ORIGINATOR Director, Bureau of Highway Operations		8-1-2
CHAPTER 8	Detector and Controller Logic	
SECTION 1	Vehicle Detection	
SUBJECT 2	Detector Types	

Wisconsin DOT recommends using its standard inductive, loop detectors. These detectors are cost effective, reliable, require little maintenance and last indefinitely when installed properly. (See FDM Chapter 16, Standard Detail Drawings).

INDUCTIVE LOOP DETECTORS

The main type of detection used in modern signal installations is inductive-loop detection. This type of detection consists of a loop installed in the pavement, a separate lead-in cable, and a detector amplifier located in the controller cabinet. When energized, the loop configuration creates a magnetic flux field. When a vehicle passes over the loop it causes that flux to change, which the detector amplifier is able to sense. Detector loops *may* be configured in many ways depending upon the application. This manual will discuss primarily rectangular loop configurations for all applications. The technology associated with today's modern loop detector amplifiers, particularly digital amplifiers, allows for a variety of motor vehicles to be detected successfully with typical rectangular configurations.

MICROLOOP

Microloops are small, passive, cylindrical probes typically buried beneath the roadway surface. The installation time for Microloops is much shorter than for installation of standard loop detectors. Microloops detect the presence of a vehicle by monitoring the Earth's magnetic field. When ferrous metal (e.g. the vehicle) is near the probe, the Earth's magnetic field flux line becomes distorted, which registers as a detection at the detector amplifier.

Microloops are used in pulse detection situations and *should* be operated in the locking detection memory mode at the controller. Microloops *may* be used on bridge decks where it is not practical to implement other loop types. Microloops for permanent installations are generally recommended only under special conditions such as poor

pavement structure and bridge decks. Their use **shall** be discussed with the maintaining authority.

VIDEO DETECTION

Video detection makes use of a camera and video monitor to detect vehicles on the roadway. The camera is placed at a location above the intersection and directed toward the approach; typically, one camera is required for each approach. The image is transmitted onto a video monitor where the user graphically draws the detection zone(s). Different sizes of detectors can be selected, and detection zones can be placed anywhere within the camera's field of view. This detection method is very flexible in that the detector locations can be modified easily using the mouse and video monitor.

Video detection is expensive but *may* have benefits in temporary or construction applications. Their use *should* be discussed with the maintaining authority.

MICROWAVE/RADAR DETECTION

Radar detection is based on the Doppler principle. A transmitter directs microwave beams toward the roadway. Any vehicle passing through the beam reflects the microwaves back to an antenna at a different frequency. The detector senses the change in frequency. These detectors can detect only passage and are difficult to maintain. Radar detection *may* be used for temporary or construction applications. Their use *should* be discussed with the maintaining authority.

SONIC DETECTION

Sonic detection is also based on the Doppler principle. Pulses of ultrasonic energy are transmitted toward the roadway through a transducer. A vehicle passing through this area reflects the energy at a different frequency back to the transducer, which senses the change and converts it to electrical energy. The transducer then relays this energy to a transceiver, which sends an impulse to the controller denoting presence or passage. Although these detectors can pick up presence and passage, they are difficult to maintain, expensive to install, and sensitive to, environmental conditions. Sonic detection is not recommended.