

Technical Memorandum

To: Marc Culver, P.E., City of Maple Grove
From: Mike Spack, P.E., P.T.O.E.
Date: August 9, 2011
Re: Effects on Pedestrian Safety of Upgrading the Pedestrian Crossing at Elm Creek Boulevard/90th Place in Maple Grove, MN

The pedestrian crossing signs on Elm Creek Boulevard at 90th Place near Kerber Park in Maple Grove, MN were recently upgraded in an effort to improve pedestrian safety. This memorandum documents the vehicle-pedestrian interactions at the site and reviews the effects of the signage change.

Background

The existing W11-2 fluorescent yellow/green pedestrian signs were replaced with lit, push-button activated pedestrian crossing signs in June, 2011. Figure 1 depicts the style of sign originally on-site and Figure 2 depicts the style of the new pedestrian crossing sign. It is believed the upgraded pedestrian signal will enhance pedestrian safety, but a literature review did not provide any before/after studies that proved the effectiveness of the LED lit sign. This study documents the yielding behavior of vehicles to pedestrians “before” and “after” the LED, push button activated pedestrian crossing signs were installed.



Figure 1 – Crosswalk Sign (before)



Figure 2 – Crosswalk Sign with Lights (after)

Methodology

Activity at the crosswalk was recorded with a non-intrusive COUNTcam video camera system before (May 2011) and after (July 2011) the signs were upgraded. Data was collected from 8 a.m. to 8 p.m. on a Wednesday & Thursday before and Wednesday & Thursday after, providing 24 hours of before data to compare with 24 hours of after data. The Wednesdays and Thursdays recorded were summer days with clear weather and had softball games scheduled at Kerber Park. This is the timeframe expected to have the most pedestrian traffic at the crosswalk.

The videos were watched and the vehicle-pedestrian interactions were classified into categories to identify the vehicle yielding nature to each pedestrian crossing. An interaction was defined as either one pedestrian crossing Elm Creek Boulevard or a cohesive group of pedestrians crossing Elm Creek Boulevard. The vehicle-pedestrian interactions were recorded as having one of the following classifications:

1. No vehicles yielding (pedestrian waits for more than 20 seconds)
2. Some vehicles yielding, but not all
3. Pedestrian makes half of the crossing but has to stop at the median for un-yielding vehicles
4. Full yielding (all vehicles stop and the pedestrian starts crossing in less than 20 seconds)
5. No conflicts (the pedestrian waits for 20 seconds or less)
6. Pedestrian crosses the road outside of the crosswalk (more than ten feet outside of the intersection)

Data Summary

Table 1 shows the results of the data collection (the raw data is attached). 54 pedestrian-vehicle interactions were observed in the 24 hours of video from the before condition compared with 41 pedestrian-vehicle interactions observed in the 24 hours of video from the after condition. Only seven of the pedestrians in the after condition pushed the button to activate the LED lights, which possibly explains the negligible difference in the before/after data. Of the seven who pushed the button, five of them experienced No Conflict leaving too little data to adequately assess the effectiveness of the flashing lights.

Table 1 – Pedestrian-Vehicle Interactions at the Crosswalk on Elm Creek Boulevard at 90th Place

Installation	No Yield	Some Yield	Median	Full Yield	No Conflict	Outside	Total
before	4	4	0	9	36	1	54
after	3	4	1	6	27	0	41

Due to the differing sample sizes, the vehicle-pedestrian interaction numbers were not compared directly. Instead, the sample sizes were used to calculate percentages for each interaction type before and after the upgrades were employed. Figure 3 summarizes the percentages by interaction for the before and after conditions.

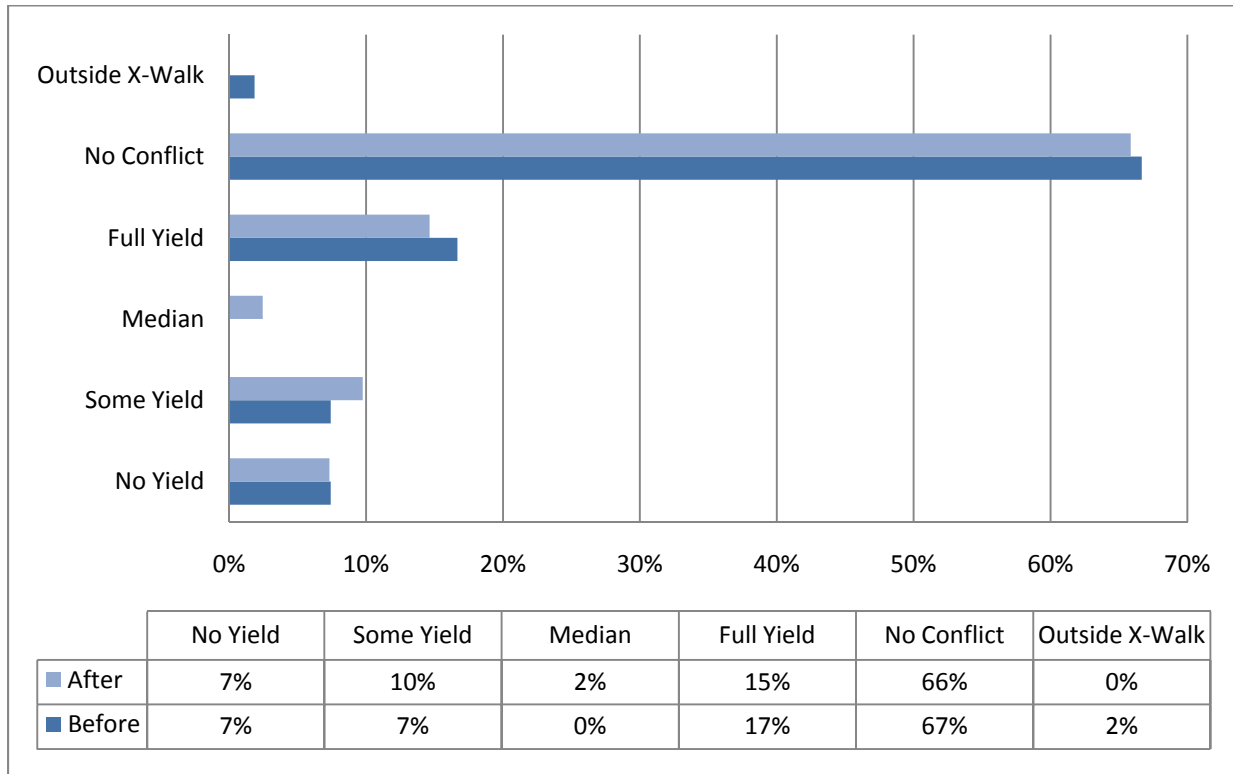


Figure 3 – Percentage of Total for Each Interaction

Conclusions

As can be seen in Figure 3, the percentages for each interaction type before and after the signs were installed closely resemble each other. The upgraded signs do not appear to have a particular effect on vehicles yielding to pedestrians. Unfortunately, less than 20% of the pedestrians pushed the LED activation button in the study period after the LED signs were installed. Greater use of the push-buttons (or installing automated pedestrian detection) may improve the vehicle yielding behavior.

Elm Creek Boulevard Pedestrian Crossing Study Raw Data

Before Data

Date	Time	Interaction	Group Size
5/18/2011	10:31:51	No Conflict	1
	10:45:49	No Conflict	2
	11:57:48	No Conflict	1
	12:02:44	No Yield	1
	12:28:12	No Conflict	1
	12:50:25	Some Yield	3
	13:08:44	No Conflict	1
	13:25:58	No Conflict	4
	13:37:11	No Conflict	1
	13:56:58	No Conflict	1
	14:47:28	No Conflict	1
	15:22:26	No Conflict	2
	15:32:37	No Conflict	1
	15:48:40	No Conflict	1
	15:53:55	No Conflict	1
	16:31:15	No Yield	2
	16:52:24	No Conflict	1
	16:55:10	Full Yield	2
	17:26:08	No Conflict	1
	17:36:45	No Yield	1
18:26:19	Full Yield	1	
18:52:08	No Conflict	2	
18:55:46	Full Yield	1	
18:59:00	Some Yield	1	
19:36:32	Full Yield	2	
19:37:39	No Conflict	2	
5/19/2011	8:09:33	No Conflict	1
	9:24:11	No Conflict	1
	9:28:17	No Conflict	2
	10:06:01	No Conflict	2
	10:52:00	No Conflict	1
	11:32:03	No Conflict	1
	12:04:01	No Conflict	1
	12:18:41	No Conflict	1
	12:41:50	Full Yield	1
	12:44:00	Some Yield	4
	13:14:55	Some Yield	1
	13:15:42	Full Yield	1
	13:26:38	No Conflict	1
	13:50:23	No Conflict	1
	14:37:49	Full Yield	4
	17:07:47	No Conflict	2
	17:29:16	No Yield	1
	17:43:05	No Conflict	1
	17:48:10	No Conflict	2
	18:20:29	No Conflict	1
	18:54:11	No Conflict	1
	18:55:02	Full Yield	1
	19:02:05	No Conflict	1
	19:06:16	No Conflict	1
	19:07:38	Full Yield	1
	19:19:00	No Conflict	2
19:53:45	No Conflict	1	
19:55:26	Outside X-Walk	2	

After Data

Date	Time	Interaction	Group Size	Button Pressed	
7/20/2011	8:03:27	No Conflict	1	No	
	13:33:02	No Conflict	1	No	
	14:05:11	No Conflict	1	No	
	14:49:16	No Conflict	1	No	
	15:48:16	No Conflict	1	No	
	18:53:16	Full Yield	1	No	
	19:47:01	No Conflict	1	No	
	7/21/2011	8:50:56	No Conflict	1	No
		11:14:14	No Conflict	1	No
		11:32:13	No Conflict	1	No
11:32:44		Full Yield	3	No	
12:26:48		No Conflict	5	No	
13:05:13		No Conflict	1	Yes	
13:21:02		Full Yield	1	Yes	
13:26:15		No Conflict	1	Yes	
14:01:02		Full Yield	1	No	
14:04:00		No Conflict	1	No	
14:06:57		Some Yield	1	No	
16:22:04		No Conflict	2	No	
16:34:38	No Yield	1	Yes		
17:36:46	No Conflict	1	No		
17:48:50	No Yield	1	No		
17:55:00	No Conflict	2	No		
18:10:28	No Conflict	1	Yes		
18:26:38	No Conflict	1	No		
18:29:32	Median	2	No		
18:32:52	No Conflict	1	No		
18:40:15	No Conflict	1	No		
18:41:55	No Conflict	1	No		
18:42:00	No Conflict	1	No		
18:46:02	Some Yield	1	No		
18:50:17	No Conflict	1	No		
18:58:45	Full Yield	1	No		
19:00:10	No Conflict	2	Yes		
19:03:36	No Conflict	1	Yes		
19:05:05	No Yield	1	No		
19:17:44	Some Yield	2	No		
19:25:12	No Conflict	1	No		
19:26:15	Some Yield	2	No		
19:34:55	No Conflict	1	No		
19:35:08	Full Yield	1	No		