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**To:** CRCOG Transportation Committee
**From:** Jillian Massey, Senior Transportation Planner
**Date:** November 4, 2016
**Subject:** Connecticut Department of Transportation Traffic Safety Resources

Attached for your reference are some traffic safety resources developed by Connecticut Department of Transportation. Included are information sheets on HAWK (High-Intensity Activated Crosswalk) Pedestrian Signals, Retroreflective Signal Backplates, and Roundabouts.

This information along with other traffic safety engineering resources can be found on CTDOT's Safety Engineering webpage located here:
http://www.ct.gov/dot/cwp/view.asp?a=3199&q=526424

If you have any questions or comments, please feel free to contact Jillian Massey at 860-522-2217 ext. 246 or jmassey@crcog.org

# HAWK Pedestrian Signals

Connecticut Department of Transportation
Bureau of Engineering and Construction

Traffic and Safety Engineering

## Definitions and Features

The HAWK (or **H**igh-Intensity **A**ctivated Cross**W**al**K**) pedestrian signal is a type of traffic control device designed to allow pedestrians to safely cross streets with high volumes of traffic. In an effort to increase pedestrian safety, the Connecticut Department of Transportation has begun an initiative to install HAWK signals at select locations throughout the state.

The HAWK signal is composed of a circular yellow signal centered under two horizontally-aligned circular red signals.

HAWK signals only operate when a pedestrian activates a push button at the pedestrian crossing. The signal activates stop control requiring vehicles to stop when a pedestrian crosses and then allows vehicles to move once pedestrians have finished crossing. Pedestrian signals will notify pedestrians when it is safe to cross the roadway.

The HAWK signal is one of the Federal Highway Administration's Proven Safety Countermeasures, providing the following safety benefits[2]:

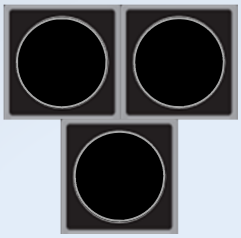
- 69% reduction of pedestrian crashes
- 29% reduction of total roadway crashes

Isolated crossings with marked crosswalks will be the only locations eligible for HAWK signal installations.

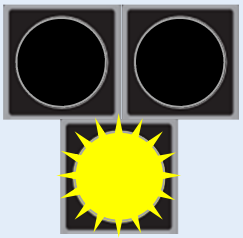
**HAWK Signal in Billings, MT (Photo courtesy of Billings Gazette)**

## How HAWK Signals Work

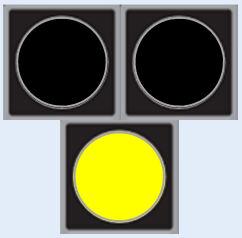
The following describes the indications on a typical HAWK pedestrian signal[1]:



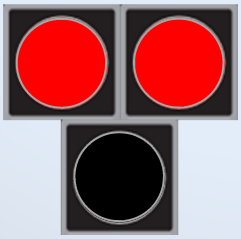
DARK—HAWK signal has not been activated. Vehicles proceed through pedestrian crossing.



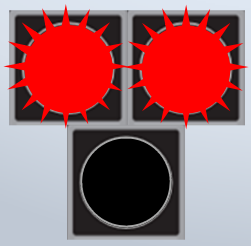
FLASHING YELLOW—Pedestrian has activated the HAWK signal.



SOLID YELLOW—Pedestrian signal is about to change. Motorists are notified their movement is being terminated and a red signal will be displayed.



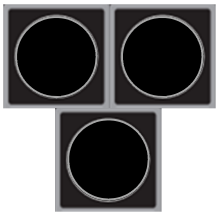
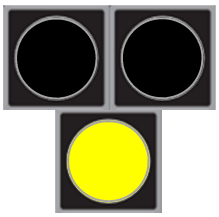
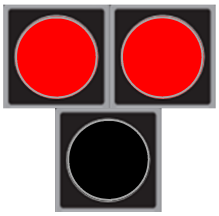
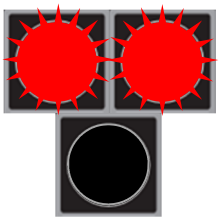
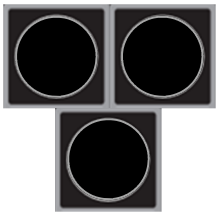
SOLID RED—Pedestrian is in the crosswalk. Motorists must stop.



FLASHING RED—The HAWK signal is about to deactivate. Drivers must stop but may proceed when pedestrians have cleared the crosswalk.

# HAWK Pedestrian Signal Operation

The following demonstrates what motorists and pedestrians will experience when approaching a crossing with a HAWK pedestrian signal[1]:

| Meaning: | What Motorists See: | What Pedestrians See: | Meaning: |
|---|---|---|---|
| HAWK is deactivated |  |  | Press button to cross |
| HAWK has been activated. |  |  | Wait to cross |
| Vehicle right of way is ending. Motorists will be required to stop. |  |  | Wait to cross |
| Stop |  |  | Cross the street |
| Stop. Proceed if crosswalk is clear. |  |  | Pedestrians in crosswalk may continue to cross. Pedestrians at push button must wait. |
| HAWK is deactivated |  |  | Press button to cross |

# Further Information on HAWK Pedestrian Signals

Additional information about HAWK pedestrian signals can be found at http://safety.fhwa.dot.gov/provencountermeasures/fhwa_sa_12_012.cfm[2] or contact Joseph Ouellette at (860) 594-2721.

*References:*


1. "Manual on Uniform Traffic Control Devices, Chapter 4F. Pedestrian Hybrid Beacons". Federal Highway Administration. 2009.
2. "Pedestrian Hybrid Beacon". Federal Highway Administration website.

# Retroreflective Signal Backplates

Connecticut Department of Transportation
Bureau of Engineering and Construction

Traffic and Safety Engineering

## Reducing Red-Light Running Crashes

Nationwide crash statistics reveal that 200,000 crashes are attributed to red-light running annually. Of these crashes, 170,000 (85%) result in injury and 900 (0.5%) are fatal.[1]

Retroreflective traffic signal backplates offer a potential low-cost countermeasure to reduce these crashes caused by driver inattentiveness and poor signal visibility (i.e. at night, in fog, or during heavy precipitation).

Retroreflective backplates provide enhancements to a traffic signal's visibility, including:

- Isolation of the traffic signal from background lighting, signs, and visual distractions
- Enhanced traffic signal visibility during power outages
- Alerts drivers of the upcoming signal after driving a long roadway section without signals.[2]

**Retroreflective Backplates in Putnam, CT**

## Proven Safety Benefits

The Federal Highway Administration has identified retroreflective traffic signal backplates as a proven safety countermeasure to red-light running crashes. Currently, more than 20 States are using retroreflective backplates.

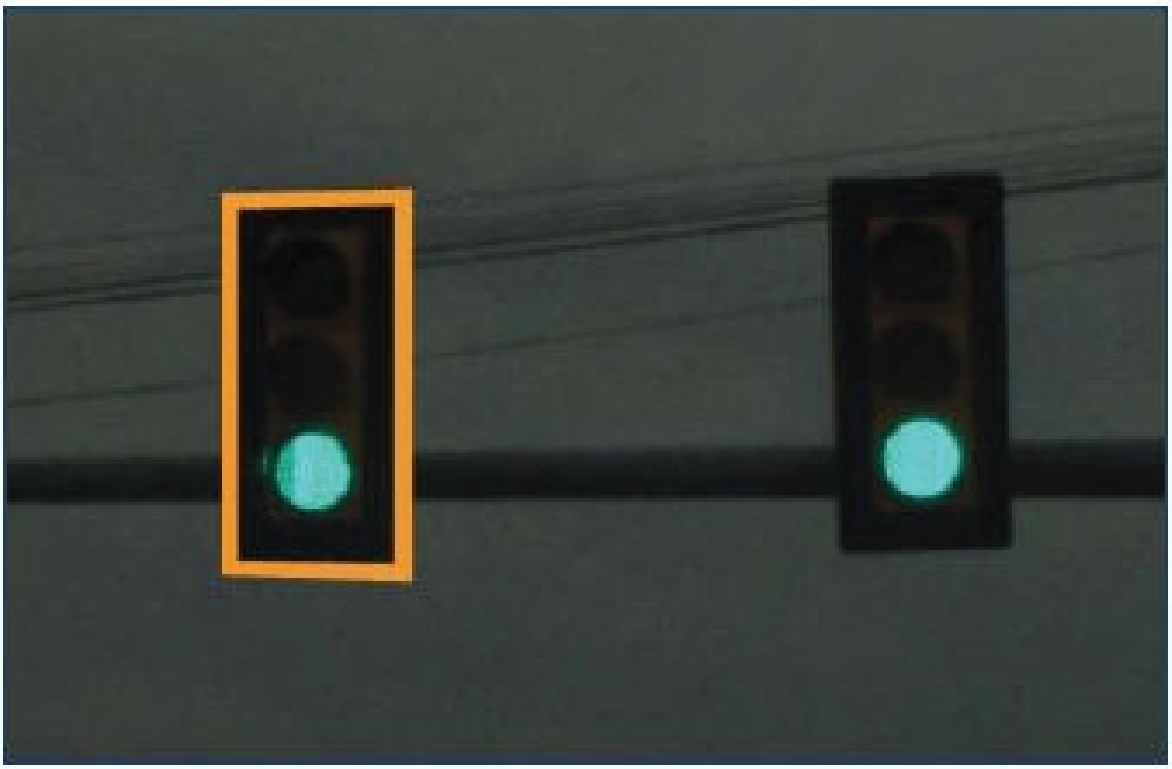
**15%** REDUCTION IN VEHICULAR CRASHES[3]

**37%** REDUCTION IN INJURY CRASHES[3]

**50%** REDUCTION IN LATE-NIGHT & EARLY MORNING CRASHES[3]

## Design of Retroreflective Traffic Signal Backplates

Backplates surround the signal housing to improve visibility of the signal. The backplates will have a two inch wide yellow, retroreflective border surrounding the signal housing to further enhance their visibility. Backplates provide a larger contrast area to help make traffic signals more visible in daylight, and the retroreflective tape improves signal visibility at night. All new state-owned traffic signals in Connecticut will be equipped with retroreflective backplates.



**Retroreflective Backplates at Night[3]**

## Further Information on Retroreflective Backplates

Additional information about retroreflective traffic signal backplates and the locations in which they will be installed can be found at http://www.ct.gov/dot/cwp/view.asp?a=3199&q=546146 or contact Joseph Ouellette at (860) 594-2721.

## References


1) Desktop Reference for Crash Reduction Factors, FHWASA-07-015, USDOT FHWA September 2007.
2) Retroreflective Traffic Signal Backplates Brochure, Virginia Department of Transportation
3) Federal Highway Administration. (December, 2009). Retroreflective Borders on Traffic Signal Backplates - A South Carolina Success Story, http://safety.fhwa.dot.gov/intersection/resources/casestudies/fhwasa09011

# Roundabouts

Connecticut Department of Transportation
Bureau of Engineering and Construction

Traffic and Safety Engineering

## Definitions and Features

A roundabout is a one-way, circular intersection in which traffic flows around a center island. All roundabouts have the following design features:[1]

- Traffic entering the roundabout yields to traffic already in the roundabout.
- Pavement markings and raised islands direct traffic into a one-way, counterclockwise flow through the roundabout.
- Geometric curvature is designed to reduce the speed of entering vehicles.

Other roundabout features include truck aprons to accommodate large and emergency vehicles driving through the intersection and pedestrian crossings with splitter islands for increased pedestrian safety.[2]

Roundabouts should not be confused with traffic circles, which are designed to control traffic with stop signs, traffic signals, or no formal control. Entering traffic does not always yield to traffic already in the traffic circle. Traffic circles also have a larger diameter circle and accommodate higher speeds.

Roundabouts provide multiple benefits over traditional intersections, including:

- Reduced delay and improved traffic flow
- Reduced speeds
- Less idling and air pollution
- Improved safety
- Reduced maintenance costs
- Longer service life compared to signalized intersections
- Aesthetically pleasing


## Proven Safety Benefits

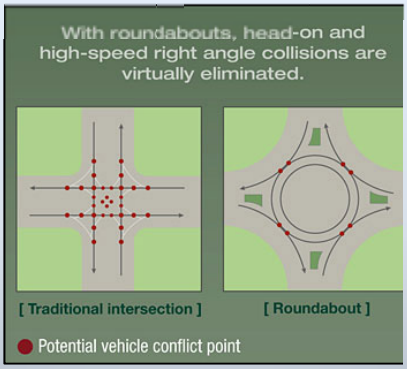
The Federal Highway Administration has identified roundabouts as a proven safety countermeasure for intersection design. Safety benefits of roundabouts include:

**35%** REDUCTION IN VEHICULAR CRASHES[3]

**89%** REDUCTION IN FATAL CRASHES[4]

**76%** REDUCTION IN INJURY CRASHES[3]

**75%** FEWER CONFLICT POINTS THAN FOUR-WAY INTERSECTIONS




Roundabout Conflict Points Reduction

## Rules for Roundabouts

**Drivers**

- When approaching a roundabout, yield to any pedestrians or bicyclists in the crosswalk.
- Yield to all circulating traffic at the yield line.
- Enter the roundabout when sufficient space is available.
- Do not pass or change lanes within the roundabout.
- If there is more than one lane, use the left lane to turn left and the right lane to turn right.
- Do not stop in the roundabout. Clear the roundabout to allow emergency vehicles to pass.
- When exiting the roundabout, use the right turn signal to notify other drivers, pedestrians, and bicyclists.
- Yield to any pedestrians and bicyclists crossing within the crosswalk when exiting the roundabout.[5]
- If you miss your exit, continue around the roundabout and exit.

**Pedestrians**

- Stay on designated walkways when approaching and leaving the roundabout.
- Only cross at designated crosswalks. Do not cross to the center island.
- Enter the crosswalk only when there is an adequate gap in traffic. Do not assume all motorists will stop for pedestrians.
- Cross to the splitter island, which offers safe refuge between two different directions of traffic flow.
- Once there is an acceptable gap in traffic, cross to the other end of the crosswalk.[5]

**Bicyclists**

- If comfortable riding with traffic, bicyclists may take the lane and circulate the roundabout. When entering the circle, bicyclists must yield to traffic already in the circle, ride at the speed of traffic in the roundabout, and use their right hand signal when exiting the roundabout.
- If uncomfortable riding with traffic, bicyclists may dismount their bike and cross the roundabout as a pedestrian at designated crosswalks.[5]


**Roundabout Crossing: Pedestrians and Bicycles**

## Further Information on Roundabouts

Additional information about roundabouts can be found at http://www.ct.gov/dot/roundabouts or contact Joseph Ouellette at (860) 594-2721.

## References


1) "Roundabouts: An Informational Guide", FHWA Publication No. FHWA-RD-00-067, June 2000.
2) "Roundabout Information: Roundabout Features", New Hampshire Department of Transportation. http://www.nh.gov/dot/org/projectdevelopment/highwaydesign/roundabouts/documents/RoundaboutFeatures.pdf
3) "NCHRP Report 572: Roundabouts in the United States. National Cooperative Highway Research Program, TRB, NAS, Washington, D.C., 2007.
4) "Safety Effect of Roundabout Conversions in the United States: Empirical Bayes Observational Before-After Study", Transportation Research Record 1751, Transportation Research Board (TRB), National Academy of Science (NAS), Washington, D.C., 2001.
5) "Guidance for Roundabout Users", Connecticut Department of Transportation. http://www.ct.gov/dot/cwp/view.asp?a=4109&q=469222&PM=1.