

October 3, 2013

Mr. Jeff Fleming
Kingsport Development Services
201 W Market St
Kingsport, TN 37660

Re: Final Summary of Findings, Center Street Road Diet

Dear Jeff,

I am writing to present the results of our full analysis for the proposed Center Street Road Diet. The purpose of this letter is to present the findings of the analysis of the study area for the City's use in making a determination as to whether to implement the Center Street Road Diet.

As a result of the preliminary findings of the road diet analysis (summarized in a memo dated August 29) and after discussions with City staff, it was decided that the road diet should only be applied to intersections east of Clinchfield Street and west of Sullivan Street. Thus, the cross streets studied in this analysis were Revere Street, Clay Street, Shelby Street, Broad Street, Commerce Street, and Cherokee Street.

You are already familiar with the benefits of the road diet proposal. In addition to the livability improvements for downtown businesses, patrons, workers, and visitors, you are aware of the mobility enhancements such as the provision of bicycle lanes, additional parking/loading/bus stop areas, and statistically fewer traffic crashes that typically accompany road diets such as this one. Our task, however, is not to itemize these benefits, but to objectively describe the traffic impacts of reallocating a portion of the through roadway capacity for other uses.

City staff collected turning movement data at these two intersections for the AM peak (7:15 – 8:15), the midday peak (12:00 – 1:00), and the PM peak (3:00 – 4:00) hours. The traffic volume data were adjusted to consolidate all volumes to a single hour for each peak period and thus develop a conservative analysis traffic volume. Staff also supplied signal timing data for these intersections.

RPM developed three SimTraffic existing conditions microsimulation models for the study corridor, one for each AM, midday, and PM peak hour. A second set of models was then created to represent the proposed (road diet) cross-section conditions. The primary change made for the proposed condition was the removal of one through lane in the eastbound and westbound Center Street approaches and the addition of a dedicated left turn lane on these same approaches.

In addition to the modified lane configuration, the proposed condition models also include recommended signal timing changes. The Center Street corridor in downtown Kingsport is characterized by traffic signals which operate as fixed-timed such that all signals turn green and red in unison. This is not the most efficient signal operation possible, but it works well and meets other objectives for downtown traffic and pedestrian activity.

The recommended signal operation in the proposed conditions model maintains this fixed-time unison phasing. The current cycle length was maintained in the analysis, but split optimizations were applied uniformly to provide more green time for traffic along Center Street. Based on the turning traffic volume and signal efficiency considerations, the recommended signal phasing does not include the addition of a protected left turn phase (green arrow). This means that the only signal equipment hardware modification that would be required is a slight shift in the placement of the existing signal heads.

Our analysis of the Center Street corridor has found that a road diet resulting in one lane in each direction along with a left turn lane at signalized intersections can be implemented with little change in traffic operations. The road diet should be limited to the segment of Center Street from east of the Clinchfield Street intersection to west of the Sullivan Street intersection. A comparison of the operational characteristics of the existing and proposed conditions are attached as Tables 1-5. Some generalized findings from these tables are as follow:

- Most travelers along Center Street through downtown will not experience a noticeable change in travel time. Depending on travel direction and time of day, the change in travel time from Clinchfield Street to Sullivan Street with the road diet will range from 17 seconds (11%) faster to 9 seconds (6%) slower.
- Except for Shelby Street, all intersections in the corridor are currently well below capacity (current max volume-to-capacity ratios of 0.34-0.57). Reconfiguring traffic lanes will result in a more efficient use of lanes and in no case will an intersection's capacity be exceeded (proposed max volume-to-capacity ratios of 0.49-0.80).
- The Shelby Street intersection has the highest delay and capacity usage in the corridor. Because of the signal timing changes as part of the road diet, delay and volume/capacity ratios will be decreased in two of the three peak periods at Shelby Street.
- The heaviest travel time is the PM peak (3:00-4:00). During this time, average delay (including drivers along Center Street and waiting to turn on to Center Street) will increase by 11%. This is an average of 2 seconds per intersection.
- Although cars won't be stopped quite as often along Center Street, queues when they are stopped will be a little longer. Worst-case estimates during the

heaviest periods of the day indicate average queue lengths growing by approximately 60 feet. That means roughly three additional cars in line at a red signal. The analysis also shows that the projected queues will not extend to the adjacent intersections.

Please feel free to contact me should you have any questions regarding this analysis or its findings.

Sincerely,

RPM Transportation Consultants, LLC

A handwritten signature in black ink, appearing to read "J. Hammond", written over a faint circular stamp.

Jeff Hammond, P.E.

Attachments

Copy: Tim Elsea, P.E. (with attachment)

Table 1. Comparison of Total Intersection Operations of Existing and Proposed Conditions

AM Peak (7:15-8:15)						
Intersection	LOS		Delay		Max V/C Ratio	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
Center Street and Revere Street	A	A	9.4	9.6	0.52	0.57
Center Street and Clay Street	B	C	12.7	29.8	0.42	0.58
Center Street and Shelby Street	C	D	26.9	52.6	0.79	0.77
Center Street and Broad Street	B	B	18.0	14.0	0.39	0.55
Center Street and Commerce Street	A	A	3.3	5.8	0.38	0.51
Center Street and Cherokee Street	A	A	6.5	8.2	0.42	0.67
Midday Peak (12:00-1:00)						
Intersection	LOS		Delay		Max V/C Ratio	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
Center Street and Revere Street	B	B	8.8	10.6	0.44	0.61
Center Street and Clay Street	B	A	11.1	9.7	0.34	0.49
Center Street and Shelby Street	C	C	34.9	25.2	0.97	0.62
Center Street and Broad Street	B	B	11.3	11.9	0.39	0.58
Center Street and Commerce Street	A	A	7.9	7.5	0.42	0.57
Center Street and Cherokee Street	A	B	9.0	10.9	0.40	0.54
PM Peak (3:00-4:00)						
Intersection	LOS		Delay		Max V/C Ratio	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
Center Street and Revere Street	A	B	8.1	10.0	0.57	0.80
Center Street and Clay Street	B	B	12.0	13.0	0.46	0.66
Center Street and Shelby Street	E	D	57.0	47.4	0.98	0.86
Center Street and Broad Street	A	C	9.6	28.7	0.51	0.73
Center Street and Commerce Street	A	A	7.3	7.4	0.52	0.71
Center Street and Cherokee Street	B	B	11.3	11.3	0.50	0.68

Table 2. Comparison of Travel Time of Existing and Proposed Conditions

Approach	Travel Time					
	AM Peak (7:15-8:15)		Mid Peak (12:00-1:00)		PM Peak (3:00-4:00)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
Eastbound (From Clinchfield St to Sullivan St)	02:30	02:18	02:25	02:24	02:24	02:10
Westbound (From Sullivan St to Clinchfield St)	02:31	02:14	02:30	02:24	02:21	02:30

Table 3. Comparison of Queue Length of Existing and Proposed Conditions (AM Peak Hour)

AM Peak (7:15-8:15)					
Intersection	Lane Group	Average Queue (ft)		95th % Queue (ft)	
		Existing	Proposed	Existing	Proposed
Center Street and Clinchfield Street	Eastbound Left	NA	NA	NA	NA
	Eastbound Through, Right	NA	NA	NA	NA
	Westbound Left	0	1	4	4
	Westbound Through, Right	46	22	107	62
Center Street and Revere Street	Eastbound Left	94	26	163	69
	Eastbound Through, Right	80	79	158	175
	Westbound Left	20	2	48	14
	Westbound Through, Right	22	82	48	127
Center Street and Clay Street	Eastbound Left	42	10	78	39
	Eastbound Through, Right	40	57	85	124
	Westbound Left	99	14	153	50
	Westbound Through, Right	111	124	164	227
Center Street and Shelby Street	Eastbound Left	120	5	191	26
	Eastbound Through, Right	137	108	206	283
	Westbound Left	79	28	133	69
	Westbound Through, Right	82	117	135	213
Center Street and Broad Street	Eastbound Left	NA	NA	NA	NA
	Eastbound Through, Right	148	177	219	281
	Westbound Left	NA	NA	NA	NA
	Westbound Through, Right	17	35	48	79
Center Street and Commerce Street	Eastbound Left	18	2	42	15
	Eastbound Through, Right	24	69	48	108
	Westbound Left	34	6	68	29
	Westbound Through, Right	25	44	62	97
Center Street and Cherokee Street	Eastbound Left	19	5	51	23
	Eastbound Through, Right	6	31	29	67
	Westbound Left	62	9	115	39
	Westbound Through, Right	60	80	121	164
Center Street and Sullivan Street	Eastbound Left	40	32	106	29
	Eastbound Through, Right	52	84	129	84
	Westbound Left	NA	NA	NA	NA
	Westbound Through, Right	NA	NA	NA	NA

Table 4. Comparison of Queue Length of Existing and Proposed Conditions (Midday Peak Hour)

Midday Peak (12:00-1:00)					
Intersection	Lane Group	Average Queue (ft)		95th % Queue (ft)	
		Existing	Proposed	Existing	Proposed
Center Street and Clinchfield Street	Eastbound Left	NA	NA	NA	NA
	Eastbound Through, Right	NA	NA	NA	NA
	Westbound Left	3	6	13	35
	Westbound Through, Right	69	54	142	107
Center Street and Revere Street	Eastbound Left	64	27	119	63
	Eastbound Through, Right	54	55	108	125
	Westbound Left	62	6	110	31
	Westbound Through, Right	83	105	126	159
Center Street and Clay Street	Eastbound Left	36	7	72	28
	Eastbound Through, Right	37	62	77	123
	Westbound Left	72	10	138	56
	Westbound Through, Right	87	129	156	230
Center Street and Shelby Street	Eastbound Left	90	16	150	51
	Eastbound Through, Right	108	165	166	262
	Westbound Left	96	35	154	78
	Westbound Through, Right	101	143	167	237
Center Street and Broad Street	Eastbound Left	NA	NA	NA	NA
	Eastbound Through, Right	71	127	129	231
	Westbound Left	NA	NA	NA	NA
	Westbound Through, Right	29	48	70	99
Center Street and Commerce Street	Eastbound Left	54	7	94	30
	Eastbound Through, Right	71	79	114	123
	Westbound Left	41	10	78	40
	Westbound Through, Right	43	67	85	128
Center Street and Cherokee Street	Eastbound Left	32	10	63	38
	Eastbound Through, Right	38	66	65	106
	Westbound Left	61	11	112	42
	Westbound Through, Right	66	122	122	212
Center Street and Sullivan Street	Eastbound Left	51	2	108	10
	Eastbound Through, Right	68	49	130	73
	Westbound Left	NA	NA	NA	NA
	Westbound Through, Right	NA	NA	NA	NA

Table 5. Comparison of Queue Length of Existing and Proposed Conditions (PM Peak Hour)

PM Peak (3:00-4:00)					
Intersection	Lane Group	Average Queue (ft)		95th % Queue (ft)	
		Existing	Proposed	Existing	Proposed
Center Street and Clinchfield Street	Eastbound Left	NA	NA	NA	NA
	Eastbound Through, Right	NA	NA	NA	NA
	Westbound Left	1	1	16	16
	Westbound Through, Right	108	97	180	158
Center Street and Revere Street	Eastbound Left	63	16	117	44
	Eastbound Through, Right	54	31	110	94
	Westbound Left	78	2	122	17
	Westbound Through, Right	98	126	143	188
Center Street and Clay Street	Eastbound Left	32	6	67	31
	Eastbound Through, Right	38	68	81	127
	Westbound Left	85	18	159	55
	Westbound Through, Right	103	192	178	306
Center Street and Shelby Street	Eastbound Left	109	10	169	40
	Eastbound Through, Right	126	177	186	286
	Westbound Left	115	21	187	61
	Westbound Through, Right	132	206	201	343
Center Street and Broad Street	Eastbound Left	NA	NA	NA	NA
	Eastbound Through, Right	60	82	112	178
	Westbound Left	NA	NA	NA	NA
	Westbound Through, Right	38	91	85	187
Center Street and Commerce Street	Eastbound Left	51	9	100	31
	Eastbound Through, Right	70	77	116	138
	Westbound Left	35	3	74	21
	Westbound Through, Right	44	77	91	146
Center Street and Cherokee Street	Eastbound Left	65	7	108	30
	Eastbound Through, Right	77	84	118	135
	Westbound Left	76	5	152	25
	Westbound Through, Right	77	129	164	261
Center Street and Sullivan Street	Eastbound Left	78	2	164	14
	Eastbound Through, Right	99	84	188	153
	Westbound Left	NA	NA	NA	NA
	Westbound Through, Right	NA	NA	NA	NA