Inductive loops are considered the most reliable traffic classification detection method available. An inductive loop consists of wire “coiled” to form a loop that usually is a square, circle or rectangle shape that is installed into or under the surface of the roadway.

Inductive loops work like a metal detector as they measure the change in the field when objects pass over them. Once a vehicle drives over a loop sensor the loop field changes which allows the detection device to detect the presence of an object (mainly a vehicle). Inductive loops are referred to as presence detectors and in traffic detection are often used in pairs to collect classification data such as speed and length data.

An induction loop is an electromagnetic communication or detection system which uses a moving magnet to induce an electrical current in a nearby wire. Induction loops are used for transmission and reception of communication signals, or for detection of metal objects in metal detectors or vehicle presence indicators.

**Vehicle detection**

Vehicle detection loops, called inductive-loop traffic detectors, can detect vehicles passing or arriving at a certain point, for instance approaching a traffic light or in motorway traffic. An insulated, electrically conducting loop is installed in the pavement. The electronics unit transmits energy into the wire loops at frequencies between 10 kHz to 200 kHz, depending on the model.

The inductive-loop system behaves as a tuned electrical circuit in which the loop wire and lead-in cable are the inductive elements. When a vehicle passes over the loop or is stopped within the loop, the vehicle induces eddy currents in the wire loops, which decrease their inductance. The decreased inductance actuates the electronics unit output relay or solid-state optically isolated output, which sends a pulse to the traffic signal controller signifying the passage or presence of a vehicle.

Parking structures for automobiles may use inductive loops to track traffic (occupancy) in and out or may be used by access gates or ticketing systems to detect vehicles while others use Parking guidance and information systems. Railways may use an induction loop to detect the passage of trains past a given point, as an electronic treadle.

The relatively crude nature of the loop’s structure means that only metal masses above a certain size are capable of triggering the relay. This is good in that the loop does not thus produce very many “false positive” triggers (say,
Inductive loops

for example, by a pedestrian crossing the loop with a pocket full of loose metal change) but it sometimes also means that bicycles, scooters, and motorcycles stopped at such intersections may never be detected by them (and therefore risk being ignored by the switch/signal).

Most loops can be manually adjusted to consistently detect the presence of scooters and motorcycles at the least.

An inductive loop vehicle detector system consists of three components: a loop, loop extension cable and a detector. When installing or repairing an inductive loop system the smallest detail can mean the difference between reliable detection and an intermittent detection of vehicles. Therefore, attention to detail when installing or troubleshooting an inductive loop vehicle detection system is absolutely critical.

How it works:
The loop is buried in the traffic lane. The loop is a continuous run of wire that enters and exits from the same point. The two ends of the loop wire are connected to the loop extension cable, which in turn connects to the vehicle detector. The detector powers the loop causing a magnetic field in the loop area. The loop resonates at a constant frequency that the detector monitors. A base frequency is established when there is no vehicle over the loop. When a large metal object, such as a vehicle, moves over the loop, the resonate frequency increases. This increase in frequency is sensed and, depending on the design of the detector, forces a normally open relay to close. The relay will remain closed until the vehicle leaves the loop and the frequency returns to the base level. The relay can trigger any number of devices such as an audio intercom system, a gate, a traffic light, etc.

Loop Extension Cable
Loop extension cable is used to extend the distance from the preformed or saw-cut loop to the vehicle detector, which is usually located indoors or in a weatherproof enclosure. The characteristics of the extension cable are just as important as the characteristics of the loop wire. Use only 14, 16, or 18 awg stranded 2 conductor twisted, shielded cable with a polyethylene insulation jacket. The distance between the loop and the detector can safely be extended to 300 feet with proper extension cable.

Loop Vehicle Detector
The proper installation and material is critical! In general, loop vehicle detectors from all manufacturers work under the same principle and will all work reliably if the installation is done properly and the correct materials are used.