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DATE: November 20, 2015

TO: Board of Mayor and Aldermen

FROM: Eric Stuckey, City Administrator
David Parker, City Engineer/CIP Executive
Paul Holzen, P.E., Director of Engineering
Carl Baughman, P. E., Traffic/Transportation Engineer

SUBJECT:
Consideration of Ordinance 2015-63, "An ordinance to revise the no right turn on red regulation on Mack Hatcher Memorial Parkway at the northbound approach to Liberty Pike"(Discussed at 10/29/15 CIC AND 12/08/15 WS; 01/12/16 BOMA 7-0). SECOND AND FINAL READING

Purpose
The purpose of this memorandum is to provide a recommendation to the Board of Mayor and Aldermen (BOMA) to modify NO TURN ON RED signing for the northbound Mack Hatcher Parkway right turn movement onto Liberty Pike eastbound.

Background
The 2014 widening of Mack Hatcher Parkway kept the dedicated northbound right turn lane, but without the pre-existing NO TURN ON RED sign that had been installed in 2008 as an aid for Jordan Road egress at Liberty Pike. The Royal Oaks neighborhood noted its absence and brought the matter to the attention of the Engineering Department, who obtained TDOT permission to re-install the sign. The sign placement on the new mast arm at the widened intersection has apparently rendered the sign less visible, even though it is properly placed adjacent to the new right turn signal head. The Royal Oaks neighborhood testifies that there seem to be more violations of the sign, and some drivers testify a lack of awareness of the sign. The CIC has floated various concepts for improved regulation here, which are described below in the data and options sections of this memo. In the meantime, the Engineering Department has collected traffic counts that reflect school activity, and has performed crash investigations here since the May 2014 opening of the widened Mack Hatcher Parkway. Engineering also located research investigations on the effect of various NO TURN ON RED treatments on the violation rate that will assist in developing its recommendation.

Data
Engineering-TOC Division collected traffic counts at both the Mack Hatcher and Jordan Road intersections on Liberty Pike on August 18-20, 2015, one week after the beginning of school. These counts enable an analysis of the volume conflicts by time of day due to the right turn movement. The table below gives the cross

product of the right turning volumes with the northbound Jordan Road volumes for the fifteen highest hours of the typical school day. (The cross-product rather than the sum gives the relative magnitude of the conflicting volumes by time of day.)

MACK HATCHER RIGHT TURNING VOLUME CONFLICTS			
Time of Day by Hour	Intersection conflicting volumes		
	NBR from MHP	NB from Jordan	Cross-Product
0500-0600	15	14	0.2×10^3
0600-0700	104	49	5.1×10^3
0700-0800	106	70	7.4×10^3
0800-0900	100	55	5.5×10^3
0900-1000	65	53	3.4×10^3
1000-1100	64	53	3.4×10^3
1100-1200	91	48	4.4×10^3
1200-1300	75	57	4.3×10^3
1300-1400	91	39	3.6×10^3
1400-1500	86	53	4.6×10^3
1500-1600	113	61	6.9×10^3
1600-1700	101	83	8.4×10^3
1700-1800	100	69	6.9×10^3
1800-1900	78	34	2.7×10^3
1900-2000	47	29	1.4×10^3

Looking for the twelve highest hours within this table suggests that the critical time frame is 6AM-6PM, i.e. a cross product above approximately 3.0×10^3.

Research by the University of Nebraska provides multiple options for consideration here. Their investigation into previous research revealed that two types of NTOR signs provided significant improvement in compliance over the standard word message sign. One of these was the word message with a red ball, and the other was a word message with a supplemental time-of-day panel particularly for pedestrian safety. In a sense the Jordan Road conflicts could be considered as similar to the pedestrian issue. Combining these types together should generate additional significant compliance.

The Nebraska research went on to investigate the violation rates of LED illuminated NTOR signs among other variables at twelve test sites. The prediction model developed from the test sites suggests that the violation rate was reduced when LED signs were present, but the improvement was not statistically significant. The researchers considered that the greatest benefit of the LED signs was at night when no intersection or sign lighting is in place, but more investigation is needed to verify the conclusions.

Crash investigation at Mack Hatcher & Liberty revealed that none of the 13 crashes reported here since the May 2014 opening of the multi-lane Mack Hatcher involved right-turning vehicles. Thus the right turn crash

rate of zero crashes per million entering vehicles compares favorably to the statewide average of 0.89 for Urban Multi-Lane Divided Signalized Turn Lanes.

Options

The available options are as follows:

1. Install enhanced NO TURN ON RED signing to include a red ball and the supplemental time-of-day application from 6 AM -6 PM. Also install a near-side post-mounted sign for emphasis.
2. Install an LED sign NO TURN ON RED that would display from 6 AM - 6 PM.
3. No action - considers that the pattern of turn violation and driver lack of awareness is acceptable.

Financial Impact

The estimated financial impacts are as follows:

Option 1 - Expenditure of $600 for two signs (use largest available size, 36” x 48”), one on the far side signal mast arm and one on a new near side sign post. Apply the Streets Department traffic sign budget.

Option 2 - Expenditure of approximately $2,000 for an LED illuminated sign, plus ongoing power costs.

Option 3 - No cost except ongoing Police enforcement expenses.

Recommendation

Adopt Option 1 and apply the Streets Department budget.