Pedestrians on Brighton Beach Avenue underneath B, Q trains on the Brighton elevated line. NYC DCP.
Older adults are more likely to suffer from serious injuries from a particular accident than people from younger age cohorts.\(^1\) Thus, when designing and planning for our aging population, accident prevention is the best practice. Some municipalities have installed lighting mechanisms to highlight the areas, namely crosswalks, where pedestrians come into conflict with vehicles (IMAGE 13). There are several approaches to highlighting crosswalks. The most common method is the installation of flashing lights denoting the presence of a crosswalk; they include: flashing lights on the sign to warn of people crossing, a flashing overhead beacon, or ground flashers.

Signage and crosswalk improvements will not only address the needs of our aging population but will be beneficial to all pedestrians. Additionally, more people will experience the physical changes associated with aging because of the rise in life expectancy. It is important that the walking environment is addressed now in order to allow people of all ages and abilities the opportunity to use the streets and sidewalks safely. It is also vital that these safety measures be incorporated to prevent potentially dangerous vehicular-pedestrian conflicts.

\(^1\) Bailey, Aging Americans: Stranded Without Options.
LED Crosswalk Signs installed in Naval Station, Mayport, Florida, focuses on highlighting crosswalks with flashing lights on the pedestrian crossing itself.

This case study relates to the Age-Friendly NYC Initiative which is concerned with safety improvements by redesigning street intersections including upgraded and improved signage.

BACKGROUND
The third largest Naval Facility in the continental United States, the Mayport Naval Station (NS), is located on the northeast coast of Florida. Vehicular traffic is the heaviest at Mayport Naval Station on weekday mornings. The crosswalk leading to Southeast Regional Maintenance Center (SERMC) had long been a dangerous area for pedestrians. The Mayport Naval Station has a unique approach to flashing crosswalks (IMAGE 14). It is a rare example of flashing lights on the actual pedestrian crossing sign. On one of the busiest intersections of the base, traffic signals caused such backups in traffic that they were removed. As a result, the crosswalk on the busiest street on the base only had a striped crosswalk.

FINDINGS
In order to remedy the numerous near pedestrian and vehicle collisions, the Naval Station security, safety, and the Public Works Department worked together to improve pedestrian safety. The Public Works Department purchased warning signs that were installed by the Naval Station’s maintenance contractor. These signs meet the Department of Transportation's safety requirements and have ultra-yellow bright LEDs that blink up to 60 times per minute and remain on all times. The safety features protect pedestrians by increasing the sign’s visibility range up to twenty times.

Another Florida Naval Station, located in Jacksonville, installed signs similar to the ones at Naval Station Mayport. According to an assessment of crosswalks that had the sign installed, accidents were reduced by 100 percent in the past ten months. The expectation is that the LED pedestrian signs at Naval Station Mayport will mimic the results experienced in Jacksonville.

NEW YORK CITY APPLICATIONS AND OPPORTUNITIES
New York City currently does not employ flashing LED pedestrian signs. The signs are designed to alert the driver to look out for pedestrians. It is uncertain whether the signs would have the same effectiveness in New York City as in Florida, because pedestrian and vehicular traffic are regulated to a great extent by traffic signals. As illustrated

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2 Traffic and Parking Control Co. Inc. (TAPCO), LED Crosswalks Signs Enhance Traffic Safety at Naval Station Mayport.
3 Jirus, Avoiding Near-Misses in Crosswalks.
4 Traffic and Parking Control Co. Inc. (TAPCO), LED Crosswalks Signs Enhance Traffic Safety at Naval Station Mayport.
5 Ibid.
6 Jason Kugel, TAPCO, Phone Interview, 19 October 2009.
7 Traffic and Parking Control Co. Inc. (TAPCO), LED Crosswalks Signs Enhance Traffic Safety at Naval Station Mayport.
in Image 14, the location shown in the photo is an unsignalized crosswalk. This would suggest the traffic volumes are low and a signal is not warranted. There may be some areas in the outer boroughs that could benefit from LED pedestrian signs, such as in residential neighborhoods, and locations near schools and senior centers.

**SAN JOSE, CALIFORNIA**

**Flashing Beacons and Ground Flashers**

**IMAGE 15. Embedded Flashers-The LED flash after the pedestrian enters the crosswalk. Image used with permission from Lightguard Systems, Inc.**

**Flashing Beacons and Ground Flashers implemented in San Jose California** are sensor actuated flashing beacons and ground flashers that cause drivers to yield and brake further from the crosswalk.

This case study relates to the *Age-Friendly NYC Initiative 31* which is concerned with safety improvements by redesigning street intersections including upgraded and improved signage.

**BACKGROUND**

The City of San Jose has experimented with both flashing beacons and in ground flashers (IMAGE 15 and IMAGE 16). The state of California has been using the beacons for a number of years. The embedded flashers were approved in 1994. However, any locality wishing to use them still had to request authorization from the California Department of Transportation (Caltrans). San Jose received authorization in 1999.²

² Malek, *Crosswalk Enhancement Comparison Study.*
The City of San Jose identified two intersections that had similar characteristics. Flashing beacons were installed on Samaritan Drive while embedded light were installed on McAbee Road. Both roads were equal in widths and rights-of-way and both had a two-way left turn lane. Samaritan Drive had four lanes of traffic, while McAbee Road had two travel lanes and two bike lanes. Their speed limits were different (30 and 34 for Samaritan Drive, respectively; and 35 and 42 for McAbee Road, respectively).

Both systems were installed at the same time. However, drivers may have come in contact with a flashing beacon before, as they have been used in California for a while. Two studies were conducted after the systems were installed; one month after and six months after. A study prior to the installation also took place at both intersections. A non-flashing intersection was not studied as a control. They were not evaluated under adverse weather conditions.

FINDINGS

Embedded flashers were more likely to cause drivers, to yield and to brake further from the crosswalk. Table 14 shows that the percentage of drivers, yielding at the overhead beacon during the day, increased one month after the installation. At the sixth month, this percentage then decreased from the first month’s percentage but still slightly increased over the prior period. The intersection with embedded flashers also experienced large increases in the number of drivers yielding after one month. However, in one direction, the percentage of drivers yielding continued to rise. The daytime braking distances doubled one month after the beacon was installed and continued to rise six months later. The daytime braking distance at the intersection with embedded flashers decreased in one direction. The nighttime figures are more encouraging (IMAGE 17). Both locations saw increases in the percentage of drivers yielding. The braking distances more than doubled one month after installation at both intersections.

The City of San Jose also administered driver and pedestrian surveys one and six months after the system installations. The drivers noted that the embedded flashers were far more effective than the beacons. Five percent thought the beacons were effective six months after installation. Whereas, sixty-six percent thought the embedded flashers were effective. Pedestrians responded that they would not rely on the beacon to stop drivers, whereas eighteen percent of pedestrians would rely on the flashers. It should be noted that pedestrians may feel a false sense of security with the added flashing lights and thus may make the intersection less safe.

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9 Ibid.
10 Ibid.
TABLE 14. Yielding and Braking Data-Before and After Installation

<table>
<thead>
<tr>
<th>Location</th>
<th>Direction</th>
<th>Action</th>
<th>Day Before</th>
<th>1 Month After</th>
<th>6 Months After</th>
<th>Night Before</th>
<th>1 Month After</th>
<th>6 Months After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead Beacon</td>
<td>Eastbound</td>
<td>Drivers Yielding (%)</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Braking Distance (feet)</td>
<td>63</td>
<td>133</td>
<td>243</td>
<td>0</td>
<td>175</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>Westbound</td>
<td>Drivers Yielding (%)</td>
<td>5</td>
<td>14</td>
<td>8</td>
<td>2</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Braking Distance (feet)</td>
<td>87</td>
<td>165</td>
<td>266</td>
<td>87</td>
<td>200</td>
<td>228</td>
</tr>
<tr>
<td>Embedded Flashers</td>
<td>Northbound</td>
<td>Drivers Yielding (%)</td>
<td>10</td>
<td>44</td>
<td>46</td>
<td>5</td>
<td>64</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Braking Distance (feet)</td>
<td>143</td>
<td>245</td>
<td>232</td>
<td>148</td>
<td>329</td>
<td>352</td>
</tr>
<tr>
<td></td>
<td>Southbound</td>
<td>Drivers Yielding (%)</td>
<td>12</td>
<td>54</td>
<td>52</td>
<td>5</td>
<td>68</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Braking Distance (feet)</td>
<td>214</td>
<td>186</td>
<td>192</td>
<td>105</td>
<td>324</td>
<td>286</td>
</tr>
</tbody>
</table>

Source: City of San Jose Department of Transportation

NEW YORK CITY APPLICATIONS AND OPPORTUNITIES

In recent years great strides have been made to alleviate walking perils, such as tactile strips, leading pedestrian intervals, refuge islands, and many other engineering improvements. NYCDOT has taken the lead and is working on many projects that aim to make streets safer, specifically for the elderly. It is vital that the surface network be maintained. For those that use walkers or other assistive devices, cracks or uneven pavement can cause major hardships. In 2009 Transportation Alternatives released Safe Routes for Seniors. The document presents a series of design and policy recommendations such as: installing benches in pedestrian refuge areas, having more bus shelters near senior centers, implementing leading pedestrian intervals (LPI) throughout the City, and fixing sidewalk and street hazards. These seemingly small changes are very important for those that have great difficulty negotiating street and sidewalk hazards.

Ground flashers would impact maintenance costs, which is the primary reason they are not employed in New York City. Some roadway devices alter the geometry or texture of the street and require the need for new equipment for street sweeping, snow removal, or landscaping. Flashing beacons accompanied with 20 MPH signs were installed on streets adjacent to schools for a pilot program. The pilot locations were selected by analyzing crash and school data. The results from the pilot showed that speeds decreased over time.

San Jose’s yielding and braking nighttime data is encouraging. Pedestrians are less visible at night than during the day, especially in residential neighborhoods that do not have many streetlights. There may be opportunities to introduce these safety measures, especially in areas with a high percentage of elderly residents.

NYC climate factors together with the high maintenance costs for ground flashers make their application in New York City a challenge; whereas flashing beacons may be a more practical alternative.

11 Transportation Alternatives. Safe Routes for Seniors.
13 Ibid.
14 New York City Department of Transportation. Reduced School Speed Limit Pilot Study-Parts I & II.
15 Ibid.
Pedestrian Actuated Crosswalk Flashers in Kirkland Washington focuses on crosswalk flashers that require the pedestrian to press a button to activate the flasher.

This case study relates to the Age-Friendly NYC Initiative which is concerned with safety improvements by redesigning street intersections including upgraded and improved signage, and addresses the challenge of time to cross an intersection.

BACKGROUND
The City of Kirkland is a suburb of Seattle and has approximately 50,000 residents. Although it is a small city, it lies further north than San Jose California and therefore has more adverse weather conditions. The City of Kirkland also installed embedded flashers in 1997 (IMAGE 18). While San Jose used sensors to detect pedestrians in the crosswalk, Kirkland used push button activators. In the San Jose model, bollards with infrared beams detect when a person passes through them and activates the flashers. In Kirkland, the pedestrian has to actually press a button to activate the flashers (IMAGE 19).

The City of Kirkland’s Public Works Department also studied the intersections before and after the installation of flashers (IMAGE 20). They used a similar methodology to San Jose to measure effectiveness. The results showed an increased percentage of drivers yielding to pedestrians increased at all ten intersections, and the braking distance also improved dramatically. However, intersections without the flashers were not measured at the same time. Also, no further formal studies have taken place to see the long term effectiveness of the system.

The City of Kirkland requested alterations to the flasher heads so that they could be more resilient to snowplows. The initial system they used has not held up well. However, additional modifications to the system have created a more durable unit.

COST
The cost of the embedded flasher system has also dropped considerably from the initial installation. The first installation cost the City $35,000 per crosswalk. Two years later the cost had already dropped to $15,000. Their costs are currently estimated at $20,000 to $50,000.

Embedded flashers are a relatively new approach to dealing with vehicular pedestrian conflicts. Therefore, not enough data exists to support or refute their effectiveness.

Although, these installations may decrease accident rates at a particular intersection, they may actually increase the number of accidents at other locations because drivers may come to expect the crosswalk to flash at any location if a pedestrian is crossing. Also,
these crosswalks flash for a predetermined amount of time. If a person takes longer to cross (as is likely the case with the elderly), the flashers may have ceased to light up before the person gets a chance to cross the entire width of the street. Since the crosswalk flashers are most effective at night, these two issues may have to be addressed before any such system is to be implemented.

NEW YORK CITY APPLICATIONS AND OPPORTUNITIES

New York City experiences adverse weather conditions and heavy vehicle flows, therefore the embedded flashers would need to be durable. Although, there have been improvements to crosswalks in recent years, the embedded flashers and other crosswalk advances as seen in the San Jose and Kirkland case studies, could be beneficial if applied to New York City neighborhoods. There are many pedestrians in New York City, and at night it can be difficult to see them. Neighborhoods that do not have many street lights or traffic lights may benefit the most from embedded flashers. But as previously stated they may need to be modified in order to guarantee their effectiveness. The higher traffic flow and number of pedestrians need to be taken into account in order to determine the effectiveness of pedestrian actuated crosswalk flashers (that are embedded in the ground) to justify initial and maintenance costs.

NYCDOT began installing pedestrian countdown signals in strategic locations throughout the city. Pedestrian countdown signals visually count down the time a pedestrian will have to cross the intersection before the traffic lights change. This is a pilot program that began with five pedestrian countdown signals and will be expanded to 1500 locations. The locations were chosen based on pedestrian and vehicular volumes in addition to the proximity to areas with a preponderance of seniors, and a high number of pedestrian accidents or injuries. Other variables were examined including: visibility, lighting, drivers’ compliance with traffic and pedestrian signals and the width of the roadway.22 Results of the pilot program are not available at this time.

Pedestrian Actuated Crosswalk Flashers addresses the challenge of sign visibility at crosswalks and intersections, and relates to Initiative 31 of Age-Friendly NYC, which aims to redesign street intersections at key locations. Pedestrian actuated countdown signals have been implemented throughout New York City. Embedded flashers may be considered in the future, but are currently not a feasible solution because of the high costs for maintaining them in the City.

22 New York City Department of Transportation, Pedestrian and Sidewalks: Safe Streets for Seniors.