ENGINEERING & PLANNING RESOURCES, P.C.
637 BERKMAR CIRCLE, CHARLOTTESVILLE, VA 22901

Memorandum

To: Tom Martin,

From: Bill Wuensch

CC: Barry Carpenter, Bob White

Date: 4/12/2012

Re: Campbell Avenue Cursory Lane Reduction Analysis

EPR is conducting a study for Campbell Avenue that is focused primarily on corridor safety and access management. This effort is being conducted in coordination with a larger sub-area master planning effort for the Campbell Avenue and Odd Fellows Road corridor areas. Through the study process, the idea of investigating the feasibility of a "road diet" concept for Campbell Avenue has emerged. This concept would involve reducing the existing four lane typical section to two through lanes and turn lanes at key intersections and locations along the corridor. The concept could also provide space for bike lanes, medians, and curb extensions at certain locations. The "road diet" concept is instrumental for creating a complete street environment while also providing turn lanes along the corridor, which in itself is an access management measure.

The purpose of this memorandum is to document the high-level feasibility analysis conducted by EPR for evaluating this concept.

Analysis methodology

The evaluation process is centered around analysis at three key intersections along the corridor. It is assumed that if the key intersections, including Kemper/Old Campbell/Campbell, Mayflower/Campbell, and Florida/Campbell can function satisfactorily with one through lane in each direction and associated turn lanes, then the larger corridor can function with a reduction in the through lanes. The analysis does not go into any level of detail about other intersections, or where median breaks would be located along the corridor. As such, this analysis should be considered a high level fatal flaw analysis. Prior to implementation of a lane reduction plan, additional analyses should be conducted and concept developed and vetted with the public and stakeholders.

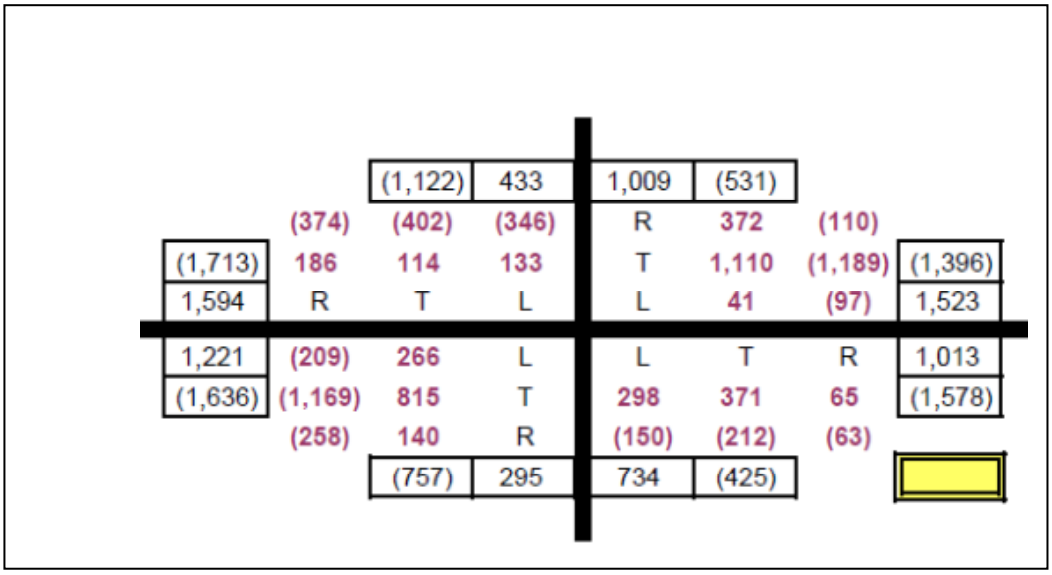
EPR collected AM and PM peak hour turning movement counts at the three key intersections as previously described. An analysis was conducted to evaluate intersection operations under existing conditions, with existing laneage. The existing conditions were then compared to a scenario using current volumes that were grown to a horizon year

(2035) with a reduction in through lanes. Iterations of the analysis were conducted to identify the most advantageous configuration of turn lanes and overall operations. The results for the existing conditions, and then future volumes with reduced laneage are summarized in Table 1 (attached to this memo).

A future horizon year analysis considered projections of traffic into year 2035. For this analysis it is assumed that the Odd Fellows Road interchange would be constructed. To develop the year 2035 traffic projections, consideration was given to the traffic forecast memoranda as developed by RKK for the Odd Fellows Road interchange project. In the memoranda, RKK examined existing conditions, and build versus no-build traffic volumes at the Route 460 ramps onto Campbell Avenue. Per their projections, the construction of the new interchange to the west is expected to remove approximately 20% of the future morning traffic volumes from Campbell Avenue and 15% of the evening future traffic volumes.

To develop a factor for growth between today's volumes and the 2035 volumes along Campbell Avenue, a comparison was made between the existing peak hour volumes just north of the Route 460 interchange and the projected [interchange] build condition year 2035 peak hour volumes. The following figures show the data sets used for comparison.

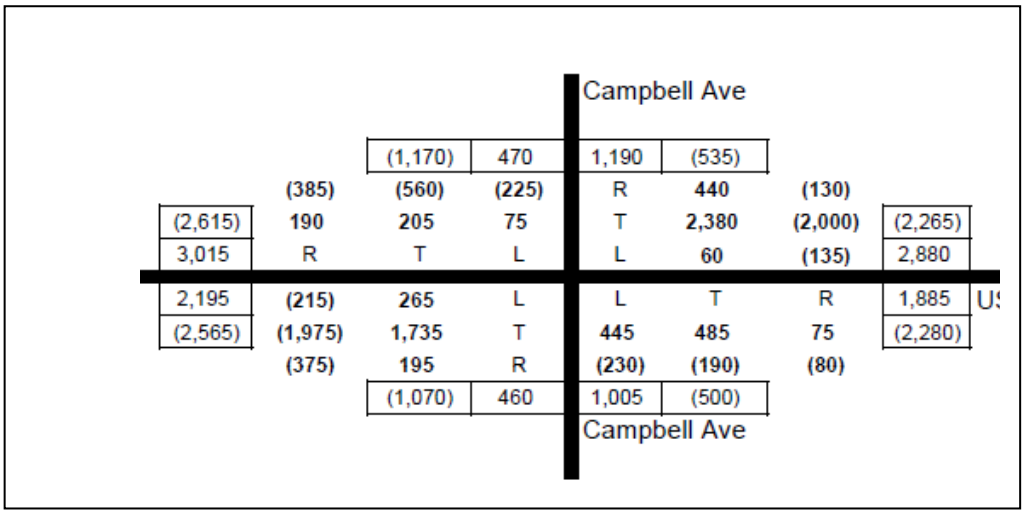
Existing Volumes (Campbell Avenue is the vertical line and Rt 460 is the horizontal line)



Key - AM(PM)

Traffic volumes north of Route 460 are the sum of the southbound traffic, plus the northbound through volume, plus the westbound right turn volume, plus the eastbound left turn volumes. Performing this calculation we see that currently there are 1623 vehicles in the AM and 1653 vehicles per hour (vph) in the PM peak periods north of Route 460

Future [w/Odd Fellow Road interchange] year 2035 Volumes



Under this scenario we see that there are 1660 vph and 1705 vph north of Route 460 along Campbell Avenue in year 2035.

By comparison:
AM 2012 - 1623 vph grows to 1660 vph in year 2035, thus a total growth of about 2% growth
PM 2012 - 1653 vph grows to 1705 vph in year 2035, thus a total growth of about 3% growth.

The growth factors were applied to the existing volumes and various intersection configurations were analyzed under the lane reduction scenario. Through the iterations, it was found that the Kemper/Old Campbell/Campbell intersection will experience excessive delay for the eastbound approach. However, if the intersection is configured such that the eastbound right turn is free flow into a dedicated receiving lane and if signalization is added, all movements function without excessive delay.

Table 1, attached to this document, provides a summary of the various performance measures for the existing and future conditions. Hand sketches of intersection modifications are also provided at the end of the document (before the appendices) showing the assumed geometry for the intersections. Assumptions shown in the sketches include:

Campbell/Kemper – the eastbound right turn lane volume is nearly as high as the southbound volume in the peak hours. Therefore it is assumed that the right turn form "old" Campbell would be free flowing into a dedicated receiving lane. This lane would merge into the through lane downstream. A traffic signal will be required to minimize queuing, and would be useful for allowing pedestrians a signalized crossing. Furthermore, the northbound Campbell Avenue approach would be free flowing towards the expressway and would not be controlled by the traffic signal.

Mayflower/Campbell – southbound left and right turn lanes would be provided.

Florida/Campbell – in the southbound direction the existing two lanes would remain. However, in the northbound direction one of the through lanes would be eliminated south of the signalized intersection. The existing outside through lane just north of the signal could become a right turn lane into the adjacent commercial uses.

Findings and Conclusions

Based on this cursory review, it appears that a lane reduction on Campbell Avenue may be feasible. The major intersections will experience added congestion though no excessive queuing or failing levels of service on the mainline would be anticipated. The lane reduction scenario would allow for construction of turn lanes, medians, and potentially bike lanes along the corridor. Careful consideration will need to be given relative to where turns from Campbell Avenue would be allowed. The adjacent grid system(s) will allow for concentration of left turn movements at certain chosen locations. However, this will also result in additional traffic loading on the sidestreets that have full access onto Campbell Avenue. If a three lane typical section (i.e. two way center left turn lane) is chosen as a preferred option, then access to the side street would be less restrictive.

Prior to moving into the design and implementation phase for a lane reduction project, a formal traffic study should be performed to examine each of the major intersections along the impacted area, identify alternative configurations, examine impacts to adjacent neighborhood circulation and business access, and vet the concepts with the public and stakeholders.

END of MEMORANDUM

Attachments: Table 1 – analysis results
Intersection sketches
Appendix – Synchro / SimTraffic Reports

TABLE 1A
LOS and Delay Summary (Synchro and SimTraffic Results)
Existing and Future Year 2035 Volumes AM and PM

		Existing AM					Existing PM					Future w/Lane Reduction AM					Future w/ Lane Reduction PM					Future w/ Lane Reduction w/signal at Old Campbell PM				
Intersection	**Movement**	Synchro Delay	LOS	Synchro Queue	SimTraffic Delay	SimTraffic Queue	Synchro Delay	LOS	Synchro Queue	SimTraffic Delay	SimTraffic Queue	Synchro Delay	LOS	Synchro Queue	SimTraffic Delay	SimTraffic Queue	Synchro Delay	LOS	Synchro Queue	SimTraffic Delay	SimTraffic Queue	Synchro Delay	LOS	Synchro Queue	SimTraffic Delay	SimTraffic Queue
		(sec/veh		(sec/veh	(s)	(ft)	(sec/veh		(sec/veh)	(s)	(f)	(sec/veh)		(sec/veh)	(s)	(ft)	(sec/veh)		(sec/veh)	(s)	(f)	(sec/veh)		(sec/veh)	(s)	(f)
Campbell/Kemper																										
Old Campbell EB	Left	129.7	F	29.0	21.90	38.0	61.9	F	424	26.8	69	15.7	B	24	23.2	38	221.4	F	908	144.7	258	27.9	C	34	31.2	62
Old Campbell EB	Right	10.8	B	26.0	6.40		4.9	A	32	9.8	57	9.4	A	44	6.1	0	221.4	F	908	11.3	70	0.9	A	0	9.9	0
Campbell NB	Left	10.2	B	58.0	6.80	116.0				7.1	113				9.6	111	10	B	35	35.7	124	7.8	A	77	24.1	124
Campbell NB	Through				2.20	102.0				1.5	15				6.2	91				1.6	364	N/A			1.5	234
Kemper SB	Through				0.90	14.0				1.3	10				3	44				7.8	176	15.9	B	276	21.8	**401**
Intersection					4.10					5.4					6.7							8.4	A			
Mayflower																										
Mayflower EB	Left/Through	27.0	C	23.0	19.70	61.0	16.4	B	19	20.3	38	27.1	C	21	18.1	10	56.2	E	51	66	98					
Mayflower EB	Right	25.6	C	19.0	3.00	64.0	19.6	B	62	7.1	101	26	C	19	3	52	55.4	E	57	22.4	160					
Entrance WB	LTR	23.6	C	2.0	10.70	15.0	14.4	B	3	12	30	24.1	C	4	0	60	52.2	D	32	64.6	52					
Campbell NB	Left				7.60					16.9		3	A	29	7.4	68	20.1	D	16	21.2	71					
Campbell NB	Through	4.7	A	138.0	4.30	162.0	6.6	A	96	5.6	131	6.9	A	282	4.1	222	4.9	A	246	4.3	228					
Campbell NB	Right				2.50					2.2					3.6											
Campbell SB	Left				1.80					4.5							6.5	A	2	14.5	12					
Campbell SB	Through	2.8	A	39.0	1.80	59.0	8	A	170	5	138	3.2	A	75	2.1	82	14.6	B	722	6.5	447					
Campbell SB	Right				1.20					3.7		2.3	A	5	8	10	3.9	A	8	2.7	73					
Intersection		5.1	A		3.90		8.9	A		5.9		6.5	A		1.1		16.8	B		3.8						
Florida																										
Florida EB	Left	15.8	B	33.0	18.80	79.0	15.3	B	32	18.7	60	29.1	C	51	27.9	76	16	B	33	19.7	57					
Florida EB	Through/Rig	16.7	B	23.0	10.60	70.0	14.5	B	32	12.6	63	27.3	C	35	204	67	15	B	34	14	72					
Florida WB	Left/Through	17.4	B	51.0	15.50	86.0	27.7	C	201	19.8	189	31.3	C	81	25.2	107	25.3	C	218	21.6	222					
Florida WB	Right	15.5	B	21.0	12.40	68.0	14.4	B	28	18.5	51	26.8	C	30	23.2	76	12.4	B	25	20.2	68					
Campbell NB	Left	11.1	B	16.0	12.70	97.0	13.7	B	23	13.5	67	7.5	A	13	12.8	122	22.5	C	23	16.3	103					
Campbell NB	Through	25.8	C	310.0	15.30	235.0	17.3	B	96	13.8	130	36	D	718	14.6	**425**	26.1	C	200	15.8	242					
Campbell NB	Right	13.1	B	36.0	2.10	64.0	15.3	B	27	2	63	9.5	A	26	1.4	52	14.8	B	27	4.8	86					
Campbell SB	Left	11.6	B	20.0	14.40	73.0	11.4	B	39	14.8	119	16.8	B	16	19.6	79	18	C	38	23.5	127					
Campbell SB	Through/Rig	13.1	B	84.0	11.00	122.0	24.9	C	232	12.9	227	9.7	A	66	7.3	109	20.3	C	178	9.8	182					
Intersection		20.4	C		6.20		21.1	C		13.1		26.5	C				21.1	C		6.6						

Campbell Ave
Edmunds St

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Campbell Ave
Florida Ave