



A Complete Guide to Vehicle Loops



**VEHICLE
LOOPS**

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This guide features in-depth explanations on Saw Cut, Direct Burial, and Surface Mounted Preformed Loops for vehicle detection. This includes specifications, installation, as well as a detailed explanation on how to order them properly.

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Vehicle Loops: The Three Types and How They Work



What is a Vehicle Loop?

Vehicle loops are surface mounted, or much more commonly, underground sensors that create an electromagnetic field which sense the presence of a vehicle when it passes over or stops within the detection zone. When a presence is detected by entering the field, the loop sends a signal to a safety device such as a gate opener to open or secure a gate.

This technology plays a vital role in applications such as traffic signal control, automated gate systems, parking lot management, and security checkpoints.



Surface Mount, Saw Cut, and Direct Burial Loops



Saw Cut

Saw cut loops are installed into grooves cut into existing pavement, making them ideal for retrofitting roadways or paved areas. After the loop is embedded, the grooves are sealed to protect the wire from damage and ensure long-term durability.



Direct Burial

Direct burial loops are installed underground before paving, making them a preferred choice for new construction projects. These loops are encased in protective materials to prevent environmental damage and withstand the weight of paving materials.



Surface Mounted

Surface Mounted loops sit on top of existing surfaces and are attached using adhesives or fasteners. They do not require cutting or trenching, making them easy to install. They are best used in temporary or restrictive environments as well as budget friendly setups.

What does "Lead-In" mean?

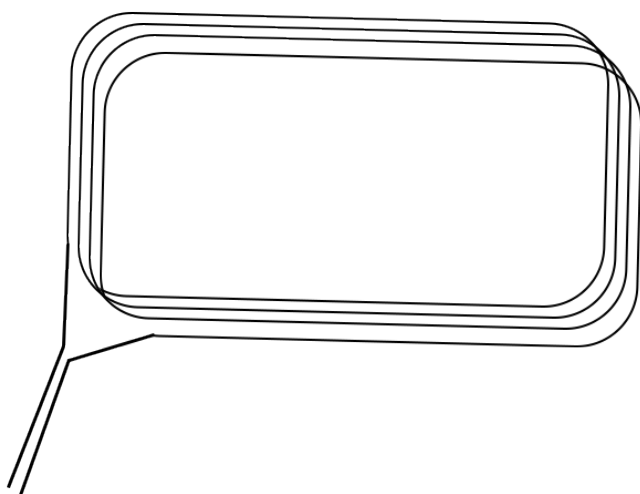
When shopping for vehicle loops, a common term is "Lead-In" or "Lead-In Wire(s)". This refers to the cables that extend out of the loops themselves (typically much thinner and more flexible), and connects to any given safety device such as a gate opener.

Often these cables are longer than the actual loops themselves so as to be connected pretty much anywhere. These are able to be customized to fit your needs, with lead-in cables being offered at upwards of 250'.

How does loop length work?

A common question we get is how loops can be measured by length and width if it's just a spool of wires. This is because those measurements are a representation of the detection fields being made by those spools.

You will also notice that despite being the same total spool length, some loops are listed as different dimensions. This is because they are manufactured with different fields in mind. For example, a 24ft loop can be sold as both a 6'x6' or a 4'x8' loop due to how they are manufactured.



4 Turn Loop Example



Lead-In Wires on a Saw Cut Loop

What are "Turns" when referring to Vehicle Loops?

The term "turns" for vehicle loops is a little misleading as it does **NOT** refer to the literal number of turns that you can make with it (4 turns for example to make a square). Rather, they refer to the total number of loops/wraps around the perimeter of your detection zone.

For example, if you have a 4 turn vehicle loop, it would wrap around your detection zone 4 times like in the example to the left. These turns help increase inductance in a vehicle loop.

What is Inductance?

Inductance is a property of an electric conductor or circuit that causes an electromotive force to be generated by a change in the current flowing. Basically, it's what makes your loop able to properly detect vehicles.

Without inductance or too much inductance, your vehicle loop can be either overly sensitive and activate your safety devices for no real reason, or not at all. Luckily, each of our loops comes with a detailed chart on the right amount of turns needed for a successful install.



Vehicle Loops 6' X 38' (14 Gauge) Preformed Direct Burial Loop
with Protected 30' Lead-In Wire - X-NL44-14-30

Reading Direct Burial Loop SKUs

All Direct Burial Loop SKUs are broken down in three parts like the following:

Vehicle Loops 6' X 38' (14 Gauge) Pre-formed Direct Burial Loop with Protected 30' Lead-In Wire - X-NL44-14-30

First is the suffix which can be X, E, or K. This indicates the **kind of direct burial loop** it is being:

- **X = Protected Lead-In Loop**
 - **E = Paveover Loop**
 - **K = Lightweight Loop**

Following this is "NL" (National Loop) and a number, in this case "44" which stands for the **total added dimensions of the loop**. Note that this loop is 6' x 38', so 6 added to 38 is 44.

After that is the **gauge**, which for this loop is 14 Gauge. Then, after choosing a lead-in length size, the sku will have an added number to the end of it. This will be the **lead-in length**. So for example, if you purchased the above sku with a 20' lead in length, it would appear as the following:

X-NL44-14-30



Vehicle Loops 4' X 9' (14 Gauge) Preformed Saw Cut Loop with
20' Lead-In Wire - Fits 1/8" Slot - P-NL13-18-20

Reading Saw Cut Loop SKUs

All Saw Cut Loop SKUs are broken down in three parts like the following:

Vehicle Loops 4' X 9' (14 Gauge) Pre-formed Saw Cut Loop with 20' Lead-In Wire - Fits 1/8" Slot - P-NL13-18-20

First is the suffix which for Saw Cut Loops is X or P. This indicates the **size of slot it fits into** which can be:

- **X = 3/16" Saw Cut Slot**
- **P = 1/8" Saw Cut Slot**

Following this is "NL" (National Loop) and a number, in this case "13" which stands for the **total added dimensions of the loop**. Note that this loop is 4' x 9', so 4 added to 9 is 13.

After that is the **gauge**, which for this loop is 18 Gauge. Then, after choosing a lead-in length size, the sku will have an added number to the end of it.

This will be the **lead-in length**. So for example, if you purchased the above sku with a 20' lead in length, it would appear as the following:

P-NL13-18-20



Saw Cut Loop Installation



Direct Burial Loop Installation



Surface Mount Loop Installation

Saw Cut Loop Installations

Saw Cut Loops are made to be installed into pre-existing parking lots, driveways, security check points, etc. More specifically, they are meant to be inserted into grooves that are cut into the ground using a saw (typically using a [diamond blade for asphalt](#)) and secured using an [approved sealant](#).

They are encased in polypropylene and are generally meant to last over 10+ years with minimal maintenance required. Part of what makes these loops so great is that they can be installed retroactively (retrofit installs), meaning you can change your mind on using them even after your cement is set.

Direct Burial Loop Installations

Direct Burial Loops are designed specifically for new build installations exclusively. Directly in-laid into the asphalt, direct burial loops are more rigid, durable, and liquid resistant than other loop types.

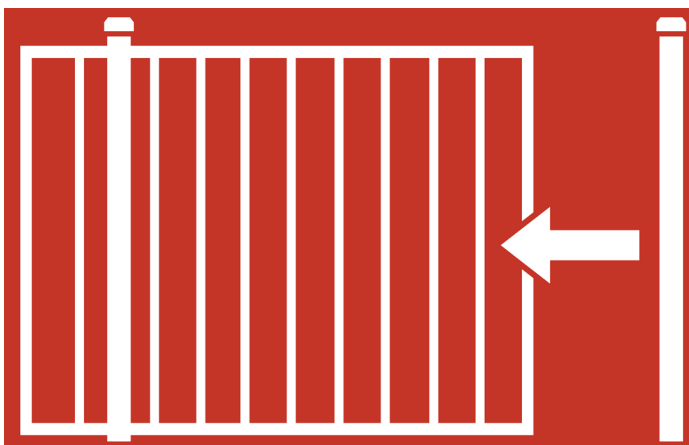
Using a 5-wire tubing system rather than a flat 4-wire system, these loops are generally best used for high-traffic, commercial, and industrial areas. Additionally, Direct Loops like the ones from National Loop Company come assembled, only needing to be inserted into the ground for instant setup.

Surface Mount Loop Installations

Surface Mount Loops are certainly the easiest to install of the three types as they are, as implied, surface mounted. Mostly they are easy, set and forget retrofit solutions for parking lots only needing to be secured with bolts, sealant, or some kind of adhesive.

These loops are protected with industrial strength EPDM rubber, making them ideal for residential and industrial areas alike. Surface Mount Loops are recommended for DIY, temporary, and retrofit installations.

[Shop Installation Tools](#)

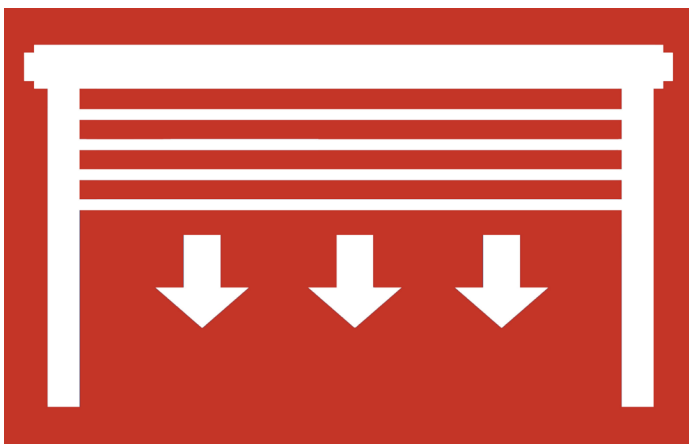
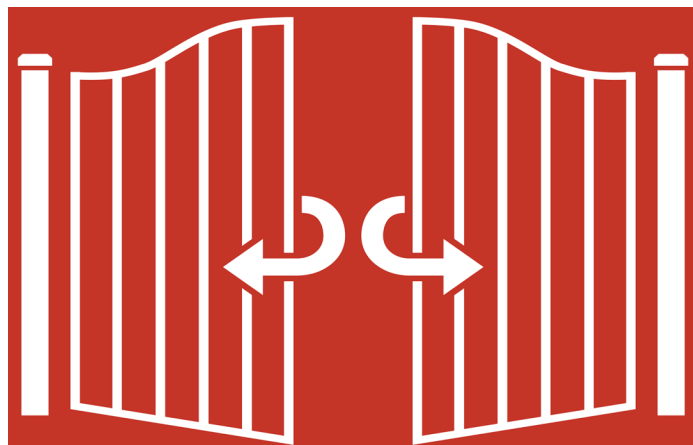


Slide Gate Installations

Slide gates need a minimum of two loops: an inside reverse loop (or exit loop) and an outside reverse loop. These loops ensure the gate stays open or reopens if a vehicle is in the path. If desired, the inside reverse loop can be connected to the exit loop function. The exit loop also opens the gate automatically when a vehicle drives over it.

Swing Gate Installations

Swing gates require a minimum of three loops: an inside reverse loop (or exit loop), a shadow loop, and an outside reverse loop. Reverse loops hold or reopen the gate if a vehicle is detected. The shadow loop checks for vehicles before the gate starts moving - but becomes inactive during motion, which is why the other loops are critical.



Overhead Door Installations

Overhead doors also require two loops: an inside reverse loop (or exit loop) and an outside reverse loop. These loops prevent the door from closing if a vehicle is in the path and can reopen it if necessary. The exit loop can also trigger the door to open automatically. Keep loops at least 4 feet apart for sites with multiple doors to prevent interference.

Vertical Pivot Gate Installations

Vertical pivot gates require at least two loops: an inside reverse loop (or exit loop) and an outside reverse loop. These loops perform the same function as other gate types - holding the gate open or reversing it if a vehicle enters the detection zone. If desired, the inside reverse loop can double as an exit loop.



How Much Sand Do You Need for Direct Burial Loops?

Dry sand fully surrounds and protects direct burial loops inside the trench. To determine how many bags of sand you'll need, gather the following info:

- Loop Perimeter (in feet)
- Lead-in Length (in feet)
- Trench Width (in inches)
- Trench Depth (in inches)
- Volume per Bag of Sand (in cubic feet)
- Sand Volume (cubic feet) = ((Loop Perimeter + Lead-In Length) x 12) x (Trench Width x Trench Depth) / 1728

We calculate the trench volume in cubic inches, then convert it to cubic feet (since one cubic foot = 1728 cubic inches). Once you know the total volume, divide by the volume each sandbag covers to get the total number of bags required. **Standard Sand Coverage: 1 bag of 50 lb dry sand = about 0.5 cubic feet.**

So, the simplified formula becomes:

Total Sand Bags = Trench Volume (cubic feet) / 0.5



[Shop Loop Sealant](#)

How Much Loop Sealant Do You Need for Saw Cut Loops?

To determine how many tubes of sealant you need, you'll need to know:

- Groove Width (in inches)
- Groove Depth (in inches)
- Loop Perimeter (in feet)
- Lead-in Length (in feet)
- Sealant Volume per Tube

$$\text{Sealant Tubes} = (\text{Total Groove Length in Feet} \times 12) \times (\text{Groove Width in Inches} \times \text{Groove Depth in Inches}) / \text{Sealant Tube Volume (in}^3\text{)}$$

Let's do some quick conversions to help get everything in the correct units first:

- Loop Perimeter + Lead-In Length = Total Groove Length
- Total Groove Length x 12 (to convert into inches)
- Groove Width x Groove Depth x Groove Length = Groove Volume

So now we have simplified the formula to:

$$\text{Sealant Tubes} = \text{Groove Volume} / \text{Sealant Tube Volume.}$$