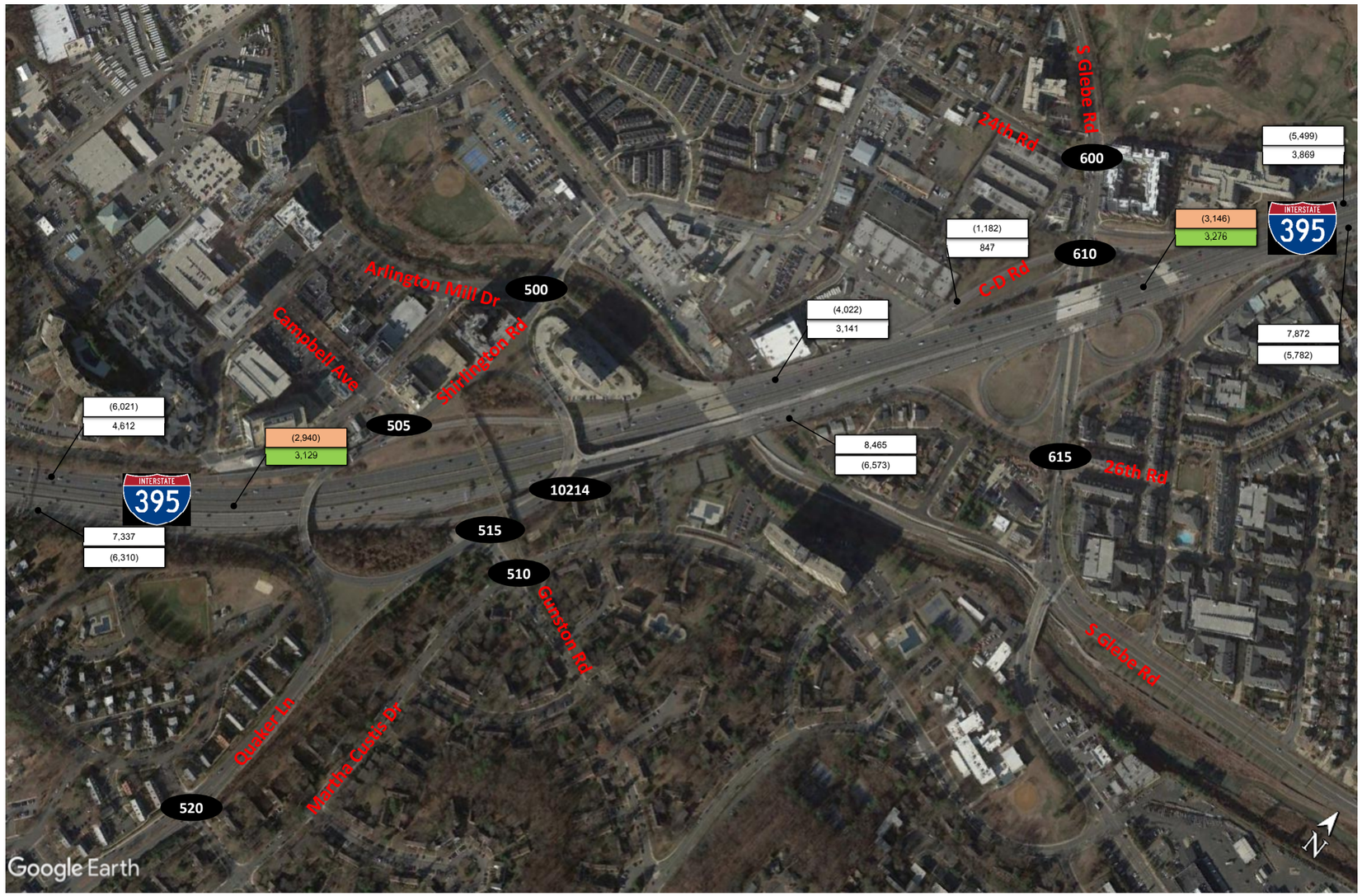
1. The I-395 peak directions during AM and PM peak hours are northbound and southbound, respectively.
2. Data Source: RITIS/INRIX database; obtained for weekdays from September 12th through 28th.

2.2. *VISSIM* Model Development

For this study, *VISSIM* Version 8.00-15 was used to model the study area. The I-395 Express Lanes model was used as the basis for development of Shirlington Road Study *VISSIM* model. As requested by VDOT, a smaller model area from Route 7 to Route 120 was extracted from the base model. It is to be noted that the extracted model does not fully capture the congestion along the mainline of I-395 which is caused by bottlenecks that are located outside of the study area. Further discussion on how I-395 mainline congestion was modeled and calibrated is included in subsequent sections.

Traffic volume input and routing information was retained from the I-395 Express Lanes Model. As noted earlier, the model was further expanded to include two additional intersection along the arterial network. The respective signal timings for additional intersections were obtained from the Arlington County. Turning movement data obtained during Phase 1 was utilized for additional intersections.

Figure 1: Study Area



Legend

xxx (xxx) Weekday AM (PM) Volume

xxx (xxx) HOV Directional AM/PM (NB/SB) Volume

NOT TO SCALE

Note: Shirlington Rd, Quaker Ln and S Glebe Road are assumed to be oriented in north-south direction.

500	Shirlington Rd at S Arlington Mill Dr (Signalized)
505	Shirlington Rd at Campbell Ave (Signalized)
10214	Shirlington Rotary at HOV Ramp (Un-Signalized)
510	Martha Custis Dr @ Gunston Rd (Unsignalized)
515	Quaker Ln @ Gunston Rd (Unsignalized)
520	N Quaker Ln at Preston Rd (Signalized)
600	S Glebe Rd at 24th Rd S (Signalized; 2 Signals)
610	S Glebe Rd at SB I-395 Off-Ramp (Signalized)
615	S Glebe Rd at NB I-395 Off-Ramp (Signalized)

500

(175)	(584)	(5)	R	111	(132)
48	419	14	T	217	(462)
R	T	L	L	46	(53)
(119)	97	L	L	T	R
(3)	21	T	60	455	39
(238)	283	R	(181)	(465)	(8)

505

(245)	(1,173)				
101	908				
R	T	L			
		L			
		T			
(475)	474	R			

10214

(206)			R	147	(0)
0			T	838	(929)
R	T	L	L		

510

(116)	(106)	(10)	R	9	(4)
118	38	5	T	227	(96)
R	T	L	L	4	(7)
(86)	70	L	L	T	R
(72)	31	T	100	96	7
(17)	6	R	(34)	(62)	(21)

515

			R	445	(246)
			T		
			L		
			L	T	R
				1,702	107
				(1,198)	(175)

520

(50)	(1,189)	(175)	R	66	(35)
11	474	35	T	9	(26)
R	T	L	L	70	(36)
(29)	81	L	L	T	R
(18)	101	T	3	1,074	116
(9)	2	R	(7)	(791)	(107)

600

(6)	(898)	(31)	R	44	(32)
1	1,023	6	T		
R	T	L	L	126	(64)
(25)	19	L	L	T	R
		T	144	931	
(291)	352	R	(271)	(1,004)	

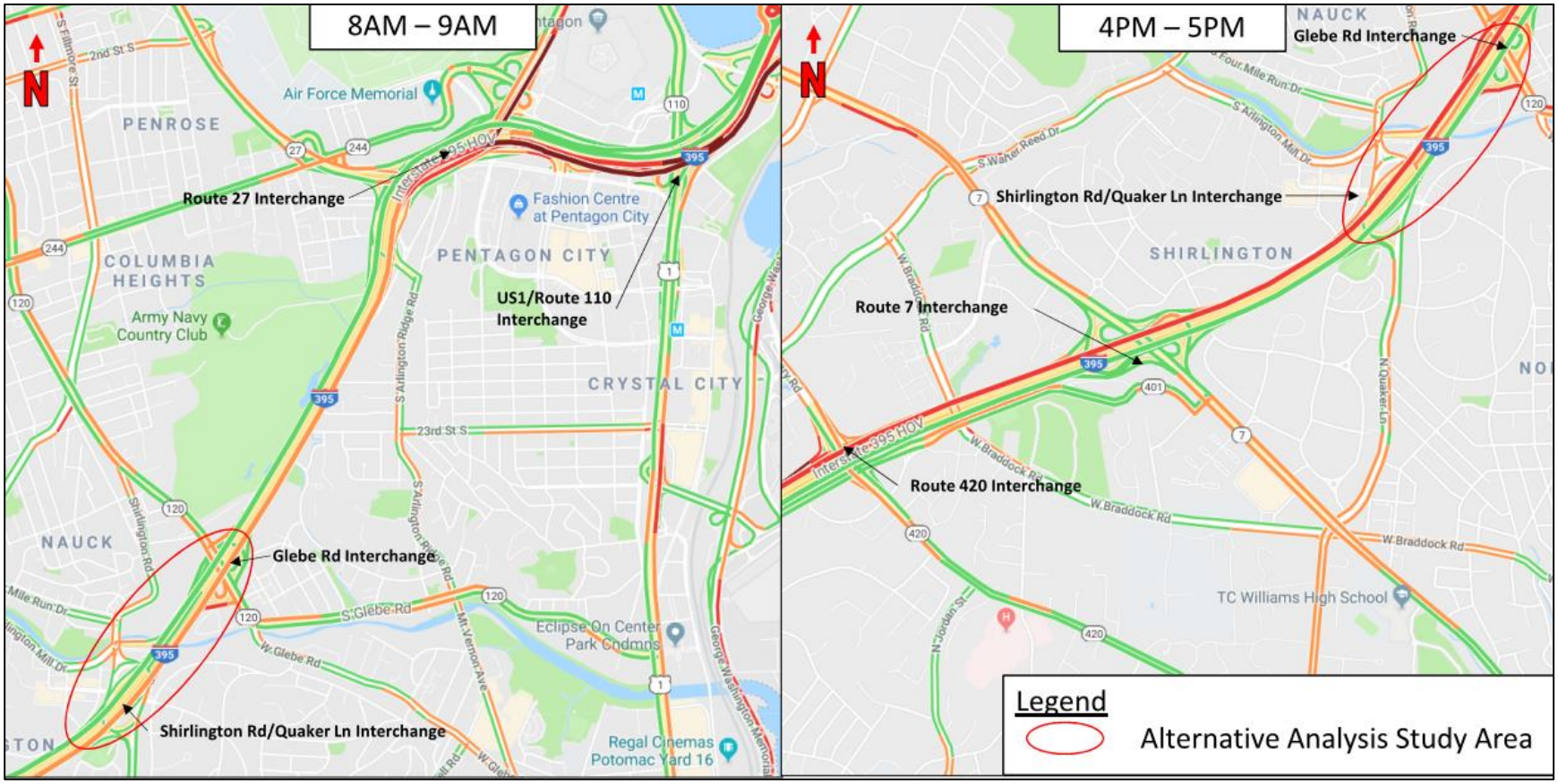
610

(362)	(1,231)		R	116	(143)
329	1,496		T		
R	T	L	L	79	(108)
		L	L	T	R
		T	5	959	
		R	(17)	(1,138)	

615

	(653)	(163)	R		
	720	250	T		
R	T	L	L		
		L	L	T	R
		T		1,312	75
(658)	866	R		(1,534)	(34)

Figure 3: Typical Traffic Conditions from Google Maps



3. CALIBRATION PROCESS

The goal of the calibration effort is to replicate the existing real-world condition in the simulation model with minimally acceptable differences. The Wiedemann 99 and Wiedemann 74 car following models were used for modeling freeway (I-395) and arterial (all non-freeway links) links, respectively. Initial simulation runs conducted using default driver behavior parameters showed significant differences in travel time and volume outputs along I-395, indicating that default driver behavior parameters do not replicate field conditions with sufficient accuracy. Hence, driver behavior parameters were adjusted through an iterative process to achieve results within the calibration targets. In particular, critical car following and lane changing parameters of Wiedemann 99 and Wiedemann 74 models were adjusted.

All the driver and link behavior parameters were retained from the I-395 Express Lane model, with few exceptions each for the AM and PM models and are documented below.

3.1. Calibration Adjustments

3.1.1. AM Peak Hour

The driver behavior along the study network (both I-395 & arterials) are dependent on the roadway operations outside of the study area. Most notably, the I-395 northbound spill back congestion from downstream is not feasible to model in the study area. Therefore, the "Reduced Speed Area" (RSA) functionality of *VISSIM* was utilized to mimic the congestion and spillback. An empirical RSA between the speeds of 27 miles per hour (mph) and 30 mph was created (**Figure 4**) and applied to northern links outside (approximately 4,000-ft north of S Glebe Road interchange) of the study area.

Except for a few locations, all of the link behaviors were retained from the I-395 Express Lane model for the urban roadways. A new passive driver behavior (RKK PASSIVE URBAN) was created for the S Shirlington Road between Arlington Mill Drive and Four Mile Run Drive. Under a much larger study area, the I-395 Express Lanes study modeled an aggressive urban driver behavior for the above-mentioned segment. However, based on more detailed field observations, the S Shirlington Road segment was noticed to have conservative behavior. **Figure 5** presents the links in the study area that were adjusted from the I-395 Express Lanes model. **Table 2** compares the RKK PASSIVE URBAN model driver behavior with default *VISSIM* urban driver behavior parameters.

Figure 4: Empirical I-395 Northbound AM Reduced Speed Area (RSA)

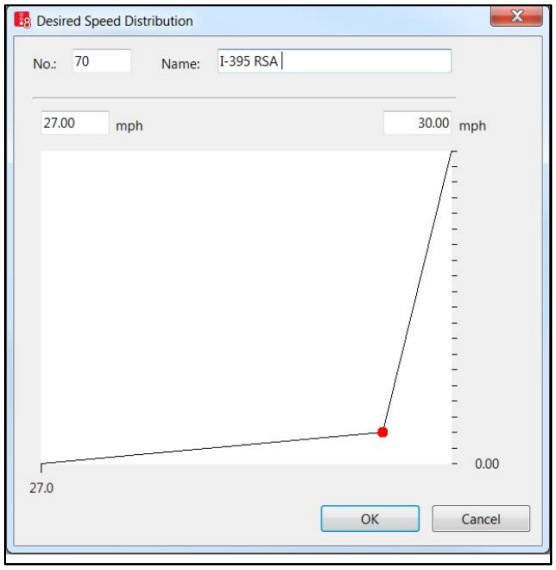


Figure 5: Graphical Summary of Links with Adjusted Driver Behavior (RKK PASSIVE URBAN)

Table 2: Comparison of Default *VISSIM* Vs RKK PASSIVE URBAN Driver Behavior Parameters

Wiedemann 74 Following Parameter	Unit	Default	RKK PASSIVE URBAN
Average Standstill Distance	ft	6.56	13.12
Additive part of safety distance		2	4
Multiplic. part of safety distance		3	6
Wiedemann 74 Lane Change Parameter	**Unit**	**Default**	**RKK PASSIVE URBAN**
Minimum Headway (Front/Rear)	ft	1.64	3.28
Safety Distance Reduction Factor		0.6	0.2

3.1.2. PM Peak Hour

Similar to the PM peak hour, the operations along the study roadway networks are dependent on the congestion outside the study area. As shown in Figure 3, spill back from the Route 420 interchange reaches the study network. An RSA was utilized to model the spill back into the study area and is shown in **Figure 6.** This RSA was specifically applied to the I-395 southbound links outside of the study area (at and south of the Route 7 interchange). Additionally, a new passive driver behavior (RKK PASSIVE FREEWAY) was created and applied to the entirety of the southbound I-395 study section. Together, the RSA and passive driver behavior are anticipated to successfully mimic the downstream congestion. **Table 3** presents the comparison of default freeway (Wiedemann 99) driver behavior with RKK PASSIVE FREEWAY behavior.

Figure 6: Empirical I-395 Southbound PM Reduced Speed Area (RSA)

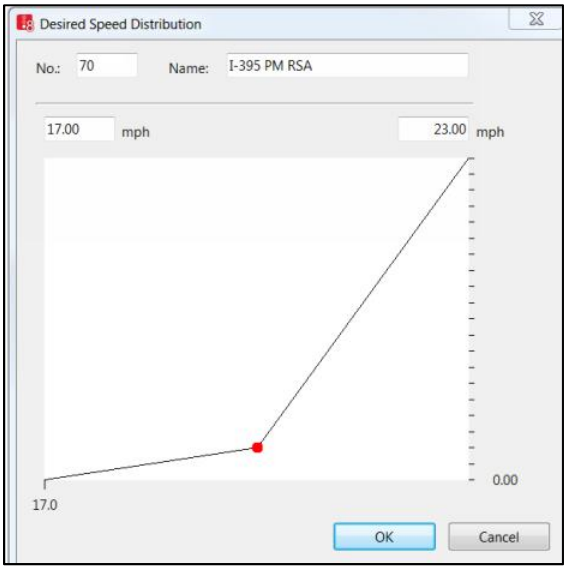


Table 3: Comparison of Default *VISSIM* Vs RKK PASSIVE FREEWAY Driver Behavior Parameter

Wiedemann 99 Following Parameter	Unit	Default	RKK PASSIVE FREEWAY
CC0 (Standstill Distance)	ft	4.92	9.84
CC1 (Headway Time)	sec	0.9	1.5
CC2 (Following Variation)	ft	13.12	20.5
CC3 (Threshold for Entering "Following")		-8	-8
CC4 (Negative "Following" Threshold)		-0.35	-0.35
CC5 (Positive "Following" Threshold)		0.35	0.35
CC6 (Speed Dependency Oscillation)		11.44	11.44
CC7 (Oscillation Acceleration)	ft/s^2	0.82	0.82
CC8 (Standstill Acceleration)	ft/s^2	11.48	11.48
CC9 (Acceleration at 50 mph)	ft/s^2	4.92	4.92
Wiedemann 74/99 Lane Change Parameter	**Unit**	**Default**	**RKK PASSIVE FREEWAY**
Minimum Headway (Front/Rear)	ft	1.64	2.5
Safety Distance Reduction Factor		0.6	0.1

3.2. Calibration Targets

The Table 5 of VDOT *Traffic Operations and Safety Analysis Manual (TOSAM), Version 1.0* suggests the following calibration thresholds (**Figure 7)** with the guidance from the FHWA *Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Micro-Simulation Modeling Software*. The I-395 model was calibrated to ensure the measures of effectiveness (MOE's) satisfy these calibration thresholds. Further sections of this memorandum document the results in detail.

3.3. *VISSIM* Global Parameters

All the *VISSIM* global parameters from the I-395 Express Lanes model are retained for this study. Below is a description of critical parameters listed in TOSAM.

3.3.1. Vehicle Inputs & Seeding Time

The TOSAM suggests coding hourly traffic volumes in 15-min intervals. However, since this study adopted the majority of volume inputs from I-395 Express Lanes model, the existing 60-min volume intervals are retained. A 15-min seeding period (twice the highest existing peak hour travel time) was utilized for this study. The peak hour (1-hour) duration is used for recording and processing the results.

3.3.2. Heavy Vehicle Percentages

The heavy vehicle percentages for the freeway and arterial network were adopted from the I-395 Express Lane Model for the study area, which was determined as 3% for analysis purposes.

3.3.3. Arrival Distribution

The "exact volume" arrival distribution is used for all the vehicle inputs.

3.3.4. Origin-Destination (O-D)

The *VISSIM* origin-destination routes are set up based on the existing traffic mainline and ramp counts for individual movements. A large-scale origin-destination study to determine all specific vehicle paths at the study interchange was not conducted as part of this study. However, the "Combine Static Routing Decision" functionality of *VISSIM* was used to achieve realistic driver behavior within the study interchange. The adopted methodology is expected to result in few vehicles exiting the freeway and entering immediately via on-ramp. Additionally, at the study location, during the PM peak some traffic does exit the I-395 HOV / Future HOT lanes at Shirlington Road and then re-enter I-395 southbound general purpose lanes at this interchange to access destinations at King Street (which is not directly served by an ramp from the HOV / Future HOT lanes). Given the nature of alternatives considered for this study and consistency of this methodology across all the models no impacts are anticipated to the analyzed alternatives.

3.3.5. Car-Following Model

The Wiedemann 99 and Wiedemann 74 car following models are used for modeling freeway and urban links corridors, respectively.

3.3.6. Simulation Period and Resolution

During both AM and PM peak hours, a simulation period of 8,100 seconds including 900 seconds of seeding time and 7,200 seconds of recording time is used. The results were extracted from 4,500-8,100 simulation period based on the RITIS/INRIX travel time data. As recommended in TOSAM, a simulation resolution of 10-time steps/simulation second is used.

3.4. Number of Model Runs/VDOT TOSAM Guidance

A minimum number of model runs is required to produce accurate results. The VDOT Sample Size Determination Tool was used to identify an appropriate number of simulation runs. The I-395 Northbound and southbound travel times at the Shirlington Road/Quaker Lane rotary interchange was used as a performance measures in determining the minimum number of runs. The resulting ten (10) simulation runs from the VDOT tool was used as basis for minimum number of model runs. **Attachment D** includes the sample size determination worksheets.

Figure 7: VDOT TOSAM Calibration Thresholds

Table 5: Microsimulation Model Calibration Thresholds

Simulated Measure	Calibration Threshold	
Simulated Traffic Volume (vehicles per hour) **The top 85% of the network links, based on link traffic volume, or a select number of critical links and/or movements, as determined by the RTE or his/her designee, shall meet the calibration thresholds. The traffic volumes identified in the calibration thresholds are actual traffic volumes as opposed to simulated traffic volumes.**	Within ± 20% for <100 vph Within ± 15% for ≥100 vph to <300 vph Within ± 10% for ≥300 vph to <1,000 vph Within ± 5% for ≥1,000 vph	
Simulated Average Speed (miles per hour) **The top 85% of the network links, based on link traffic volume, or a select number of critical links and/or movements, as determined by the RTE or his/her designee, shall meet the calibration thresholds.**	Within ± 5 mph of average observed speeds on arterials Within ± 7 mph of average observed speeds on freeways	
Simulated Travel Time (seconds) **Eight-five percent (85%) of the travel time routes, or a select number of critical routes, as determined by the RTE or his/her designee, shall meet the calibration thresholds. Travel time routes should be determined in cooperation with the VDOT project manager based on project needs and goals.**	Within ± 30% for average observed travel times on arterials Within ± 20% for average observed travel times on freeways The travel time should be calibrated for segments and routes separately or as deemed appropriate by the VDOT project manager.	
Simulated Queue Length (feet) **The top 85% of the network links, based on link traffic volume, or a select number of critical links and/or movements, as determined by the RTE or his/her designee, shall meet the calibration thresholds.**	Undersaturated conditions (refer to Section 2.6 for guidance)	*Average queue length on arterials:* Within ± 30% for movements ≤10 vph Within ± 20% for movements >10 vph
		Maximum queue length on arterials: Within ± 25%
	Oversaturated conditions (refer to Section 2.6 for guidance)	*Average queue length:* Within ± 20% on arterials Within ± 30% on freeways
		Maximum queue length: Within ± 20% on arterials Within ± 35% on freeways

Notes:

1. The calibration thresholds shall be used as minimum thresholds for calibration. The VDOT project manager may decide to use stricter thresholds based on the project needs. If the minimum thresholds cannot be achieved, written justification shall be provided for review and approval by the RTE or his/her designee.
2. Field measurements should be made when there are no unusual traffic conditions, such as special events, crashes, incidents, etc. and preferably at the same time as the counts are conducted.
3. Critical links, movements, and/or routes in the network, if needed, shall be determined in coordination with the RTE or his/her designee.

Recommendations for Selecting Simulated Measures Based on Type of Analysis:

- Intersection Analysis: simulated traffic volume and simulated queue length should be used for calibration.
- Arterial Analysis (no freeways): simulated traffic volume and simulated queue length should be used for calibration.
- Freeway Analysis (no arterials): simulated traffic volume and simulated average speed should be used for calibration. Simulated queue length at bottlenecks should also be checked, if present.
- Network Analysis (both freeways and arterials): simulated traffic volume and simulated travel time should be used for calibration.

4. CALIBRATION METHODOLOGY & RESULTS

As mentioned earlier in the document, traffic analysis was conducted using the microsimulation tool *VISSIM.* Within this chapter, key results for freeway facilities and intersections are color coded to correspond to varying congestion levels. **Table 4** summarizes the thresholds for freeway segments and signalized intersection measures of effectiveness. Because the results presented were developed using microsimulation tool, level of service (LOS) is not reported as a measure of effectiveness.

Table 4: Congestion Levels as Freeway and Intersection Measure of Effectiveness

Freeway Congestion Levels	Average Density (veh/mi/ln)
Light	≤ 26
Moderate	> 26-35
Heavy	> 35-45
Severe	> 45
Intersection Congestion Levels	**Average Delay (sec/veh)**
Light	≤ 35
Moderate	> 35- 55
Heavy	> 55 - 80
Severe	> 80

The model travel times along I-395 and arterial network were captured using the *VISSIM "travel time"* evaluation feature for identical start/end locations as in RITIS/INRIX database and field runs. Initial simulation runs conducted using default driver behavior parameters showed significant differences in travel time and volume outputs along I-395, indicating that default driver behavior parameters did not replicate field conditions with sufficient accuracy. Hence, driver behavior parameters were adjusted through an iterative process to achieve results that satisfy the calibration targets as mentioned in Section 3.1.

4.1. I-395 Travel Time and Volume Calibration Results

The performance measures considered for the freeway (I-395) calibration include speeds, travel times, and volume throughput.

The travel time results for I-395 mainline for the calibrated AM and PM peak hour models are summarized in **Table 5**. During the AM peak hour, the modeled I-395 travel times for the length of the study segment of I-395 are within 10% of the field travel times and satisfy the calibration threshold. Additionally, all of the individual model study segment travel times are within the calibration thresholds (20%) of field values, except for one. The northbound I-395 model segment (Section#2) at the Shirlington Road/Quaker Lane interchange travel time exceeds field travel times by 34%. However, the low absolute travel time values are often expected to result in high percentage results as noticed in this case. The deviation in this individual segment is approximately 14 seconds and would not impact the analysis of the alternatives in the future build conditions (which are focused on the arterial street network, ramps, and collector-distributor roads.

During the PM peak hour, the travel times along both directions of I-395 for the entire study segment are within (under 12%) the calibration threshold of 20%. A few individual segments experience higher travel times than field observed conditions along the off-peak direction (northbound); but the overall travel time differences are not significant and will not impact the alternatives under study for this project. Along the peak southbound direction, one I-395 travel time (Section#9) south of the study interchange exceeds the calibration threshold of 20%. However, the low absolute travel time values over a short travel time section length (approximately 0.1 miles for #9) are deemed to be acceptable for the calibration. Again, the differences within individual short segments are not expected to substantively impact the analysis results for the alternatives under consideration for this project; the end to end travel times along the study segment of I-395 are within 12% of the field-observed values.

Table 6 includes the volume calibration and link evaluation results for I-395 and ramp junctions. The table includes VISSIM volume inputs and modeled throughputs for each segment. Additionally, at two locations, field measured throughputs were obtained from mainline counts. For calibration purposes on a congested corridor, the volume inputs to VISSIM represent the estimated demand (not field-measured throughput) and typically exceed the measured throughput in order to generate the necessary congestion, which often lead to unfinished vehicles in the model. The model revealed a moderate number (over 100 vehicles) of unfinished vehicles during both AM and PM periods along the respective peak directions of I-395. Therefore, a direct comparison between model inputs and outputs along I-395 is not appropriate. Instead, at the key locations, model throughputs and the field-measured throughputs were compared. The VISSIM throughputs in the peak direction are within 4% of the field throughputs at 3 of the 4 locations assessed. At the remaining location, the model throughputs are 7% above the field measured value (exceeding the 5% TOSAM threshold) and would not substantially impact the analysis results for the alternatives considered for this study. **Table 7** presents the throughput calibration along the I-395 ramps in the study area, which satisfy the calibration thresholds listed in Figure 6.

Overall, the calibrated model indicates severe congestion along peak directions of I-395 during AM (northbound) and PM (southbound) similar to field observed conditions. Along the off-peak directions, traffic operations are acceptable with moderate to light congestion during both peak hours.

4.2. Arterial Calibration Results

The performance measures considered for arterial calibration include travel time, volume throughputs. Additionally, the maximum queue lengths were also considered as a secondary performance measure. For the secondary performance measure, a calibration threshold of 100-ft or approximate four-car lengths was also considered in addition to the TOSAM 25% difference threshold between the model and field queue lengths.

Table 8 presents the travel time calibration results for the arterial network in the study area. The calibrated model successfully replicated the total travel times during both AM and PM peak hours along the arterial roadways (S. Glebe Road, Quaker Lane, Shirlington Road and Rotary Loop roadways) within 30% of the field travel time, except for one. The PM peak hour model travel times along S Glebe Road that is located outside of Shirlington Road study interchange exceeded calibration thresholds. However, this outlier segment would not substantially impact the alternative analysis considered for this study. During the AM peak hour, there were seven (7) individual roadway travel time sections that did not meet the calibration threshold. However, the majority (6) of these exceptions were either observed on short travel time sections (0.15 miles or lower) or have low (under 50 seconds) absolute travel time values. The deviations within individual segments would not substantially impact the evaluation of alternatives.

During the PM peak hour, five (5) individual travel time sections did not satisfy the calibration threshold. However, three (3) of these sections were noticed to have similar attributes as the excepted segments in AM, with short section lengths or low absolute values.

Table 9 presents the volume calibration and analysis results for the study intersections. During AM peak hour, the calibrated model successfully processed over 97% of intersection approaches within the thresholds in the study network (which exceeds the requirement for 85% of the links). Similarly, during the PM peak hour, the model successfully processed over 95% of the intersection approaches within the calibration thresholds (which exceeds the requirement for 85% of the links). Overall, all the study intersections operate at acceptable conditions with light or moderate congestion levels during the AM and PM peak hours. **Attachment E** includes a comparison of field-collected turning movements and VISSIM modeled turning movements for each intersection.

Table 10 presents the maximum queue length calibration results for the study intersections. Approximately over 70% of the approaches were calibrated within 25% or 125-ft of the field observed maximum queue lengths. Calibrating individual maximum queuing movements can be challenging in urban conditions with variable day to day traffic congestion. Queue observations were conducted on two days in 2017 and one day in 2018. The queuing conditions may have varied on those dates compared to the dates the volumes were collected. With volumes and travel times on the segment matching within thresholds for the arterial network, it is not anticipated that the deviations from the queuing thresholds will substantively impact the analysis results for the alternatives under study. Specific locations (both of which are not impacted by the alternative envisioned) where the modeled queues substantially exceed the recommended thresholds include:

- SB Shirlington Rd at S. Arlington Mill Drive – The modeled queue lengths in both the AM and PM peak exceed the field observed values. This is an entry link and the appropriate volume was processed on this approach based on the volume calibration. The input (demand) value for this approach may be too high, leading to longer queue lengths than observed in the field. This deviation would not impact the assessment of alternatives.
- S Glebe at 24th Rd – The modeled queue length in the AM peak exceeds the thresholds along the southbound S Glebe approach. Again, this location is an entry link and the volume throughput along S Glebe matches the field collected data. The input demand may too high here leading to a longer queue for this approach; however, this would not impact the results for the alternatives being considered.

As mentioned earlier in this document, the analysis indicates that severe congestion levels along northbound and southbound I-395 during the AM and PM peak hours, respectively. As noticed in the field, the I-395 queue spill back extended beyond the upstream ramps at specific locations. Similarly, due to the existing congestion on the arterial network, queue spill back was also noticed to extend onto the freeway network. Below is a list of locations with a noticeable queue spill back:

1. Shirlington Road/Quaker Lane rotary to I-395 Northbound
    a. During AM peak hour, queue extends from I-395 mainline onto the rotary impacting the operations. The queue for this location is within 9% of the field observed values (see Table 10).
2. I-395 Northbound off-ramp to S Glebe Road
    a. During the AM peak hour, arterial queue spill back was noticed to spill back onto the freeway. This condition is replicated in the VISSIM model, with queues within 20% of the estimated maximum length.

b. During the PM peak hour, arterial queue spill back extends just short of the I-395 off-ramp diverge point.

3. I-395 Southbound off-ramp to S Glebe Road/Shirlington Road/Quaker Lane C-D Road
    a. During the PM peak hour, queue from the downstream C-D Road on-ramp to I-395 southbound impacts the upstream off-ramp and I-395 mainline.
4. I-395 Southbound on-ramp to S Glebe Road/Shirlington Road/Quaker Lane C-D Road
    a. During the PM peak hour, the congestion on I-395 caused spill back onto the C-D Road on-ramp.

Table 5: Existing Condition I-395 Travel Time Calibration Results

Direction	INRIX ID	VISSIM ID	Segment	Field	*VISSIM*	% Diff	Field	*VISSIM*	Diff
				Travel Times (Secs)[1]			Speeds (Mph)[2]		
AM Peak Hour (7AM-8AM)									
I-395 Northbound	110P04124	1	NB Between King St Ramps	115.3	114.5	1%	20	20	0%
	110P04125	2	NB Between Quaker Ln Ramps*	40.0	53.7	-34%	22	17	5
	110+04126	3	NB Weaving Btwn Quaker Ln & S Glebe Rd	91.6	89.6	2%	18	18	1
	110P04126	4	NB Btwn S Glebe Rd NB Ramps	74.0	63.6	14%	19	21	2
	110+04127	5	NB North of S Glebe Rd	143.8	128.2	11%	20	22	2
	Total Northbound			464.7	449.6	3%	-		
I-395 Southbound	*110N04126*	6	SB Btwn S Glebe Rd SB Ramps	30.6	34.3	-12%	62	56	5
	110-04125	7	SB Weaving Btwn Quaker Ln & S Glebe Rd	25.8	28.3	-10%	62	56	6
	110N04125	8	SB Btwn Quaker Ln Ramps	13.1	13.1	0%	59	56	3
	110-04124	9	SB Btwn Quaker Ln & King St	7.2	8.5	-18%	58	54	4
	110N04124	10	SB Between King St Ramps	40.6	44.5	-10%	61	56	4
	Total Southbound			117.4	128.7	-10%	-		
PM Peak Hour (5PM-6PM)									
I-395 Northbound	110P04124	1	NB Between King St Ramps	41.0	43.2	-5%	55	52	3
	110P04125	2	NB Between Quaker Ln Ramps	14.4	17.9	-24%	62	51	11
	110+04126	3	NB Weaving Btwn Quaker Ln & S Glebe Rd	27.1	32.5	-20%	59	51	8
	110P04126	4	NB Btwn S Glebe Rd NB Ramps	24.0	25.6	-6%	57	52	5
	110+04127	5	NB North of S Glebe Rd	47.6	53.0	-11%	61	53	8
	Total Northbound			154.2	172.2	-12%	-		
I-395 Southbound	*110N04126*	6	SB Btwn S Glebe Rd SB Ramps	103.7	118.6	-14%	18	16	2
	110-04125	7	SB Weaving Btwn Quaker Ln & S Glebe Rd	90.1	93.0	-3%	18	17	1
	110N04125	8	SB Btwn Quaker Ln Ramps	41.7	47.2	-13%	19	15	3
	110-04124	9	SB Btwn Quaker Ln & King St	22.4	43.9	-97%	19	10	8
	110N04124	10	SB Between King St Ramps	148.7	148.1	0%	17	17	0
	Total Southbound			406.6	450.9	-11%	-		

1. Travel time values that exceed the TOSAM threshold limits (20%) along peak direction are highlighted.
2. Average Speed values that exceed the TOSAM threshold limits (±7MPH) along peak direction are highlighted.
*Quaker Ln refers to Shirlington Rd/Quaker Ln Rotary Interchange.

Table 6: Existing Condition I-395 Volume Calibration and Link Results

	Link	Link#	# Lanes	Type	8AM-9AM					5PM-6PM				
					Field-Measured Throughput [1]	Model Volume Input	Model Volume Output	% Diff	Density (pcpmpl)	Field-Measured Throughput [1]	Model Volume Input	Model Volume Output	% Diff	Density (pcpmpl)
I-395 Northbound	Off Ramp to King St	1332	4	Weave	-	5,863	4,919	-	92	-	6,235	6,242	-	29
	Between King St Ramps - 1	1333	3	Basic	-	5,569	4,664	-	86	-	5,432	5,439	-	35
	On Ramp from EB King St	135	4	Merge	-	6,367	5,468	-	86	-	6,051	6,064	-	30
	Between King St and Quaker Ln	254	4	Weave	6,041	7,337	6,443	-7%	84	5,921	6,310	5,838	1%	30
	Between Quaker Ln Ramps	292	4	Basic	-	7,077	6,213	-	88	-	5,621	5,209	-	25
	Between Quaker Ln & Glebe Rd	294	5	Weave	-	8,265	7,606	-	80	-	6,573	6,023	-	28
	Between Glebe Rd Off& On Ramps	392	4	Basic	-	7,499	6,821	-	77	-	5,915	5,424	-	26
	Betwenn S Glebe Rd Weave Ramps	393	5	Weave	-	7,780	7,094	-	74	-	6,087	5,593	-	23
	Between S Glebe Rd Off& On Ramps	395	4	Basic	-	7,526	6,790	-	81	-	5,646	5,191	-	25
	On Ramp from S Glebe Rd	396	5	Merge	7,043	7,872	7,136	-1%	99	5,317	5,782	5,328	0%	20
					8AM-9AM					5PM-6PM				
	Link	Link#	# Lanes	Type	Field-Measured Throughput [1]	Model Input Volume	Model Volume Output	% Diff	Density (pcpmpl)	Field-Measured Throughput [1]	Model Volume Input	Model Volume Output	% Diff	Density (pcpmpl)
I-395 Southbound	North of S Glebe Rd	369	3	Basic	4,169	3,869	3,884	7%	19	5,062	5,499	5,286	-4%	89
	On Ramp from S Glebe Rd	444	4	Merge	-	3,988	3,985	-	18	-	5,204	4,843	-	78
	Between Quaker Ln & King St	1263	5	Weave	4,766	4,612	4,599	4%	17	5,554	6,021	5,606	-1%	104
	Between King St Ramps	137	4	Basic	-	3,875	3,862	-	17	-	5,099	4,751	-	83
	On Ramp from King St NB	126	5	Merge	-	4,169	4,158	-	15	-	5,282	4,943	-	57
	On Ramp from King St SB	1334	5	Merge	-	4,594	4,583	-	16	-	5,625	5,282	-	50

1. Field measured throughput from the four (4) mainline I-395 counts conducted as part of this study.

Table 7: Existing Condition I-395 Ramp Calibration Results

				8AM-9AM			5PM-6PM		
I-95 Northbound	*Note*	*Link#*	*# Lanes*	*Model Volume Input*	*Model Volume Output*	*% Diff*	*Model Volume Input*	*Model Volume Output*	*% Diff*
	On Ramp from King St	1341	2	970	982	-1%	259	261	-1%
	Off Ramp to Quaker Ln	381	1	260	227	13%	689	626	9%
	On Ramp from Quaker Ln	383	1	1,388	1,381	0%	952	810	15%
	Off Ramp to SB Glebe Rd	390	1	866	775	10%	658	600	9%
	On Ramp from SB Glebe Rd	426	1	281	280	0%	172	170	1%
	Off Ramp to NB Glebe Rd	394	1	354	310	12%	441	405	8%
	On Ramp from NB Glebe Rd	397	1	346	342	1%	136	138	-2%
I-95 Southbound	*Note*	*Link#*	*# Lanes*	**8AM-9AM**			**5PM-6PM**		
				Field	*Model*	*% Diff*	*Model Volume Input*	*Model Volume Output*	*% Diff*
	Off Ramp to Glebe Rd & Quaker Ln	371	2	728	733	-1%	1,477	1,362	8%
	On Ramp from Glebe Rd	445	1	847	841	1%	1,182	1,107	6%
	On Ramp from Quaker Ln	461	1	624	612	2%	817	759	7%
	Off Ramp to King St	138	1	737	736	0%	922	856	7%

Table 8: Existing Condition Arterial Travel Time Calibration Results

Roadway	VISSIM ID	Location	Section Length (ft)	Field	VISSIM	% Diff	Field	VISSIM	% Diff
				Travel Times			Travel Times		
				AM Peak Hour (7AM-8AM)			PM Peak Hour (5PM-6PM)		
S Glebe Rd Northbound	11	Four Mile Run Dr (FMR) to I-395 NB Off Ramp	484	14	19	-33%	31	23	26%
	12	I-395 NB Off Ramp to I-395 SB Off Ramp	982	29	27	7%	50	31	39%
	13	I-395 SB Off Ramp to 24th St	431	27	27	-1%	32	23	27%
	Total Northbound		***1,897***	***70***	***73***	***-4%***	**113**	**77**	**32%**
S Glebe Rd Southbound	14	24th St to I-395 SB Off Ramp	420	11	13	-20%	13	12	11%
	15	I-395 SB Off Ramp to I-395 NB Off Ramp	982	35	48	-36%	53	31	42%
	16	I-395 NB Off Ramp to FMR	471	13	15	-16%	45	18	60%
	Total Southbound		***1,873***	***59***	***76***	***-29%***	**111**	**61**	**45%**
Quaker Ln Northbound	28	Preston Rd to Gunston Rd	1,581	67	65	3%	39	44	-14%
	24	Gunston Rd to I-395 NB Ramps	497	11	11	3%	10	10	-3%
	25	I-395 NB Ramps to Arlington Mill Dr	802	66	50	24%	91	48	47%
	26	Arlington Mill Dr to FMR	407	15	24	-62%	27	17	37%
	Total Northbound		***3,287***	***159***	***150***	***6%***	**167**	**120**	**28%**
Shirlington Rd Southbound	21	FMR to Arlington Mill Dr	439	92	37	60%	106	83	21%
	22	Arlington Mill Dr to Campbell Ave	813	27	44	-64%	54	48	11%
	23	Campbell Ave to Gunston Rd/Quaker Ln	1,525	33	46	-39%	34	43	-25%
	Total Southbound		***2,777***	***152***	***127***	***16%***	**194**	**174**	**10%**
Rotary Loop Northbound	29	Gunston Rd to I-395 NB On-Ramp	480	11	11	3%	12	10	14%
	30	I-395 NB On-Ramp to Campbell Ave	1,030	29	41	-41%	41	41	0%
	Total Northbound		***1,510***	***40***	***51***	***-29%***	**53**	**52**	**3%**
Rotary Loop Southbound	27	I-395 SB On Ramp to Preston Rd	1,525	47	48	-2%	48	47	3%
	Total Southbound		***1,525***	***47***	***48***	***-2%***	**48**	**47**	**3%**

1. Travel time values that exceed the TOSAM threshold arterial limits (30%) are highlighted.

Table 9: Existing Condition Arterial Intersection Volume Calibration and Operational Results

Study Intersection	Movement	ID	AM Peak Hour				PM Peak Hour			
			Volume Input	Volume Output	% Diff	VISSIM Delay[1]	Volume Input	Volume Output	% Diff	VISSIM Delay[1]
Shirlington Rd at S Arlington Mill Dr (Signalized)	*EB*	500	*401*	*403*	*0%*	*18.4*	*360*	*363*	*-1%*	*22.3*
	WB	500	*374*	*388*	*-4%*	*37.9*	*647*	*618*	*4%*	*55.0*
	RampWB	500	*14*	*13*	*7%*	*77.4*	*114*	*115*	*-1%*	*76.2*
	NB	500	*554*	*527*	*5%*	*30.1*	*654*	*708*	*-8%*	*34.2*
	SB	500	*481*	*466*	*3%*	*41.2*	*764*	*749*	*2%*	*47.3*
	Overall	500	***1824***	***1797***	***1%***	***32.4***	***2539***	***2553***	***-1%***	***43.3***
Shirlington Rd at Campbell Dr (Signalized)	*EB*	505	*474*	*473*	*0%*	*7.7*	*475*	*479*	*-1%*	*11.0*
	SB	505	*1009*	*994*	*1%*	*24.7*	*1418*	*1456*	*-3%*	*24.2*
	Overall	505	***1483***	***1467***	***1%***	***19.2***	***1893***	***1935***	***-2%***	***20.9***
Shirlington Rotary at HOV Ramp (Un-Signalized)	*NB*	10214	*759*	*752*	*1%*	*1.4*	*492*	*634*	*-29%*	*0.8*
	Overall	10214	***759***	***752***	***1%***	***1.4***	***492***	***634***	***-29%***	***0.8***
Martha Custis Dr @ Gunston Rd (Unsignalized)	*EB*	510	*107*	*111*	*-4%*	*8.5*	*175*	*181*	*-3%*	*9.1*
	WB	510	*240*	*236*	*2%*	*29.5*	*107*	*104*	*3%*	*13.9*
	NB	510	*203*	*200*	*1%*	*18.7*	*117*	*115*	*2%*	*12.6*
	SB	510	*161*	*163*	*-1%*	*13.8*	*232*	*232*	*0%*	*10.5*
	Overall	510	***711***	***710***	***0%***	***19.6***	***631***	***632***	***0%***	***11.0***
N Quaker Ln at Gunston Rd (Unsignalized)	*WB*	515	*445*	*444*	*0%*	*14.2*	*246*	*241*	*2%*	*7.2*
	NB	515	*1809*	*1811*	*0%*	*15.7*	*1373*	*1388*	*-1%*	*3.8*
	Overall	515	***2254***	***2255***	***0%***	***15.4***	***1619***	***1629***	***-1%***	***4.3***
N Quaker Ln at Preston Rd (Signalized)	*EB*	520	*184*	*180*	*2%*	*28.7*	*56*	*55*	*2%*	*26.8*
	WB	520	*145*	*143*	*1%*	*26.0*	*97*	*97*	*0%*	*25.0*
	NB	520	*1193*	*1191*	*0%*	*20.3*	*905*	*902*	*0%*	*10.3*
	SB	520	*520*	*521*	*0%*	*6.8*	*1414*	*1395*	*1%*	*6.2*
	Overall	520	***2042***	***2035***	***0%***	***18.0***	***2472***	***2449***	***1%***	***8.9***
S Glebe Rd at 24th Rd S (Signalized; 2 Signals)	*EB*	605	*371*	*374*	*-1%*	*41.5*	*316*	*321*	*-2%*	*25.5*
	WB	600	*170*	*171*	*-1%*	*50.2*	*96*	*96*	*0%*	*42.4*
	NB	605	*1075*	*1031*	*4%*	*17.3*	*1275*	*1244*	*2%*	*16.6*
	SB	600	*1030*	*1023*	*1%*	*29.2*	*935*	*931*	*0%*	*29.3*
	Overall	600	***2646***	***2599***	***2%***	***27.6***	***2622***	***2592***	***1%***	***23.2***
S Glebe Rd at SB I-395 Off-Ramp (Signalized)	*EB*	610	*5*	*5*	*0%*	*14.9*	*11*	*11*	*0%*	*11.9*
	WB	610	*195*	*181*	*7%*	*24.2*	***251***	***214***	*15%*	*27.4*
	NB	610	*964*	*910*	*6%*	*10.0*	*1155*	*1110*	*4%*	*10.1*
	SB	610	*1496*	*1486*	*1%*	*4.4*	*1231*	*1227*	*0%*	*3.3*
	Overall	610	***2660***	***2582***	***3%***	***7.8***	***2648***	***2562***	***3%***	***8.3***
S Glebe Rd at NB I-395 Off-Ramp (Signalized)	*EB*	615	*866*	*780*	*10%*	*41.7*	*658*	*602*	*9%*	*29.1*
	WB	615	*345*	*343*	*1%*	*28.5*	***509***	***499***	*2%*	*130.6*
	NB	615	*1387*	*1369*	*1%*	*13.5*	*1568*	*1555*	*1%*	*13.8*
	SB	615	*970*	*963*	*1%*	*42.1*	*816*	*817*	*0%*	*21.7*
	Overall	615	***3568***	***3455***	***3%***	***29.3***	***3551***	***3473***	***2%***	***35.1***

1. Color coded delay values indicate Light, Moderate, Heavy & Severe congestion levels.
2. Glebe Rd, Shirlington Rd, Quaker Lane are assumed to be oriented in North-South direction.
3. Volume input and volume output values refer to field volumes and *VISSIM* model processed volumes, respectively.

Table 10: Existing Condition Arterial Intersection Maximum Queue Length (in feet) Calibration Results

Study Intersection/Site	Movement	AM Peak Hour				PM Peak Hour			
		Max Q^2 Field	Max Q^2 VISSIM	Difference (ft)	%Diff	Max Q^2 Field	Max Q^2 VISSIM	Difference (ft)	%Diff
S Shirlington Rd at S Arlington Mill Dr (Signalized)	*EB*	*125*	*105*	*20*	*16%*	*100*	*115*	*-15*	*-15%*
	WB	*300*	*210*	*90*	*30%*	*400*	*470*	*-70*	*-18%*
	RampWB	*25*	*40*	*-15*	*-60%*	*250*	*185*	*65*	*26%*
	NB	*300*	*290*	*10*	*3%*	*300*	*440*	*-140*	*-47%*
	SB	*125*	*365*	*-240*	*-192%*	*100*	*390*	*-290*	*-290%*
S Shirlington Rd at Campbell Ave (Signalized)	*EB*	*175*	*190*	*-15*	*-9%*	*200*	*230*	*-30*	*-15%*
	SB	*275*	*510*	*-235*	*-85%*	*500*	*630*	*-130*	***-26%***
N Quaker Ln at Preston Rd (Signalized)	*EB*	*125*	*160*	*-35*	*-28%*	*50*	*90*	*-40*	*-80%*
	WB	*200*	*170*	*30*	*15%*	*125*	*125*	*0*	*0%*
	NB	*750*	*355*	*395*	*53%*	*375*	*225*	*150*	*40%*
	SB	*150*	*150*	*0*	*0%*	*300*	*325*	*-25*	*-8%*
S Glebe Rd at 24th Rd S (Signalized; 2 Signals)	*EB*	*250*	*545*	*-295*	*-118%*	*275*	*390*	***-115***	*-42%*
	WB	*275*	*280*	*-5*	*-2%*	*100*	*160*	*-60*	*-60%*
	NB	*225*	*280*	*-55*	*-24%*	*400*	*290*	***110***	*28%*
	SB	*150*	*520*	*-370*	*-247%*	*500*	*480*	*20*	*4%*
S Glebe Rd at SB I-395 Off-Ramp (Signalized)	*WB*	*200*	*175*	*25*	*13%*	*375*	*250*	*125*	*33%*
	NB	*200*	*220*	*-20*	*-10%*	*600*	*305*	*295*	*49%*
	SB	*250*	*370*	***-120***	*-48%*	*250*	*340*	*-90*	*-36%*
S Glebe Rd at NB I-395 Off-Ramp (Signalized)	*EB*	*770*	*920*	*-150*	*-19%*	*500*	*295*	*205*	*41%*
	WB	*400*	*250*	*150*	*38%*	*375*	*410*	*-35*	*-9%*
	NB	*440*	*490*	*-50*	*-11%*	*400*	*500*	*-100*	*-25%*
	SB	*600*	*755*	*-155*	***-26%***	*375*	*315*	*60*	*16%*
Shirlington Rd On-Ramp to NB I-395		965	1050	-85	*-9%*	-	-	-	-
SB S Glebe Rd On-Ramp to NB I-395		175	140	35	*20%*	-	-	-	-
NB S Glebe Rd On-Ramp to NB I-395		125	130	-5	*-4%*	-	-	-	-
Shirlington Rd On-Ramp to SB I-395		-	-	-	-	75	100	-25	*-33%*

1. Values highlighted in green represent approaches that satisfy the calibration threshold.
*The actual maximum queue length was not be determined as back of the queue could not be seen.

5. CONCLUSIONS

The calibration process was conducted to refine the model area and produce a microsimulation model which accurately reflects existing operations within the Study area. Although the key bottlenecks along I-395 are located well out of the current (and smaller) study area, the in-threshold calibration results are an indicative of a suitable and well-fitting methodology adopted for this study. The study model will be updated to reflect future No Build conditions and then used to test a variety of potential improvement options along the arterial roadway network, ramps, and collector distributor roads.

MEMORANDUM

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Date: **September 4, 2018 (Revision5 November 08, 2019)**

To: **VDOT**

From: **RK&K**

CC: **File**

Re: **I-395 and S. Shirlington Road Interchange Safety and Operations Phase 2 Study – Traffic Analysis Memorandum; UPC/CSC-107831; Activity Code: 616**

1. INTRODUCTION AND BACKGROUND

The RK&K, LLP (RK&K) / WSP USA (WSP) team was tasked to conduct a safety and operations study at the I-395 (Henry H. Shirley Memorial Highway) and S. Shirlington Road interchange. The Phase 1 of this project included data collection, identifying safety and operational issues; and identified candidate improvements for further study. The Phase 2 (hereby referred to Shirlington Road/Quaker Lane Study or this study) is intended to advance the evaluation of the preliminary concepts, including more detailed operational analysis of existing and future conditions, preparation of refined conceptual drawings and cost estimates, and outreach to local government stakeholders and the general public. The goal is to identify potential, implementable projects to enhance safety within the study area.

An existing conditions *VISSIM* calibration memorandum was submitted to VDOT in April, 2018(**Attachment A)**. The purpose of this memorandum is to document the future No Build conditions and evaluate the potential improvement design concepts in terms of traffic operations. Overall, the alternatives (also referred to as concepts) for this study focused on improvements to the existing local street network, ramps and collector-distributor road network. The study area (**Figure 1**) is a subset of the much wider study area previously used for the Interstate 395 Express Lanes Northern Extension, Traffic, and Transportation Technical Report, Project Number: 0395-969-205, P101; UPC: 108313; Federal Project Number: NHPP-395-4(189) dated September 2016. The interstate network of the study area includes I-395 from Route 7 (King Street) to Route 120 (S Glebe Road) including the Shirlington Road/Quaker Lane rotary interchange (hereby referred to also as the study interchange). In general, the study area is geographically located in the Shirlington neighborhood of Arlington County and in the City of Alexandria. The study area straddles the boundary between Arlington County and the City of Alexandria, with the area west of I-395 located in Arlington County and the east side in the City of Alexandria. Moreover, west of I-395 the rotary roadway itself is referred to as Shirlington Road; while east side is labelled as Quaker Lane. Below is the list of study intersections analyzed in this study where the proposed improvements are concentrated:

1. S Shirlington Road at S Arlington Mill Dr; Signalized
2. S Shirlington Road at Campbell Avenue; Signalized
3. N Quaker Lane at Gunston Road; Un-Signalized
4. N Quaker Lane at Preston Road; Signalized

2. TRAFFIC DATA

As mentioned earlier in Section 1, the study area is a subset of much wider project (I-395 Express Lanes). The 2040 traffic forecasts for the study area were obtained from the I-395 Express Lane study. Due to the nature of proposed improvements that are concentrated within the study area, no changes in traffic routing patterns were anticipated between the Build and No Build conditions. **Figure 2** presents the balanced 2040 peak hour volumes in the study area and **Attachment B** includes the traffic volume graphics from the I-395 Express Lane study.

3. FUTURE ALTERNATIVE CONCEPTS AND PRELIMINARY EVALUATION

As part of improving operations along the surface street network in the study area, six (6) Build condition alternative concepts were developed to mitigate the deficiencies within the study interchange. These future alternative concepts were initially envisioned as isolated or localized improvements to achieve operational and safety benefits at different locations within the interchange without geometrically impacting the I-395 mainline. A preliminary evaluation of these concepts was conducted and presented to VDOT on July 20, 2018. It is noted that no detailed analysis results were developed for the preliminary evaluation effort and none are presented in this memorandum. **Attachment C** includes the conceptual graphic designs presented to VDOT and with notes summarizing the potential operational concerns with respect to each alternative. Below is a list of alternative concepts including the No Build condition followed by a short summary of the design.

3.1. No Build Condition

Under the No Build condition, the existing lane geometry along all roadways would be retained. The No Build condition does assume conversion of the existing I-395 HOV lanes to HOT lanes as part of the I-395 Express Lanes project. No physical improvements are proposed but the volume of traffic using these reversible lanes in the median is expected to increase relative to existing conditions. Specific trouble spots are anticipated, based on the simulation results, along the single lane entry on Quaker Lane at the Rotary and along the stop- controlled approach of the I-395 southbound off-ramp at the Shirlington Road/Campbell Avenue. Both locations are expected to worsen compared to existing conditions due increased traffic demand inadequate capacity due to the existing yield and stop control configurations.

3.2. Alternative S-1: Reduce and Repurpose Existing Lanes

The Alternative S-1 concept proposes to reduce the Quaker Lane side of the rotary from 3-lane cross-section to a 2-lane cross section, including at the upstream and downstream end from/towards Shirlington Road, with signing and striping improvements. Alternative S-1 is expected to reduce required weaving maneuvers within the rotary. However, preliminary analysis indicated an increase in queueing along Quaker Lane as vehicles would have more difficulty finding gaps to enter the rotary.

3.3. Alternative S-2: Realign Quaker Lane Ramp

Alternative S-2 proposes to realign the entrance angle of Quaker Lane with the rotary. S-2 is expected to improve safety along the Quaker Lane approach by better controlling the speeds at which vehicles approach the rotary. Although the safety benefits of S-2 cannot be directly quantified, it is anticipated that the proposed change in entrance angle would slow down entering vehicles, similar to a roundabout entry, and improve safety for motorists along Quaker Lane and circulating within the rotary. However,

from an operations standpoint, AlternativeS-2 would not provide any benefits compared to the No Build condition. If any, S-2 is expected to slightly worsen the queueing along Quaker Lane approach due to low speed merging.

3.4. Alternative S-3: Add a Lane to Arlington Mill Drive Exit

Alternative S-3 proposes an additional lane along the rotary exit towards the Shirlington Road/ Arlington Mill Drive intersection. Currently, the outside lane of the rotary exits towards the Arlington Mill Drive. This configuration requires vehicles entering the rotary on the left from I-395 northbound to make two lane changes to exit towards Arlington Mill Drive; there is only approximately 250 feet between the entry and exit points for drivers to complete these lane changes. Under S-3, the center lane within the rotary would be converted to a choice lane to either exit towards Arlington Mill Drive or continue within the rotary. This would o provide two (2) exit lanes towards the Arlington Mill Drive intersection. The dual-lane exit under S-3 would also provide additional queue storage for the downstream intersection and is not expected to result in any safety or operational deficiency.

3.5. Alternative S-4: Create a signalized T-intersection with Rotary and Quaker Lane.

Under the existing condition, traffic along Quaker Lane is signed to yield to the oncoming rotary traffic. However, field observations and anecdotal feedback from local residents indicates that yielding compliance at this location is low, potentially due to the high approach angle and speeds along Quaker Lane. Additionally, there is an extensive history of rear-end crashes along Quaker Lane approaching the rotary; this indicates that when vehicles do yield (appropriately), following traffic may not be prepared, resulting in these crashes. Alternative S-4 proposes a realignment of the rotary approach to form a T-intersection with Quaker Lane. The intersection is anticipated to operate as a 2-phase signal to serve two (2) single lane approaches (one lane within the rotary and one lane along Quaker Lane). However, the preliminary evaluation indicated substantial queueing along the Shirlington Rotary approach that would eventually spillback onto Shirlington Road, Arlington Mill Drive and I-395 during both AM and PM peak hours with only a single lane approach. Quaker Lane queues would also continue to be lengthy with only a single lane approaching the proposed signal.

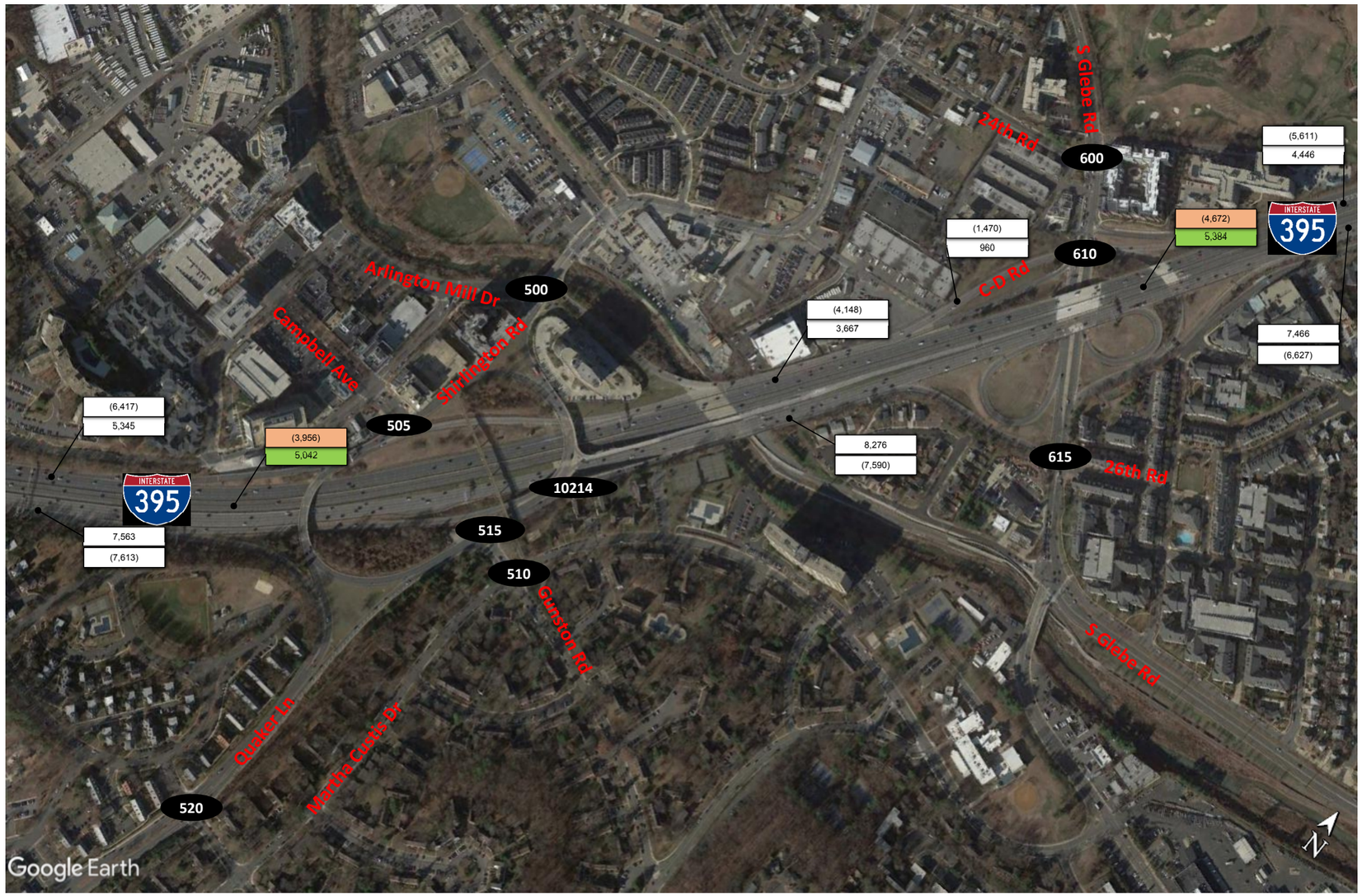
3.6. Alternative S-5: Create a signalized intersection with the I-395 northbound off-ramp and Quaker Lane at Gunston Road.

Alternative S-5 concept proposes to re-align the I-395 northbound off-ramp to intersect with Quaker Lane at a signalized intersection, across from the existing intersection at Gunston Road. This would eliminate the existing free-flow left entry into the rotary from the I-395 northbound off-ramp. Under S-5, Gunston Road would operate as a signalized approach, thereby eliminating the two (2) downstream weaving conflicts along Quaker Lane with Gunston Road and with I-395 off-ramp. The proposed signal is expected to induce additional stops for Quaker Lane traffic resulting in some increased queuing along Quaker Lane.

3.7. Alternative S-6: Create a signalized intersection with I-395 southbound and Shirlington Road /Campbell Avenue.

The existing queueing along stop-controlled approach of I-395 southbound off-ramp at the Shirlington Road is expected to worsen in the year 2040. Alternative S-6 proposes to re-align the off-ramp to form a signalized single-lane approach with the existing intersection of Shirlington Road and Campbell Avenue. The proposed improvement is expected to reduce queueing along the off-ramp but would potentially worsen operations along the Shirlington Road and Campbell Avenue approaches due to the additional phase at this location.

Figure 1: Study Area



Legend

xxx (xxx) 2040 Weekday AM (PM) Volume

xxx (xxx) HOV Directional AM/PM (NB/SB) Volume

NOT TO SCALE

Note: Shirlington Rd, Quaker Ln and S Glebe Road are assumed to be oriented in north-south direction.

500	Shirlington Rd at S Arlington Mill Dr (Signalized)
505	Shirlington Rd at Campbell Ave (Signalized)
10214	Shirlington Rotary at HOV Ramp (Un-Signalized)
510	Martha Custis Dr @ Gunston Rd (Unsignalized)
515	Quaker Ln @ Gunston Rd (Unsignalized)
520	N Quaker Ln at Preston Rd (Signalized)
600	S Glebe Rd at 24th Rd S (Signalized; 2 Signals)
610	S Glebe Rd at SB I-395 Off-Ramp (Signalized)
615	S Glebe Rd at NB I-395 Off-Ramp (Signalized)

500

(142)	(522)	(1)		R	125	(113)
52	450	13		T	232	(337)
R	T	L		L	40	(15)
(125)	101	L		L	T	R
(22)	28	T		48	521	45
(250)	301	R		(206)	(738)	(13)

505

(424)	(1,353)				
81	1,130				
R	T	L	L	372	(827)
		L			
		T			
(554)	502	R			

10214

(716)			R	342	(0)
0			T	1,057	(1,163)
R	T	L	L		

510

(225)	(123)	(5)	R	5	(5)
168	46	5	T	391	(166)
R	T	L	L	5	(5)
(185)	195	L	L	T	R
(303)	49	T	100	88	8
(1)	4	R	(13)	(64)	(22)

515

			R	659	(404)
			T		
			L		
			L	T	R
				1,558	248
				(1,209)	(489)

520

(42)	(1,331)	(200)	R	71	(22)
13	587	39	T	18	(46)
R	T	L	L	71	(162)
(47)	83	L	L	T	R
(24)	11	T	5	901	115
(5)	1	R	(25)	(794)	(60)

600

(12)	(903)	(35)	R	47	(35)
8	1,081	7	T		
R	T	L	L	131	(71)
(27)	18	L	L	T	R
		T	196	1,008	
(336)	360	R	(276)	(1,087)	

610

(333)	(963)		R	115	(185)
359	1,224		T		
R	T	L	L	76	(170)
		L	L	T	R
		T	5	1,089	
		R	(20)	(1,177)	

615

	(799)	(186)	R	309	(330)
	791	233	T		
R	T	L	L	76	(192)
		L	L	T	R
		T		1,417	94
(684)	953	R		(1,744)	(35)

4. PROPOSED HYBRID ALTERNATIVES

The alternatives presented in Section 3 were envisioned as isolated improvements and were not expected to fully address the traffic concerns for the study interchange. The RK&K / WSP team further developed two (2) additional concepts (hereby referred to as Hybrid) that were primarily based on the above-mentioned alternatives, S1 thru S6. Some additional refinements to lane configurations and traffic control were recommended to address specific operational issues identified in the initial analysis described in Section 3. Below is a list of Hybrid Alternative Concepts and **Attachment D** includes the respective conceptual designs.

4.1. Alternative Hybrid1: Combination of S-3, S-4 and S-6.

Alternative Hybrid1 concept combines three (3) of the concepts from Section 3 that include an additional lane to Arlington Mill Drive exit, creating a signalized intersection along Quaker Lane with the Rotary and realigning and signalizing the I-395 southbound off-ramp at Shirlington Road. Additionally, the Hybrid1 concept proposes lane modifications that include an additional through lane along Quaker Lane, a second-left-turn lane along the Rotary approach at Quaker Lane and an additional shared through-left turn lane along the I-395 southbound off-ramp. The Hybrid1 concept aims to improve mobility along all of the arterial streets within study area, unlike the localized improvements discussed in Section 3.

4.2. Alternative Hybrid2: Combination of S-3, S-4, *S-5* and S-6.

The Alternative Hybrid2 is similar to the Hybrid1 concept in combining the S-3, S-4, and S-6 concepts. Additionally, the Hybrid 2 concept proposes a traffic signal at Quaker Lane with the I-395 northbound off-ramp (S-5). A further refinement was made to Alternative S-6 to mitigated queueing identified for Hybrd1; this refinement includes restriping Shirlington Road at Campbell Avenue to provide and two (2) exclusive through lanes and a shared through / right-turn along Shirlington Road at Campbell Avenue. Under existing, No Build, and Alternative S-6 conditions, this approach to the signalized intersections consists of two (2) through lanes and one (1) exclusive right-turn lane. With only two through lanes and the addition of a new signal phase to serve the I-395 southbound off-ramp, increased queues and delay were along Shirlington Road under Alternative S-6 and Hybrid 1. On the other side of the rotary, the existing westbound Gunston Road approach could be retained as a stop-controlled approach or could also be signalized to run concurrently with movements from the I-395 northbound off-ramp.

5. TRAFFIC ANALYSIS RESULTS

The existing conditions traffic analysis and calibration results were submitted to VDOT in April 2018 (See Attachment A for the latest revision). Similar to the existing condition analysis, the origin-destination routes were individually setup for movements within the interchange using “Combine Status Routing Decision”. The routing methodology is consistent across all the analyses and no impacts are anticipated to the analyzed alternatives. This memorandum summarizes the future conditions analysis results conducted using the microsimulation tool *VISSIM.* Within this chapter, key results for the intersections and freeway facilities are color coded to correspond to varying congestion levels. Therefore, **Table 1** summarizes the thresholds for freeway segments and signalized intersection measures of effectiveness, similar to the existing conditions memorandum. The results presented were developed using a microsimulation tool, therefore level of service (LOS) is not reported as a measure of effectiveness.

Table 1: Congestion Levels as Freeway and Intersection Measure of Effectiveness

Freeway Congestion Levels	Average Density (veh/mi/ln)
Light	≤ 26
Moderate	> 26-35
Heavy	> 35-45
Severe	> 45
Intersection Congestion Levels	**Average Delay (sec/veh)**
Light	≤ 35
Moderate	> 35- 55
Heavy	> 55 - 80
Severe	> 80

All the calibration parameters from the existing conditions models were retained for future analyses. The future condition model travel times along I-395 and arterial network were captured using the *VISSIM "travel time"* evaluation feature for identical start/end locations as in existing condition models. The critical network performance parameter outputs including average delay per vehicle, total stops and latent demand are also presented below to gauge the impact of proposed improvements on the overall network.

5.1. Arterial and Intersection Results

Table 2 presents the travel time results for the arterial network in the study area for existing and future years. In comparison with the existing conditions, the arterial travel times in the 2040 No Build condition are expected to be similar (within 5%) during the AM peak hour and significantly increase (approximately over 30%) during the PM peak hour.

During the 2040 AM peak hour, the Hybrid1 and Hybrid2 arterial travel times are expected to increase by approximately 12% and 16%, respectively over the No Build condition. Most notably, the southbound Shirlington Road segment is expected to increase by approximately 30%. The increase in travel time is attributed to the proposed signalization of the I-395 southbound off-ramp and the new signal along Quaker Lane with Rotary, which are expected to create additional stops along the travel segment. However, it should be noted that the raw increase in travel times are still relatively low (between 30 and 60 seconds). Additionally, by time-separating conflicting movements at a number of locations, both Hybrid 1 and Hybrid 2 would be expected to improve safety at a number of locations within the study area.

The PM peak hour arterial travel times are expected to follow a similar increasing pattern as with the AM peak hour. The Hybrid1 and Hybrid2 concepts are expected to increase arterial travel time by approximately 28% and 11% respectively. Most notably, travel times along the Shirlington Road segments are expected to experience a substantial (over 50%) increase compared to the No Build condition. The travel time increase is attributed to the proposed I-395 southbound off-ramp signal, as noticed with the AM peak hour. However, the travel time along Quaker Lane is expected to be reduced by approximately 25% under each of the concepts. The reduction is most likely attributed to the proposed signal at the

Rotary with Quaker Lane, which eliminates the downstream weaving turbulence between the approaching roadways.

A detailed comparison of Hybrid1 and Hybrid2 reveals that the former concept is expected to operate slightly better (under 4%) during the AM peak hour and the latter concept (approximately 13% better) during PM peak hour. The AM peak hour improvement with Hybrid1 is expected mostly along the Quaker Lane, where Hybrid2 operates with an additional signal which induces more stops at the I-395 northbound off-ramp. The Hybrid2 improvement during PM peak hour is mostly attributed to the 3rd through-right shared lane which increase approach capacity along the Shirlington Road at Campbell Avenue.

Table 3 presents AM and PM peak hour future condition intersection results in the study area. **Attachment E** includes an electronic copy of the detailed analysis worksheets and results by movement. During the AM peak hour, all the study intersections and their respective approaches are expected to operate at or better than *moderate* congestion levels, except for one. The westbound I-395 southbound off-ramp approach at the Arlington Mill Drive intersection is expected to operate under heavy congestion levels in the Build and No Build conditions. The signalization of the I-395 off-ramps at each of the Campbell Avenue and Gunston Road intersections resulted in a minimal increase (<10 seconds) in delay over No Build conditions without impacting overall congestion levels.

The PM peak hour results presented in **Table 3** indicate that all the study intersections are expected to operate at *moderate* or better congestion levels under No build and Hybrid2 conditions. Most notably, the southbound I-395 off-ramp to Shirlington Road under the No Build conditions is expected to have a maximum queue length of 9,777-feet that extends upstream on to the CD Road and I-395 southbound mainline with **severe** congestion. However, the maximum queue length includes stop and go traffic along the CD Road to I-395 southbound and therefore a portion (2,640+ feet) of the total queue that is approximately equal to the distance to the CD Road gore is reported in Table 3. Under the Build conditions (both Hybrid1 and Hybrid2), the realigned I-395 southbound approach at the Campbell Avenue is expected to operate at heavy congestion levels, with an approximate maximum queue of 700-feet that clears during each cycle without any potential spill back to the upstream I-395 collector-distributor road. Under Hybrid1, the Shirlington Road intersection with Campbell Avenue and I-395 southbound off-ramp is expected to operate at heavy congestion levels with mainline potential queue spillback to the upstream Arlington Mill Drive intersection. The newly created signalized intersections under Hybrid1 and Hybrid2 along Quaker Lane are expected to operate at or better than *moderate* congestion levels without any potential queue spillback. Most notably, both Hybrid1 and Hybrid2 are expected to eliminate the **severe** congestion caused due to weaving maneuvers, just upstream of the Gunston Road intersection, and the single lane Quaker Lane entry to the rotary.

5.2. I-395 Travel Time Results

As mentioned earlier in this document, both Hybrid1 and Hybrid2 alternative concepts propose roadway modifications to the surface streets in the study area without any impacts to the I-395 mainline. It is anticipated that there would be minimal operational impacts, if any along the I-395 mainline. **Table 4** presents the travel time results for the future Build and No Build conditions which indicate a negligible (< 0.8%) of change in travel time during the AM peak hour and a minimal 3% change during the PM peak hour. The results validate the "minimal operational impact on I-395" assumption and therefore no additional performance measures are presented in this memorandum. **Attachment F** includes travel time segment map.

5.3. Network Performance Results

Table 5 presents the future conditions network performance results for the study area. These MOEs include latent demand (unserved vehicles during the modeling period), total stops, average delay per vehicle, and total travel time (in vehicle hours). During the AM peak hour both Hybrid1 and Hybrid2 concepts are expected to be similar (within 5%) to No Build conditions. During the PM peak hour, a decrease in latent demand under both hybrid concepts indicates that study area roadway network would be able to process at least 10% more traffic (most likely along northbound Quaker Lane and I-395 southbound off-ramp) than the No Build conditions. A similar improvement pattern is also expected with a reduction in the total number of stops in the study area under Hybrid1 (approximately 5%) and Hybrid2 (approximately 8%). The average delay per vehicle, total network delay and total network travel time values are expected to increase under the hybrid concepts. The increase is attributed to the network's ability to process more vehicles when compared to the No Build conditions as well as the addition of one or two new signals (depending on the alternative) and an additional signal phase at one intersection. It is important to note that most public feedback at this location is related to traffic safety concerns. The proposed improvements primarily address these safety concerns by converting stop, yield, and uncontrolled entry points which result in higher speed weaving within the rotary to signalized intersections where conflicting movements are time-separated. This will reduce the overall potential for conflicts within the rotary, but at the expense of some increase in travel time and stops, though the increases will be small in magnitude.

Table 2: Comparison of Existing and Future Condition Arterial Travel Time Results

Segment	VISSIM ID	Location	AM Peak Hour				% Difference w No Build	
			2016 Model	2040 No Build	2040 Hybrid1	2040 Hybrid2	2040 Hybrid1	2040 Hybrid2
			7AM-8AM	7AM-8AM	7AM-8AM	7AM-8AM	7AM-8AM	7AM-8AM
Quaker Ln Northbound	28	Preston Rd to Gunston Rd	64.8	54.2	55.6	67.3	3%	24%
	24	Gunston Rd to I-395 NB Ramps	10.6	10.7	10.6	10.8	-1%	1%
	25	I-395 NB Ramps to Arlington Mill Dr	50.3	53.4	53.4	55.8	0%	4%
	26	Arlington Mill Dr to Four Mile Run	24.3	26.0	26.8	27.5	3%	6%
	Total Northbound		*150.0*	*144.3*	*146.3*	*161.3*	*1%*	*12%*
Shirlington Rd Southbound	21	Four Mile Run to Arlington Mill Dr	37.0	39.6	39.6	39.7	0%	0%
	22	Arlington Mill Dr to Campbell Ave	44.2	43.2	43.7	38.6	1%	-11%
	23	Campbell Ave to Gunston Rd/Quaker Ln	46.0	46.2	84.5	89.7	83%	94%
	Total Southbound		*127.2*	*129.1*	*167.9*	*168.1*	*30%*	*30%*
Loop Northbound	29	Gunston Rd to I-395 NB On-Ramp	10.6	10.7	10.6	10.8	-1%	1%
	30	I-395 NB On-Ramp to Campbell Ave	40.8	40.0	43.0	41.5	7%	4%
	Total Northbound		*51.4*	*50.7*	*53.6*	*52.3*	*6%*	*3%*
Loop Southbound	27	I-395 SB On Ramp to Preston Rd	47.8	47.0	47.3	48.4	1%	3%
	Total Southbound		*47.8*	*47.0*	*47.3*	*48.4*	*1%*	*3%*
Total Arterial Travel Time			***376.4***	***371.1***	***415.1***	***430.0***	***12%***	***16%***

Segment	VISSIM ID	Location	PM Peak Hour				% Difference w No Build	
			2016 Model	2040 No Build	2040 Hybrid1	2040 Hybrid2	2040 Hybrid1	2040 Hybrid2
			5PM-6PM	5PM-6PM	5PM-6PM	5PM-6PM	7AM-8AM	7AM-8AM
Quaker Ln Northbound	28	Preston Rd to Gunston Rd	44.3	122.9	74.7	77.5	-39%	-37%
	24	Gunston Rd to I-395 NB Ramps	10.3	11.0	10.6	10.8	-4%	-2%
	25	I-395 NB Ramps to Arlington Mill Dr	47.9	64.8	62.5	59.1	-3%	-9%
	26	Arlington Mill Dr to Four Mile Run	17.0	25.3	25.7	21.0	2%	-17%
	Total Northbound		*119.6*	*224.0*	173.6	168.3	*-23%*	*-25%*
Shirlington Rd Southbound	21	Four Mile Run to Arlington Mill Dr	83.4	87.4	104.6	87.9	20%	1%
	22	Arlington Mill Dr to Campbell Ave	48.1	54.9	150.2	78.5	174%	43%
	23	Campbell Ave to Gunston Rd/Quaker Ln	42.6	43.2	98.4	109.3	128%	153%
	Total Southbound		*174.0*	*185.5*	353.2	275.8	*90%*	*49%*
Loop Northbound	29	Gunston Rd to I-395 NB On-Ramp	10.3	11.0	10.6	10.8	-3%	-2%
	30	I-395 NB On-Ramp to Campbell Ave	41.2	43.2	66.7	62.1	54%	44%
	Total Northbound		*51.5*	*54.2*	77.3	72.8	*43%*	*34%*
Loop Southbound	27	I-395 SB On Ramp to Preston Rd	46.8	52.9	58.4	58.7	10%	11%
	Total Southbound		*46.8*	*52.9*	58.4	58.7	*10%*	*11%*
Total Arterial Travel Time			***391.9***	***516.7***	***662.5***	***575.6***	***28%***	***11%***

Table 3: Comparison of Existing and Future Condition Intersection Results

Study Intersection	Movement	Peak	ID	Existing		2040 No Build		2040 Hybrid1		2040 Hybrid2	
				VISSIM Delay[1]	Max Q[2] (ft)	VISSIM Delay[1]	Max Q[2] (ft)	VISSIM Delay[1]	Max Q[2] (ft)	VISSIM Delay[1]	Max Q[2] (ft)
Shirlington Rd at S Arlington Mill Dr (Signalized)	*EB*	*AM Peak Hour*	500	*18.4*	*105*	*18.0*	*120*	*18.1*	*115*	*18.1*	*115*
	WB		500	*37.9*	*210*	*72.8*	*55*	*72.8*	*55*	*72.8*	*55*
	RampWB		500	*77.4*	*40*	*38.8*	*250*	*38.8*	*240*	*37.9*	*260*
	NB		500	*30.1*	*290*	*33.8*	*280*	*32.0*	*270*	*33.5*	*315*
	SB		500	*41.2*	*365*	*43.9*	*355*	*43.9*	*355*	*43.6*	*360*
	Overall		500	***32.4***	-	***34.2***	-	***33.7***	-	***33.9***	-
S Shirlington Rd at Campbell Ave (Signalized)	*EB*		505	*7.7*	*190*	*7.5*	*190*	*26.1*	*220*	*24.9*	*225*
	WB		505			*15.9*	*150*	*40.6*	*215*	*40.7*	*215*
	SB		505	*24.7*	*510*	*24.0*	*515*	*21.3*	*495*	*18.8*	*330*
	Overall		505	***19.2***	-	***18.2***	-	***26.1***	-	***24.4***	-
N Quaker Ln at Gunston Rd (Unsignalized)	*EB*		515							*29.9*	*280*
	WB		515	*14.2*	*255*	*21.0*	*285*	*21.3*	*280*	*14.8*	*280*
	NB		515	*15.7*	*730*	*10.5*	*885*	*10.0*	*510*	*19.0*	*570*
	Overall		515	***15.4***	-	***13.0***	-	***12.7***	-	***18.9***	-
N Quaker Ln at Shirlington Rd (Signalized)	*EB*		2005					*34.3*	*345*	*31.5*	*340*
	NB		2005					*10.5*	*305*	*12.6*	*365*
	Overall		2005					***19.3***	-	***19.7***	-
N Quaker Ln at Preston Rd (Signalized)	*EB*		520	*28.7*	*160*	*29.2*	*145*	*28.4*	*135*	*27.6*	*125*
	WB		520	*26.0*	*170*	*22.0*	*160*	*21.2*	*160*	*20.0*	*165*
	NB		520	*20.3*	*355*	*11.0*	*235*	*8.3*	*215*	*7.9*	*220*
	SB		520	*6.8*	*150*	*5.8*	*140*	*5.5*	*130*	*5.3*	*135*
	Overall		520	***18.0***	-	***11.3***	-	***9.6***	-	***9.2***	-
Shirlington Rd at S Arlington Mill Dr (Signalized)	*EB*	*PM Peak Hour*	500	*22.3*	*115*	*25.9*	*135*	*92.2*	*320*	*29.2*	*165*
	WB		500	*55.0*	*470*	*88.9*	*240*	*108.7*	*255*	*93.0*	*240*
	RampWB		500	*76.2*	*185*	*50.2*	*310*	*49.5*	*310*	*46.7*	*290*
	NB		500	*34.2*	*440*	*46.7*	*765*	*46.1*	*640*	*39.7*	*475*
	SB		500	*47.3*	*390*	*51.6*	*390*	*75.2*	*400*	*52.2*	*395*
	Overall		500	***43.3***	-	***47.8***	-	***64.5***	-	***45.7***	-
S Shirlington Rd at Campbell Ave (Signalized)	*EB*		505	*11.0*	*230*	*12.1*	*245*	*40.2*	*285*	*42.2*	*285*
	WB		505			*75.5*	***2640+***	*69.8*	*720*	*69.6*	*650*
	SB		505	*24.2*	*630*	*23.6*	*710*	*69.8*	*835*	*47.5*	*700*
	Overall		505	***20.9***	-	***33.4***	-	***64.6***	-	***51.6***	-
N Quaker Ln at Gunston Rd (Unsignalized)	*EB*		515							*40.0*	*590*
	WB		515	*7.2*	*120*	*10.7*	*250*	*10.9*	*245*	*6.4*	*175*
	NB		515	*3.8*	*15*	*32.7*	*1405*	*28.3*	*545*	*30.2*	*585*
	Overall		515	***4.3***	-	***28.4***	-	***24.9***	-	***28.6***	-
N Quaker Ln at Shirlington Rd (Signalized)	*EB*		2005					*44.6*	*485*	*46.4*	*640*
	NB		2005					*22.9*	*405*	*16.1*	*360*
	Overall		2005					***33.5***	-	***30.7***	-
N Quaker Ln at Preston Rd (Signalized)	*EB*		520	*26.8*	*90*	*34.7*	*120*	*31.1*	*120*	*28.4*	*130*
	WB		520	*25.0*	*125*	*48.4*	*250*	*32.6*	*245*	*33.0*	*230*
	NB		520	*10.3*	*225*	*75.8*	*455*	*12.5*	*260*	*12.7*	*255*
	SB		520	*6.2*	*325*	*12.9*	*440*	*11.5*	*455*	*11.8*	*455*
	Overall		520	***8.9***	-	***36.5***	-	***14.2***	-	***14.4***	-

1. indicates approximate level of service (LOS) and average delay in seconds per vehicle from VISSIM.
2. Max Q referS to Maximum queue in feet, from VISSIM.
3. Glebe Rd, Shirlington Rd, Quaker Lane are assumed to be oriented in North-South direction.
4. The VISSIM reported maximum queue length along I-395 Off-Ramp is 9,777-feet. However, the reported VISSIM queue includes stop and go traffic along the CD-Road to I-395 southbound mainline. Therefore, a portion of the total queue (2,640+ feet) that is approximately equal to the distance to the CD Road gore from the stop bar is reported in the table.

Table 4: Comparison of Existing and Future Condition I-395 Travel Time Results

Direction	VISSIM ID	Location	Existing	2040 No Build	2040 Hybrid1	2040 Hybrid2
			AM Peak Hour (7AM-8AM)			
I-395 Northbound	1	NB Between King St Ramps	114.5	121.0	121.6	123.4
	2	NB Between Quaker St Ramps	53.7	53.7	53.8	54.7
	3	NB Weaving Btwn Quaker & Glebe	89.6	90.3	90.3	91.2
	4	NB Btwn Glebe Rd NB Ramps	63.6	64.7	64.8	65.0
	5	NB North of Glebe Rd	128.2	128.2	128.1	128.4
	Total Northbound		*449.6*	*458.0*	*458.7*	*462.6*
I-395 Southbound	6	SB Btwn Glebe Rd SB Ramps	34.3	34.4	34.4	34.4
	7	SB Weaving Btwn Quaker & Glebe	28.3	28.5	28.5	28.5
	8	SB Btwn Quaker Ln Ramps	13.1	13.1	13.1	13.1
	9	SB Btwn Quaker Ln & King St	8.5	8.5	8.5	8.5
	10	SB Between King St Ramps	44.5	44.7	44.7	44.7
	Total Southbound		*128.7*	*129.2*	*129.2*	*129.2*
Direction	**VISSIM ID**	**Location**	**Existing**	**2040 No Build**	**2040 Hybrid1**	**2040 Hybrid2**
			PM Peak Hour (5PM-6PM)			
I-395 Northbound	1	NB Between King St Ramps	43.2	46.4	46.5	46.6
	2	NB Between Quaker St Ramps	17.9	19.2	19.2	19.2
	3	NB Weaving Btwn Quaker & Glebe	32.5	34.5	34.6	35.3
	4	NB Btwn Glebe Rd NB Ramps	25.6	25.9	25.9	26.0
	5	NB North of Glebe Rd	53.0	53.2	53.3	53.3
	Total Northbound		172.2	179.3	179.5	180.4
I-395 Southbound	6	SB Btwn Glebe Rd SB Ramps	118.6	80.6	84.1	81.2
	7	SB Weaving Btwn Quaker & Glebe	93.0	71.0	75.2	74.6
	8	SB Btwn Quaker Ln Ramps	47.2	38.0	40.1	40.3
	9	SB Btwn Quaker Ln & King St	43.9	38.3	40.1	40.0
	10	SB Between King St Ramps	148.1	148.6	149.1	148.8
	Total Southbound		450.9	376.4	388.5	384.9

Table 5: Comparison of Existing and Future Condition Network Performance Measures

AM Network MOE Parameter	Existing	2040 No Build	2040 Hybrid1	% Difference w No Build	2040 Hybrid	% Difference w No Build
Latent Demand*	1,215	3,162	3,164	0%	3,075	-3%
Total Stops	101,133	109,586	111,417	2%	113,341	3%
Average Delay Time per Vehicle (Seconds)	145	144	146	1%	146	2%
Total Travel Time (Hours)	1,922	2,104	2,120	1%	2,128	1%
PM Network MOE Parameter	**2040 No Build**	**2040 No Build**	**2040 Hybrid1**	**% Difference**	**2040 Hybrid**	**% Difference**
Latent Demand*	121	1,060	957	-10%	908	-14%
Total Stops	110,929	140,157	132,819	-5%	129,578	-8%
Average Delay Time per Vehicle (Seconds)	113	134	140	5%	136	1%
Total Travel Time (Hours)	1,955	2,390	2,452	3%	2,416	1%

*Latent Demand represents the average number of vehicles which were input into the model coding but not able to make their way onto the network.

6. SUPPLEMENTAL HYBRID ALTERNATIVE CONCEPTS AND SENSITIVITY ANALYSES

The analysis results presented in Section 5 highlight the expected heavy and **severe** congestion levels in the study area under the No Build condition, notably along the southbound Shirlington Road, I-395 southbound off-ramp and northbound Quaker Lane segments. The Build condition concepts are expected to reduce the congestion levels during both AM and PM peak hours. This section summarizes the supplemental analyses, conducted using the modified versions of Hybrid2. Additionally, a sensitivity analysis of bypass traffic along southbound I-395 via rotary for the PM peak hour is also presented.

6.1. Supplemental Hybrid Analyses

The RK&K / WSP team further explored a modified version of Hybrid2, hereby referred to Hybrid3, where eastbound Campbell Avenue right-turning traffic towards Shirlington Road would be detoured via Quincy Street and Arlington Mill Drive. The Hybrid3 concept would further require a complete closure of Campbell Avenue, east of Quincy Street. However, it is understood that a complete closure of Campbell Avenue may not be feasible due the transit traffic from the Shirlington Station located along Quincy Street and potential impacts to the local street network within Shirlington. Therefore, the results from Hybrid3 analysis are to be recognized as hypothetical conceptual results pending further research in regard to its feasibility of implementation.

As mentioned earlier in this document, the study area is geographically located in both Arlington County and City of Alexandria. In addition to the Hybrid3 concept, the Hybrid2 concept was further evaluated by isolating the proposed improvements by their geographic limits. The two (2) additional concepts further resulted and discussed in this memo are labelled as *Arlington* and *Alexandria,* representing the geographic improvements falling under each locality.

Table 6 presents the Hybrid3, *Arlington* and *Alexandria* concept arterial travel time results in comparison with the Hybrid2 results. The Hybrid3 concept results are presented for information purposes only. The

analysis of *Arlington* and *Alexandria* concepts indicated a pattern mimicking the No Build conditions in the opposite jurisdiction when each of them is implemented separately. For instance, under the *Arlington* concept where improvements are concentrated along Shirlington Road, the travel time along northbound Quaker Lane segment is similar to No Build condition (See Table 6 text highlighted in green). Similarly, under the *Alexandria* concept, the travel time along southbound Shirlington Road is identical to the No Build condition (see Table 6 text highlighted in blue). The results indicate that either of the improvements and the respective benefits on either side of the localities are independent of each other.

Table 7 presents the intersection analysis results for *Arlington* and *Alexandria* concepts in comparison with the Hybrid2 concept. The study intersections are expected to operate at *moderate* or better congestion levels during the AM and PM peak hours under the all of the evaluated concepts. As with the travel time analysis, the intersection results for locations not included in the two jurisdiction-specific scenarios closely match the No Build results for those locations (without any additional negative impacts from the other improvements being implemented. Furthermore, a similar pattern to the travel time analysis was noted for each of the jurisdiction specific improvement packages. For instance, the operations (intersection delay of approximately within ±2 seconds of LOS D threshold) at the Campbell Avenue and Shirlington Road intersection under the *Alexandria* concept are similar to the No Build condition. A similar pattern can be expected between No Build conditions and the *Arlington* concept at the Quaker Lane and Gunston Road intersection.

In summary, improvements could be implemented along Quaker Lane and the northbound I-395 ramp without needing to implement the corresponding improvements along Shirlington Road and the southbound I-395 off-ramp. This means that the two localities could advance projects separately or the entire package could be developed at one time. However, the maximum benefits would be achieved by advancing both concepts concurrently.

6.2. Sensitivity Analyses

Under the direction of VDOT, the RK&K / WSP team conducted a sensitivity analyses of I-395 southbound traffic bypassing the mainline via collector-distributor (CD) road and Shirlington Road. In the existing conditions, some portion of traffic from the I-395 southbound off-ramp was noticed entering the rotary only to immediately exit to the I-395 southbound on-ramp. This maneuver is likely intended to bypass a portion of the congestion along the I-395 mainline. No specific origin-destination data was collected for this movement, so the total magnitude is unknown.

One issue noted was, that with the proposed *Hybrid1* and *Hybrid2* alternatives, this maneuver may be discouraged by the realignment and signalization of the I-395 southbound off-ramp to Shirlington Road (across from Campbell Avenue). If fewer vehicles use this ramp to bypass I-395 southbound mainline traffic, then there may be some potential that operations would worsen along I-395. Therefore, a sensitivity analysis was conducted assuming that the proposed improvements would discourage traffic using the rotary to bypass I-395 southbound congestion. For this analysis, 10% and 20% of the I-395 southbound off-ramp traffic to the rotary would be diverted to the I-395 southbound mainline via the ramp from the collector-distributor road (referred to as I-395 SB Off-Ramp Traffic Decreased by x%).

Table 8 and **Table 9** compare the intersection operations for the impacted Shirlington Road at Campbell Avenue and I-395 operations with *Hybrid2* alternative. Table 8 indicates that if 10% or 20% of traffic from the I-395 southbound off-ramp to the rotary diverts to the I-395 southbound mainline via the ramp from the collector-distributor road, the operations of the Shirlington Road intersection would improve

compared to the baseline *Hybrid2* conditions. The respective travel times (provided in the Table 8 footnotes) along Shirlington Road, are expected to improve by at least 3%.

The southbound I-395 operations (within the study interchange; Table 9) are expected to remain similar to Hybrid2 when additional traffic is diverted to the mainline from the I-395 off-ramp to Shirlington Road rotary.

Table 6: Comparison of Future Supplemental Hybrid Concept Travel Time Results

Segment	VISSIM ID	Location	AM Peak Hour					% Difference w Hybrid2		
			2040 No Build	2040 Hybrid2	2040 Hybrid3	*2040 Arlington*	*2040 Alexandria*	2040 Hybrid3	*2040 Arlington*	*2040 Alexandria*
			7AM-8AM	7AM-8AM	7AM-8AM	7AM-8AM	7AM-8AM	7AM-8AM	7AM-8AM	7AM-8AM
Quaker Ln Northbound	28	Preston Rd to Gunston Rd	54.2	67.3	55.1	56.2	62.5	-18%	-16%	-7%
	24	Gunston Rd to I-395 NB Ramps	10.7	10.8	10.6	10.8	11.0	-2%	0%	2%
	25	I-395 NB Ramps to Arlington Mill Dr	53.4	55.8	54.1	53.5	56.3	-3%	-4%	1%
	26	Arlington Mill Dr to Four Mile Run	26.0	27.5	26.6	27.3	26.2	-3%	-1%	-5%
	Total Northbound		*144.3*	*161.3*	*146.5*	*147.8*	*155.9*	*-9%*	*-8%*	*-3%*
Shirlington Rd Southbound	21	Four Mile Run to Arlington Mill Dr	39.6	39.7	39.7	39.6	39.6	0%	0%	0%
	22	Arlington Mill Dr to Campbell Ave	43.2	38.6	**24.6**	39.3	43.8	-36%	2%	13%
	23	Campbell Ave to Gunston Rd/Quaker Ln	46.2	89.7	**82.3**	**39.3**	93.4	-8%	-56%	4%
	Total Southbound		*129.1*	*168.1*	*146.6*	*118.1*	*176.8*	*-13%*	*-13%*	*-30%*
Loop Northbound	29	Gunston Rd to I-395 NB On-Ramp	10.7	10.8	10.7	10.8	11.0	-1%	0%	2%
	30	I-395 NB On-Ramp to Campbell Ave	40.0	41.5	27.5	41.5	40.4	-34%	0%	-3%
	Total Northbound		*50.7*	*52.3*	*38.1*	*52.3*	*51.3*	*-27%*	*-27%*	*0%*
Loop Southbound	27	I-395 SB On Ramp to Preston Rd	47.0	48.4	47.2	47.0	48.7	-2%	-3%	1%
	Total Southbound		*47.0*	*48.4*	*47.2*	*47.0*	*48.7*	*-2%*	*-2%*	*-3%*
Total Arterial Travel Time			***371.1***	***430.0***	***378.3***	***365.3***	***432.8***	***-12%***	***-15%***	***1%***

Segment	VISSIM ID	Location	PM Peak Hour					% Difference w Hybrid2		
			2040 No Build	2040 Hybrid2	2040 Hybrid3	*2040 Arlington*	*2040 Alexandria*	2040 Hybrid3	*2040 Arlington*	*2040 Alexandria*
			5PM-6PM	5PM-6PM	5PM-6PM	5PM-6PM	5PM-6PM	5PM-6PM	5PM-6PM	5PM-6PM
Quaker Ln Northbound	28	Preston Rd to Gunston Rd	122.9	77.5	80.3	**124.5**	70.5	4%	61%	-9%
	24	Gunston Rd to I-395 NB Ramps	11.0	10.8	10.7	10.8	11.0	-1%	0%	2%
	25	I-395 NB Ramps to Arlington Mill Dr	64.8	59.1	58.0	60.1	56.2	-2%	2%	-5%
	26	Arlington Mill Dr to Four Mile Run	25.3	21.0	20.4	24.6	19.8	-3%	17%	-6%
	Total Northbound		224.0	168.3	169.3	220.0	157.4	*1%*	*31%*	*-6%*
Shirlington Rd Southbound	21	Four Mile Run to Arlington Mill Dr	87.4	87.9	88.4	85.4	84.5	1%	-3%	-4%
	22	Arlington Mill Dr to Campbell Ave	54.9	78.5	**42.1**	73.3	57.2	-46%	-7%	-27%
	23	Campbell Ave to Gunston Rd/Quaker Ln	43.2	109.3	**123.2**	**40.0**	100.2	13%	-63%	-8%
	Total Southbound		185.5	275.8	253.7	198.7	241.9	*-8%*	*-28%*	*-12%*
Loop Northbound	29	Gunston Rd to I-395 NB On-Ramp	11.0	10.8	10.7	10.8	11.0	-1%	0%	2%
	30	I-395 NB On-Ramp to Campbell Ave	43.2	62.1	39.5	60.5	41.0	-36%	-3%	-34%
	Total Northbound		54.2	72.8	50.2	71.3	52.0	*-31%*	*-2%*	*-29%*
Loop Southbound	27	I-395 SB On Ramp to Preston Rd	52.9	58.7	60.3	55.4	56.3	3%	-6%	-4%
	Total Southbound		52.9	58.7	60.3	55.4	56.3	*3%*	*-6%*	*-4%*
Total Arterial Travel Time			***516.7***	***575.6***	***533.6***	***545.5***	***507.6***	***-7%***	***-5%***	***-12%***

Table 7: Comparison of Future Supplemental Hybrid Concept Intersection Results

Study Intersection	Movement	Volume	Peak	ID	2040 No Build		2040 Hybrid2		2040 Arlington		2040 Alexandria	
					VISSIM Delay[1]	Max Q[2] (ft)	VISSIM Delay[1]	Max Q[2] (ft)	VISSIM Delay[1]	Max Q[2] (ft)	VISSIM Delay[1]	Max Q[2] (ft)
Shirlington Rd at S Arlington Mill Dr (Signalized)	*EB*	430	*AM Peak Hour*	500	*18.0*	*120*	*18.1*	*115*	*18.1*	*115*	*18.1*	*115*
	WB	21		500	*72.8*	*55*	*72.8*	*55*	*72.8*	*55*	*72.8*	*55*
	RampWB	397		500	*38.8*	*250*	*37.9*	*260*	*38.0*	*255*	*37.9*	*235*
	NB	614		500	*33.8*	*280*	*33.5*	*315*	*32.4*	*280*	*32.8*	*285*
	SB	515		500	*43.9*	*355*	*43.6*	*360*	*43.3*	*370*	*43.5*	*350*
	Overall	1977		500	***34.2***	*-*	***33.9***	*-*	***33.5***	*-*	***33.7***	*-*
S Shirlington Rd at Campbell Ave (Signalized)	*EB*	502		505	*7.5*	*190*	*24.9*	*225*	*25.1*	*220*	*8.4*	*195*
	WB	372		505	*15.9*	*150*	*40.7*	*215*	*41.7*	*215*	*15.9*	*150*
	SB	1211		505	*24.0*	*515*	*18.8*	*330*	*19.9*	*300*	*24.4*	*485*
	Overall	2085		505	***18.2***	*-*	***24.4***	*-*	***25.3***	*-*	***18.6***	*-*
N Quaker Ln at Gunston Rd (Unsignalized)	*EB*	388		515	*0.0*	*0*	*29.9*	*280*	*0.0*	*0*	*28.7*	*245*
	WB	659		515	*21.0*	*285*	*14.8*	*280*	*21.5*	*275*	*21.4*	*280*
	NB	1806		515	*10.5*	*885*	*19.0*	*570*	*10.9*	*590*	*15.8*	*515*
	Overall	2853		515	***13.0***	*-*	***18.9***	*-*	***13.3***	*-*	***18.1***	*-*
N Quaker Ln at Shirlington Rd (Signalized)	*EB*	751		2005	*-*		*31.5*	*340*	*-*		*31.1*	*310*
	NB	1055		2005			*12.6*	*365*			*10.5*	*295*
	Overall	1806		2005			***19.7***	*-*			***18.2***	*-*
N Quaker Ln at Preston Rd (Signalized)	*EB*	95		520	*29.2*	*145*	*27.6*	*125*	*28.9*	*135*	*28.3*	*130*
	WB	160		520	*22.0*	*160*	*20.0*	*165*	*26.9*	*180*	*20.8*	*165*
	NB	1021		520	*11.0*	*235*	*7.9*	*220*	*15.7*	*285*	*8.6*	*235*
	SB	639		520	*5.8*	*140*	*5.3*	*135*	*5.9*	*145*	*5.4*	*135*
	Overall	1915		520	***11.3***	*-*	***9.2***	*-*	***14.4***	*-*	***9.8***	*-*
Shirlington Rd at S Arlington Mill Dr (Signalized)	*EB*	397	*PM Peak Hour*	500	*25.9*	*135*	*29.2*	*165*	*27.2*	*140*	*18.1*	*115*
	WB	157		500	*88.9*	*240*	*93.0*	*240*	*93.1*	*230*	*72.8*	*55*
	RampWB	465		500	*50.2*	*310*	*46.7*	*290*	*48.2*	*320*	*37.9*	*235*
	NB	957		500	*46.7*	*765*	*39.7*	*475*	*45.0*	*665*	*32.8*	*285*
	SB	665		500	*51.6*	*390*	*52.2*	*395*	*48.9*	*385*	*43.5*	*350*
	Overall	2641		500	***47.8***	*-*	***45.7***	*-*	***46.7***	*-*	***33.7***	*-*
S Shirlington Rd at Campbell Ave (Signalized)	*EB*	554		505	*12.1*	*245*	*42.2*	*285*	*38.4*	*275*	*8.4*	*195*
	WB	827		505	*75.5*	*2640+*	*69.6*	*650*	*71.5*	*1570*	*75.5*	*2640+*
	SB	1777		505	*23.6*	*710*	*47.5*	*700*	*43.3*	*715*	*24.4*	*485*
	Overall	3158		505	***33.4***	*-*	***51.6***	*-*	***48.8***	*-*	***37.1***	*-*
N Quaker Ln at Gunston Rd (Unsignalized)	*EB*	609		515	*0.0*	*0*	*40.0*	*590*	*0.0*	*0*	*28.7*	*245*
	WB	404		515	*10.7*	*250*	*6.4*	*175*	*10.9*	*255*	*21.4*	*280*
	NB	1698		515	*32.7*	*1405*	*30.2*	*585*	*33.3*	*1410*	*15.8*	*515*
	Overall	2711		515	***28.4***	*-*	***28.6***	*-*	***28.9***	*-*	***18.1***	*-*
N Quaker Ln at Shirlington Rd (Signalized)	*EB*	834		2005	*-*		*46.4*	*640*	*-*		*31.1*	*310*
	NB	864		2005			*16.1*	*360*			*10.5*	*295*
	Overall	1698		2005			***30.7***	*-*			***18.2***	*-*
N Quaker Ln at Preston Rd (Signalized)	*EB*	76		520	*34.7*	*120*	*28.4*	*130*	*34.6*	*120*	*28.3*	*130*
	WB	230		520	*48.4*	*250*	*33.0*	*230*	*45.0*	*250*	*20.8*	*165*
	NB	879		520	*75.8*	*455*	*12.7*	*255*	*73.9*	*465*	*8.6*	*235*
	SB	1573		520	*12.9*	*440*	*11.8*	*455*	*13.9*	*470*	*5.4*	*135*
	Overall	2758		520	***36.5***	*-*	***14.4***	*-*	***36.2***	*-*	***9.8***	*-*

1. indicates approximate level of service (LOS) and average delay in seconds per vehicle from VISSIM.
2. Max Q refers to Maximum queue in feet, from VISSIM.
3. Glebe Rd, Shirlington Rd, Quaker Lane are assumed to be oriented in North-South direction.

Table 8: Comparison of Future Sensitivity Analysis Intersection Results

Study Intersection	Movement	2040 Hybrid2			I-395 Off-Ramp Traffic Decreased 10%			I-395 Off-Ramp Traffic Decreased 20%		
		Volume Output	VISSIM Delay[1]	Max Q[2] (ft)	Volume Output	VISSIM Delay[1]	Max Q[2] (ft)	Volume Output	VISSIM Delay[1]	Max Q[2] (ft)
Shirlington Rd at S Arlington Mill Dr (Signalized)	*EB*	*399*	*29.2*	*165*	*400*	*25.4*	*140*	*399*	*25.6*	*140*
	WB	*158*	*93.0*	*240*	*156*	*88.9*	*235*	*156*	*90.0*	*235*
	RampWB	*405*	*46.7*	*290*	*397*	*46.3*	*305*	*395*	*46.7*	*315*
	NB	*919*	*39.7*	*475*	*941*	*37.9*	*495*	*943*	*38.2*	*485*
	SB	*654*	*52.2*	*395*	*673*	*51.2*	*385*	*673*	*52.4*	*390*
	Overall	***2535***	***45.7***	*-*	***2567***	***43.8***	*-*	***2566***	***44.4***	*-*
S Shirlington Rd at Campbell Ave (Signalized)	*EB*	*542*	*42.2*	*285*	*553*	*40.4*	*280*	*538*	*42.8*	*280*
	WB	*693*	*69.6*	*650*	*640*	*61.3*	*500*	*569*	*59.3*	*440*
	SB	*1768*	*47.5*	*700*	*1782*	*34.1*	*650*	*1773*	*39.5*	*685*
	Overall	***3003***	***51.6***	*-*	***2975***	***41.1***	*-*	***2880***	***44.0***	*-*

1. 10 % and 20 % to Hybrid2 refer to sensitivity analyses with 10 % and 20 % of respective CD Road on-ramp traffic to I-395 is directed via Shirlington Road rotary. Similarly 10 and 20 % from Hybrid2 refer to analyses with 10 % and 20 % of respective Shirlington Road off-ramp bypass traffic is directed via the on-ramp from CD Road.
2. VISSIM Delay and Max Q refer to average delay per vehicle in seconds and Maximum queue in feet, respectively from VISSIM.
3. Glebe Rd, Shirlington Rd, Quaker Lane are assumed to be oriented in North-South direction.
4. Southbound Shirlington Road Travel Times from Four Mile Run Dr to Gunston Road (secs): Hybrid2 (276), 10% Decrease (259) and 20% Decrease (268).

Table 9: Comparison of I-395 Southbound Sensitivity Analysis Results

	Note	Link#	Type	PM Peak Hour			
				Model Volume Input	*Model Volume Output*	*% Diff*	*Speed Difference Over Hybrid2 (MPH)*
2040 Hybrid2	North of Glebe Rd	369	Basic	5,611	5,213	-7%	-
	CD Road: Glebe to I-395	**443**	**Merge**	**2,297**	**2,017**	**-12%**	**-**
	CD Road Off Ramp to Rotary	**446**	**Basic**	**827**	**710**	**-14%**	**-**
	On Ramp from Glebe Rd	444	Merge	5,618	5,191	-8%	-
	Between Quaker Ln & King St	1263	Weave	6,417	5,883	-8%	-
	Between King St Ramps	137	Basic	5,170	4,740	-8%	-
	On Ramp from King St NB	126	Merge	5,362	4,940	-8%	-
	On Ramp from King St SB	1334	Merge	5,920	5,494	-7%	-
I-395 Off-Ramp Traffic Decreased 10%	North of Glebe Rd	369	Basic	5,611	5,233	-7%	-1
	CD Road: Glebe to I-395	**443**	**Merge**	**2,297**	**2,044**	**-11%**	**1**
	CD Road Off Ramp to Rotary	**446**	**Basic**	**745**	**654**	**-12%**	**1**
	On Ramp from Glebe Rd	444	Merge	5,618	5,244	-7%	1
	Between Quaker Ln & King St	1263	Weave	6,417	5,882	-8%	0
	Between King St Ramps	137	Basic	5,170	4,733	-8%	0
	On Ramp from King St NB	126	Merge	5,362	4,935	-8%	0
	On Ramp from King St SB	1334	Merge	5,920	5,489	-7%	0
I-395 Off-Ramp Traffic Decreased 20%	North of Glebe Rd	369	Basic	5,611	5,266	-6%	0
	CD Road: Glebe to I-395	**443**	**Merge**	**2,297**	**2,036**	**-11%**	**1**
	CD Road Off Ramp to Rotary	**446**	**Basic**	**662**	**581**	**-12%**	**1**
	On Ramp from Glebe Rd	444	Merge	5,618	5,319	-5%	3
	Between Quaker Ln & King St	1263	Weave	6,417	5,879	-8%	1
	Between King St Ramps	137	Basic	5,170	4,739	-8%	0
	On Ramp from King St NB	126	Merge	5,362	4,940	-8%	0
	On Ramp from King St SB	1334	Merge	5,920	5,494	-7%	0

7. CONCLUSIONS

As part of the I-395 (Henry H. Shirley Memorial Highway) and S. Shirlington Road interchange study, this report summarizes the future condition analysis results for the study area. A detailed memorandum summarizing the existing conditions and model calibration was submitted to VDOT earlier in April 2018. The No Build condition analyses revealed an expected increase in congestion along arterial streets in the study area. Notably, northbound Quaker Lane and southbound I-395 off-ramp are expected to suffer from **severe** congestion during the PM peak hour.

The RK&K / WSP team developed six (6) alternative concepts for preliminary evaluation. These future alternative concepts were initially envisioned as isolated or localized improvements to achieve operational and safety benefits at different locations within the interchange without requiring modifications to the I-395 mainline. The preliminary evaluation results for the six (6) concepts were reviewed with VDOT on July 20, 2018. The discussion narrowed down to four (4) of the concepts (S3 through S6) which were expected show spot benefits within the study area, when implemented

independently, as long as some additional geometric refinements were completed. Furthermore, the discussion identified a potential for greater benefits by combined several concepts, resulting in two Hybrid alternatives (Hybrid1 and Hybrid2). Additionally, VDOT directed the team to evaluate the potential for phasing the Hybrid2 alternative, implementing separately the proposed improvements in each of the impacted jurisdictions (Alexandria and Arlington).

The analysis results indicated that under both Hybrid1 and Hybrid2 concepts, the intersection operations are expected to improve compared to the No Build condition, with notable improvements at the intersections of Shirlington Road with I-395 southbound off-ramp and Quaker Lane with the Rotary. The network performance results indicated that the hybrid concepts are expected to process more vehicles within the study interchange, over the No Build condition. However, the travel times within the rotary and average delay per vehicle within the network are expected to increase due to the proposed signals. It is noted that despite an increase in the performance measures, the hybrid concepts are expected increase mobility and improve safety. Although safety cannot be quantified by the operational parameters evaluated in this study, it is anticipated that the elimination of the perceived unsafe merging and weaving maneuvers would result in safer streets. With the proposed Hybrid alternatives, conflicts between rotary traffic and entering traffic would be time-separated at up to 3 additional locations compared to No Build conditions. This will reduce the potential for conflicts directly at the entry points, but also reduce weaving movements between access points and enhancing safety compared to the existing configuration.

Based on the PM peak hour travel time, intersection operations along Shirlington Road and network performance measures, Hybrid2 is expected to provide greater benefits compared to the Hybrid1 concept, primarily due to improvements along Shirlington Road approaching Campbell Avenue and the I-395 southbound off-ramp with the additional through lane proposed under Hybrid2 The phasing analysis found that improvements could be implemented along Quaker Lane and the northbound I-395 ramp without needing to implement the corresponding improvements along Shirlington Road and the southbound I-395 off-ramp. This means that the two localities could advance separate projects impacting their specific jurisdiction. However, the maximum benefits would be achieved by advancing the full Hybrid2 alternative.

Lastly, sensitivity analyses indicated that southbound I-395 operations within the study area would be expected to remain similar if the proposed improvements result in traffic which currently uses the collector-distributor road, off-ramp and rotary to bypass congestion along I-395 instead using the I-395 mainline to complete their trip.

In summary, the proposed improvements to the Shirlington Road / Quaker Lane rotary are expected to improve safety along the ramps and local street network, while not negatively impacting the I-395 mainline.

APPENDIX I – Project Cost Estimate

Appendix I - I-395 Shirlington Cost Comparison

April 19, 2019

Project Cost by Locality

ALTERNATIVES / PROJECT PHASE		Alexandria Side Based on Hybrid Conceptual Design	Arlington Side Based on Hybrid Conceptual Design		Hybrid Alternative
Funding	PE	$ 634,117	$ 412,100	IMR & Public Outreach = $200,000	$ 1,246,217
	RW/UTIL	$ 150,000	$ 250,000		$ 400,000
	CN	$ 4,877,826	$ 3,170,200		$ 8,048,026

Project Cost by Element and Hybrid Alternative

RANKING		4	1	3	2	
ALTERNATIVES / PROJECT PHASE		Additional Lanes on Arlington Mill Dr exit from Rotary	Signalized T-intersection with rotary and N. Quaker Ln	Signalized intersection with NB I-395 off-ramp and Gunston Rd	Signalized intersection with I-395 SB off-ramp and Campbell Ave	Hybrid Alternative
Funding	PE TOTAL	$ 352,500	$ 696,046	$ 739,316	$ 703,500	$ 1,246,217
	RW/UTIL	$ 50,000	$ 75,000	$ 75,000	$ 200,000	$ 400,000
	CN	$ 508,400	$ 2,480,229	$ 2,696,582	$ 2,517,300	$ 8,048,026
	TOTAL	$ 911,000	$ 3,252,000	$ 3,511,000	$ 3,421,000	$ 9,694,243
	TOTAL (Rounded)	$ 915,000	$ 3,255,000	$ 3,515,000	$ 3,420,000	$ 9,690,000

Project Cost Summary

Scoping level cost estimates were developed using quantity takeoffs from the concept level plans, unit prices from VDOT's AASHTOWare system, and applying planning-level contingency amounts. The table below summarizes the project cost for the Hybrid Alternative and presents the costs if the individual elements were to be constructed as separate construction projects. There is a cost savings in designing and constructing the Hybrid Alternative as one project due in part to economy of scale, as a proportionate savings in cost would be gained for Preliminary Engineering (e.g., plan/bid document preparation and public involvement) and Construction (e.g., mobilization and maintenance of traffic) activities by delivering one larger project rather than four separate smaller projects.

Alternatives		Preliminary Engineering	Right of Way/ Utilities	Construction	TOTAL
Single Construction Project					
Hybrid Alternative		$1,240,000	$400,000	$8,050,000	$9,690,000
Ranking	Phased Construction Projects				
1	Signalize Rotary and N. Quaker Ln	$700,000	$75,000	$2,480,000	$3,255,000
2	Signalize I-395 SB off-ramp and Campbell Ave	$700,000	$200,000	$2,520,000	$3,420,000
3	Signalize NB I-395 off-ramp and Gunston Rd	$740,000	$75,000	$2,700,000	$3,515,000
4	Widen Exit to Arlington Mill Drive	$355,000	$50,000	$510,000	$915,000
	Total	$2,495,000	$400,000	$8,210,000	$11,105,000

CONCEPTUAL COST ESTIMATE - TOTAL

I-395 Shirlington Interchange Operations Study

March 2019

Alexandria Side Based on Hybrid 2B Conceptual Design

CITY OF ALEXANDRIA, VIRGINIA; NOVA DISTRICT

VDOT PROJECT NO.****-***-***; UPC No. 107831

ITEM CODE	ITEM	UNIT	CONCEPTUAL QUANTITY	UNIT COST	COST
00100	MOBILIZATION	LS	1.0	$154,505	$ 154,500
00101	CONSTRUCTION SURVEYING (CONSTRUCTION)	LS	1.0	$5,000	$ 5,000
00110	CLEARING AND GRUBBING	LS	1.0	$5,000	$ 5,000
00120	REGULAR EXCAVATION	CY	300.0	$55	$ 16,300
00150	EMBANKMENT	CY	180.0	$87	$ 14,200
00588	UNDERDRAIN UD-4	LF	1200.0	$16	$ 19,100
06818	DROP INLET DI-3B,L=6'	EA	3.0	$5,320	$ 16,000
10123	AGGR. BASE MATL. TY. I NO. 21A	TON	2000.0	$27	$ 52,800
10128	AGGR. BASE MATL. TY. I NO. 21B	TON	230.0	$56	$ 12,400
10628	FLEXIBLE PAVEMENT PLANING 0" - 2"	SY	3675.0	$7	$ 27,400
10636	ASPHALT CONC.TY. SM-9.5D	TON	1450.0	$116	$ 167,300
10642	ASPHALT CONC. BASE COURSE TY. BM-25.0A	TON	2180.0	$89	$ 192,900
11070	NS SAW-CUT ASPH CONC FULL DEPTH	LF	1550.0	$5	$ 7,800
12020	STD. CURB CG-2	LF	400.0	$37	$ 15,000
12600	STD. COMB. CURB & GUTTER CG-6	LF	1200.0	$33	$ 39,200
13220	HYDRAULIC CEMENT CONC. SIDEWALK 4"	SY	670.0	$65	$ 43,600
13280	GUARDRAIL GR-MGS1	LF	480.0	$29	$ 13,800
13286	GUARDRAIL TERMINAL GR-MGS2	EA	1.0	$4,039	$ 4,000
13287	GUARDRAIL END ANCHORAGE GR-MGS3	EA	2.0	$1,286	$ 2,600
13288	GUARDRAIL HEIGHT TRANSITION GR-MGS4	EA	1.0	$822	$ 800
13383	FIXED OBJECT ATTACH. GR-FOA-1 TY. I	EA	1.0	$3,063	$ 3,100
13384	FIXED OBJECT ATTACH. GR-FOA-1 TY. II	EA	1.0	$950	$ 1,000
13530	RETAINING WALL RW-3	CY	55.0	$1,200	$ 60,400
24265	NS MAINTENANCE OF TRAFFIC	LS	1.0	$415,020	$ 415,000
24430	DEMOLITION OF PAVEMENT (FLEXIBLE)	SY	5450.0	$20	$ 108,200
24505	NS RELOCATE EXIST. (LIGHT POLES)	EA	8.0	$10,000	$ 80,000
24600	REMOVE EXISTING GUARDRAIL	LF	950.0	$5	$ 4,800
27012	TOPSOIL CLASS A 2"	ACRE	1.0	$19,929	$ 4,000
27102	REGULAR SEED	LB	220.0	$26	$ 5,600
27103	OVERSEEDING	LB	140.0	$18	$ 2,400
27215	FERTILIZER(15-30-15)	LB	1.0	$4,784	$ 1,200
27250	LIME	TON	4.0	$573	$ 2,000
27275	NS EROSION CONTROL	LS	1.0	$90,000	$ 90,000
41101	NS RELOCATE (CCTV CAMERA, CABINETS, AND UTILITIES)	LS	1.0	$100,000	$ 100,000
50108	SIGN PANEL	SF	150.0	$37	$ 5,400
50430	SIGN POST STP-1, 2", 14 GAUGE	LF	10.0	$38	$ 400
50490	CONCRETE FOUNDATION STP-1, TYPE F	EA	150.0	$613	$ 88,200
50860	REMOVE-DISPOSE SIGN STRUCT. TY. I	EA	16.0	$242	$ 3,900
52000	NS TRAFFIC SIGNALIZATION (PED. SIGNAL EQUIP. AND LOOPS)	LS	5.0	$100,000	$ 500,000
54060	TYPE B CLASS IV PVMT LINE MRKG 24"	LF	160.0	$19	$ 2,900
54075	TYPE B CLASS VI PVMT LINE MRKG 4"	LF	6725.0	$5	$ 34,300
54076	TYPE B CLASS VI PVMT LINE MRKG 6"	LF	2040.0	$6	$ 12,900
54571	PVMT SYMB MRKG (THRU ARROW) TY B, CL I	EA	5.0	$128	$ 600
54574	PVMT SYMB MRKG (SGL TURN ARROW) TY B, CL I	EA	7.0	$159	$ 1,100
NS	SWP/BMP/ENVIRONMENTAL MITIGATION	LS	1.0	$300,000	$ 300,000
NS	RELOCATE SIGN PANEL ON NEW O/H STRUCTURE	EA	1.0	$7,500	$ 7,500
	SUBTOTAL				$ 2,644,600
	CEI Costs (VDOT to provide, using 17%)				$ 449,582
	Incentives (5%)				$ 132,230
	Construction Contingency (Conceptual Design, assume 40%)				$ 1,290,565
	TOTAL				$ 4,384,747
	CN TOTAL (FY22, 2.7% Escalation)		**Add to Hybrid Option**		**$ 4,877,826**
	RW/Utilities		**Add to Hybrid Option**		**$ 150,000**
	PE (13% of CN TOTAL)		**Add to Hybrid Option**		$ 634,117
	IMR & Public Outreach		**Add to Hybrid Option (1 Time)**		$ 200,000
	PE TOTAL				**$ 834,117**
	PE+RW/UTIL+CN				**$ 5,862,000**

	GENERAL ASSUMPTIONS
1	Item costs calculated through AASHTOWare Preconstruction online application
2	Pavement Depths assumed to be 2" Asphalt Surface Material, 8" Asphalt Base Material, and 8" Aggregate Base Material
3	Lump Sum items for minor items rounded up to $5000 (Construction Surveying, Clearing and Grubbing)
4	Lump Sum of Maintenance of Traffic based on 20% of Construction Items
5	Lump Sum Traffic Signals include all associated work/items and an average price of $100,000 per approach (including signal pole and mast arm)
6	Widening of Quaker Ln will requre shifting curb and gutter and sidewalk. Sidewalk relocation will require relocating existing light poles ($10,000EA)
7	Ground Mounted signs in areas of widening counted as relocation, and assume 4 new signs for new Shirlington to Quaker ramp
8	Overhead Sign Relocation at Shirlington Road and Quaker Lane Gore assumed to be approximately $3500
9	Relocation of existing CCTV Camera, Cabinets, and associated utilities assumed to be $100,000

CONCEPTUAL COST ESTIMATE - TOTAL

I-395 Shirlington Interchange Operations Study

March 2019

Arlington Side Based on Hybrid 2B Conceptual Design

ARLINGTON COUNTY, VIRGINIA; NOVA DISTRICT

VDOT PROJECT NO.****-***-***; UPC No. 107831

ITEM CODE	ITEM	UNIT	CONCEPTUAL QUANTITY	UNIT COST	COST (Rounded)
00100	MOBILIZATION	LS	1	$ 112,340	$ 112,300
00101	CONSTRUCTION SURVEYING (CONSTRUCTION)	LS	1	$ 5,000	$ 5,000
00110	CLEARING AND GRUBBING	LS	1	$ 5,000	$ 5,000
00120	REGULAR EXCAVATION	CY	55	$ 55	$ 3,000
00150	EMBANKMENT	CY	640	$ 87	$ 55,800
00588	UNDERDRAIN UD-4	LF	550	$ 16	$ 8,800
01240	24" PIPE	LF	200	$ 100	$ 20,000
06818	DROP INLET DI-3B,L=6'	EA	2	$ 5,320	$ 10,600
09056	MANHOLE MH-1 OR 2	LF	2	$ 800	$ 1,600
09057	FRAME & COVER MH-1	EA	2	$ 600	$ 1,200
10123	AGGR. BASE MATL. TY. I NO. 21A	TON	980	$ 27	$ 26,100
10628	FLEXIBLE PAVEMENT PLANING 0" - 2"	SY	6750	$ 7	$ 50,400
10636	ASPHALT CONC.TY. SM-9.5D	TON	1070	$ 116	$ 123,700
10642	ASPHALT CONC. BASE COURSE TY. BM-25.0A	TON	1080	$ 89	$ 95,600
11070	NS SAW-CUT ASPH CONC FULL DEPTH	LF	385	$ 5	$ 1,900
12032	RADIAL CURB CG-3	LF	550	$ 41	$ 22,800
13280	GUARDRAIL GR-MGS1	LF	680	$ 29	$ 19,700
13286	GUARDRAIL TERMINAL GR-MGS2	EA	1	$ 4,039	$ 4,000
13287	GUARDRAIL END ANCHORAGE GR-MGS3	EA	2	$ 1,286	$ 2,600
13288	GUARDRAIL HEIGHT TRANSITION GR-MGS4	EA	1	$ 822	$ 800
13383	FIXED OBJECT ATTACH. GR-FOA-1 TY. I	EA	1	$ 3,063	$ 3,100
13384	FIXED OBJECT ATTACH. GR-FOA-1 TY. II	EA	1	$ 950	$ 1,000
13530	RETAINING WALL RW-3	CY	40	$ 1,200	$ 48,000
14120	REMOVAL OF COMB. CURB AND GUTTER	LF	600	$ 20	$ 12,000
24265	NS MAINTENANCE OF TRAFFIC	LS	1	$ 274,460	$ 274,500
24430	DEMOLITION OF PAVEMENT (FLEXIBLE)	SY	2950	$ 20	$ 59,000
24505	NS RELOCATE EXIST. (LIGHT POLES)	EA	3	$ 10,000	$ 30,000
24600	REMOVE EXISTING GUARDRAIL	LF	1800	$ 5	$ 9,000
27012	TOPSOIL CLASS A 2"	ACRE	0.2	$ 19,929	$ 4,000
27102	REGULAR SEED	LB	50	$ 26	$ 1,300
27103	OVERSEEDING	LB	30	$ 18	$ 500
27215	FERTILIZER(15-30-15)	LB	0.1	$ 4,784	$ 500
27250	LIME	TON	0.8	$ 573	$ 500
27275	NS EROSION CONTROL	LS	1	$ 60,000	$ 60,000
52000	NS TRAFFIC SIGNALIZATION (PED. SIGNAL EQUIP. AND LOOPS)	LS	3	$ 100,000	$ 300,000
54060	TYPE B CLASS IV PVMT LINE MRKG 24"	LF	170	$ 19	$ 3,200
54075	TYPE B CLASS VI PVMT LINE MRKG 4"	LF	5450	$ 5	$ 27,900
54076	TYPE B CLASS VI PVMT LINE MRKG 6"	LF	1900	$ 6	$ 12,000
54571	PVMT SYMB MRKG (THRU ARROW) TY B, CL I	EA	1	$ 128	$ 100
54574	PVMT SYMB MRKG (SGL TURN ARROW) TY B, CL I	EA	10	$ 159	$ 1,600
57060	CCTV CAMERA (DIGITAL)	EA	1	$ 30,000	$ 30,000
NS	SWP/BMP/ENVIRONMENTAL MITIGATION	LS	1	$ 300,000	$ 300,000
NS	O/H SIGN PANEL AND STRUCTURE	EA	1	$ 10,000	$ 10,000
	SUBTOTAL				$ 1,759,100
	CEI Costs (VDOT to provide, using 17%)				$ 299,000
	Incentives (5%)				$ 88,000
	Construction Contingency (Conceptual Design, assume 40%)				$ 703,600
	TOTAL				$ 2,849,700
	CN TOTAL (FY22, 2.7% Escalation)		**Add to Hybrid Option**		**$ 3,170,200**
	RW/Utilities		**Add to Hybrid Option**		**$ 250,000**
	PE (13% of CN TOTAL)		**Add to Hybrid Option**		$ 412,100
	IMR & Public Outreach		**Add to Hybrid Option (1 Time)**		$ 200,000
	PE TOTAL				**$ 612,100**
	PE+RW/UTIL+CN				**$ 4,033,000**

GENERAL ASSUMPTIONS	
1	Item costs calculated through AASHTOWare Preconstruction online application
2	Pavement Depths assumed to be 2" Asphalt Surface Material, 8" Asphalt Base Material, and 8" Aggregate Base Material
3	Lump Sum items for minor items rounded up to $5000 (Construction Surveying, Clearing and Grubbing)
4	Lump Sum of Maintenance of Traffic based on 20% of Construction Items
5	Lump Sum Traffic Signals include all associated work/items and an average price of $175,000 per signal pole and mast arm.

CONCEPTUAL COST ESTIMATE - TOTAL

I-395 Shirlington Interchange Operations Study

April 2019

S3- Additional Lanes on Arlington Mill Dr exit from Rotary Conceptual Design

ARLINGTON COUNTY, VIRGINIA; NOVA DISTRICT

VDOT PROJECT NO.****-***-***; UPC No. 107831

ITEM CODE	ITEM	UNIT	CONCEPTUAL QUANTITY (NOT ROUNDED)	CONCEPTUAL QUANTITY	UNIT COST	COST (Rounded)
00100	MOBILIZATION	LS	1.0	1	$ 42,005	$ 42,000
00101	CONSTRUCTION SURVEYING (CONSTRUCTION)	LS	1.0	1	$ 1,984	$ 2,000
00111	CLEARING AND GRUBBING	ACRE	0.038	0.04	$ 20,000	$ 800
00120	REGULAR EXCAVATION	CY	0.0	0	$ 55	$ -
00150	EMBANKMENT	CY	0.0	0	$ 87	$ -
00588	UNDERDRAIN UD-4	LF	150	150	$ 16	$ 2,400
01240	24" PIPE	LF	100	100	$ 100	$ 10,000
06818	DROP INLET DI-3B,L=6'	EA	1	1	$ 5,320	$ 5,300
09056	MANHOLE MH-1 OR 2	LF	1	1	$ 800	$ 800
09057	FRAME & COVER MH-1	EA	1	1	$ 600	$ 600
10123	AGGR. BASE MATL. TY. I NO. 21A	TON	45.4	50	$ 27	$ 1,300
10628	FLEXIBLE PAVEMENT PLANING 0" - 2"	SY	2429.7	2450	$ 7	$ 18,300
10636	ASPHALT CONC.TY. SM-9.5D	TON	283.6	290	$ 116	$ 33,500
10642	ASPHALT CONC. BASE COURSE TY. BM-25.0A	TON	49.9	50	$ 89	$ 4,400
11070	NS SAW-CUT ASPH CONC FULL DEPTH	LF	215.0	215	$ 5	$ 1,100
12032	RADIAL CURB CG-3	LF	150.0	150	$ 41	$ 6,200
13280	GUARDRAIL GR-MGS1	LF	0.0	0	$ 29	$ -
13286	GUARDRAIL TERMINAL GR-MGS2	EA	0.0	0	$ 4,039	$ -
13287	GUARDRAIL END ANCHORAGE GR-MGS3	EA	0.0	0	$ 1,286	$ -
13288	GUARDRAIL HEIGHT TRANSITION GR-MGS4	EA	0.0	0	$ 822	$ -
13383	FIXED OBJECT ATTACH. GR-FOA-1 TY. I	EA	0.0	0	$ 3,063	$ -
13384	FIXED OBJECT ATTACH. GR-FOA-1 TY. II	EA	0.0	0	$ 950	$ -
13530	RETAINING WALL RW-3	CY	0.0	0	$ 1,200	$ -
14120	REMOVAL OF COMB. CURB AND GUTTER	LF	200.0	200	$ 20	$ 4,000
24265	NS MAINTENANCE OF TRAFFIC	LS	1.0	1	$ 29,760	$ 29,800
24430	DEMOLITION OF PAVEMENT (FLEXIBLE)	SY	0.0	0	$ 20	$ -
24505	NS RELOCATE EXIST. (LIGHT POLES)	EA	0.0	0	$ 10,000	$ -
24600	REMOVE EXISTING GUARDRAIL	LF	0.0	0	$ 5	$ -
27012	TOPSOIL CLASS A 2"	ACRE	0.00	0.0	$ 19,929	$ -
27102	REGULAR SEED	LB	5.0	5	$ 26	$ 100
27103	OVERSEEDING	LB	3.0	5	$ 18	$ 100
27215	FERTILIZER(15-30-15)	LB	0.01	0.1	$ 4,784	$ 500
27250	LIME	TON	0.1	0.1	$ 573	$ 100
27275	NS EROSION CONTROL	LS	1.0	1	$ 9,920	$ 9,900
52000	NS TRAFFIC SIGNALIZATION (PED. SIGNAL EQUIP. AND LOOPS)	LS	0.0	0	$ 100,000	$ -
54060	TYPE B CLASS IV PVMT LINE MRKG 24"	LF	26.0	30	$ 19	$ 600
54075	TYPE B CLASS VI PVMT LINE MRKG 4"	LF	3376.0	3400	$ 5	$ 17,400
54076	TYPE B CLASS VI PVMT LINE MRKG 6"	LF	0.0	0	$ 6	$ -
54571	PVMT SYMB MRKG (THRU ARROW) TY B, CL I	EA	1.0	1	$ 128	$ 100
54574	PVMT SYMB MRKG (SGL TURN ARROW) TY B, CL I	EA	2.0	5	$ 159	$ 800
57060	CCTV CAMERA (DIGITAL)	EA	0.0	0	$ 30,000	$ -
NS	SWP/BMP/ENVIRONMENTAL MITIGATION	LS	1.0	1	$ 90,000	$ 90,000
NS	O/H SIGN PANEL AND STRUCTURE	EA	0.0	0	$ 10,000	$ -
	SUBTOTAL					$ 282,100
	CEI Costs (VDOT to provide, using 17%)					$ 48,000
	Incentives (5%)					$ 14,100
	Construction Contingency (Conceptual Design, assume 40%)					$ 112,800
	TOTAL					$ 457,000
	CN TOTAL (FY22, 2.7% Escalation)					**$ 508,400**
	R/W/Utilities					**$ 50,000**
	PE (30% of CN TOTAL)					$ 152,500
	IMR & Public Outreach					$ 200,000
	PE TOTAL					**$ 352,500**
	PE+RW/UTIL+CN					**$ 911,000**

CONCEPTUAL COST ESTIMATE - TOTAL

I-395 Shirlington Interchange Operations Study

April 2019

S4-Signalized T- intersection with rotary and N. Quaker Lane Conceptual Design

CITY OF ALEXANDRIA, VIRGINIA; NOVA DISTRICT

VDOT PROJECT NO.****-***-***; UPC No. 107831

ITEM CODE	ITEM	UNIT	CONCEPTUAL QUANTITY (Not Rounded)	CONCEPTUAL QUANTITY	UNIT COST	COST
00100	MOBILIZATION	LS	1.0	1.0	$92,605	$ 92,600
00101	CONSTRUCTION SURVEYING (CONSTRUCTION)	LS	1.0	1.0	$10,349	$ 10,300
00111	CLEARING AND GRUBBING	ACRE	0.24	0.25	$20,000	$ 4,800
00120	REGULAR EXCAVATION	CY	297.7	300.0	$55	$ 16,300
00150	EMBANKMENT	CY	162.4	180.0	$87	$ 14,200
00588	UNDERDRAIN UD-4	LF	1200.0	1200.0	$16	$ 19,100
06818	DROP INLET DI-3B,L=6'	EA	3.0	3.0	$5,320	$ 16,000
10123	AGGR. BASE MATL. TY. I NO. 21A	TON	808.4	820.0	$27	$ 21,500
10128	AGGR. BASE MATL. TY. I NO. 21B	TON	222.0	230.0	$56	$ 12,400
10628	FLEXIBLE PAVEMENT PLANING 0" - 2"	SY	3671.1	3675.0	$7	$ 27,400
10636	ASPHALT CONC.TY. SM-9.5D	TON	773.4	775.0	$116	$ 89,400
10642	ASPHALT CONC. BASE COURSE TY. BM-25.0A	TON	888.5	890.0	$89	$ 78,600
11070	NS SAW-CUT ASPH CONC FULL DEPTH	LF	1315.0	1315.0	$5	$ 6,600
12020	STD. CURB CG-2	LF	400.0	400.0	$37	$ 15,000
12600	STD. COMB. CURB & GUTTER CG-6	LF	1200.0	1200.0	$33	$ 39,200
13220	HYDRAULIC CEMENT CONC. SIDEWALK 4"	SY	666.7	670.0	$65	$ 43,600
13280	GUARDRAIL GR-MGS1	LF	0.0	0.0	$29	$ -
13286	GUARDRAIL TERMINAL GR-MGS2	EA	0.0	0.0	$4,039	$ -
13287	GUARDRAIL END ANCHORAGE GR-MGS3	EA	0.0	0.0	$1,286	$ -
13288	GUARDRAIL HEIGHT TRANSITION GR-MGS4	EA	0.0	0.0	$822	$ -
13383	FIXED OBJECT ATTACH. GR-FOA-1 TY. I	EA	0.0	0.0	$3,063	$ -
13384	FIXED OBJECT ATTACH. GR-FOA-1 TY. II	EA	0.0	0.0	$950	$ -
13530	RETAINING WALL RW-3	CY	0.0	0.0	$1,200	$ -
24265	NS MAINTENANCE OF TRAFFIC	LS	1.0	1.0	$155,235	$ 155,200
24430	DEMOLITION OF PAVEMENT (FLEXIBLE)	SY	1722.2	1750.0	$20	$ 34,400
24505	NS RELOCATE EXIST. (LIGHT POLES)	EA	8.0	8.0	$10,000	$ 80,000
24600	REMOVE EXISTING GUARDRAIL	LF	0.0	0.0	$5	$ -
27012	TOPSOIL CLASS A 2"	ACRE	0.20	1.0	$19,929	$ 4,000
27102	REGULAR SEED	LB	129.0	130.0	$26	$ 3,400
27103	OVERSEEDING	LB	81.0	90.0	$18	$ 1,400
27215	FERTILIZER(15-30-15)	LB	0.16	1.0	$4,784	$ 800
27250	LIME	TON	2.1	3.0	$573	$ 1,200
27275	NS EROSION CONTROL	LS	1.0	1.0	$51,745	$ 51,700
41101	NS RELOCATE (CCTV CAMERA, CABINETS, AND UTILITIES)	LS	0.0	0.0	$100,000	$ -
50108	SIGN PANEL	SF	144.0	150.0	$37	$ 5,400
50430	SIGN POST STP-1, 2", 14 GAUGE	LF	10.0	10.0	$38	$ 400
50490	CONCRETE FOUNDATION STP-1, TYPE F	EA	144.0	150.0	$613	$ 88,200
50860	REMOVE-DISPOSE SIGN STRUCT. TY. I	EA	0.0	0.0	$242	$ -
52000	NS TRAFFIC SIGNALIZATION (PED. SIGNAL EQUIP. AND LOOPS)	LS	2.0	2.0	$100,000	$ 200,000
54060	TYPE B CLASS IV PVMT LINE MRKG 24"	LF	54.0	60.0	$19	$ 1,000
54075	TYPE B CLASS VI PVMT LINE MRKG 4"	LF	4302.0	4325.0	$5	$ 22,000
54076	TYPE B CLASS VI PVMT LINE MRKG 6"	LF	0.0	0.0	$6	$ -
54571	PVMT SYMB MRKG (THRU ARROW) TY B, CL I	EA	2.0	2.0	$128	$ 300
54574	PVMT SYMB MRKG (SGL TURN ARROW) TY B, CL I	EA	5.0	5.0	$159	$ 800
NS	SWP/BMP/ENVIRONMENTAL MITIGATION	LS	1.0	1.0	$180,000	$ 180,000
NS	RELOCATE SIGN PANEL ON NEW O/H STRUCTURE	EA	1.0	1.0	$7,500	$ 7,500
	SUBTOTAL					$ 1,344,700
	CEI Costs (VDOT to provide, using 17%)					$ 228,599
	Incentives (5%)					$ 67,235
	Construction Contingency (Conceptual Design, assume 40%)					$ 656,214
	TOTAL					$ 2,229,513
	CN TOTAL (FY22, 2.7% Escalation)					**$ 2,480,229**
	RW/Utilities					**$ 75,000**
	PE (20% of CN TOTAL)					$ 496,046
	IMR & Public Outreach					$ 200,000
	PE TOTAL					**$ 696,046**
	PE+RW/UTIL+CN					**$ 3,252,000**

CONCEPTUAL COST ESTIMATE - TOTAL

I-395 Shirlington Interchange Operations Study

APRIL 2019

S5 - Signalized intersection with NB I-395 off ramp and Gunston Conceptual Design

CITY OF ALEXANDRIA, VIRGINIA; NOVA DISTRICT

VDOT PROJECT NO.****-***-***; UPC No. 107831

ITEM CODE	ITEM	UNIT	CONCEPTUAL QUANTITY (Not Rounded)	CONCEPTUAL QUANTITY	UNIT COST	COST
00100	MOBILIZATION	LS	1.0	1.0	$98,190	$ 98,200
00101	CONSTRUCTION SURVEYING (CONSTRUCTION)	LS	1.0	1.0	$11,270	$ 11,300
00111	CLEARING AND GRUBBING	ACRE	0.17	0.17	$20,000	$ 3,300
00120	REGULAR EXCAVATION	CY	52.2	60.0	$55	$ 2,900
00150	EMBANKMENT	CY	442.9	460.0	$87	$ 38,600
00588	UNDERDRAIN UD-4	LF	0.0	0.0	$16	$ -
06818	DROP INLET DI-3B,L=6'	EA	0.0	0.0	$5,320	$ -
10123	AGGR. BASE MATL. TY. I NO. 21A	TON	1173.9	1180.0	$27	$ 31,300
10128	AGGR. BASE MATL. TY. I NO. 21B	TON	0.0	0.0	$56	$ -
10628	FLEXIBLE PAVEMENT PLANING 0" - 2"	SY	0.0	0.0	$7	$ -
10636	ASPHALT CONC.TY. SM-9.5D	TON	674.2	675.0	$116	$ 77,900
10642	ASPHALT CONC. BASE COURSE TY. BM-25.0A	TON	1290.2	1300.0	$89	$ 114,200
11070	NS SAW-CUT ASPH CONC FULL DEPTH	LF	232.0	235.0	$5	$ 1,200
12020	STD. CURB CG-2	LF	400.0	400.0	$37	$ 15,000
12600	STD. COMB. CURB & GUTTER CG-6	LF	0.0	0.0	$33	$ -
13220	HYDRAULIC CEMENT CONC. SIDEWALK 4"	SY	0.0	0.0	$65	$ -
13280	GUARDRAIL GR-MGS1	LF	475.0	480.0	$29	$ 13,800
13286	GUARDRAIL TERMINAL GR-MGS2	EA	1.0	1.0	$4,039	$ 4,000
13287	GUARDRAIL END ANCHORAGE GR-MGS3	EA	2.0	2.0	$1,286	$ 2,600
13288	GUARDRAIL HEIGHT TRANSITION GR-MGS4	EA	1.0	1.0	$822	$ 800
13383	FIXED OBJECT ATTACH. GR-FOA-1 TY. I	EA	1.0	1.0	$3,063	$ 3,100
13384	FIXED OBJECT ATTACH. GR-FOA-1 TY. II	EA	1.0	1.0	$950	$ 1,000
13530	RETAINING WALL RW-3	CY	50.4	55.0	$1,200	$ 60,400
24265	NS MAINTENANCE OF TRAFFIC	LS	1.0	1.0	$169,050	$ 169,100
24430	DEMOLITION OF PAVEMENT (FLEXIBLE)	SY	3688.6	3700.0	$20	$ 73,800
24505	NS RELOCATE EXIST. (LIGHT POLES)	EA	8.0	8.0	$10,000	$ 80,000
24600	REMOVE EXISTING GUARDRAIL	LF	0.0	0.0	$5	$ -
27012	TOPSOIL CLASS A 2"	ACRE	0.00	0.0	$19,929	$ -
27102	REGULAR SEED	LB	87.0	90.0	$26	$ 2,300
27103	OVERSEEDING	LB	55.0	60.0	$18	$ 1,000
27215	FERTILIZER(15-30-15)	LB	0.11	1.0	$4,784	$ 500
27250	LIME	TON	1.4	2.0	$573	$ 800
27275	NS EROSION CONTROL	LS	1.0	1.0	$56,350	$ 56,400
41101	NS RELOCATE (CCTV CAMERA, CABINETS, AND UTILITIES)	LS	1.0	1.0	$100,000	$ 100,000
50108	SIGN PANEL	SF	0.0	0.0	$37	$ -
50430	SIGN POST STP-1, 2", 14 GAUGE	LF	0.0	0.0	$38	$ -
50490	CONCRETE FOUNDATION STP-1, TYPE F	EA	0.0	0.0	$613	$ -
50860	REMOVE-DISPOSE SIGN STRUCT. TY. I	EA	11.0	11.0	$242	$ 2,700
52000	NS TRAFFIC SIGNALIZATION (PED. SIGNAL EQUIP. AND LOOPS)	LS	3.0	3.0	$100,000	$ 300,000
54060	TYPE B CLASS IV PVMT LINE MRKG 24"	LF	0.0	0.0	$19	$ -
54075	TYPE B CLASS VI PVMT LINE MRKG 4"	LF	2400.0	2400.0	$5	$ 12,300
54076	TYPE B CLASS VI PVMT LINE MRKG 6"	LF	480.0	480.0	$6	$ 3,000
54571	PVMT SYMB MRKG (THRU ARROW) TY B, CL I	EA	2.0	2.0	$128	$ 300
54574	PVMT SYMB MRKG (SGL TURN ARROW) TY B, CL I	EA	1.0	1.0	$159	$ 200
NS	SWP/BMP/ENVIRONMENTAL MITIGATION	LS	1.0	1.0	$180,000	$ 180,000
NS	RELOCATE SIGN PANEL ON NEW O/H STRUCTURE	EA	0.0	0.0	$7,500	$ -
	SUBTOTAL					$ 1,462,000
	CEI Costs (VDOT to provide, using 17%)					$ 248,540
	Incentives (5%)					$ 73,100
	Construction Contingency (Conceptual Design, assume 40%)					$ 713,456
	TOTAL					$ 2,423,996
	CN TOTAL (FY22, 2.7% Escalation)					**$ 2,696,582**
	RW/Utilities					**$ 75,000**
	PE (20% of CN TOTAL)					$ 539,316
	IMR & Public Outreach					$ 200,000
	PE TOTAL					**$ 739,316**
	PE+RW/UTIL+CN					**$ 3,511,000**

CONCEPTUAL COST ESTIMATE - TOTAL

I-395 Shirlington Interchange Operations Study

April 2019

S6-Signalized intersection with I-395 SB off ramp and Campbell Conceptual Design

ARLINGTON COUNTY, VIRGINIA; NOVA DISTRICT

VDOT PROJECT NO.****-***-***; UPC No. 107831

ITEM CODE	ITEM	UNIT	CONCEPTUAL QUANTITY (NOT ROUNDED)	CONCEPTUAL QUANTITY	UNIT COST	COST (Rounded)
00100	MOBILIZATION	LS	1.0	1	$ 95,085	$ 95,100
00101	CONSTRUCTION SURVEYING (CONSTRUCTION)	LS	1.0	1	$ 10,757	$ 10,800
00111	CLEARING AND GRUBBING	ACRE	0.21	0.22	$ 20,000	$ 4,400
00120	REGULAR EXCAVATION	CY	52.2	55	$ 55	$ 3,000
00150	EMBANKMENT	CY	639.8	640	$ 87	$ 55,800
00588	UNDERDRAIN UD-4	LF	400.0	400	$ 16	$ 6,400
01240	24" PIPE	LF	100.0	100	$ 100	$ 10,000
06818	DROP INLET DI-3B,L=6'	EA	1.0	1	$ 5,320	$ 5,300
09056	MANHOLE MH-1 OR 2	LF	1.0	1	$ 800	$ 800
09057	FRAME & COVER MH-1	EA	1.0	1	$ 600	$ 600
10123	AGGR. BASE MATL. TY. I NO. 21A	TON	934.1	940	$ 27	$ 25,000
10628	FLEXIBLE PAVEMENT PLANING 0" - 2"	SY	4319.1	4325	$ 7	$ 32,300
10636	ASPHALT CONC.TY. SM-9.5D	TON	781.4	790	$ 116	$ 91,300
10642	ASPHALT CONC. BASE COURSE TY. BM-25.0A	TON	1026.6	1030	$ 89	$ 91,200
11070	NS SAW-CUT ASPH CONC FULL DEPTH	LF	172.0	175	$ 5	$ 900
12032	RADIAL CURB CG-3	LF	400.0	400	$ 41	$ 16,600
13280	GUARDRAIL GR-MGS1	LF	675.0	680	$ 29	$ 19,700
13286	GUARDRAIL TERMINAL GR-MGS2	EA	1.0	1	$ 4,039	$ 4,000
13287	GUARDRAIL END ANCHORAGE GR-MGS3	EA	2.0	2	$ 1,286	$ 2,600
13288	GUARDRAIL HEIGHT TRANSITION GR-MGS4	EA	1.0	1	$ 822	$ 800
13383	FIXED OBJECT ATTACH. GR-FOA-1 TY. I	EA	1.0	1	$ 3,063	$ 3,100
13384	FIXED OBJECT ATTACH. GR-FOA-1 TY. II	EA	1.0	1	$ 950	$ 1,000
13530	RETAINING WALL RW-3	CY	40.0	40	$ 1,200	$ 48,000
14120	REMOVAL OF COMB. CURB AND GUTTER	LF	400.0	400	$ 20	$ 8,000
24265	NS MAINTENANCE OF TRAFFIC	LS	1.0	1	$ 161,355	$ 161,400
24430	DEMOLITION OF PAVEMENT (FLEXIBLE)	SY	2839.9	2850	$ 20	$ 57,000
24505	NS RELOCATE EXIST. (LIGHT POLES)	EA	3.0	3	$ 10,000	$ 30,000
24600	REMOVE EXISTING GUARDRAIL	LF	950.0	950	$ 5	$ 4,800
27012	TOPSOIL CLASS A 2"	ACRE	0.20	0.2	$ 19,929	$ 4,000
27102	REGULAR SEED	LB	43.0	45	$ 26	$ 1,200
27103	OVERSEEDING	LB	27.0	30	$ 18	$ 500
27215	FERTILIZER(15-30-15)	LB	0.06	0.1	$ 4,784	$ 500
27250	LIME	TON	0.7	0.7	$ 573	$ 400
27275	NS EROSION CONTROL	LS	1.0	1	$ 53,785.00	$ 53,800
52000	NS TRAFFIC SIGNALIZATION (PED. SIGNAL EQUIP. AND LOOPS)	LS	3.0	3	$ 100,000	$ 300,000
54060	TYPE B CLASS IV PVMT LINE MRKG 24"	LF	140.0	140	$ 19	$ 2,600
54075	TYPE B CLASS VI PVMT LINE MRKG 4"	LF	2050.0	2050	$ 5	$ 10,500
54076	TYPE B CLASS VI PVMT LINE MRKG 6"	LF	1860.0	1900	$ 6	$ 12,000
54571	PVMT SYMB MRKG (THRU ARROW) TY B, CL I	EA	5.0	5	$ 128	$ 600
54574	PVMT SYMB MRKG (SGL TURN ARROW) TY B, CL I	EA	4.0	5	$ 159	$ 800
57060	CCTV CAMERA (DIGITAL)	EA	1.0	1	$ 30,000	$ 30,000
NS	SWP/BMP/ENVIRONMENTAL MITIGATION	LS	1.0	1	$ 180,000	$ 180,000
NS	O/H SIGN PANEL AND STRUCTURE	EA	1.0	1	$ 10,000	$ 10,000
	SUBTOTAL					$ 1,396,800
	CEI Costs (VDOT to provide, using 17%)					$ 237,500
	Incentives (5%)					$ 69,800
	Construction Contingency (Conceptual Design, assume 40%)					$ 558,700
	TOTAL					$ 2,262,800
	CN TOTAL (FY22, 2.7% Escalation)					**$ 2,517,300**
	RW/Utilities					**$ 200,000**
	PE (20% of CN TOTAL)					$ 503,500
	IMR & Public Outreach					$ 200,000
	PE TOTAL					**$ 703,500**
	PE+RW/UTIL+CN					**$ 3,421,000**

APPENDIX J – Public Comment

I-395 Shirlington Interchange Improvements Study Comments

Speaker Number	May 21, 2018 Public Information Meeting Comments
1	• Guardrail along Glebe Road Ramps to I-395 need to be replaced/repaired. • Arlington County has allowed more car dealerships to be built which is increasing the number of vehicular trips. • Arlington County has passed a measure to recognize the importance of maintaining the infrastructure which should be considered with this interchange. • Consideration of the increased traffic from I-395 Express Lanes Extension to Fredericksburg
2	• Need to address NB I-395 exit to Glebe Road weave and merge area • Considerable weaving conditions/issues at this location • Several in the audience seem to agree with the speaker • WSP addressed how and why the SB I-395 exit was brought into the study
3	• Has mixed feelings about installing a signal light at Quaker Lane and the rotary • Feels traffic will back up further on Quaker Lane during the AM peak • WSP responded that the existing model will show the current queues at Quaker and Gunston and alternatives will be compared to existing conditions
4	• The proposed improvements should be discussed with Shirlington and Gunston residents and merchants • The interchange needs a long-term plan for fixing the problems (there are no long-term improvements slated for this interchange
5	• Suggested direct access from S. Shirlington Road from interchange
6	• Remove connection to Gunston Road (Prefaced comment that he was not speaking for the Park Fairfax Community) • Park Fairfax has 3 entrances and doing this would cut it to two entrances • Remove the foliage and grass so that you can see vehicles in the rotary • Asked what are the long term plans for this interchange. VDOT responded that the local Counties develop the long term plans with VDOT assistance
7	• Yield signs do not work on Quaker Lane entering the rotary
8	• Closing the entrance at Gunston Rd would not work • Led to some discussion between attendees on winners and losers to improve this intersection
9	• Not impressed with any of the alternative – Alternative S-1 only • Massive increases in density are only going to make things worse • Redevelopment of the areas around the interchange will make things worst
10	• Alternative G1 is a good idea • Recommended revisiting the timing of the signals around the interchange
11	• NB I-395 to N. Arlington – merging issues still exist with Alternative S-5 and exasperate the issues
12	• With Four Mile Run traffic and GMU traffic, is there a way to direct people away from the rotary and onto other roads?
13	• Invest in stop signs to see if they work rather than yield signs. • VDOT stated that this was an option early on but removed by Counties as it may increase rear-end accidents
14	• S. Shirlington and S. Arlington Mill Drive – Make left turn bay longer coming from NB S. Shirlington Drive to WB S. Arlington Mill Drive to reduce backups into the rotary. • This use to be a double left to Arlington Mill and was changed to a single Left
15	• Questioned how congestion was measured
16	• Clean up pedestrian bridge • Lights seem to be working • Project is limited safety and operations improves so the funding cannot be used for maintenance• How do funds get programed? - Talk to your local representatives - Report deficiencies on VDOT website
17	• How was the study area define and it should be extended to several intersections beyond the interchange? • Queues at some of the intersection beyond the study area limits are effecting the intersection closer to the interchange

Speaker Number	May 21, 2018 Public Information Meeting Comments
18	• Liked Option G-1 • Timing of signals at Preston is poor and leads to a lot of stop and go traffic
19	• Would like to look at where the issues and trips start for traffic into the rotary. • Signal timing on 4-mile run is poor
20	• Where can I find crash maps for the study area? Will they be published online?
21	• What was the purpose of providing Alternative G-2? Does not address or would improve the conditions significantly from existing • Alternative G-1 is good but may create significant back-ups on the ramps
22	Mill Road are not being obeyed. This seemed to be pressing issue for many. • Also if the grass can stay short and mowed that would help substantially with sight distance. High grass leads to blind spots and reduction in sight distance around the rotary

I-395 Shirlington Interchange Improvements Study Comments

Comment Number	Commenter						Comment Sheet Questions			
	Name	Address	Email Address	Phone Number	Date Received	Source	1. What alternative(s) do you support and why?	2. What are your major concerns that you would like to see incorporated into this study?	3. Please provide us with any additional information or suggestions that will assist VDOT in developing the final alternatives and design of this study.	4. How did you hear about this meeting?
1	Linda Hunt	4200 S. Abingdon St, Arlington, VA 22206			5/21/2018	Comment Sheet	I support any alternative or alternatives that will move vehicles on/off I-395 safely and expeditiously. Not traffic lights	Too many vehicles entering /leaving I395 within 5 years - no matter what the alternative(s). Arlington County plans major redevelopment of Shirlington which will generate many more vehicle trips.	Please contact Arlington County Government at 703-228-3600 to obtain a list of currently approved redevelopment projects for Shirlington and the traffic projections before anything else.	E-mail from County
2	Pamela Van Hine		pvanhine@gmail.com		5/23/2018	E-mail	56 – so that we can safely merge onto the Interchange with traffic from Campbell and Shirlington Road. Adding a traffic light should really make the merge safer. G1 – this reconfiguration of Glebe merge lanes seems the safest alternative. I hope your traffic studies will show that it is feasible. 54 – Like 56, 54 seems like it's the safest alternative for the Alexandria side. Again, adding a traffic light should really help.	a) Please make the Alexandria side of the bike-ped bridge more safe. Minimally we need a safe crosswalk across Gunston so we can continue up Quaker – with warning signs/warning lights. Currently we have to walk back a block to Martha Custis, cross Gunston carefully (cars don't always stop), then walk back down Gunston to Quaker. Alternatively, people dash across Gunston, but this is very dangerous. We also need wayfinding signage/map at the base of the bike-ped bridge, as it's not clear where the bike trail goes.	a) Please add No right on red sign from Campbell onto the Interchange - drivers turning right on red here add to the already dangerous mixing merge. Actually, not right on red throughout the Interchange area would be great!	Newspaper - Washington Post - thanks for putting VDOT meeting notices in the Post!
3	Pamela Van Hine		pvanhine@gmail.com		5/23/2018	E-mail		b) Currently, cyclists and pedestrians have no safe way to cross Shirlington Road at the Four Mile Run Trail. Although we have a flashing beacon light, it is widely ignored by most drivers (including the driver who almost hit me when I was walking to your meeting on Monday). Ideally, your study area would include Shirlington Road north of Adams Mill at least to Four Mile Run Trail. Minimally, can you work with the County on the Shirlington Bridge project (E-89 in draft CIP) to provide a safe crossing for cyclists and pedestrians? Your project study area appears to include the intersection of Shirlington and Adams Mills (north side) – the space for pedestrians and cyclists waiting to cross Shirlington at this light needs to be much larger – and we really need an adequate sidewalk (ADA-compatible) on the East side of Shirlington Bridge so we can walk and ride from the Trail to Adams Mill, cross Shirlington in a crosswalk with traffic light, and continue on the trail, which is then parallel to Adams Mill. Four Mile Run Trail has heavy use by both cyclists and pedestrians, and the current crossing over Shirlington Road is a dangerous pinch point for us.		
4	Linda Hunt	4200 S Abingdon Street Arlington VA 22206			5/21/2018	Comment Sheet	I support any alternative or alternatives that will move vehicles on/off I-395 safely and expeditiously. Not traffic lights.	Too many vehicles entering/ leaving I-395 within 5 years- no matter WHAT THE ALTERNATIVE(S). Arlington County Plans major redevelopment of Shirlington which will generate many more vehicle trips.	Please contact Arlington County Government at 703-228-3600 to obtain a list of currently approved redevelopment projects for Shirlington and the traffic projections before anything else.	E-mail from county
6					5/21/2018	Comment Sheet	51, 52	The entrance from Quaker to Shirlington Road toward Arlington Mill is extremely difficult because of the speed and merging across lanes. The entrance from 395N to Shirlington Road toward Arlington Mill is almost a blind merge w/ very little time to get across lanes. Very difficult to see cars coming around turn.	Address the issue with merging from Quaker to Shirlington and from 395 to Shirlington. Please do not add signal lights and cause more traffic back ups on Quaker Road. It will be extremely difficult to merge onto the interchange if a light is installed.	Friend
7		Gunston Road Alexandria VA 22302			5/21/2018	Comment Sheet	54 & 56 signals at the straight lane, getting traffic to stop will resolve the problem of failure to yield that happens ALL OF THE TIME!! 53: Add Longer left turn lane onto S Arlington Mill Drive along with reducing # of lanes from 3 to 2 lanes. G-1. merge don't work well in G-2, but dedicated lane in G-1 much better.	5-1 Terrible--doesn't help the failure to yield, 5-2 curve change won't help on downhill & failure to yield, 5-5 Worry about traffic backup in Park Fairfax Community, G-2 Terrible merge still too short		Facebook
8	Greg Adel	4500 28th Rd. S Arlington, VA 22206	GregAdel@gmail.com		5/21/2018	Comment Sheet	A combination of 5-3, 5-4, 5-6, and G-1. In concert these seem to provide the greatest overall increase in safety without too much investment.	Throughput is already a problem and ongoing development will only exacerbate this. All options reduce throughput. Mch more radical solutions seem like the only real long-term answer.	Glade Road is the top concern. Gunston Road is second. People will die if those areas are unaddressed. A more significant overhaul could include re-aligning Arlington Mill Road to a right angle and creating a more rectangular rotary w/ all traffic light controlled access. Campbell & Gunston would need to be re-routed.	Website
9					5/21/2018	Comment Sheet	(53 & 54 & G1) Better Realignment exfort & less moving + increased distance to merge	An exiting bad design to be corrected for enhanced safety.	Merging alternatives with otcomes to help having a better understanding & better decision taking. Also knowing how much each alternative costs good to know.	other
10					5/21/2018	Comment Sheet	1-6 definitely, something needs to be done to address that area. Cars at the stop sign trying to get onto the circle don't know if they should be waiting behind them or to the right to know it clear to go.	Please address 5 Arlington Mill/ Shirlington interchange. Trail crossing is unsafe.	N/A	E-Mail
11	Mark		Markwic1@aol.com		5/21/2018	Comment Sheet		This is a huge concern of traffic entering the rotary from the Shirlington Road entrance. This is a stop sign/yield before entering the rotary and I've seen so many almost accidents because drivers do not stop. The rotary traffic has the right of way. VDOT has to do something to alleviate this hazard as most people on the rotary are heading to 395 South or Quaker Lane after the light at Shirlington.		
	Mark		Markwic1@aol.com		5/21/2018	Comment Sheet		What VDOT might also consider is closing off the parking lot entrance before the light and make all vehicles enter 395 from the main Shirlington entrance at the light. All traffic to the parking lot should be one way heading into the lot and not out of the lot.		
12		North Fairlington 22206			5/21/2018	Comment Sheet	Any alternative(s) that bring less traffic into Shirlington	We are going to be overwhelmed by traffic from local and regional sources within 5 years	Arlington County is on a "more car diet" and is regionalizing parks, recreation, and arts infrastructure to bring more traffic in/out of Shirlington	website
13			pvanhine@gmail.com		5/21/2018	Comment Sheet	1) 56-impossible to get to Glebe-395 58 to Quaker safe- traffic light a must...	Crash Prevention 1) put crosswalk at exit from pedalbike bridge over 395 so ped/cyclists can continue up Quaker, at least add Way finding for act route on M. Chshs. 2) build bike/ped tunnel under Shirlington at UMRT? On street crossing is NOT SAFE. (bridge overall ok)	Newspaper (Thanks VDOT for ADC WP!)	
14							2) G1 Glebe road is dangerous, G1 is best option if traffic allows. 3) 55 Sators Solah L Quaker/ guest	2) build bike/ped tunnel under Shirlington at UMRT? On street crossing is NOT SAFE. (bridge overall ok)	Newspaper (Thanks VDOT for ADC WP!)	
14	Amy Van Norman	3518 Gunston Road	amy20@yahoo.com		5/21/2018	Comment Sheet	5-4, 5-6, G-1-Suggest a " both/and" approach rather than an "either/or"	1. Most don't follow the signs now & most are driving at least 35 mph (typically higher). 2. The Gunston Road exit & entrance (like light at Gunston Road in 55)	1. 55-Doesn't solve people coming off N/ Quaker Lane into the rotary because many ignore the yield or get annoyed at cars want to exit at Gunston. 2. Traffic lights over signs	Social Media
15	Julie Treatman	3392 Martha Custis Rn Alexandria, VA 22302			5/21/2018	Comment Sheet	5-4- Request & eliminate the talks of yield by vehicles. Option for the east side of the rotary., 5-6-Best option to eliminate difficult stop sign/right Best would be to combine 5-4 & 5-6, G-1 most sense to reduce blind spot entrance.	Quaker Lane entrance to the rotary. Northbound exit to S. Glebe Road. /Entrance from Quake Lane	5-5 does not address the Quaker Lane yield onto the circle which has high accident rate	Social Media
25	Deborah Hahn	N Overlook Drive	hahndebbie@hotmail.com		5/25/2018	E-Mail	I would pursue the recommendations above first. If they cannot be tested or implemented, it would be great to know why they are not feasible, as they seem the most straightforward solutions to the main problems, which are related to drivers not yielding correctly. In terms of the alternatives and whether I support or not: Alternative 5-1: I do not support. I do not see how this resolves the issue of excessive speed and unyielding traffic from N Quaker Lane. It could exacerbate the yield issue and the difficulty entering the rotary from the left lane of Gunston Road at the stop sign. Alternative 5-2:I am skeptical of effectiveness and do not support.I do not see this as changing the conditions enough to make any difference. Alternative 5-3: Moderate support. I see this as potentially creating a yield problem for express lane traffic having to merge over to get to Campbell road, but this probably does reduce weaving movements. Alternative 5-4: Do not support. I see this as backing up traffic around the rotary in a potentially dangerous way, reducing rotary flow even if it would slow traffic from N Quaker Lane, therefore the cons outweigh the pros. BUT, a stop sign added to N Quaker lane with no additional changes to the rotary eliminate the cons of this alternative and maximize the pros. Alternative 5-5: Mild concerned support. The pros are that this allows I-395NB traffic to have access to Gunston Road. It forces management of the delay from Gunston onto the rotary. It does resolve the speeding from N Quaker Lane. HOWEVER, it is unclear to me how this resolves the yield from N Quaker Lane to the rotary lanes issue. How will traffic that wants to leave rotary to Gunston Road get over if the N Quaker Lane right lane is backed up because of the signal light? Alternative 5-6: Do not support.I am skeptical that this is really needed. This does not seem to be the highest priority issue for the rotary. Alternative G-1: Do not support.I think creating a merge for the 2 lane West ramp will cause more problems than the problem it intends to fix. Alternative G-2: I support.	The most dangerous part of my interaction with the Rotary are the drivers that do not yield on the N Quaker Lane entrance to the Rotary and the drivers that swerve from the far left across the left turn only lane of the Rotary so that they can take a right up to N Quaker Lane. I am concerned that Alternative 5-1 will not solve the speeding and unyielding issues with N Quaker Lane entering the rotary. If anything this will increase the volume (two rotary lanes going to one) of rotary traffic that is threatened by unyielding N Quaker Lane traffic. This is why I suggest making N Quaker Lane a true merge lane that must merge to the rotary, as opposed to basically a dedicated lead in to the on ramp. Also, I fear Alternative 5-1 will further complicate the drivers ability to enter the rotary from the stop sign at Gunston Road and the rotary. This already gets clogged in high volume traffic times during the morning commute because the majority of the traffic is onramping to I-395. Alternative 5-2 does not convince me that it will slow N Quaker Lane traffic. I don't see how a slight turn will slow traffic. The main problem with N Quaker Lane is that it is basically a dedicated lane to the onsamp, so drivers interpret the yield to be only to traffic that is in the rotary, not to traffic leaving the rotary to enter the on ramp lane. The yield sign there is tremendously confusing and I do not think the majority of drivers understand what to do there, because they have their own lane leading to where most want to go which is I-395 NB.	My daily usage of the Shirlington Interchange involves the Gunston Road stop sign at N Quaker lane and the I-395 NB On Ramp and then the Rotary exit and right turn onto Gunston Road where the Quaker Lane traffic fails to merge. The highest priority action to take is to reduce the speed of traffic that fail to merge from N Quaker Lane and I think the only way to make a substantial difference is to take away the dedicated lane from N Quaker to the on ramp.	Other: A posting to the Beverley Hills Listserve
26	Guy Foulks	N Overlook Drive Alexandria VA	guy_foulks@hotmail.com		5/25/2018	E-Mail	I would pursue my recommendations above first. If they cannot be tested or implemented, it would be great to know why they are not feasible, as they seem the most straightforward solutions to the main problems, which are related to drivers not yielding correctly. In terms of the alternatives and whether I support or not: Alternative 5-1: I do not support. I do not see how this resolves the issue of excessive speed and unyielding traffic from N Quaker Lane. It could exacerbate the yield issue and the difficulty entering the rotary from the left lane of Gunston Road at the stop sign. Alternative 5-2:I am skeptical of effectiveness and do not support.I do not see this as changing the conditions enough to make any difference. Alternative 5-3: Moderate support. I see this as potentially creating a yield problem for express lane traffic having to merge over to get to Campbell road, but this probably does reduce weaving movements. Alternative 5-4: Do not support. I see this as backing up traffic around the rotary in a potentially dangerous way, reducing rotary flow even if it would slow traffic from N Quaker Lane, therefore the cons outweigh the pros. BUT, a stop sign added to N Quaker lane with no additional changes to the rotary eliminate the cons of this alternative and maximize the pros. Alternative 5-5: Mild concerned support. The pros are that this allows I-395NB traffic to have access to Gunston Road. It forces management of the delay from Gunston onto the rotary. It does resolve the speeding from N Quaker Lane. HOWEVER, it is unclear to me how this resolves the yield from N Quaker Lane to the rotary lanes issue. How will traffic that wants to leave rotary to Gunston Road get over if the N Quaker Lane right lane is backed up because of the signal light? Alternative 5-6: Do not support.I am skeptical that this is really needed. This does not seem to be the highest priority issue for the rotary. Alternative G-1: Do not support.I think creating a merge for the 2 lane West ramp will cause more problems than the problem it intends to fix. Alternative G-2: I support.	The most dangerous part of my interaction with the Rotary are the drivers that do not yield on the N Quaker Lane entrance to the Rotary and the drivers that swerve from the far left across the left turn only lane of the Rotary so that they can take a right up to N Quaker Lane. I am concerned that Alternative 5-1 will not solve the speeding and unyielding issues with N Quaker Lane entering the rotary. If anything this will increase the volume (two rotary lanes going to one) of rotary traffic that is threatened by unyielding N Quaker Lane traffic. This is why I suggest making N Quaker Lane a true merge lane that must merge to the rotary, as opposed to basically a dedicated lead in to the on ramp. Also, I fear Alternative 5-1 will further complicate the drivers ability to enter the rotary from the stop sign at Gunston Road and the rotary. This already gets clogged in high volume traffic times during the morning commute because the majority of the traffic is onramping to I-395. Alternative 5-2 does not convince me that it will slow N Quaker Lane traffic. I don't see how a slight turn will slow traffic. The main problem with N Quaker Lane is that it is basically a dedicated lane to the onsamp, so drivers interpret the yield to be only to traffic that is in the rotary, not to traffic leaving the rotary to enter the on ramp lane. The yield sign there is tremendously confusing and I do not think the majority of drivers understand what to do there, because they have their own lane leading to where most want to go which is I-395 NB.	My daily usage of the Shirlington Interchange involves the Gunston Road stop sign at N Quaker lane and the I-395 NB On Ramp and then the Rotary exit and right turn onto Gunston Road where the Quaker Lane traffic fails to merge. The highest priority action to take is to reduce the speed of traffic that fail to merge from N Quaker Lane and I think the only way to make a substantial difference is to take away the dedicated lane from N Quaker to the on ramp.	Other: A posting to the Beverley Hills Listserve
54	Stephanie Bautista	2732 S. Arlington Mill Drive Arlington VA 22206 Unit 108	Sbautista@u-stee.com		5/21/2018	Comment Sheet		I have 3 major concerns regarding the 395 Shirlington Interchange: 1. Cars coming from Quaker Lane onto the circle do not yield- it is so difficult to navigate getting onto the ramp to 395N due to the issue.		Tenants in are condo building went to a VDOT meeting.
54	Stephanie Bautista		Sbautista@u-stee.com		5/21/2018			2. Merging onto 395N from the Shirlington Circle ramp is a "death trap" due to the cars merging over to Glebe Road and the cars merging into the right lane at the same-it's hard to believe this has not been looked at before and amazing that there have not been MANY accidents-this is particularly bad in the early morning during rush hour. If there isn't enough money to make a substatial change, can't you at least change the timing of the light at Glebe Road so it allows more cars to enter onto the road there by stopping the traffic from building up on the entrance ramp and causing this traffic nightmare-it's been this way since we've lived in Shirlington (10 years) 3. The grass is not being mowed enough at the circle-particulary in front of lo Piazzo- we can't see if there are cars coming into the circle because the grass is so overgrown- this has been an issue for the last few years-it is a dangerous situation.		Tenants in are condo building went to a VDOT meeting.
55	Brain Barker	608 Beverly Drive Alexandria VA 22302	bfbarker@gmail.com		5/21/2018	Comment Sheet	I support Alt 5-2 Realign Quaker Lane Ramp. However you also need to add flashing yield signs/light on N. Quaker Lane and S. Shirlington Lane so drivers are clear that they are suppose to yield.	How to make it more clear as to who has the right of way. I have been in the circle many time. When another driver cuts in front of me and even honks at me as they enter the circle from N.Quaker & S. Shirlington Rd.	Not sure	Social Media

I-395 Shirlington Interchange Improvements Study Comments

Comment Number	Commenter						Email Comment
	Name	Address	Email Address	Phone Number	Date Received	Source	
2	Pamela Van Hine		pvanhine@gmail.com		5/23/2018	E-mail	First, thanks so much for providing the public informational meeting on the I-395 Shirlington Interchange plan on Monday. I found it very informative, and it helped me understand the options much better. All VDOT staff were very helpful as well, as they patiently answered all of my questions. I submitted a scribbled form at the end of the meeting, but I am also submitting typed comments so you can actually read them.
3	Sarah Jones, PhD		sarahsquarks75@gmail.com		5/24/2018	E-Mail	Thank you for your presentation. I found it very interesting and I'm glad you are requesting feedback from the public. First, I want to bring up the fact that my spouse and I didn't even know about this traffic study or the public information meeting until my spouse got forwarded an email about it from someone at Arlington Co transportation. He had been nagging about the yield sign issue I'm talking about below for awhile by sending emails to VDOT and Arlington transportation, etc to get this fixed. And only then did someone inform us about this study/meeting. We would really appreciate information like this getting disseminated more thoroughly. Perhaps you can contact the local residences and apartment complexes so they can disseminate flyers to their residents. Concerning the study: my major concerns are to do with traffic flow especially around the Shirlington on-ramp with traffic coming from the S Arlington Mill Dr and Shirlington Rd stoplight into the traffic circle. None of your alternatives seemed to address this issue. This surprises me because it's such a huge problem. Here's the intersection: 
5	Helen Staren	2720 S. Arlington Mill Drive #609 Arlington VA 22206			5/19/2018	E-Mail	Dear Ms. Daniszewski, I am a resident of Shirlington and will not be able to attend the meeting on May 21 about the potential for improvements in the Shirlington area. I would like to express my opinion about one very dangerous situation. As you probably know, to go north on Route 395, Shirlington residents must cross the bridge over the highway,and then merge into the traffic coming down Quaker Lane, Alexandria. There is a yield sign at the merge area, but it is rarelt observed. Especially during rush hour, the drivers coming down Quaker Lane do not pay any attention to the sign, nor do they even look to see if there is anyone in the circle trying to merge. In addition, they are usually speeding and do not even slow down. I have seen many close calls at this merge area and have had a few scary episodes myself. It is rare to find any enforcement in this area. I can't remember the last time I saw a police car there. Although there is room for improvement at the other intersections in the Shirlington area, this is clearly he most dangerous place.I hope it will be at the top of the list of improvements. Thank you, Helen Staren
16	Jean and Ric Voigt	2709 Ridge Road Drive Alexandria, VA 22302	jmdvoigt@comcast.net	7035490258	5/22/2018	E-Mail	Good evening, Good evening, I am responding to this because where Shirlington Road feeds into the traffic circle is a safety hazard. My husband and I comment every time we go around it, which is several times a week, that someone is going to be killed. The MAJORITY of the time people entering the circle do not yield to the circle. You then have to slam on your brakes hoping the person behind you on the circle is able to stop in time. I now drive the circle blowing my horn as I approach the area. Please before someone is hurt something needs to be done. Thank you,
17	Carrie Keene		ckeene96@gmail.com		5/22/2018	E-Mail	I am sorry that I was unable to attend the meeting, but I am so glad to see that the circle in Shirlington is being reviewed. I looked over the proposed plans and I think that Alt. Plan S-1 may be addressing the number one problem I've had over the years and many near fatal accidents, but I'm not sure how it will fix the problem. I enter the circle from Quaker lane daily and pass through around to 395 South. The yield sign for motorist coming off of South Shirlington Road does not work. 75% of the time, the people merging, who are supposed to be yielding, do not slow down or even look to see if anyone is coming around the circle. I see where you are speaking of dedicated lanes, but I worry that people will still just power over without looking. I hope that whatever changes are made at dangerous section minimize the chances of traffic coming over into the circle at the entry point.
18	David Mudarri		mudarri.david@yahoo.com		5/23/2018	E-Mail	There is a major safety problem as cars enter the circle coming from Quaker Lane where they are supposed to yield to the traffic in the circle. I'd say about half the drivers pay no attention to the yield sign and just blindly go right through, especially those heading for the exit to 395 North. Coming around the circle from Shirlington and trying to cut through that Quaker Lane traffic to enter the Gunston-Martha Custis intersection is like playing Russian Roulette. A blinking YIELD sign would help
19	Tamsin Harrington		tamsin.harrington@gmail.com		5/23/2018	E-Mail	Ms. Daniszewski, As a resident of the neighborhood adjacent to this circle, I am very appreciative of your efforts to improve its safety. I have reviewed your proposals to mitigate the situation. I am concerned that the introduction of any traffic signals will severely increase traffic in this area. I am hoping you will also consider alternatives to that solution to include replacing the yield sign on the Quaker lane ramp with a stop sign. I think that the efforts to slow the traffic on that lane by physically impeding the angle in alternative S2 also could help. But if individuals were forced to actually yield(comply with the existing sign) or even stop at that point, I think the crash point would also be minimized without increasing traffic by much. Also, even at high traffic times, the amount of merging traffic from the circle is not excessive, so I believe a stop sign would not increase traffic as much as a signal would. And, it should be noted there is a similar stop sign on the other side for vehicles coming off of 395 southbound, which seems to be effective. The addition of a warning sign explaining merging traffic would also be an easy mitigation in the meantime. Again, I appreciate your attention to this matter and hope for the best solution. Thanks! Tamsin
20	Tim Gibson	4207 32nd Rd. S Arlington VA 22206	tgibson1989@gmail.com	7032987698	5/24/2018	E-Mail	Hello Ms. Daniszewski, I am pleased VDOT is planning improvements for Shirlington Circle. I live in Fairlington, on 32nd Road S., very near 395 and the circle. I would like VDOT to not only improve traffic flow on the Circle, but also to consider strengthening the pedestrian access within and especially across the circle. Right now there are only two ways to cross 395 to get back and forth from Shirlington Village (our primary commercial center): the distant pedestrian bridge in at the intersection of Gunston and Martha Custis Drive and the equally distant 34th Street bridge. There is a perfect spot for a new pedestrian bridge, almost exactly midway between the Gunston bridge and the 34th Street bridge. The new bridge should go from the corner of 32nd Street S and S. Utah Street (right by Utah Park) across 395 to 31st Street S (near the Shirlington transit center). This bridge would increase pedestrian links between the two "sides" of Fairlington and would better connect South Fairlington to Shirlington Village. This bridge would also encourage more cycling in the neighborhood, and it would reduce the number of cars using the Circle every day (to get to Shirlington and back). Thank you for considering this proposal.
	Jennifer Dougherty		merckx.dougherty@gmail.com		5/22/2018	E-Mail	To Whom It May Concern, As someone that has lived on both sides of the circle for over 20 years, I can not tell you how many times I have avoided a serious collision while driving around the circle. The issue is the traffic coming down Quaker Lane that will not yield to traffic in the circle. Not only do they not yield, but their speed is also excessive. I have now learned that as I drive around the circle approaching the Quaker Lane entrance to the circle, I lean on my horn until I can make the turn into Gunston. Though it may not help much, people that are not yielding are assisted in seeing the yield by the sound of the horn. I am AMAZED that there has yet to loss of life. I am sorry that the neighbors were unaware of your meeting as I and other would have gladly attended to voice our concerns!

I-395 Shirlington Interchange Improvements Study Comments

Comment Number	Commenter						Email Comment
	Name	Address	Email Address	Phone Number	Date Received	Source	
21	Cicely Woodrow		cbwoodrow@icloud.com		5/29/2018	E-Mail	Thank you for the opportunity to comment on the proposed changes to Shirlington Circle. Having been driving over the circle regularly over the past 30 years, I am pleased to know that the project is taking shape. Based on the materials and displays provided, I offer the following comments: My first comment is that three relatively low cost options would help the project in the meanwhile: Pave the southbound part of the circle. Cars swerve to miss potholes and uneven pavement. Trim the foliage on at the merge areas at Quaker and S. Shirlington ENFORCE the YIELD signs at the merge area at Quaker and S. Shirlington — both Arlington and Alexandria could make a fortune in increased revenue just by enforcing the traffic law. As for the proposals on the table: Alternative G-1: It would be the best of the two options because it reduces the blind that drivers have while entering from the East Ramp. Alternative G-2: Does not adequately address the merging issue from the East Ramp. Alternative S-1: Makes no sense given the volume of traffic and high speeds in the circle. Alternative S-2: I agree with this alternative. It makes the most sense, provided enforcement of the traffic laws pertaining to merging occurs or the yield sign is replaced with a stop sign. Alternative S-3: I agree with this alternative. It makes the most sense in dealing with the traffic issues toward Arlington Mill Road. Alternative S-4: I oppose this alternative. It makes no sense given the amount of traffic in and around the area. Alternative S-5: I oppose this alternative. It makes no sense given the amount of traffic and given that the vehicles off the ramp will be going directly into a residential area.
22	Eric Keber		keber.eric@gmail.com		5/31/2018	E-Mail	I've looked over the materials online and have a few comments. I'll preface my comments by saying I live in Parkfairfax, right off the circle, so I use it frequently. Please keep in mind that this area is part of our community and not just a thruway for communters. The main problem I experience is that drivers entering the circle off of Quaker Lane and S. Shirlington Road are either not aware of or disregard the yield signs. The materials online say that "In 2016, data on traffic volumes and vehicle movements was collected to identify safety and operational issues" yet I don't see any data presented from this study. Are the results of this study online? I'm curious to know how unsafe the interchange truly is. How many accidents have occurred over the timeline of the study? How serious were they and how does the number of accidents compare to other interchanges? What is the expected reduction in accidents due to the proposed changes? What are the metrics being used to weigh the pros and cons? I do not think Alternatives S-4/S-5 (signalized intersection with Quaker Lane/Rotary/Gunston Rd.) is worthwhile. The problem here is the speed at which drivers come down to the Circle from Quaker Lane and their disregard for the yield signs. The problem is not the drivers on the Circle. Alternative S-2 seems like a much better way to address this problem. However, please keep in mind that in solving some supposed problems, there is the possibility of creating others. Drivers change their routes based on attempts to change their behavior. For example, I envision any attempt to slow access to the Circle from Quaker Lane will divert drivers into Parkfairfax and Marta Custis Drive. Drivers heading to 395 on Quaker Lane during rush hour already turn off Quaker Lane onto Preston Rd. and take Martha Custis Drive down the hill to Gunston Rd. rather than continuing on Quaker Lane to the Circle to 395. Any alterations that slow or hinder drivers' entrance to the Circle has a good chance of increasing commuter traffic into Parkfairfax. This would not be a positive result for the residents of Parkfairfax or the riders of the Dash route(s) that go along Martha Custis. I also worry that the instillation of traffic lights at the Gunston Rd. entrance to the Circle will result in traffic backing up into Parkfairfax. I presume any construction on the Circle will result in clearcutting all vegetation. This is lamentable, as we'll loose the flowering trees that add beauty to the Circle. I also assume the hundreds of daffodils that grow around the circle will be destroyed. The presentation argues that removing trees and "overgrowth" creates better visibility, but better visibility can also encourage boldness in driving. Lack of visibility encourages drivers to be more cautious. If construction does proceed, I request that the trees and flowers be replaced. Remember, for those of us who live near the Circle, this is part of our neighborhood. I don't want it to end up like the denuded landscape surrounding the new 495 interchanges after the HOT Lanes construction was completed. It seems like a lot of time and money ($1.6 million alone for the study!) are being spent on studies and potential construction when many of these problems could be solved by better signs, lower posted speeds on the Circle, better enforcement, and increased driver awareness.
23	Virginia Farris		vfarris52@gmail.com		5/31/2018	E-Mail	I support funding a project to provide the proposed improvements to this confusing and dangerous interchange (see specifics about alternatives below). However, one important intersection is MISSING: Northbound entrance to I-395 and Glebe Road! This intersection is as much in need of improvement as the Southbound one. There is a shorter distance between the NB I-395 on-ramp and the exit to eastbound Glebe Road than between the SB I-395 on-ramp and Seminary Road. Cars coming down the NB ramp from Shirlington Circle going to Glebe Road are not at full speed and must dodge cars exiting from I-395 at full speed (and then some). It's really hair-raising! There should be a dedicated lane from the circle to EB Glebe Road, or some other intervention to separate these two streams of traffic. In addition, please work with Arlington County and City of Alexandria to improve pedestrian safety at the intersection of the SB -I-395 exit with S Arlington Mill Dr and Shirlington Rd. Pedestrian crossing lights there do not work and crossings are confusing and extremely dangerous. It is difficult to address because of the 3 jurisdictions involved, so this project is the perfect and perhaps only time to improve this intersection! Alternatives: Oppose: Alternative S-1 is inadequate. Alternative S-2 will not reduce speeds effectively. I support and prefer Alternative S-5: Create Signalized Intersection with I-395 NB Off-Ramp & Gunston Rd. This will most comprehensively address the safety issues with the Quaker Lane merge and the exit to S Arlington Mill Dr. It may add to congestion in the AM peak, but the length of that exit ramp should be sufficient to control that. I support Alternative S-3: Add Lane to Arlington Mill Drive Exit. This is an essential minimum, but will not address the Quaker Lane/Gunston weave. I support Alternative S-4: Create Signalized T-Intersection with Rotary & Quaker Lane. It will slow down traffic on the rotary, but is a realistic way to control traffic coming from Quaker Lane. Be sure to add appropriate signage of the upcoming signal, so that drivers used to the weave are aware! I am unsure about Alternative S-6: Create Signalized Intersection with I-395 SB Off-Ramp & Campbell Ave. This may add to PM rush-hour backups on that off-ramp. I support the combination of S-3 and S-4. I may support the combination of S-5 and S-6, pending study of the S-6 effects on SB rush hour traffic.

I-395 Shirlington Interchange Improvements Study Comments

Comment Number	Commenter						Email Comment
	Name	Address	Email Address	Phone Number	Date Received	Source	
24	William Hill	1663 Preston Road Alexandria VA 22302	billh8590@yahoo.com	7037512884	5/30/2018	E-Mail	I am a resident of Parkfairfax who attended the VDOT public meeting on 5/21/2018 to discuss proposed improvements to the Shirlington Circle. I am glad that VDOT is studying ways to improve this high-accident area. I reviewed the various proposals. The three proposals which I prefer are: S-4 – T Intersection with the Rotary and Quaker Lane S-6 – Signal with the I-395 South Ramp and Campbell Avenue G-1 – Merge two-lane west ramp to one-lane Thank you for your consideration, William Hill
25	Deborah Hahn	N Overlook Drive	hahndebbie@hotmail.com		5/25/2018	E-Mail	Overall Recommendation/Comments not present in current alternatives The two most concerning areas of the rotary are 1. The unyielding, speeding traffic that comes down N Quaker Lane towards the 1-395 NB on ramp and 2. the Shirlington Road lanes that split towards the 1-395NB on ramp (to left) and N Quaker Lane (to right). Unfortunately the solutions presented in the proposed alternatives do not consider two options that seem to be the most effective and perhaps even least costly. High speeds of traffic entering interchange from N Quaker Lane. Solution 1:Test out Stop signs instead of yield signs for traffic on N Quaker Lane. I feel this is the least disruptive to the rotary traffic, which flows well now. Solution 2: Research whether N Quaker Lane and the rotary can be re-laned, so that N Quaker lane loses its dedicated lane to the I-395 NB on ramp and becomes a true merge lane into the rotary. This could be achieved by modifying "Alternative S-1: Reduce & Repurpose Existing Lanes" by turning N Quaker lane into a true merge, converting the left lane into a widened shoulder, and shifting the two rotary lanes into the left lane proceeding around the rotary and the right lane leading directly into the I-395 on ramp (instead of N Quaker Lane leading into that on ramp. This forces N Quaker Lane traffic to actually yield because they are entering both the rotary and the on ramp to I-395. Swerving from far left lane to right lane to leave Shirlington Road Rotary to N Quaker Lane. Solution #1: Improve signage and lane markings. I would try to improve signage around the rotary so that drivers are better aware coming from Shirlington Road/Campbell Ave Signal light that the far left lane is left turn only. Also, I would make the white lines leading into that dedicated lane SOLID WHITE and start that from early in the rotary turn. This will warn drivers to merge right sooner than at the last second which is what drives them into traffic to their right that is also turning left from the middle lane. Unmowed grass obstructing views. Solution#1: Mow the grass more frequently in the Spring and Summer. The grass at the yield sign on the Northwest corner of the rotary where the rotary passes S Shirlington Road, prevents the yielding traffic or rotary traffic from seeing each other easily.
26	Guy Foulks	N Overlook Drive Alexandria VA	guy_foulks@hotmail.com		5/25/2018	E-Mail	The two most concerning areas of the rotary are 1. The unyielding, speeding traffic that comes down N Quaker Lane towards the 1-395 NB on ramp and 2. the Shirlington Road lanes that split towards the 1-395NB on ramp (to left) and N Quaker Lane (to right). Unfortunately the solutions presented in the proposed alternatives do not consider two options that seem to be the most effective and perhaps even least costly. High speeds of traffic entering interchange from N Quaker Lane. The reason this is a problem is that the drivers on N Quaker Lane have a dedicated lane that flows directly into the on Ramp and in part I think drivers use the hill, ignore the yield, to start their acceleration for the on ramp. Also, the hill itself accelerates vehicles faster than they may otherwise choose to go. Lastly, I think because there is a dedicated lane, drivers do not understand that they must yield their lane to the traffic in the rotary. They instead assume they must only yield if they intend to enter the rotary and not if they are heading to the 1-395 on ramp. This creates danger for rotary traffic that intends to make a right turn on Gunston Road from the Rotary as well as challenges traffic trying to enter the rotary at the Gunston Road stop sign. Solution 1:Test out Stop signs instead of yield signs for traffic on N Quaker Lane. I feel this is the least disruptive to the rotary traffic, which flows well now. Solution 2: Research whether N Quaker Lane and the rotary can be re-laned, so that N Quaker lane loses its dedicated lane to the I-395 NB on ramp and becomes a true merge lane into the rotary. This could be achieved by modifying "Alternative S-1: Reduce & Repurpose Existing Lanes" by turning N Quaker lane into a true merge, converting the left lane into a widened shoulder, and shifting the two rotary lanes into the left lane proceeding around the rotary and the right lane leading directly into the I-395 on ramp (instead of N Quaker Lane leading into that on ramp. This forces N Quaker Lane traffic to actually yield because they are entering both the rotary and the on ramp to I-395. Swerving from far left lane to right lane to leave Shirlington Road Rotary to N Quaker Lane. The danger is traffic disobeying the dedicated left turn only lane and swerving into the right lane to go up to N Quaker Lane. Solution #1: Improve signage and lane markings. I would try to improve signage around the rotary so that drivers are better aware coming from Shirlington Road/Campbell Ave Signal light that the far left lane is left turn only. Also, I would make the white lines leading into that dedicated lane SOLID WHITE and start that from early in the rotary turn. This will warn drivers to merge right sooner than at the last second which is what drives them into traffic to their right that is also turning left from the middle lane. Unmowed grass obstructing views. Solution#1: Mow the grass more frequently in the Spring and Summer. The grass at the yield sign on the Northwest corner of the rotary where the rotary passes S Shirlington Road, prevents the yielding traffic or rotary traffic from seeing each other easily. Very dangerous at an already problematic interchange where cars occasionally fail to yield to the rotary.
27	Matt Burden	Beverley Road Alexandria VA	mburden@gmail.com		5/24/2018	E-Mail	Thank you for making the Shirlington Interchange improvements. I have driven this traffic circle multiple times a day for the past 11 years, and have numerous thoughts on improving the safety, efficiency, and appearance of this critical junction. 1) The most dangerous spot is the Quaker Lane Ramp, that is shown and discussed in proposal S-2. Many drivers do not see or understand the yield sign, and travel down this hill at a high rate of speed, focused on continuing straight to I-395N, without realizing that cars in the roundabout have the right-of-way to merge over to Gunston Rd. I believe that proposal S-2 best addresses this situation (subtly forcing traffic to slow down as they approach the traffic circle). I have long wished for rumble strips on this ramp, forcing drivers to realize that a yield sign was approaching. This remedies the situation of inattentive drivers entering the interchange at high speeds from Quaker Lane, without adding traffic signals. 2) I am strongly against adding additional traffic lights into the circle. I don't think they are necessary, and would inevitably cause huge backups at peak travel times, and inconvenience at all other times when the circle is not busy. For these reasons, options S-4 and S-5 are non-starters. 3) No major concerns with proposal S-1. The left lane on the quakerlane side is underutilized. But without the S-2 option, you would still have a dangerous merge between high speed Quaker Lane ramp traffic and the cars already in the rotary. 4) The proposal for S-6 addresses a dangerous spot. The stop sign is located too far back, making it difficult to see oncoming cars while accelerating to merge. I would recommend a dedicated lane for the I-395SB off ramp that continues PAST the 395S entrance. Imagine traffic cones (like the ones that separate the I-495 HOT lanes from the main traffic lanes). This would prevent queue jumpers from getting directly back onto 395, and postpones a potential weave until later in the circle (5) No strong preference for the G-1 or G-2 options. They both appear to be feasbile. If possible, I would lean towards G-2 as I most frequently travel via the I-395SB ramp, and would prefer the two lanes through there. 6) The general improvements are sorely needed, including more regular grass mowing and general beautification. Thank you for the opportunity to comment. Please keep me informed of future opportunities to engage as this project moves forward. -Matt Burden
28	Stephanie DiNapoli	801 N Overlook Dr. Alexandria, VA 22305	stephdinapoli@yahoo.com	703-581-2424	5/24/2018	E-Mail	I am glad improvements are being considered for the 395-Shirlington Interchange as it is, in my experience, one of the most dangerous interchanges I've ever had to use. I think the most dangerous portion of the interchange is where traffic coming down Quaker Lane, heading north, is merging into the traffic circle; at present, the Quaker Lane traffic has a "yield to traffic in circle" sign, which rarely happens. The traffic coming down Quaker Lane is frequently going 55mph, or more, and accelerating as it comes down into the Shirlington Circle, rather than preparing to yield to merging traffic. It is exceptionally dangerous and I am continually surprised that serious accidents don't occur there on a regular basis. On the other side of the Shirlington circle, where traffic is traveling south, merging from Four Mile Run into the traffic circle, there is another dangerous portion where again the traffic merging into the circle has a "yield to traffic in circle" sign, which also, rarely happens. In my opinion, the traffic coming down Quaker Lane and into the Shirlington Circle, as well the traffic coming from Four Mile Run into the Circle should both have full STOP signs so that they will at least consider yielding.

I-395 Shirlington Interchange Improvements Study Comments

Comment Number	Commenter						Email Comment
	Name	Address	Email Address	Phone Number	Date Received	Source	
29	Chris Slatt		chris@dodgersden.com		5/23/2018	E-Mail	I strongly support alternative S-6. The current merge onto Shirlington Circle from Southbound I-395 is unsafe. Drivers cannot see the traffic signal well to know if the traffic coming from the rear or the traffic coming from the right currently has a green making it difficult to know which lane to be watching and the stop line for the stop sign is situated so far back that it is extremely difficult to see if traffic is approaching from the rear. None of these alternatives seem to address the danger to pedestrians crossing Gunston Rd to get to the pedestrian bridge. Cars coming around the corner from the circle and from Quaker Lane are going very fast thanks to the very generous turn radius and lack of traffic calming. Combined with the bad sight lines this is a recipe for disaster. The study area appears to include the intersection of Shirlington Rd and Arlington Mill Dr but doesn't appear to propose any changes to this intersection. This project should coordinate with Arlington's planned replacement of the Shirlington Rd bridge to provide safe, complete pedestrian facilities on the east side of Shirlington Rd to connect pedestrians from the Shirlington Gateway building safely and efficiently to points North without having to cross and re-cross Shirlington Rd multiple times.
30	Judith Schaeffer	3406 Alabama Avenue Alexandria VA 22305	jeschaeffer@msn.com		5/23/2018	E-Mail	Dear VDOT: As a longtime resident of Alexandria and regular user of Shirlington Circle, I am writing to comment on the proposed "improvements" around the rotary. My wife and I have lived in Beverley Hills for the past 26 years, and, for 13 years before that, we lived in Fairlington (both North and South), so I am abundantly familiar with the issues that you have been studying, and have previously complained to you about the dangers posed by drivers speeding down the ramp on Northbound Quaker Lane who fail to yield to traffic in the rotary. I am pleased that you are finally addressing this and other issues; thank you. I am surprised, however, that, at least in your written materials (I apologize that I was not at the May 21 presentation), you do not mention the fact that the most pressing safety issues around the rotary are caused by the failure of drivers to obey Yield signs, both on Quaker Lane as noted above, and also, on the other side of the rotary, along what I think is southbound Shirlington Road. I am very much opposed to the installation of traffic signals as a first alternative to deal with the failure of drivers to obey road signs, especially when such signals would cause delays for those of us who obey the law, and when other options have not been tried first. In particular, I am very much opposed to Alternative S-4, creating a signalized T-intersection with the rotary and Quaker Lane. For those of us who need to exit the rotary at Gunston (as I do), or who are wanting to enter 395 Northbound, this would create needless delay. And I predict that many drivers who would prefer to exit at Gunston would drive southbound up Quaker Lane to turn left onto Preston, putting additional pressure on that intersection (and the short left-turn arrow), and putting more traffic onto those residential streets. S-4, and any traffic signal, should be a last resort. What about speed tables on the northbound Quaker Lane ramp where it approaches the rotary? What about more and better positioned and visible Yield signs, signs that say YIELD TO TRAFFIC ON YOUR LEFT, to make it clear who has the right-of-way? What about painting YIELD in huge letters all the way down the ramp? What about enforcement of the law? I object to punishing those of us who do obey the law by the installation of traffic signals that would not be necessary if drivers obeyed the law. I would certainly prefer S-2 to S-4, but it's not clear that S-2 would really address the issue of the failure of drivers on Quaker Lane to yield to traffic exiting the rotary at Gunston. I do think it critical that the grass in the median between the Quaker Lane ramp and the rotary be mowed more regularly. It sometimes gets so high that when you are driving on the rotary you can't see the traffic on the Quaker Lane ramp. I do not believe there is a problem at the Gunston/rotary intersection that would warrant the installation of a traffic signal. On the other side of the rotary, where southbound drivers on (what I think is) Shirlington Road fail to yield to traffic coming around the rotary, I think replacing the Yield signs with Stop signs should be tried before any traffic signals are added. Again, I thank you for undertaking this study and for your efforts to address the genuine safety issues around Shirlington Circle. I strongly urge that new traffic signals not be the first alternative chosen to address those issues, when other options have not be tried first. Thank you for considering my comments.
31	Tom Slayton	628 Pullman Place	ricetrader@aol.com	703-549-1199	5/23/2018	E-Mail	Sirs, The primary problem with the Shirlington Interchange is the failure of north bound cars on Quaker Lane traveling at excessive speeds are ignoring the yield sign and risking rear-ending cars turning onto Gunston. This can be solved cheaply by the installation of traffic calming bumps on Quakerand/or a stop sign.
32	David Fitzgerald		dfitzge1@gmail.com		5/23/2018	E-Mail	Issue: Disregard of Yield Sign at Quaker Lane/Shirlington Interchange Proposal: Emplace Traffic Camera or Other Permanent Control Measure to Ensure Yield Sign is Obeyed when Traffic in Circle is Present. Background: I take the Gunston Rd. exit off the Shirlington/I-395 interchange every night on my return commute. Based on my personal experiences over the last 3 years, I would generously estimate that fewer than 1 car in 10 obeys the posted Yield sign directing traffic entering the interchange from Quaker Lane. Such flagrant disregard of important traffic signals is, obviously, hazardous in any situation. But given: (1) the short distance traffic in the circle has to complete an exit onto Gunston; (2)the speed at which the violative merging drivers blow by the Yield sign; and (3) the angle of the Quaker Ln ramp/Circle merger, the danger to drivers exiting the circle is particularly--and needlessly--acute. Assume that the North end of the Interchange is 12 o'clock and the South end is 6 o'clock. Drivers in the circle must start watching the on-ramp for merging traffic between the 5-7 o'clock marks of the circle. If merging traffic is present, drivers in the circle--at least those aware of the proclivity of merging traffic to disregard the Yield--are forced to reduce speed until the intentions of the merging drivers become clear. This obviously congests the circle and exposes drivers with the right of way to needless risk of getting rear-ended. Alternatively, if drivers in the circle wait until nearer the Gunston exit to look for oncoming traffic, they have to look almost completely behind them (because of the on-ramp angle relative to the circle) to ensure their exit lane is clear of merging drivers who failed to obey the Yield. Forcing drivers with the right of way to take their eyes off the road ahead, especially given the high volume of shifting traffic in this short stretch because of the minimal distance to the 395 on-ramp/nearby Shirlington exits, also needlessly exposes drivers to undue risk. Conclusion: Replacing the Yield with a Stop sign is not desirable because (1) nothing suggests merging drivers would obey it anymore than they do the Yield and (2) it is unnecessarily disruptive of merging traffic when circle traffic is absent. People simply need to heed the existing Yield. Whether that is accomplished through some remote monitoring device or greater police presence (although it should be noted that I occasionally observe police sitting in the median at Gunston Rd, they do not--obviously--seem to be focused on the Quaker on-ramp), the simple solution seems to be forcing compliance with existing measures. Thank you, Dave Fitzgerald
33	Jennifer Mondale	1410 Crestwood Drive Alexandria VA 22302	jennifer.mondale@gmail.com				Dear planning team, I appreciate you reviewing the various elements associated with this interchange. I live at 1410 Crestwood Drive (Alexandria, VA 22302), just up the hill, so I travel on these roads daily. It does seem to me that many of the options proposed seem a bit heavy handed to deal with drivers failing to yield. If the yield signs presented at the two intersections were shifted to stop signs, I believe it would address the core issue of people failing to yield, without the additional time burden (or expense) of a traffic signal. I wonder if you could even try this approach of replacing yield with stop signs as a pilot to see if it addresses the issues before taking more significant steps? However I am very happy to see that you are considering a second lane to the Arlington Mill ramp - I've seen many near-accidents at this intersection and also acts of road rage that result when cars do (or do not) allow cars onto that road - a second lane will absolutely address the issue. In case helpful, I've circled on your display the two intersections where I recommend you replace yield signs with stop signs. Jennifer Mondale

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Comment Number	Commenter						Email Comment
	Name	Address	Email Address	Phone Number	Date Received	Source	
34	Libby Good		libbygood@aol.com		5/23/2018	E-Mail	I'm so glad this study is underway, as there are significant safety issues at multiple points. In my experience driving this area over the last 30 years, I've had many close calls. The three points that I believe pose the most risk are: 1. Exit from Shirlington Circle to Gunston Rd. Traffic from Quaker Lane entering 395 at this point routinely fails to yield to exiting traffic and speeding is the norm. It seems it doesn't even occur to most drivers to pause to check for exiting traffic before barreling on their way to 395. I have occasionally tapped my horn at these drivers, only to get angry glares as they continue on their speedy failure-to-yield journey. Their reaction confirms my observation that these drivers do not understand the requirement to yield to exiting traffic. I am reluctant to suggest a stop sign, but improvements to the signage and/or traffic signals like a blinking yellow light at that point could clarify the requirement for entering traffic to yield. 2. Entrance from Gunston Rd onto 395. Particularly during rush hours, vehicles entering 395 from Gunston are challenged by both the volume and speed of traffic on entrance lanes from Quaker. It is particularly difficult for the Gunston entrants to cross 3 lanes to the entrance to southbound 395. As much as I dislike added traffic lights, I think one operating at this intersection during periods of high volume may be one of the best options. 3. Merge of southbound traffic on Shirlington Rd with traffic on the circle (behind WETA building). The theme continues with failure to yield combined with high speed creating a dangerous spot. Here again, drivers seem oblivious to the yield sign. Improvements to signage (e.g., yield sign with blinking yellow light) could help. I am sorry that I was unaware of the 5/21 meeting. I would welcome an opportunity to see the alternatives that were offered at that session and thereby offer mire educated comments. Is there a way to access that information online? Thank you. Regards, Elizabeth Good
35	Mimi Saunders		outlook_DD09A9F2F01A0F96@outlook.com		5/22/2018	E-Mail	The only option I can think of to improve this dangerous situation is to replace the current yield sign with a stop sign for the traffic coming down from Quaker Lane to the circle. I cannot count the number of times a car has totally ignored the yield sign and just barreled into the circle at full speed. I can't believe nobody has been killed yet; it's just a matter of time.
36	Deb Riley	702 S. Overlook Dr.	rileydebraann@gmail.com	703.624.6421	5/22/2018	E-Mail	I have lived in the Beverley Hills neighborhood just off the circle for 20 years. Friends were driving my daughter home and a car slammed into them when they attempted to turn right onto Gunston. This car and many, many others completely disregard the yield signs on the ramp. I have had too many close calls to count. I am very glad to hear that this dangerous traffic pattern will be reconsidered. You are welcome to contact me.
37	Suzanne Salva		suzannesalva28@gmail.com		5/22/2018	E-Mail	Very good presentation at the public meeting on May 21 by VDOT staff and consultants. Can the study options shown on the boards and in the presentation be posted on the VDOT project page? The long term solution to this traffic circle is to reconfigure it to function as either a local road connector or an access ramp to a highway. The engineers at the public meeting on May 21, 2018 correctly identified the biggest safety issue on this traffic circle is the differential speeds between highway vehicles and local vehicles. I live in Parkfairfax and I support the closing of the Gunston Road access to I-395. Vehicles exiting the highway at Gunston Road are traveling too fast to safely maneuver the merging with the Quaker Lane and circle vehicles. There is also a four-way STOP controlled intersection with pedestrian crossings 500 feet from the traffic circle, at the intersection of Gunston Road and Martha Custis Road. The conflict between exiting highway vehicles and pedestrians accessing the pedestrian bridge is a hazard. If the Gunston Road access to I-395 can not be closed, then the circle should be re-configured to allow only local traffic access between Gunston Road and Shirlington Road. Reconfiguring the lanes on the traffic circle will not be successful due to aggressive driver behavior that ignores YIELD signs and the differential speeds between highway vehicles and local vehicles. Installing traffic signals on the circle is the only way to improve the vehicular safety of this traffic circle. Traffic signals will control aggressive drivers and mitigate the differential speeds between local and highway vehicles.
38	Joelle Costello		joellecostello@gmail.com		5/21/2018	E-mail	Good morning - I live on Gunston Road. It is very difficult and dangerous to exit the Shirlington Interchange circle onto Gunston Road. In my opinion, two things affect the safety of this intersection the most: The biggest problem is cars entering from Quaker and not yielding to cars trying to exit onto Gunston Road. There needs to be a stop sign there. There is no signage in the circle for the Gunston Road exit. (after turning you can see a small street sign hidden in the trees). A large "Gunston Road Exit" sign will help tremendously. Many people get lost or miss the turn because there is no sign. I strongly believe that a stop sign at the on the entrance ramp of Quaker, as well as added signage on the circle will significantly improve the level of safety. Thank you for conducting this improvements study and taking residents concerns into account. Sincerely, Joelle Costello
39	Bucky Green		buckygreen@comcast.net		5/19/2018	E-Mail	Hey VDOT - One of the big safety issue at the shirlington interchange is the shirlington circle entrance onto NB 395 and the next/immediate exit ramp from NB 395 onto s bound Glebe Road. A very tight merge and frequent stacking/backup on that s glebe road ramp blocks one of the through travel lanes on 395nb. Did you all exclude that from the scope on purpose?? Thanks, bucky green
40	PJ Lepp		pjlepp@livewiredc.com	7035191600	5/18/2018	E-Mail	Between 5:00-5:30 pm the light that regulates cars leaving 2800 Shirlington Road only lets one car out before turning yellow. It would be nice for it to be a tad longer. Thanks! PJ Lepp Live Wire Media Relations, LLC W: 703-519-1600 X 102 | C: 703-864-9471 pjlepp@livewiredc.com | www.livewiredc.com
41	Sally Cluthe		sally.cluthe@gmail.com		5/18/2018	E-Mail	There are many issues with the Shirlington Circle interchange that need to be addressed for everyone's safety. One area that I think needs immediate attention is the traffic entering the circle from Quaker Lane. While the signage says "yield to traffic in circle" the incoming vehicles from Quaker Lane enter at full speed and no pay attention to the the traffic already in the circle. This is made even more dangerous since any car in the already in the circle that going toward the I-395 North ramp must start merging right - which is also not clearly marked. I m looking forward to common sense solutions. Regards, Sally Cluthe

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Comment Number	Commenter						Email Comment
	Name	Address	Email Address	Phone Number	Date Received	Source	
42	Thomas Philibin		tphilibin@livewiredc.com	703-519-1600	5/18/2018	E-Mail	To Whom It May Concern; Ask anyone – literally anyone – who works at or visits the Shirlington Gateway at 2800 Shirlington Road. They'll tell you that traffic light lets out a maximum of 3 cars per cycle during afternoon rush hour, resulting in a 20-30-minute wait to exit the building's lot. It's one of the easiest fixes that's going to solve a lot of congestion issues from people running the light and blocking the box on occasion. Kindest, Thomas
43	Jeffrey Sturman		Jeffrey.Sturman2@usdoj.gov	202-213-0204	5/17/2018	E-Mail	I ride Metrobus everyday from Pentagon to the Shirlington Transit Center. For the evening rush hour, there is always a backup of cars coming from Shirlington Road/Arlington Mill Drive to merge onto I395 S/Shirlington Circle. They do not yield for buses coming off the highway at high speeds and usually block the circle so the bus cannot make a right-hand turn. Very dangerous conditions. Cars also block the right-hand turn lane and use it as a lane to merge onto the highway. Heading from Shirlington Circle onto I395 N, cars coming from Quaker Lane rarely yield to traffic already in the circle. This is dangerous when cars in the circle try to take the ramp onto I395 N and Quaker Lane traffic goes straight without yielding.
44	Karen & Elliot Parkin	2720 S Arlington Mill Drive Unit 1117 Arlington, VA 22206	parkin_kw@hotmail.com		5/23/2018	E-Mail	#1 What alternative(s) do you support and why? We support S-2, S-3 and S-4. These will provide some relief for the Shirlington Rotary without creating additional backups on the Rotary. We would not support S-1, S-5 and S-6 that we feel would create other unsafe conditions or additional backups at peak times. In addition, we support G-1 - merge 2 lanes on West ramp to 1 lane. It appears that this alternative will help to increase vehicle visibility and enable left lane vehicles to move over more efficiently. #2 What are your major concerns that you would like to see incorporated in this study? We would like to see the study include the northbound Shirlington ramp onto I-395. This is a very dangerous merge from the ramp onto a fast moving lane on I-395 and in close proximity to the Glebe Road exit ramp. The Glebe Road exit ramp regularly backs up almost to the end of the Shirlington on ramp. This issue will only get worse as Potomac Yards development continues. #3 Please provide us with any additional information or suggestions that will assist VDOT in developing the final alternatives and design of this study. Would like to see the left turn lane from Shirlington Road onto Arlington Mill extended in addition to the improvements suggested by S-3. Would like to see coordination with Arlington County on improvements to the block of Shirlington Road between Arlington Mill Drive and Four Mile Run Road. This is a short block, not included in your study area, but creates some of the problems that your study is trying to address. We would not be in favor of any additional traffic exiting onto Campbell Avenue since the exit is a very short block (at most 3 vehicles) and narrows to 1 lane just past Quincy Avenue.
45	Mazie Baskin	Global Director, Education Programs/Sales Informatica	maziebaskin@icloud.com	703-953-6784	5/31/2018	E-Mail	Hello. The ramp from Quaker Lane onto the Shirlington 395 circle really needs a stop sign instead of a yield. The yield is too ambiguous for drivers and mostly they just ignore it. I have to stop in the middle lane to wait for the traffic f om Quaker to let me in even though I have the right of way. Many speed up on the ramp as if it were a race. A stop sign would fix the issues currently experienced. Thanks. Mazie Baskin
46	Wright Smith		WSmith@weta.org		6/7/2018	E-Mail	Hello, I realize I am past the deadline to submit comment regarding the improvements to Shirlington Circle, but I would like to add my voice. The south-east exit from the circle onto N Quaker Lane southbound is an absolute mess. Honestly, I am surprised there are not more traffic incidents there. By following the posted signage, the flow of traffic for the interior lane of the circle should not have access to N Quaker lane, but drivers either seem to not notice or not care about the posted flow of traffic and often try to exit the circle to N Quaker lane, cutting off traffic in the outer lane of the circle who are staying in the circle. Something needs to be done. The exit onto N Quaker lane needs to be narrowed to one lane instead of 2, or there needs to be better signage, but that exit is an absolute mess and needs significant attention. Thank you Wright Smith
47	Kate Stradar		kate@stradar.com	202-669-8918	6/10/2018	E-Mail	This is a very difficult interchange to navigate. I would appreciate modification to the traffic pattern.

I-395 Shirlington Interchange Improvements Study Comments

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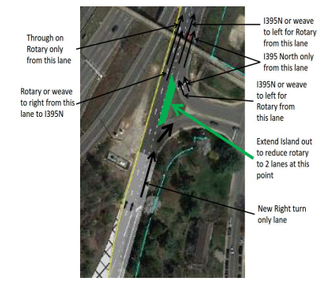
	Name	Address	Email Address	Phone Number	Date Received	Source	
48	Daniel MacDougall	2727 S Quincy St Apt 211 Arlington, VA 22206	danielsmacdougall@gmail.com	608-234-0125	5/29/2018	E-Mail	Ms. Daniszewski and Messeurs Roper and Ramey: Though I was unable to attend the meeting on the 21st, my wife attended and briefed me, and I have studied the briefing materials on the VDOT website. I appreciate that VDOT is taking the problems around this interchange seriously, and with PEs and EITs working on it, I have confidence that significant improvements will be made, if funding is provided. Though you have probably already heard my screed about the merge between S. Shirlington Road and the rotary, I'll rehash it, since only Alternative S-1 would likely have any effect on it. The reason near-collisions are incredibly common at this point is simply non-compliance with the existing yield sign. Adequate compliance would solve this particular issue. While I think some of the other alternatives would alleviate traffic and accidents in this area, this one spot matters to me far more than others, because I have almost been killed there several times. And while anecdotal evidence is the weakest form of evidence, I witness near collisions every day, caused solely by motorists heading south on S Shirlington Rd not abiding by the yield signs and pulling right in front of those with the right of way in the rotary. I am aware that a situation like this can't be modeled with car-counters and discrete-event simulation software, but observation of this area with any significant amount of traffic should convince anyone that it is a hazardous situation. To me, the clearest solution is to make sure motorists are away of the requirement to yield to traffic in the rotary. Non-compliance is more likely to be caused by inattention and being unaware of the requirement. The yield sign on the right of the roadway is somewhat obstructed by trees. The one on the left is visible, but is right before the merge, no providing any advance notice. I would suggest putting flashing LED lights around the perimeter of the yield signs to draw attention to them, and panting "YIELD" or "YIELD AHEAD" on the pavement in BOTH lanes. If that doesn't draw attention and change drivers' behavior, the other option would be to replace the yield signs with stop signs. Alternative A-1 might help, but any change in lane designations will only further confuse drivers who are already apparently having trouble grasping the meaning of a simple yield sign. Please use signage and lane markers to make it abundantly clear who is supposed to yield to whom at this location. If you do that, I will hound the Arlington Police Department until I'm blue in the face to enforce it. Thank you for soliciting input from the community. Regards, Dan
49	Bob Gronenberg		bob2@comcast.net		5/21/2018	E-Mail	Hi Olivia, Great job at the Public Information Meeting! It's good to see safety is the top priority and hopefully a package of modest improvements will yield very positive change. I would like to resubmit my previous proposal for adding one set of signals at the Circle/Quaker merge, another at the Circle, Shirlington Rd merge and removal of the existing signal at the Circle and Campbell Ave. I also suggest reopening the right lane on Quaker to mitigate any backup a signal would create. Please see attached. Please let me know if I can be of assistance, and I look forward to seeing you again next month. Best regards. v/r Bob
50	Sherry Grossman	441 Argyle Drive Alexandria, VA 22305	sherrygrossman@verizon.net	703-549-2694	5/23/2018	E-Mail	Thanks very much for addressing this issue. My former car pool driver's wife used to claim that he would die for the right-of-way when trying to turn from the circle onto Gunston, and we sometimes thought that would happen. It's especially challenging when drivers both in the circle and in the entrance ramp are speeding toward 395N and you are at risk from all sides while trying to get out of the circle onto Gunston Rd. I'm sure you'll hear many people complain that few drivers bother to yield or even look over their shoulder to see if there is traffic coming in the circle despite numerous yield signs and other efforts such as narrowing the entrance ramp off Quaker Lane. I have a feeling that even a stop sign at the end of the Quaker Lane entrance ramp would be ignored by some, who are just revving up to enter the highway and have no interest in slowing down. Perhaps the only way to make that a safe intersection is to install traffic lights, but I wonder whether a stop sign at the end of the entrance ramp, along with a warning to look behind them to see if there is on-coming traffic in the circle and yield to it before proceeding, would work if people understood that it is their last chance to drive safely and obey these signs before the inevitable traffic light installation if safety at that intersection doesn't improve. Such a plan could be widely communicated in local newspapers and neighborhood listservs, and it could be limited to a specific test period, like 6 months or maybe less, before a decision is made to install traffic lights if safety doesn't improve. I would like to see one more attempt to make people yield before installing traffic lights because I hate to see everyone inconvenienced by having to wait for a traffic light because of the dangerous practices of some, but I encourage you to do it if you feel that all lesser ameliorative avenues have been exhausted. The entrance to I 395 going South from South Glebe may be even worse in terms of accidents or near-misses. I avoid that road at all costs - it's just too dangerous. Many thanks for your attention to these issues. Sherry Grossman
51	Gabrielle Summers	927 Douglass Dr.	mrsgse@yahoo.com		5/25/2018	E-Mail	Dear We live at 927 Douglass Dr. Our roads are being cut thru on a daily basis. Our priority would be to have this one mile stretch restricted to residents only during evening rush hour so people could not cut through. Also, the drivers speed like Crazy. So speed bumps would be helpful. And last, but not least, the intersection of Douglass and Georgetown Pike is so dangerous. People fly over the blind hill in front of St Johns Episcopal church. There are many accidents. Having a slower speed limit of 25 from Langley High school to the beltway would make things safer. And flashing lights warning drivers to yield to pedestrians so they can cross the Pike at Douglass Drive . Literally, NO ONE ever stops to let anyone cross at the pedestrian crossing. It is a useless crossing. One day someone will get killed, It is a matter of when. Thank you. Gabrielle Summers
52	Mary Ryan Connolly		mary_connolly@comcast.net		5/29/2018	E-Mail	I believe that Quaker Lane should have a metered light (same as the ones used on the ramps to enter 395. Quick green and red) which would stop and/or slow traffic from entering the circle but not hold up traffic for any long period of time. Additionally, the outside lane of the circle should stay the same with one exception, being able to enter Gunston Road. This eliminates a merge. With the metered light, traffic would come to a stand still and not enter the circle until it is safe to do so. Gunston Road is wide enough already to accommodate two lanes of traffic coming off the circle. Sincerely Mary Ryan Connolly

I-395 Shirlington Interchange Improvements Study Comments

Comment Number	Commenter						Email Comment
	Name	Address	Email Address	Phone Number	Date Received	Source	
53	Cheryl Slayton	Alexandria 22305	ceslayton@aol.com	571-319-3178	5/23/2018	E-Mail	I have lived here almost 35 years and am always surprised that the quaker lane ramp to 395 and the circle isn't on the top list of the worst merging area in NOVA. So tho I am glad you are addressing the issue I do not feel any of the proposals will fix this problem Speed bumps and a huge yield sign painted at the yielding area and maybe a camera and maybe enforcement will help solve this problem. At least try the first two of my suggested options. The stop signs aren't an issue on Gunston and Martha Custis. People are polite and get thru that. They lose all manners at the quaker ramp. I can tell you we all take our lives in our hands there. Speeding (i complained about the 30 mph before to no avail) and no yielding). If i stop in the circle i will get rammed so I either speed up or put my flashers on or go around again!!! And pray alot!!!! Feel free to call me or email me if you need more information. Even better come ride with me on my adventure coming and going to Shirlington !! Thank you. Cheryl Slayton
54	Stephanie Bautista	2720 S. Arlington Mill Drive Arlington VA 22206 Unit 108	Sbautista@u-store.com		5/21/2018	Comment Sheet	
54	Stephanie Bautista		Sbautista@u-store.com		5/21/2018		
55	Brain Barker	808 Beverly Drive Alexandria VA 22302	btbarker@gmail.com		5/21/2018	Comment Sheet	
56	William & Kathy Hughes	Shirlington Village Condo	huggies94@msn.com		6/14/2018	E-mail	I have lived in this area – first on Valley Drive in Park Fairfax and now in Shirlington Village Condo – for nearly fifteen years and applaud your review of this interchange. Comments… Quaker Lane traffic seldom "yields" those in the circle. Cars exiting 395 onto the circle and approaching the Campbell-Shirlington Rd light seldom "stop" much less yield to those on their right. Better signage, more enforcement, different signage is in order. About a month ago, my husband was making the legal right-on-red from Campbell onto the Circle, when someone coming off the 395 ramp went through the signage and into the barrels aside the 395S ramp. My husband was blindsided, pushed down the ramp, and the other vehicle overturned on the ramp. Yes, changes are in order! Kathy Hughes
57	Gary Hucka	1929 North Quaker Lane Alexandria, VA 22302	ghucka@verizon.net	7036714074	6/13/2018	E-mail	  Extend the merge south on the rotary to eliminate the ability for vehicles to merge back onto 395 South. Also need to fix the road camber to better the sight lines Good idea here. Also adjust the road camber so to increase the sight lines
58	W. ALLAN CAGNOLI / MARILYN R. MURPHY	1604 Crestwood Drive Alexandria, VA 22302	acagnoli@aol.com	703-998-8144	6/22/2018	E-mail	I live right off of Quaker Lane near Shirlington Circle and have used it nearly every day since 1983. Over the last few years I have noticed a DRAMATIC increase in the number of drivers who totally ignore all of the signs, both yield and stop, while using the various entrance points to the circle. It is a VERY DANGEROUS situation. In fact, just yesterday, I was nearly hit FOUR (4) times in the space of time I approached the circle from Quaker Lane and drove around it to exit into Shirlington by the Shell station. While entering from Quaker Lane drivers behind me beeped and squeal-braked as I yielded to circle traffic trying to exit onto Gunston or 395 North; drivers getting onto the circle from 395 North nearly hit me while trying to cross over to exit/enter Shirlington Road; drivers coming from Shirlington Road -- who almost NEVER stop or yield -- did not yield and nearly hit me while I was trying to exit onto Campbell Avenue. These occurrences were odd in that they all happened within about 60 seconds, but not odd in that at least one of them happens EVERY time I use the circle. BTW, I am an excellent defensive driver who has avoided many accidents by my skills, enhanced no doubt by my experiences driving here; sadly, other drivers just do not care about laws or common courtesy. This is as much a transportation safety issue as DWI or distracted driving; sometimes they are combined to produce nearly disastrous results. You need more traffic police at the circle to start nabbing all of these lousy drivers. My guess is that things will get much better very quickly. Thank you. Allan
59	Lorraine Hartmann		HartmannL@state.gov		6/20/2018	E-mail	I personally don't think any major changes are necessary. The problem is volume and speed; volume will not change but perhaps speed can be controlled. My idea is to paint "YIELD" on the pavement on Quaker Lane going to I-395 N, before the merge with the circle. Also, better signage "Quaker Lane must yield to circle traffic" and rumble strips (like the ones on the side of highways when you drift off to the shoulder). Perhaps a flashing light. But NO traffic light at Gunston Rd, that would back up Quaker all the way to King St in the mornings and not keep the flow moving. On the Shirlington side, I have never had a problem – if you travel at 30 mph, all merges can be accomplished (maybe lower the speed to 25 mph?) I kind of liked the idea of extending the off ramp from I-395 south farther down into the circle to prevent line jumpers but I don't see too much of that happening. Thanks, Lori Hartmann

I-395 Shirlington Interchange Improvements Study Comments

Comment Number	Commenter						Email Comment
	Name	Address	Email Address	Phone Number	Date Received	Source	
60	James Pierce		james.pierce28@gmail.com		6/25/2018	E-mail	I wish to request that exit 7 south be expanded to two lanes. Thank you in advance. V/R James Pierce

I-395 Shirlington Interchange Improvements Study Comments
Public Information Meeting No. 2 June 12, 2019

Comment #	Commenter		Comment Sheet Questions		
	Date Received	Source	Do you support the Hybrid Alternative?	Please provide any additional information or suggestions that will assist VDOT in the completion of this study.	Additional Comments
1		Comment Sheet	Though I'm not thrilled at the prospect of having to stop at four traffic lights to access I-395 Northbound from Arlington Villages, it seems that the Hybrid plan is the best alternative of those reviewed.	I don't believe that Shirlington Circle can be considered until the death trap of the 7A (395 Northbound, Glebe exit) is addressed. Entering the highway with backed up traffic rom a red light at the ramp, merging traffic, and high speeds - all extremely dangerous.	
2		Comment Sheet	No. Recent improvement in sighs: Larger Yield signs (with flagging - even better) is better than over the top (expensive) solutions VDOT is proposing. I have lived here 50 years and do not want the 24/7 slower traffic lights will produce. The light/ stop sign on the west side is fine the way it is.	I was told at the meeting that my main concern, the merge on 395 is outside of this study. Try more cheaper solutions before more costly changes. Invest in better signage first, please.	
3		Comment Sheet	It appears to be safer with more traffic signals. The continuous circle is way too curvy and there are many accidents or close calls when merging lane is limited. I would suggest having two lanes to the right from the circle to southbound Quaker Lane. In the presentation the left lane only goes to Gunston Road but it may be more efficient to have both a right/left turn lane option as you approach the proposed Shirlington Circle/Quaker Lane intersection.	(See Comments from Question #1) Also, the off ramp from south bound I-395 to the current stop sign (near Campbell Ave) to Quaker Lane should have a curb or barrier to prevent cars to drive straight onto Shirlington or Campbell Ave. Make a signal _____ from South Shirlington Road to the rotary before Campbell Ave. (If it were to be considered the road alignment needs to be studied to avoid rear-end collisions.	
4		Comment Sheet	Sort of.	The proposed hybrid change at the intersection of South Shirlington to the circle does not adequately consider those people on the circle trying to get onto Campbell Ave. South Shirlington (2 lanes) merges with the circle (2 lanes) and will go to one lane? Who will give way?	
5		Comment Sheet	Yes. An improvement to existing conditions.		
6		Comment Sheet	Support Improving circle. Access from Gunston Road needs to double lane with RTOR ok from Right lane.	Straight thru movement should be allowed from right lane exit from 395 south to main road thru Shirlington (Campbell Ave). This would receive some pressure off Arlington Mill Rd. off ramp	Make 2 lane movement under 395 from W/B Glebe Road to S/B 395 one lane on right to eliminate no merge area for traffic accessing S/B 395 from E/B Glebe Rd on W/S of 395.
7		Comment Sheet	Yes. One of the few times a road improvement proposal appears very thoughtful and reasoned. People understand lights, they don't understand yields.	Timing of the lights will be critical and need to be monitored/adjusted after implementation.	
8		Comment Sheet	In theory yes, but the current setup works better for me speed wise.	I believe that some additional thought should be given to the merge from South Shirlington road to the circle as that is a spot that has a number of issues with people not yielding to oncoming traffic.	
9		Comment Sheet		In the meanwhile, can police regularly enforce the 'YIELD' on Quaker (entering the circle) and the 'STOP' on the 395Sou ramp entering the circle near Campbell??!! Traffic pattern coming from professional/medical building needs clarification.	
10		Comment Sheet	Your proposal does not address the most dangerous spot on the circle! [diagram] Traffic does not obey this yield sign!		
11		Comment Sheet	Yes this will ensure safety. In actual how will the ease of movement be impacted. Will it slow down?	1) Signal timings are to be planned to avoid backups 2) If full funding not there is there a plan B. Please discuss	
12		Comment Sheet		At tonight's meeting Olivia addressed a comment on the very bad Glebe Road SB ramp situation saying it is NOT a part of this stud and needs its own study. Please, Please initiate a study on this.	Regarding Glebe Road SB ramp; Ramp from SB Glebe Road (East Ramp) should have its own lane at existing merge with Ramp form NB Glebe Rd (West Ramp). Cars on East Ramp do not yield to merge and even if they tried, it is very hard to see (almost directly behind you) to safely merge.
13		Comment Sheet	Sure. It is _____ to avoid accident and regulate the increasing traffic.	When providing the signals, care should be taken to avoid ___ only back up of traffic in the park Fairfax area. Traffic turning from Campbell towards Quaker (towards 395) needs care. Maybe the signal can be coordinated.	
14		Comment Sheet	Yes and No. I don't understand exactly what the changes will look like.	Quaker Lane is so backed up during the weekday rush because of people waiting to get on 395 and for the people that live off Quaker and work near Shirlington they have to take Quaker and wait to get down the hill - a 1.5 mile commute can take 40 minutes as mine did this week - Off Quaker to Drew Model Elementary.	
16	6/24/2019	email	I do not agree that the two newly planned traffic signals will do anything to improve traffic flow and reduce accidents - they will only cause worse back-ups.	it could be done relatively easily and cheaply with rumple strips and better signage. While the traffic signal at the T-intersection will bring cars to a halt, the next traffic signal at Gunston is too close to be effective. Also, with all the electronic signage going up already at Gunston due to the HOT lanes, another electronic signal will just make worse an already bad situation. Cars will back up on Gunston and Martha Custis as people read the signs and determine whether to pay the HOT prices or take regular lanes onto 395.	Did your study coordinate with the HOT lanes project? Finally, if it will take 5+ years to get funding, a new study will be necessary to assess current conditions in five years The traffic flow may change dramatically with the HOT lanes opening.

I-395 Shirlington Interchange Improvements Study Comments
Public Information Meeting No. 2 June 12, 2019

Comment #	Commenter		Comment Sheet Questions		
	Date Received	Source	Do you support the Hybrid Alternative?	Please provide any additional information or suggestions that will assist VDOT in the completion of this study.	Additional Comments
17	6/23/2019	email	Overall, I do not support the Hybrid Alternative plan as proposed. However, there is an aspect of the plan I think is positive: Adding a lane to the Arlington Mill Rd exit is a great idea and I suspect would vastly reduce lane changes at the most dangerous part of the rotary. Disagree: 1. Effectively dismantling the rotary by adding additional signals will significantly increase waiting times for drivers at off-peak hours in the interchange, especially during the weekend and overnight hours. Under the proposed plan, traffic traveling from 395N to Gunston Rd will now have to wait through two traffic lights. During peak periods, I believe these lights will increase the probability and frequency the circle becomes locked with traffic, which currently only happens when there are serious delays on 395. 2. I would be willing to guarantee that traffic during peak periods will back up onto Martha Custis and Gunston waiting for the light. Recently the right lane of the ramp from Gunston to the Shirlington Rotary was closed - traffic now backs up in ParkFairfax during the morning rush hour period, particularly between 8a and 9a. My bus commute has increased by at least 10 minutes since this change due to the heavy traffic, and I suspect it would be the same or worse with a signal at Gunston. Also, during the morning rush hour, it is very likely people will attempt to run the four-way stop to make a green light, increasing the chance for accidents in an area where there are a lot of pedestrians crossing to catch busses. 3.The issue on the eastern side of the rotary has never been the entrance of traffic into the circle from 395 or the flow of traffic to and from Gunston. The issue has always been, and continues to be, the unmanaged flow of traffic into the circle from N. Quaker Lane. Drivers ignore or do not see the yield sign and do not yield to traffic in the circle.	1. Instead of realigning the western entrance ramp - move the stop sign for the ramp from SB 395 toward Quaker Lane further up the ramp, closer to where the merge actually occurs. This would force people to stop completely and wait until there is no oncoming traffic from the signal at Campbell Avenue. Currently, the stop sign is so far from the merge point people barely stop and wait for traffic to clear or for an appropriate merge opportunity. 2. Replace the yield signage at the end of N Quaker Ln with stronger signage, a flashing yield sign or maybe some form of digital/lighted signage to increase awareness for drivers to slow down and/or stop for traffic already in the circle. Paint yield markers on the asphalt at the yield point. Metering signals during peak periods would probably also help significantly for the traffic entering from N. Quaker Ln. At a community meeting earlier in the year I made this suggestion and was told metering signals were only used for highways. That doesn't seem like a valid reason not to use them at this intersection in this way. 3. Install radar speed sign(s) on N. Quaker Ln between the light at Preston and the merge point for the circle to encourage drivers to manage their speed and slow down to prevent traffic from joining the circle at too high a rate of speed. Install similar signage in the circle to slow the traffic in the circle down. Request an ACPD officer sit in the striped part of N. Quaker Lane to help slow traffic. 4. PLEASE do not action any of the construction aspects of this project prior to the opening of the HOT lanes on 395. I am sure traffic patterns will change after the ability to pay a toll and enter the HOV lanes becomes possible - particularly volume and traffic movements (lane changes) as traffic will likely divert from the regular lanes to the HOT lanes.	I drive this rotary at least once a day, every day and It is great at moving a lot of traffic quickly, which is very important in a congested area like this. I would hate to see that ruined by adding a bunch of traffic lights.The plan proposed seems to be the result of over-engineering. Retraining drivers with better signage may be all that is needed to solve the issue, and I would really like to see some more inexpensive solutions at least trialed before $9+ million is spent on heavy construction projects that are likely to reduce the efficiency of the rotary as it is now. This is a comment from a resident of the area who also made similar comments on the Facebook page of Delegate Mark Levine.
18	20-Jun-19	email	My only bias is that I hate to see very long-running construction, as it can be a traffic nightmare, and can often when finished turn out to be less than ideal, anyway. I also don't like to see money "wasted", ie money spent on less important tasks rather than more important ones. There is only a problem that demands immediate attention at this circle for incompetent (or new) drivers, of course, and for nearly all at extreme peak load times (probably about 730-830am and 400-6pm, workdays). I know this by driving there myself at many different times over the past more than 30 years. And the problems, while significant, are for the most part limited to the following: a) bad sight lines; b) dangerous speeds; c) dangerous merge-lanes; d) an ineffective stop sign at entry from 395south; and e) backups onto 395s exit/circle onramp, and/or into Shirlington Village.	First, the stop sign (entering circle from 395S exit) must go. But it can be cheaply replaced by a traffic light (without major road reconstruction), timed with the light for cars entering from Shirlington Village, and alternating with the existing traffic light nearby on the circle. (Excess speeds will not be a problem here on green, due to the sharp uphill) With a traffic light there, greens could be significantly extended between 3-6pm, greatly reducing the backup on the 395south access road. This must be accompanied by a large overhead sign, just after the new light, reminding people "CARS MERGING FROM RIGHT" even though they have the green (the merging cars being from entry from Shirlington (Campbell St) – who need their own large overhead sign, just beyond their traffic light, "CARS MERGING FROM LEFT") This requires little to no actual road construction. Second, the bad sight lines are in part due to terrible maintenance: ALL THE TREES INSIDE THE CIRCLE MUST BE CUT DOWN. This is a small onetime expense. Right now, coming around the circle on the southern side you can't see anything beyond 30-40' due to both the tight turning radius and these giant pointless trees. I believe there are trees or other objects also on the north side of the circle which also block the view around to the traffic light. There is also at times tall uncut grass at the entry from Quaker northbound. All this must be cut or taken down, and should have been removed long ago. Speeds are an issue on the long downhill side (the half of circle to southeast): this can be resolved by a large "CAUTION -- 30MPH" sign overhead and several small speedbumps/rumble strips (about a half inch high and perhaps 6" apart). This resolves the problem of high-speed merging accidents on the ParkFairfax side. Merge lanes can mostly be improved by trusting drivers to follow signs, just as they slow down when sufficiently reminded. Large OVERHEAD LIT signs at all merge points reminding circling drivers "CARS MERGING FROM RIGHT" and entering drivers "CARS MERGING FROM LEFT" will mostly (I'd guess 75-95%) resolve this, ie, reduce accidents and near-accidents.	I believe these several fairly easy improvements could be done in 1-2 years at a cost of well below $1million, possibly less than half that. While a drop in the bucket in $$, these changes would make a big difference to local drivers, and the changes would come much sooner than the hoped-for "big fix", and the state and the local communities would save many $millions that could be used for other arguably even more necessary traffic improvements in the region.
				The one problem that there is no cost-effective way to fully deal with is the unfortunately-designed approaching mini-block in the Village next to the (other) service station that only allows a handful of cars to wait at light before backing up into the intersection. This can be helped, a bit, by two things: one) a sign ABOVE on entryway just after intersection(Campbell/Quincy) saying "RIGHT ON RED FROM RIGHT LANE ONLY (no turns 7-9am, 3-6pm)" – this will encourage cars to move to the right, if possible, where they can enter at next green or turn right-on-red (but not on red (red right arrow) btw 7-9am and 3-6pm); and, two) shorter greens at busy hours on both Campbell and Quincy – which will please the many street-crossers...	
19	6/20/2019	email		One comment - the traffic on southbound S Shirlington Avenue, as it joins the rotary, has a yield sign that if very often ignored. I am always nervous when I come up to that merge because traffic just ignores the yield sign. Don't know how to make this safer and looks like it was not addressed in the plans.	

I-395 Shirlington Interchange Improvements Study Comments
Public Information Meeting No. 2 June 12, 2019

Comment #	Commenter		Comment Sheet Questions		
	Date Received	Source	Do you support the Hybrid Alternative?	Please provide any additional information or suggestions that will assist VDOT in the completion of this study.	Additional Comments
20	6/20/2019	email	Yes, I think your plan will make traveling through this interchange much safer for drivers. I support the proposed lane modifications and new/modified traffic signals. On the other hand, I do not believe that the proposed changes make travel in this area safer or easier for pedestrians and cyclists I am especially concerned about ped/bike crossing at Arlington Mill Road/Shirlinton Road and Quaker/Gunston. I do not see anything in your proposal that would make these crossing safer for us.	a) Please make the Alexandria side of the bike-ped bridge more safe. Minimally we need a safe crosswalk across Gunston so we can continue up Quaker – with warning signs/warning lights. Does your planned traffic signal include a pedestrian signal and will the intersection have a crosswalk? Currently we have to walk back a block to Martha Custis, cross Gunston carefully (cars don't always stop), then walk back down Gunston to Quaker. Alternatively, people dash across Gunston, but this is very dangerous. We also need wayfinding signage/map at the base of the bike-ped bridge, as it's not clear where the bike trail goes. b) Currently, cyclists and pedestrians have no safe way to cross Shirlington Road at the Four Mile Run Trail. Although we have a flashing beacon light, it is widely ignored by most drivers (including the driver who almost hit me when I was walking to your meeting on Monday). Ideally, your study area would include Shirlington Road north of Adams Mill at least to Four Mile Run Trail. Minimally, can you work with the County on the Shirlington Bridge project (E-89 in draft CIP) to provide a safe crossing for cyclists and pedestrians? Your project study area appears to include the intersection of Shirlington and Adams Mills (north side) – the space for pedestrians and cyclists waiting to cross Shirlington at this light needs to be much larger – and we really need an adequate sidewalk (ADA-compatible) on the East side of Shirlington Bridge so we can walk and ride from the Trail to Adams Mill, cross Shirlington in a crosswalk with traffic light, and continue on the trail, which is then parallel to Adams Mill. Four Mile Run Trail has heavy use by both cyclists and pedestrians, and the current crossing over Shirlington Road is a	
21	6/18/2019	email	Yes, I support the Hybrid Alternative. If the full plan cannot be realized, I support completing the phases in the priority order in which they were presented in the meeting on the "evaluation matrix" slide. As a resident of Parkfairfax, I drive at least some parts of the Shirlington Circle every day. Every day I wonder whether other drivers will yield to me like they should, or whether I will have to yield to them or go around the circle another time in order to exit safely. I believe the four improvements proposed in the study will make the interchange safer, which is my top concern. It seems like they will also help, or at least be neutral, in terms of operational impact.	At the meeting, there were two things related to Gunston Road that came up that I wanted to comment on: The first is whether there would be two lanes or one lane on Gunston entering the circle. There are currently two lanes, but one of the models/simulations showed only one lane. The VDOT officials said this may have been an oversight in the model/simulation. I strongly support still having two lanes as we have now (or at least, when there isn't a work zone blocking one of them). This allows drivers in the far right lane to enter directly onto the I-395 north ramp and allows drivers in the other lane to enter the circle to go to the HOV lane, Shirlington, or I-395 south. (please also see my other suggestion about this below) The second is whether drivers exiting I-395 northbound and entering the circle at the new signal at Gunston would be able to cross directly onto Gunston, or whether they would be required to turn left onto the circle. I strongly support requiring them to turn left onto the circle, which is what the current model recommends. I would not want drivers to be able to exit the highway and cross directly into the neighborhood. Drivers who want to get into the neighborhood would still have the same options they have now, which are to use the "Quaker Lane" exit and then turn left onto Preston, or to enter the circle and go around until they are able to exit at Gunston.	(Similarly, the model shows that drivers exiting I-395 south at the Campbell Ave intersection would also be required to enter the circle and would not be able to cross directly into Shirlington, and I also support that model. Drivers have the option to take the Arlington Mill exit from I-395 if they want to go into Shirlington.)
22	6/17/2019	email	While no one likes to sit at a red traffic light, I think that the signalizing proposed in the hybrid solution is overall a good idea. It will slow some avenues down but speed others up bringing movement to a more manageable middle.	Please keep the the Gunston Road signal as it appears on the current designs without direct access from I-395 northbound to Gunston Rd. If the proposed signal at Gunston Rd allowed traffic to go straight into ParkFairfax via Gunston Rd, the cut-through traffic would likely increase dramatically. There are two alternative routes that provide the residents access to the ParkFairfax community either by exiting onto N. Quaker Lane southbound or circling the rotary and exiting at N. Quaker Lane northbound. The streets in the ParkFairfax neighborhood are lined with parked cars, cars parking and exiting parking spaces, and lots of pedestrians crossing at any point along the roads, not mention the children living in the community and those attending the elementary school along Martha Custis Dr. As a historic district on the National Register of Historic Places along with the density of housing, there is little to nothing that can be done within the community to increase the capacity of the roads. They will never be suitable for a high volume of traffic. It's better for residents to make an extra turn or two to try to discourage people using it as a cut-through. Also, please don't forget to keep two lanes entering from Gunston Rd as it is now. It sounded like from the meeting that showing it as one lane was merely an oversight on the graphic. I like the proposed traffic light from the I-395 southbound/Glebe Rd ramp entering the rotary at Campbell Ave. Right now that is a complicated merge with a stop sign next to a traffic light. I think this will really help the rush hour backup that current occurs	
23	6/15/2019	email		1. In illustration 2, southbound exit ramp to Campbell Ave indicates two mandatory left turn lanes, rather than straight through to Campbell. This would seem to force traffic once around the circle before getting onto Campbell directly. 2. In illustration 3, the northbound exit is even more perplexing. There again is no way to go directly onto Gunston without going once around the circle. In addition, this is not controlled by a light, which I would think would back up the exit.	

I-395 Shirlington Interchange Improvements Study Comments
Public Information Meeting No. 2 June 12, 2019

Comment #	Commenter		Comment Sheet Questions		
	Date Received	Source	Do you support the Hybrid Alternative?	Please provide any additional information or suggestions that will assist VDOT in the completion of this study.	Additional Comments
24	6/14/2019	email	I am in favor of having some type of light that only allows flow of traffic if there are no vehicles in the circle. This might also deter people from cutting all the way down Quaker from Duke to get to 395.	People have total disregard for many traffic signs so I don't even think flashing yellow lights would help. Large speed bumps on Quaker.....maybe. There definitely needs to be some safety changes to that area and this is the time to make those changes.	
25	6/13/2019	email	I am worried that signalizing the entrance to the rotary from Guston Rd will result in long delays and backups into the neighborhood, especially if the rotary entrance continues to be limited to one lane (as it seems to have been during the past 2 weeks)... there is only very limited ability for traffic to queue for the signal after the 4 way stop at Martha Custis and Gunston. Traffic will back up on Gunston and Martha Curtis and there will be accidents at the intersection there as folks rush to cross and make the green light into to rotary.	A suggested modification: The majority of traffic heads out Gunston onto 395 NB. People who knew how to use the current/just prior traffic pattern there knew that the right lane fed right directly into to the 395N ramp and was a separate lane from the traffic on the rotary (so did not need to be as cautious waiting for gaps in traffic on the rotary). Could your model not enable this further by allowing a right lane on Gunston to turn freely into a dedicated 395N only ramp lane (with clearer separation so rotary traffic never crosses into the ramp turn lane by accident)? The majority of traffic then passes quickly, avoiding backups, and the signal for the left lane helps the more difficult task of crossing 2 lanes of the rotary to go across to Shirlington or 395 SB. I really worry that you will create massive unintended backups onto Gunston and Martha Custis if you force 395NB traffic to wait at the light.	

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