OVERVIEW

Basic Detector Theory

The inductive loop detection system is comprised of two elements, the electronic detector module and the inductive loop coil and lead-in cable. The detector oscillator circuit drives energy, 10 - 200KHz, through the loop wire creating an electromagnetic field. The loop detector forms a tuned electrical circuit of which the loop wire is the inductive element. If a metallic mass passes through the field, eddy currents will be induced in the conducting object. Since the loop inductance is proportional to the magnetic flux, it results in a decrease in loop inductance. The detector senses the change in inductance and actuates its electronic output.

Basic Loop Theory

The loop wire and lead-in cable are the inductive elements of the detection system and possess a combination of resistance and capacitance (both interwire and wire-to-earth). The loop wire is constructed to form a coil (usually two to six turns depending on loop size) where the magnetic field becomes more concentrated creating the zone of detection. All conductors or wires carrying an electrical current produce magnetic flux caused by the current flowing through the wire. The affect of this flux is the electrical property called inductance which is measured in microhenrys (μh).

Loop Wire

The inductive loop and lead-in wires are typically constructed using #14 to #18 AWG wire with low AC and DC resistance. The wire gauge and number of strands are important. However, more critical are the quality, thickness and type of wire insulation. The insulation may be rubber, thermoplastic or synthetic polymer. Cross-link polyethylene (XLP) is the most popular insulation and is strongly recommended. The insulation must withstand wear and abrasion from shifting slabs or pavement, moisture and attack by solvents and oils. Stranded loop wire is suggested over solid wire because of its mechanical characteristics. Stranded wire is more likely to survive bending and stretching than solid wire.