



## INSIDE THIS ISSUE

1. Real Time Signal Timing Revisions Being Done in Montgomery
2. LED Street Lights
3. Speed Bumps or Humps?
4. Leaf Removal for \$
5. High-Intensity Activated Crosswalk Signals
6. Publications from Auburn University

## Alabama Transportation Newsletter

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## Real Time Signal Timing Revisions Being Done in Montgomery

Montgomery has become the first jurisdiction in Alabama to implement the TACTICS traffic signal management software in order to access real time information about signal settings and make adjustments to signal timings. About 241 intersections in the City are currently connected to the system. There are 406 signalized intersections in Montgomery. Many of the remaining intersections will have their communications connected to the system as part of federally-funded traffic signal projects or the Intelligent Transportation System (ITS) Project in the City.

One of the first applications of the software was to revise the yellow and all-red signal intervals at a few selected intersections. The timing parameters from the street were uploaded, and then the changes were determined. The desired revisions were then downloaded back to the controllers on the street. Increasing the all-red timing is anticipated to produce a safety benefit that has been realized in several other jurisdictions.

The software will also allow for future revisions to signal coordination. Revisions to timing splits, phasing and offsets will be downloaded similarly from the central office of the Traffic Engineering Department. Access to make these changes is limited to three persons in the Department who have the skills needed to do traffic signal timings and revisions.

The system also provides real time alerts. The problem areas detected include conflict monitoring that may result in a flashing operation, the loss of communications to a controller, and simpler functional items such as a controller cabinet with a door open. Reports of these alerts are e-mailed to the system operators. This communication to and from the field is another major benefit of these ITS projects. In this case the intelligence is in the information detected in the field and then communicated to the office.

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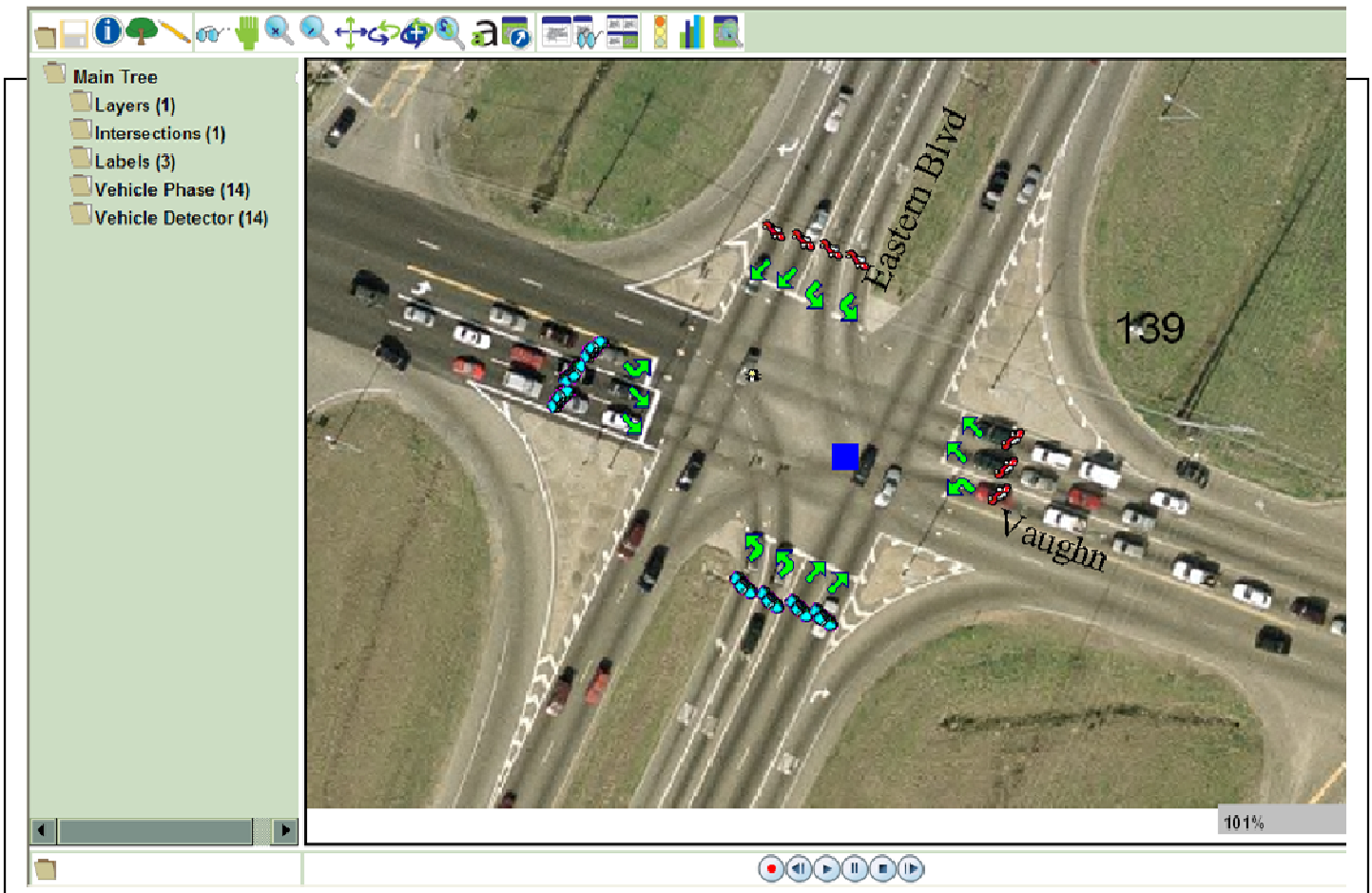
(Continued from page 1, "Real Time Signal Timing Revisions Being Done in Montgomery")

Time-of-day information can also be stored for up to one year in advance. This feature allows timing plans to be customized for different seasons of the year and also provides for exception days, such as three-day weekends and special events. The traffic signal in this ITS application is making use of the intelligence that can be programmed into the controller from the office.

The graphical presentations are informative and easy to use. A base map of the City showing the interconnected intersections is available. For each intersection, the base map from an aerial photograph was imported as a jpeg or a bitmap file. Layers on the map are used for reference information such as street names and the controller sequence number, and lane assignments. The accompanying figure shows an intersection in Montgomery with dual left turns on the main street, Eastern Blvd, and single left turn lanes on the side street, Vaughn Rd. Additional displays include the current phase status and the detection areas that are currently occupied.

TACTICS was installed in Montgomery after the City had used ACTRA for several years. ACTRA was developed by Siemens and distributed by Eagle Traffic Control Systems. TACTICS allowed the City to import the stored ACTRA data directly into its database. The system is PC-based and uses a Windows operating system. The software is password protected for secure access. The software was installed by Temple, Inc, of Decatur, AL.

(Prepared by John R. McCarthy, PE. Traffic Engineer III, City of Montgomery, Alabama)



# LED Street Lights

If you are trying to make sustainable changes in your community, one simple solution is to install or replace existing street lights with LED light fixtures. This article will explain how LEDs work, the costs and benefits of making the switch and how LED lighting contributes to sustainability.

## How LED lights work differently than incandescent bulbs

Light-emitting diode (LED) light bulbs are becoming fairly common in household use. Due to their energy efficiency and long-term cost-effectiveness, communities are bringing the bulbs to a larger scale for use in street light fixtures.

The fixtures include many individual LED bulbs in one unit. The light from LED bulbs is clear blue or white rather than yellowish like incandescent street lamps. This change helps colors being illuminated to look more “true,” and may help some people see better while driving.

## Efficient and effective

Several characteristics of LED fixtures help communities save money:

**Energy efficiency.** LED fixtures use significantly less power to operate than incandescent fixtures. According to a study by the Missouri Center for Transportation Infrastructure and Safety at the Missouri University of Science and Technology (Missouri S&T), LEDs can provide a 93 percent energy savings.

**Bulb longevity.** LEDs contain no mercury and produce less heat than other bulbs so that the unit can work efficiently without premature bulb burnout. LED bulbs transfer heat over the area of the lamp evenly, and the unit lasts longer as a result. Missouri S&T estimates the lifespan of an LED bulb at 10 years.

**Maintenance advantages.** While traditional bulbs need to be replaced as soon as the bulb goes out, LED fixtures contain many small individual bulbs that create a uniform glow so it is hardly noticeable when a few of the small bulbs go out. Maintenance can be scheduled at regular intervals rather than in response to instances of street lights burning out.

**A good fit with solar power.** LED light fixtures come in different types, including solar-powered. Using solar power is especially feasible for these fixtures because the energy draw from LED bulbs is much lower than for incandescent bulbs.

**Can be retrofitted.** A new LED unit can replace an incandescent unit on an existing pole. Swapping the units takes only about 30 minutes per fixture, per the Missouri S&T.

## Cost

Upfront, LED street light units are significantly more expensive than traditional ones. According to an article in USA Today, LED units cost about \$1000 per unit compared to conventional units that are around \$250 each. Bulbs are more expensive too; LED street light bulbs themselves go for about \$40, while conventional high pressure sodium lamp bulbs are about \$20. However, LEDs are much more energy efficient, and that’s the primary way long-term cost savings are achieved. While communities would have to pay more for the fixture to start, they would save maintenance costs and energy costs over the long run, helping to make up the difference.

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(Continued from page 3; "LED Street Lights")

### Communities using LEDs

Many communities across the United States, large and small, are using or piloting LED street light fixtures in their jurisdictions. Here are just a few:

**City of Los Angeles, California,** uses LED street lights, and their Bureau of Street Lighting states that LEDs are a no-cost sustainable alternative because they are highly efficient.

**City of Lawrence, Kansas.** A newspaper article about Lawrence, Kansas' switch to LED bulb units in the vintage-looking streetlights downtown reported that it will take about 40 years for the lights to pay for themselves in energy savings. Even with the long payback, staying with traditional bulbs may soon not be an option for many communities. Assistant city public works director Mark Thiel said Lawrence's switch to LED lights would be inevitable because of decreasing production and decreasing popularity of metal halide and high pressure sodium light bulbs.

**Riley County, Kansas.** Riley County Public Works has installed five different types of LED street lights in their parking lot to test their effectiveness. All are solar powered. Solar panels come in two types— monocrystalline and thin film. Rod Meredith, the County's assistant public works director, says the thin film system is a better alternative for use with LEDs because it includes batteries in the base of the pole that enable more storage capacity for power. The streetlight also remains dim until a car approaches, preserving power until it is needed. LEDs do not take as long as traditional lights to illuminate to full brightness. These units cost about \$7,000.

Meredith says solar technology coupled with LED fixtures really saves money if the fixtures are being placed in a new area that would otherwise not need electrical lines installed.

Riley County plans to install three more types of LED street lights in their parking lot this year to consider the best options for future use in parks and possibly on county roads. Meredith says that the LED street lights they are testing are self sufficient and work well.

### Potential downsides to using LED technology

**Technology is new and changing.** Meredith said the only thing to watch out for is the rapidly changing LED industry. Because the products are so new, variations of LEDs fixtures come out often that you may not be able to depend on using the same replacement equipment and bulbs and procedures again and again.

**Very bright light.** According to the Missouri S&T, there have been complaints that LED street lights are too bright and at times distracting for drivers. In residential areas, LED street lights can be bothersome at night when they are in close proximity to bedroom windows. However, Meredith says that the complaints he received in Riley County were that the solar lights installed in their parking lot were not bright enough. He plans to install one of the brightest LED fixtures soon to compare it to the relatively dimmer models he currently has in place.

On the plus side, LEDs' capacity for brightness could allow bicyclists to ride at night with greater safety.

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(Continued from page 4; "LED Street Lights")

### Are LED units worth the extra cost?

The initial cost of LEDs can be intimidating and could deter a community from making the switch. However, LED street light fixtures are energy-efficient and can be cost-effective in certain situations. They have more potential to be cost effective for new installations rather than retrofits on existing fixtures that already have an incandescent fixture in place and you could just continue replacing the bulb when it burns out. Still, retrofits allow for significant energy savings and more predictable maintenance—a plus for any community, and something to consider as electricity prices continue to rise in Kansas and the availability of incandescent bulbs declines over time.

(Prepared by Nora Fairchild for Kansas LTAP Newsletter, Summer 2011)

## Speed Bumps or Humps?

The majority of citizens believe there is no difference between speed humps and speed bumps, when in fact, the two are very different.

The **speed bump** was first developed over a century ago as a way to slow traffic. The speed bump was seen as a success because drivers did not like the sharp bounce they experienced as they drove across it, causing them to slow down. Over time, more and more road agencies started using the speed bumps in residential areas to slow traffic, making the roadway safer for children and pedestrians. Business owners also started using bumps between their parking areas and storefronts for the same reason.

Speed bumps, though, were never engineered to ensure they worked effectively. They are usually six inches to three feet wide and three to six inches high. This design can slow drivers, but with the advancements in vehicle shocks, some have found the faster you drive over them the less jolt the driver experiences. There have also been reports of vehicle damage and personal injuries caused by speed bumps, and without an approved engineering design, road agencies have been found liable for such damages. Speed bumps are also a tripping hazard for pedestrians. Additionally, plow trucks cannot properly work around their rounded design causing the speed bumps to be frequently damaged during winter maintenance. For these reasons, speed bumps should not be used on public roads and streets.

The **speed hump** is a designed response to these concerns. Speed humps are typically twelve to fifteen feet wide and only three to four inches high. Humps have contoured approaches that allow the vehicle to cross over them, giving the driver more of a swaying motion than a jolt. Most speed humps are designed and constructed for an operating speed of eighteen to twenty miles per hour. If a driver tries to pass over the speed hump at a faster speed, they experience a very discomforting feeling, making the humps self-enforcing. The design is also more conducive to plow trucks, bicycles, and pedestrians.

(From "Country Roads & City Streets," Newsletter, West Virginia LTAP, Fall 2011)

## LEAF REMOVAL FOR \$

At a time when cities and counties are examining their core services for cuts, one rural town has managed to turn leaf disposal into black gold.

The City of Hutchinson, Minnesota owns and operates Creekside Soil, which not only diverts Hutchinson's leaves and grass from local landfills, but also composts yard waste from seven nearby cities. Creekside sells the bagged compost to some of the largest garden centers in Minnesota and Iowa.

The city launched the center 10 years ago, after rethinking its old way of collecting leaves from residents, Hutchinson public works director John Olson said at the [2011 Spring Maintenance Training Expo](#).

"We wanted to see if there was a different way we could do leaf removal in Hutchinson," Olson said.



Hutchinson sells bagged compost to garden centers.

### Fixed cost

Leaf removal is a large fixed cost for most Midwestern cities, Olson said. "Every agency spends a lot of money and effort on leaves." Those costs include leaf removal, waste disposal, and equipment costs. If residents bring their leaves to a compost site, cities have to pay to staff the sites, often at odd hours.

"The thing you run into [is that] typically the residents want to be able to do it when they want to do it, and how do you staff that appropriately?" Olson said. "The other thing is that no matter how good of a job a site monitor does, you end up with plastic bags. They end up costing a lot of effort down the line."

Curbside pickup with garbage can also be expensive, he said.

Some cities have also encouraged residents to compost on their own property. But most residents don't have enough space to compost all the leaves in their yards every year, so then they end up in the garbage and, Olson said, "You ended up landfilling a lot of leaves."

Prior to launching Creekside, Hutchinson had a three-pronged approach to leaf gathering: city residents could bring their leaves to a compost site; they could purchase a special compostable bag and have leaves picked up with their garbage; or they could put them in eco-friendly garbage bags.

"That seemed to work OK, but we wanted to see if we could do better," Olson said. Participation in the city's compostable bag program was low. It cost money to staff the disposal site. And, even with the monitors, too much plastic was ending up in compost, which cost the city extra to process as solid waste.

### New approach

The city wanted to try a new approach, Olson said. Employees settled on a strategy of collecting leaves at the gutter with a leaf vacuum. Residents would rake the leaves out to the gutter.

"It ended up being a win-win," Olson said. "Property owners win, because they don't have to buy special bags. If they want, they can still haul out to a disposal site during normal working hours."

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(Continuation from page 6; "Leaf Removal for \$")

The city found that the vacuums were less expensive than using a street sweeper. The machines chopped up the leaves into pieces, which started the mulching process before the material made it to the compost site. Finally, by taking the leaves directly to the compost site, the city avoided additional hauling or storing costs.

Once the program started, the city had a big drop in the amount of leaves that ended up in the garbage, Olson said.

In the first year of the program, some residents thought the city was opening a checkbook to anyone who wanted to dump trash in the gutter. To avoid that, the city launched an extensive education campaign and told residents that it wouldn't clean the curbside piles if they had anything but leaves in them. After a few houses were skipped and tagged early on, neighbors put peer pressure on each other to keep the piles clean, Olson said.

### **Regional compost producer**

Since the start of the program, Creekside has grown into a regional compost producer. General Manager Doug Johnson said the facility takes in 20,000 to 30,000 tons of yard waste a year and sells the bagged compost in the five-state area. Customers include Bachman's, Gertens, Linder's, and Home Depot.

Demand is growing for the compost and from other cities that want to divert more yard waste from landfills, Johnson said. The facility processes yard waste from eight cities in McLeod County and is talking to Glencoe about adding the service.

Hutchinson residents pay no tip fees to drop off compost, Johnson said, and other cities in McLeod County have their fees subsidized with a county grant. Outside the county, Creekside charges \$15 to \$20 a ton for yard waste, which is much lower than the \$25 to \$30 a ton commercial carriers charge, he said. Creekside charges less in part because the leaves are already chopped up by sweepers before they get to the site.

"We live in farmland. If you charged 5 cents for it here, it would end up in ditches," he said.

Creekside has had its own growing pains. Early on, Johnson said he learned not to accept yard waste in black bags after the winter wind caught the bags and the local newspaper wrote a front-page story about how the facility was causing a "black snowstorm."

He said cities don't have to launch their own compost facility to do so, either. A smaller-scale operation could use a skidsteer to compost yard waste down and turn it into rougher compost that could be used for parks or given away to residents.

### **Residents like it**

There are two services Hutchinson will never drop, Olson said: leaf removal and mosquito spraying. By finding a creative way to compost and use yard waste, the city was able to give residents a higher level of service without losing money.

When the leaf vacuums are out, "we get more thumbs up than any other finger," Olson said.

"We're a town of 14,000, and [we] have 500 tons of leaves. If you really start thinking about what it takes to pick this stuff up and get rid of it, it's a pretty significant cost. If you can keep that cost as low as possible and provide the best possible service for our residents, I think everybody wins."

(Prepared by Trisha Collopy for "Technology Exchange", Minnesota LTAP, Summer 2011)

## High-Intensity Activated Crosswalk Signals

A relatively new type of crosswalk signal that stays dark until a pedestrian activates it can reduce crashes at intersections where a full-fledged traffic signal isn't warranted, a study sponsored by the Federal Highway Administration has found.

The High-Intensity Activated Crosswalk, or HAWK, beacon consists of 2 red lights over 1 yellow and is typically marked with large pedestrian crossing signs. When a pedestrian presses a button, the signal flashes yellow, then switches to solid yellow. Then both red lights shine, and pedestrians can start crossing. Finally, the device switches to flashing red, meaning drivers can proceed as soon as pedestrians have cleared the lane.

The city of Tucson, Arizona, developed HAWK signals in the late 1990s and now uses them at more than 100 sites. Other cities have since adopted HAWK, also known as a pedestrian hybrid beacon. Less expensive than full signals, HAWKs have been shown to be effective in getting drivers to yield to pedestrians on major streets with multiple lanes or high speeds, and they're being tested for use at roundabouts. The flashing red phase allows vehicle traffic to resume quickly.

Traffic engineers have several tools to help people cross a major road. A familiar one is a standard, red-yellow-green traffic light that remains green until a pedestrian pushes a button. However, under the *Manual on Uniform Traffic Control Devices*, such signals should only be used midblock. If a traffic light is at an intersection, it must be a full signal that controls the side street, too.

Tucson officials wanted to allow pedestrians to cross at intersections but didn't want full signals at residential side streets because they tend to encourage cut-through traffic. The solution devised by Richard Nassi, until recently Tucson's transportation chief, was the HAWK beacon. It controls traffic at intersections on main roads only, while side streets still have a stop sign.

The Federal Highway Administration's study, conducted by researchers at the Texas Transportation Institute, looked at 21 HAWK sites and compared the number of crashes in the 3-year period before the signals were installed with the number of crashes after.

The HAWK signals did their job. Pedestrian crashes near the intersections tumbled 59 percent, and other types of crashes also went down. Total crashes fell 14 percent, and severe crashes fell 13 percent. These results take into account changes in the number of crashes at nearby intersections without HAWKs or other traffic signals.

The study also examined a smaller group of crashes that were specifically reported as intersection-related. In this analysis, pedestrian crashes declined 51 percent, total crashes dropped 29 percent, and severe crashes fell 15 percent.

HAWK is rapidly gaining acceptance, and the pedestrian hybrid was included in the 2009 traffic control devices manual. However, recommended use differs from the practice in Tucson, where the vast majority of HAWKs are on major arteries at intersections where side streets are controlled by stop signs. The guidelines say the signals should be installed at least 100 feet from side streets or driveways controlled by stop or yield signs to avoid driver confusion.

Nassi says he expects the National Committee on Uniform Traffic Control Devices, of which he is a member, to ask the Federal Highway Administration to reconsider that guidance in light of the recent study.

"The perceived danger is not turning out to be a danger," he says. "HAWKs provide another pedestrian safety tool at both intersections and midblock locations."

(Status Report, Insurance Institute for Highway Safety, Vol. 45, No. 10, 9/28/2010)

## PUBLICATIONS FROM AUBURN UNIVERSITY

The following publications are free upon request from the Auburn University T2 Library. Please call Alice Fraasa in the AU Civil Engineering Department at (334) 844-4320 or email her at [fraasak@auburn.edu](mailto:fraasak@auburn.edu)

**293-1 FHWA Road Safety Audit Guidelines** Federal Highway Administration, February 2005, 76 pp. These guidelines present basic road safety audit principles and identify procedures for conducting safety investigations of roads and intersections.

**293-2 Low-Volume Roads and Road Safety Audits** Transportation Research Record 2213, Transportation Research Board, 2011, 9 pp.

This paper presents the application of Road Safety Audits to low-volume paved roads and presents a safety discussion of unpaved roads. Common safety issues pertinent to low-volume roads through 10 years of experience are identified.

**293-3 Guardrail Optimization for Rural Roads** Transportation Research Record 2203, Transportation Research Board, 2011, 8 pp.

A versatile W-beam guardrail with improved capabilities is described. A physics-based guardrail analysis was conducted. Successful crash tests are documented.

**293-4 Analysis of Factors Causing Corrugation of Gravel Roads; Improvement Recommendations for Unsealed Gravel Roads; Implementation Guide for the Management of Unsealed Gravel Roads** Transportation Research Records 2204 and 2205, Transportation Research Board, 2011, 24 pp.

These three articles cover the causes of washboarding, the rating of earth and gravel roads, and the management of such low-volume roads. Roads in South Dakota and Wyoming are described.

**293-5 Comparison of Earthwork Computation Methods** Transportation Research Record 2215, Transportation Research Board, 2011, 5 pp.

Average-end-area earthwork volumes are compared to surface-to-surface terrain-based volumes. The results reveal that the differences between the two methods approach 5% with a cross-section interval of 100 ft. Road projects in Wisconsin were analyzed.

**293-6 Development and Validation of Speed Kidney, a New Traffic-Calming Device** Transportation Research Record 2223, Transportation Research Board, 2011, 11 pp.

The speed kidney, developed at the Polytechnic University of Valencia, Spain, consists of a main speed hump, curved like a kidney, and a complementary speed hump. The vehicle straddles the device and its speed is moderated. The results from preliminary tests indicate that it is a functional, feasible, sustainable and safe solution for traffic calming.

**293-7 The When, Where and How of Mid-Block Crosswalks** Kansas LTAP Newsletter, Nate Vander Brock, Spring 2011, 4 pp.

This article addresses the elements of mid-block crosswalks including, criteria, location, design, passive and active sensors, signalization, lighting and costs.