The following ordinance was introduced by Alderman Broun and seconded by Alderman Coleman:

BICYCLE LOOP DETECTORS CAPITAL IMPROVEMENT PROJECT ORDINANCE, FY 2011-12

Ordinance No. 14/2011-12

WHEREAS, the Town of Carrboro, has received funding from the North Carolina Department of Transportation (NCDOT) under the federal Surface Transportation Program-Direct Attributable (STP-DA) program for the design and construction of Bicycle Loop Detectors; and,

WHEREAS, the Town of Carrboro intends to enter into a Municipal Agreement with NCDOT to administer this federal funding to design and construct bicycle loop detectors; and,

WHEREAS, local funds are required and have been designated in the Town's unassigned fund balance in the general fund to match the NCDOT STP-DA funding award;

NOW, THEREFORE PURSUANT TO N.C.G.S 159-13.2, BE IT ORDAINED BY THE BOARD OF ALDERMEN OF THE TOWN OF CARRBORO THAT:

1. The Bicycle Loop Detectors Capital Improvement Project is hereby authorized to be undertaken until all project activity is completed.

2. The following revenues are anticipated to be available to the Town of Carrboro to complete the project:

Federal STP-DA Funds	$ 30,000.00
Town General Fund Unassigned Fund Balance	$ 7,500.00
	$ 37,500.00

3. The following amount is appropriated for this project to be expended in the following manner:

Design, Environmental Documentation and Construction	$ 37,500.00

4. Within five (5) days after this ordinance is adopted, the Town Clerk shall file a copy of this ordinance with the Finance Director and Planning Director.

The foregoing ordinance having been submitted to a vote received the following vote and was duly adopted this 22nd day of November 2011:

Ayes: Dan Coleman, Sammy Slade, Lydia Lavelle, Mark Chilton, Joal Hall Broun, Jacquelyn Gist, Randee Haven-O'Donnell

Noes: None

Absent or Excused: None

ATTACHMENT A

A RESOLUTION APPROVING A MUNICIPAL AGREEMENT WITH NCDOT TO DESIGN AND CONSTRUCT BICYCLE LOOP DETECTORS
Draft Resolution No. 52/2011-12

WHEREAS, bicycle loop detection at signalized intersections allows bicyclists to request a green

WHEREAS, bicycle loop detection at signalized intersections allows bicyclists to request a green light by placing their bicycles over an inductive loop that communicates with the traffic signal; and,

WHEREAS, bicycle loop detectors have the potential to discourage red-light running by providing an alternative to quickly cross the intersection; and,

WHEREAS, the Comprehensive Bicycle Transportation Plan recommends placement of bicycle detectors at various intersections and provides loop detector design guidance; and,

WHEREAS, the Board of Aldermen approved the bicycle loop detectors as a federal STP-DA transportation project on November 20, 2007, and subsequently designated fund balance for the local match required to install ten bike loop detectors; and,

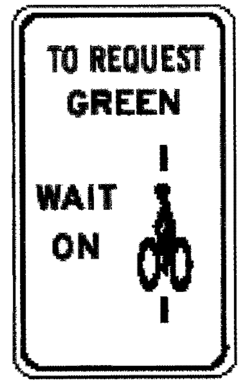
WHEREAS, the Durham-Chapel Hill-Carrboro MPO allocated $30,000 of STP-DA funding for the project on May 14, 2008; and,

WHEREAS, a Municipal Agreement is necessary to proceed with preliminary engineering and construction of the loop detectors;

NOW THEREFORE BE IT RESOLVED by the Carrboro Board of Aldermen that:

1. The Board of Aldermen approves the Municipal Agreement with NCDOT to design and construct bicycle loop detectors (NCDOT TIP # U-4726-DF);
2. The Interim Town Manager or Town Manager is authorized to execute the Municipal Agreement;
3. The Interim Town Manager or Town Manager is authorized to designate a "Person in Responsible Charge" for the project, as stipulated in the Municipal Agreement and in accordance with 23 CFR 635.105.

Fig. 7-29. Signage can help instruct bicyclists on how to use the detector loop.

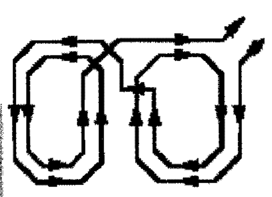


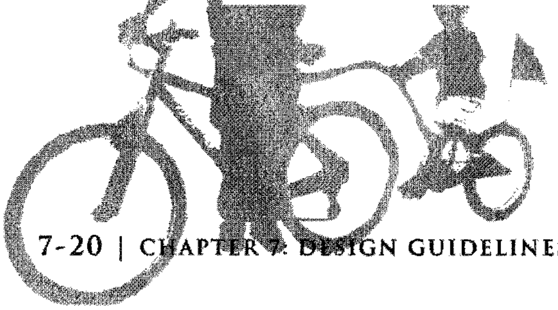
Bicycle-Activated Detector Loop

Changing how intersections operate can help make them more "friendly" to bicyclists. Improved traffic signal timing for bicyclists, bicycle-activated loop detectors, and camera detection make it easier and safer for cyclists to cross intersections. Bicycle-activated loop detectors are installed within the roadway to allow the weight of a bicycle to trigger a change in the traffic signal. This allows the cyclist to stay within the lane of travel and avoid maneuvering to the side of the road to trigger a push button, which ultimately provides extra green time before the light turns yellow to make it through the light. Current and future loops that are sensitive enough to detect bicycles should have pavement markings to instruct cyclists on how to trip them.

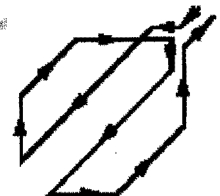
Loop detectors are important at cross streets, left-turn-only lanes and other travel lanes where cyclists may become stuck, unable to get a green light. Lane markings or signage that show cyclists where to position their bicycle maximize the capability of the sensor.

Quadruple Loop
- Detects most strongly in center
- Sharp cut-off sensitivity
- Used in bike lanes

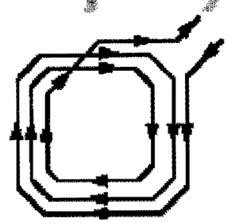




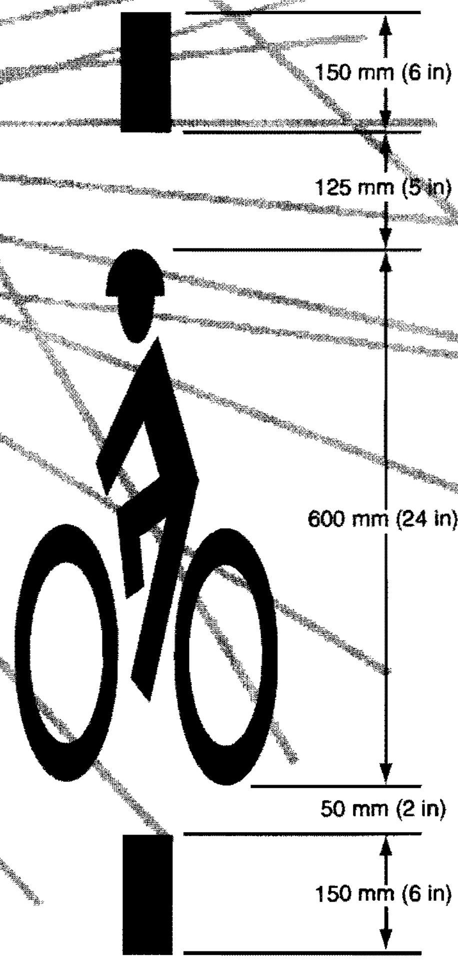
Diagonal Quadruple Loop
- Sensitive over whole area
- Sharp cut-off sensitivity
- Used in shared lanes



Standard Loop
- Detects most strongly over wires
- Gradual cut-off
- Used for advanced detection



From: Implementing Bicycle Improvements at the Local Level, FHWA, 1998, p. 70.



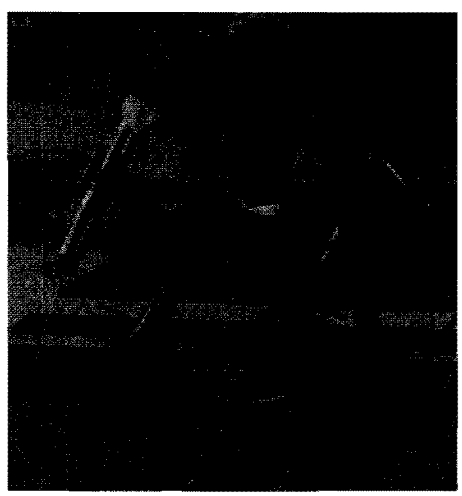


Fig. 7-30 — 7-31. Use pavement marking (top) to aid bicyclists in locating loop detectors at intersections (bottom).

h) Lighting systems that provide higher levels during more active times of the early morning and evenings should be considered. For example, employment areas could have pedestrian level lighting to supplement standard street lighting which could be timed to dim or shut off when pedestrian activity is lower. This reduces energy costs and potential "sky glow" impacts.

i) Lighting fixture and pole designs, color, and amenities such as banners should contribute to the identity of the district.

14. Street trees should be planted such that, once established, shade is provided for pedestrians. In areas with older very mature trees, an urban forester should be consulted to devise a programmatic tree replacement strategy so that when the older trees begin to die naturally, younger well-established trees will fill-in some of the area and avoid a stark change. Tree "pits" are now the preferred ground cover for street trees, replacing the older tree "grates." An urban forester will recommend the size and shape of tree "pits" to fit specific tree species.

E. Bikeability Improvements — The Town should retain a consultant and contractor to complete a design/build project that will install bicycle detection capabilities at all signalized intersections throughout Carrboro. The California Department of Transportation (Caltrans) recently completed a successful demonstration project that shows that video (camera) technology detected greater than 98 percent of bicyclists who were waiting for a green light without any cars or trucks at the intersection. This avoids bicyclists waiting at a specific spot to trigger a super-sensitive in-pavement loop detector and it saves time and effort by bicyclists to avoid going over to push the pedestrian signal pushbuttons. The consultant should initiate discussions to reach agreement with NCDOT on the use of suitable technology in Carrboro, perhaps using federal transportation enhancement funds, state bicycle program funds, state direct-allocation funds, or federal congestion mitigation air quality funds. As streets are repaved in downtown Carrboro, consideration should be given to restriping them with 11-foot travel lanes and 5-foot wide bicycle lanes (for state roads) or 10-foot travel lanes on town roads, if feasible. Proper pavement marking and signing should be installed as per the MUTCD particularly in intersection areas. Throughout downtown, bicycle route signs should be posted on streets that provide interconnectivity between the bicycle lanes and shared-use paths radiating from downtown. Cost ranges from a low of $25,000 per intersection to as much as $100,000 based on the Caltrans demonstration project.

F. Bus Stop Improvements — Amenities at bus stops should include seating, overhead shelter, shade, a map of the area, a bus route map and either a bus schedule or status board showing arrival time of next bus. For comfort, nearby should be marked crosswalks, public toilets, newsstand/magazines and books, and convenience items such as drinks and snacks for sale. Ideally, the bus stop is located where activities draw other people to the immediate vicinity, such as the Weaver Street "green" or Main Street businesses. Most existing bus stops in downtown Carrboro have a bench and bus route schedule. A shade tree should be planted preferably on the south side of the bench. The Town of Carrboro should consider a new form of shelter, perhaps inspired by a local artist. Triangle Transit Authority has a new design for shelters at future rail stations that could be one form of inspiration. Funding would likely be required by the Town of Carrboro for the incremental cost of each shelter above the cost of Chapel Hill Transit's existing shelters.

APPENDIX F: BICYCLE DETECTION PROJECT SUMMARY

Background and Purpose

Caltrans has undertaken a demonstration project to deploy a new technology, using a video image and tracking system, to detect and process bicyclists at selected intersections along state routes in three communities. The project shows that Video Image Detection System (VIDS) is an effective method to detecting bicyclists at traffic signal locations. The inductive loop typically used to detect vehicles at signalized intersections has not consistently been able to detect bicycles due to their small metallic mass. The purpose of the project was to field-deploy and evaluate Video Image Detection System (VIDS) equipment at test intersections for the purpose of detecting bicycles.

Six-Phase Approach

The demonstration project was conducted in six phases. The first phase produced a Feasibility Study and Technology Evaluation Report that studied available detection technologies. The study identified that the video image processing is a suitable detection technology currently available for bicycle detection. In the second project phase, the consultant invited video detection technology vendors to participate in a field evaluation demonstration. Four vendors accepted the invitation to participate in the VIDS equipment testing. Caltrans and consultant established a minimum level of accuracy for the demonstration tests and the vendors that met or exceeded the minimum threshold were eligible to bid on the final contract phase. All vendors exceeded the Caltrans video detection standard and were pre-qualified. The third phase of the project was to meet with city agencies and outreach to the bicycle communities to identify specific needs and concerns regarding bicycle detection at a signalized intersection. Comments and suggestions were gathered for inclusion into the project design. VIDS plans and specifications were prepared for the project sites in the fourth phase of the demonstration project. The design incorporated the latest Caltrans design standards and also included other upgrades to accommodate VIDS at the signal. The fifth phase was the construction phase of the project, which followed with the installation and commissioning of the video detection and other related traffic equipment. Iteris was the selected vendor for the bicycle detection through the standard bidding process. The final phase of the project involved a quantitative evaluation of the installed detection systems as well as a user satisfaction survey. This summary was prepared from the project findings and recommendations.

Effectiveness

The findings in this demonstration project conclude that video image processing technology is an effective method for bicycle detection application. From the project test results, the actual bicycle detection rate exceeded 98% per lane for the VIDS system. In most situations, the bicycle detection rate was 100%. Since the minimum Caltrans standard for front detection is 98%, the demonstration project exceeds Caltrans standards. Unlike loop detectors, VIDS has the ability to detect a bicycle's presence in the full width of an approach lane. Bicyclists do not need to position their bicycles at a specific location to trigger the detection sensor. VIDS also provides passive detection capability and no action from a bicyclist such as depressing a push button is needed. The seamless video detection process provides a safer and more effective crossing solution for casual bicyclists. Survey responses show the bicycle community was receptive to the video detection system and was satisfied with the detection performance at the test locations.

User Satisfaction

A survey was conducted with assistance from the bicycle coalition groups to identify the effectiveness of the VIDS system. A standardized survey form was developed to focus the evaluation comments on the project objectives. Survey questions include intersections evaluated, travel direction, time of day, weather conditions, other vehicles' presence, satisfaction with detection system, and other comments requiring intersection operation.
Most bicycle crossings were completed under optimal (sunny) conditions. The survey responses covered evaluations for some of the test intersections. Bicyclists had overwhelmingly favorable responses to the installed VIDS systems. All responses had satisfied remarks for the system performance. All survey bicyclists were detected and granted a green light in the absence of other vehicles in the test intersection.

In summary, the bicyclists surveyed were satisfied with the VIDS system, but some respondents wish there were signs indicating a VIDS system is in operation. This would encourage them to remain on the roadway and not move on to the sidewalk to activate the pedestrian push button for their crossing. Aside from the detection system performance, one of the respondents also requested timing adjustment in conjunction with the VIDS system.

LESSONS LEARNED

- The bicycle detection zone needs to cover the full width of the approach as a bicycle may be positioned anywhere within an approach lane. The detection zone can extend beyond the limit line to allow the bicyclists to be continued to be detection once they leave the limit line. This will give more time to bicyclists to cross the intersection.
- Once cyclists were accustomed to the new detection system, they were able to proceed through the test intersections with less delay.
- False detection and missed detection of the video detection system could be reduced with proper camera location and system setup programming.
- Deployment of VIDS is typically faster than inductive loops. Because there is usually no roadway disturbance in the VIDS installation process, road closures are minimized.
- In conjunction with bicycle detection, the timing parameters may need to be adjusted to allow more time for a bicycle to cross the intersection starting from a stop at some locations. Although, the detection zone will allow the bicyclists to be detected longer and the signal would not change as quickly as with inductive loops.
- Not all bicyclists are comfortable positioning themselves on the roadway alongside motorized vehicles. These bicyclists feel they risk a higher chance of injury on the roadway, especially at a left turn lane. For these bicyclists, they will continue to use the sidewalk and crosswalk to cross an intersection regardless of the detection system employed.
- Cyclists unaware of the presence of the VIDS system continued to use pedestrian push buttons to cross the test intersections.

- Under lower ambient light conditions (such as an intersection without street lighting at night), the VIDS system cannot detect a bicycle due to the low video contrast between the bicycle and the background, if the bicycle does not have a headlight. Under this condition, a headlight or other light source on the bicycle is needed to trigger the VIDS system.