

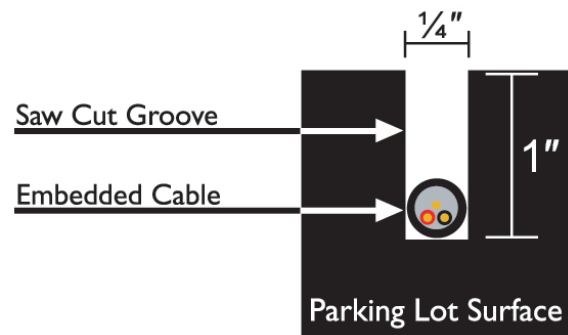
## Saw Cutting the Marked Area

The 14AWG locking antenna is installed in asphalt or concrete in a saw cut one inch (1") deep and one-quarter inch (1/4") wide. Saw cutting at this depth minimizes the chances of running into drain or power transmission lines already placed in the ground, as they are required to be buried at a much lower depth. Saw cuts can be done using either a wet or dry cut technique.

Dry saw cutting leaves no wet residue and is therefore easier to clean up. The downside to dry saw cutting is that it requires the proper equipment to capture the airborne dry asphalt particles. If you choose to dry cut, make sure that all technicians are equipped with proper breathing apparatus and protective gear.

Wet cutting does not require respiratory protection, but requires more work to clean up. Also, residue from wet cutting must NEVER be allowed to run into the storm drain or public streets. Most cities will levy a heavy fine for this infraction.

All saw-cuts on concrete should be in a cold seam, where possible.



## Removing Saw Cut Residue

After sawing, the cut needs to be cleaned out. If you have chosen to wet cut, clean out the saw cut and surrounding area using a wet-dry shop vacuum and a high-pressure water sprayer. In order to minimize staining, make sure to clean the areas before the saw cut residue dries.

If you have chosen to dry cut, clean the saw cut and surrounding area using the specified power sweeper. Any excess residues should be cleaned out using the Gatekeeper Hook, or if a Hook is not available, you may use a straight edge screwdriver.



Gatekeeper Hook for cleaning out the saw cut

## Installing the Perimeter Antenna

Once the saw cut is completed, and cleaned, the next step is to install the 14AWG antenna. Place the antenna wire spool onto a wire caddy and walk along the saw cut so that the wire rolls off the spool and into the cut. Follow with the Gatekeeper Antenna Roller to press the antenna securely down into the cut.

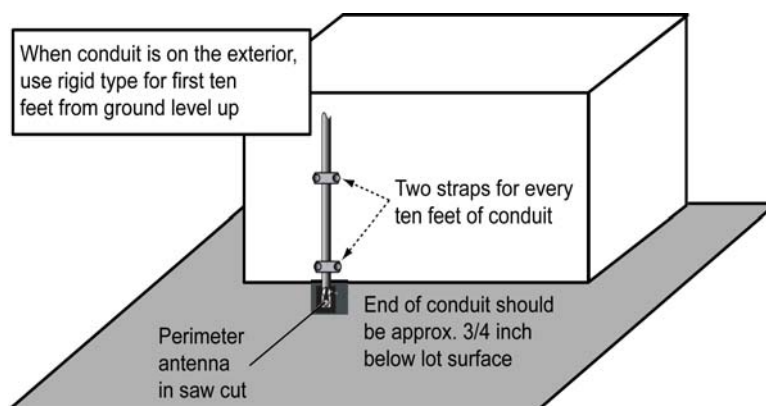
At some point during the installation, you will need to run the perimeter antenna through landscaped areas enclosed by concrete curbs. See "Perimeter Antenna through Curbs", page 42 for detailed instructions.

Before trenching in the landscape, insure that you will not be encroaching upon any sprinkler system or electrical lines. It is imperative that any antenna placed in the landscape areas be installed in conduit, as the conduit offers corrosion, resistance and high impact protection. Take caution to insure that the antenna is installed away from sprinklers, water valves, and other high maintenance areas. Use your fish tape to pull the antenna from one end of the PVC to the other end. Anytime PVC conduit is used it must be sealed where the conduit ends. Use expansion foam to seal each end of the PVC conduit after the antenna has been installed. Always return the landscape area to its original condition.

When it is necessary to bring the antenna across the roofline or down the side of the building, ½" rigid conduit is used for the first ten feet (10'), then ½" EMT conduit should be installed and supported as required by code. When conduit is exposed to the elements, compression connectors must be used. Never install any antenna above ground without running it through conduit.

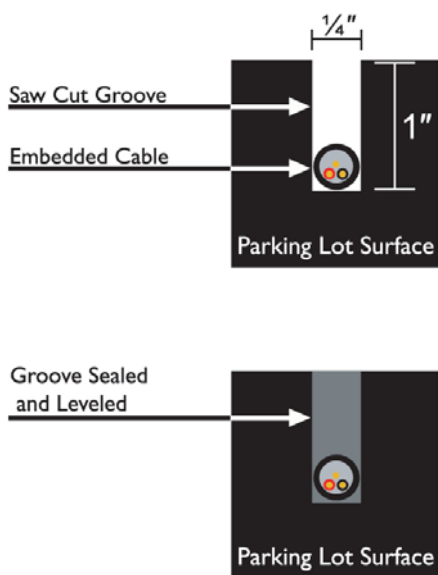
Anytime a conduit makes contact with the ground surface, a one inch (1") penetration must be made and repaired with the appropriate patch, i.e. concrete or asphalt. If the conduit contacts the earth, the conduit must be no less than six inches (6") deep. Use expansion foam to seal the ends of conduit when installing below ground. When EMT is installed on a roofline, 2" x 4" wood blocks must be used to support the conduit. Use mastic to affix the blocks to the roof. Never nail or screw the wood blocks to the roof. The roof surface should never be penetrated.

For detailed instructions on making splices in the perimeter antenna, see 46.



## Sealing the Saw Cut

After the antenna is in place, the remaining  $\frac{3}{4}$ " of the saw cut is filled with asphalt sealer. The environment of the installation will dictate the type of sealer to use. In dry weather conditions of 40° Fahrenheit or higher, a cold-pour



sealant and pour pot should be used. Gatekeeper approved sealants for asphalt include OverKote and SealMaster. Gatekeeper approved sealants for concrete include SikaFlex or Vulcum. Make sure that you have completely cleaned the surface of the asphalt before applying sealer. When using cold pour asphalt sealant, mix the sealer thoroughly before attempting to apply. Use an electric drill with a mixing paddle for at least five (5) minutes to guarantee that it is thoroughly mixed. To insure a professional looking installation, make sure that the sealant is level with the top of the saw cut (see diagram). If any settling, sags, or cracks develop during the curing process, a second application will be required. While applying the sealer into the saw cut, if there is any excess or over spill, use a V-shaped squeegee to direct the excess into the saw cut and to obtain an even application. It is advisable to use traffic cones and caution tape to prevent any vehicle or customer traffic from crossing the sealer for approximately 30 minutes while it is drying. It takes approximately 24 hours for cold pour sealer to completely cure.

Cold pour sealant may not be used at temperatures below 40° Fahrenheit or in wet conditions.

If cold or wet weather does not permit the use of a cold pour sealant, then a hot melt asphalt sealant will be required. For hot melt installations, you will need a melting applicator, a heat lance, and hot pour crack sealant. It is important to note that if the temperature is less than 40° Fahrenheit, you must use a heat lance to heat the asphalt before applying the hot pour crack sealant. If the asphalt is not properly prepared with the heat lance, the hot pour sealant will not adhere to the asphalt surface. Adjust the melting applicator to a temperature ranging from 350° to 375° Fahrenheit and insert the crack sealant cubes. Gatekeeper's approved Type 2 traffic cable (IMSA 51-50) is rated to withstand a temperature of 400° Fahrenheit. When applying the hot pour crack sealant, use the v-squeegee to direct the sealant into the crack.

## Mounting the Central Transmitter

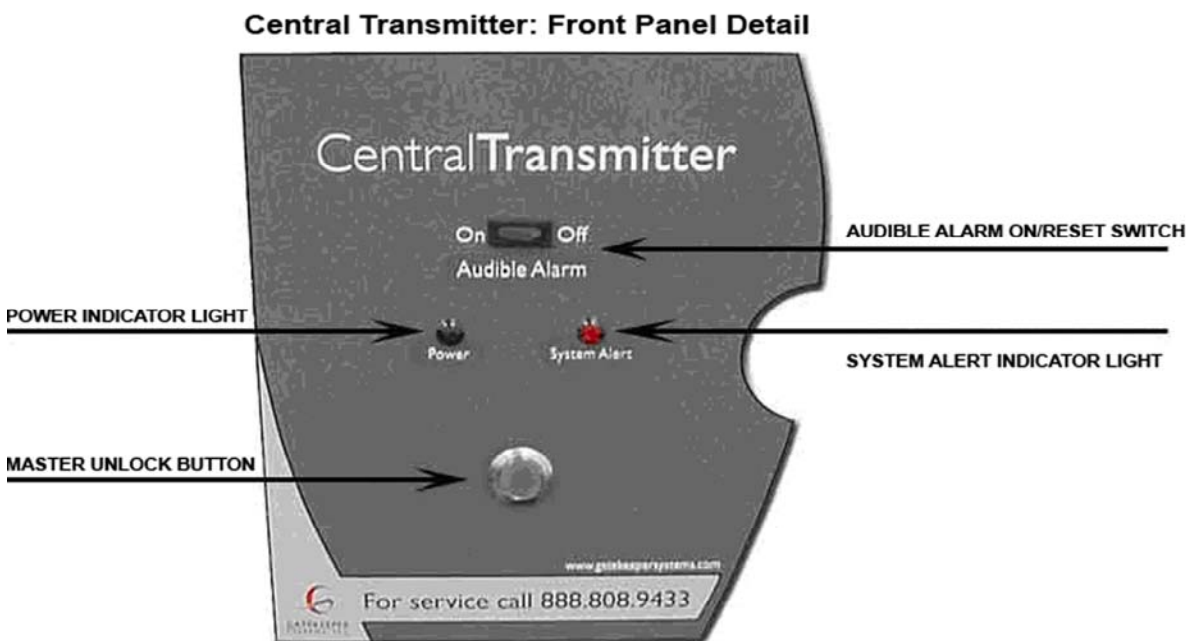
The CentralTransmitter should be mounted in a secure, accessible location, away from possible forklift impact or any other hazards. The CentralTransmitter needs air flow for cooling; do not install in a small confined space. Mount the unit to the wall, at least five (5) feet above the finished floor, using the pre-drilled holes on the back chassis of the enclosure. A drill-hole template is included inside the shipping package for the CentralTransmitter.

The enclosure comes with pre-drilled access holes located at the bottom of the enclosure: one for the power supply and one for the conduit containing the antenna. Any conduits entering the transmitter must be installed neatly and anchored properly using EMT straps.

This is a good point in the installation to check the resistance in the perimeter antenna (see "Checking Perimeter Antenna Resistance", page **Error! Bookmark not defined.**). Write down your measurement on the sticker located on the insides of the CentralTransmitter door.

## CentralTransmitter Front Panel

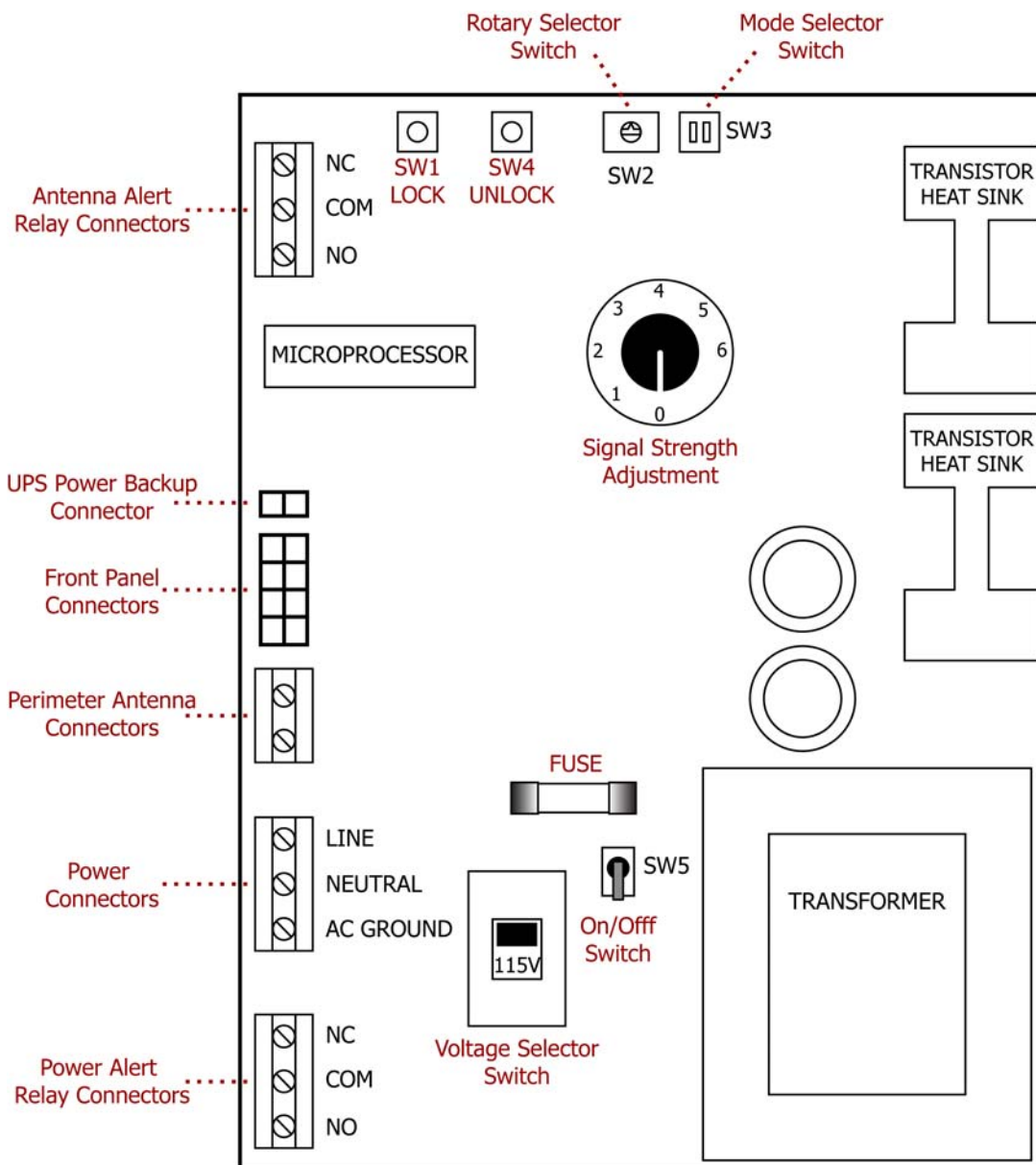
The exterior of the Central Transmitter has two LED's that indicate system status. In addition, the Central Transmitter has an audible alarm, to alert store personnel of a system disruption. The GREEN Power Indicator LED will illuminate when the Central Transmitter is powered up and connected to a completed circuit (a functioning perimeter antenna). If there is a break in the perimeter antenna, the RED System Alert LED will illuminate (see diagram below).



The Master Unlock Button may be used to transmit a temporary unlock signal through the perimeter antenna. In situations where the store has lost all of their CartKeys, the master unlock provides the ability to unlock any locked wheels that are still located at the perimeter line. The master unlock signal is factory preset to transmit an unlock signal for 30-seconds. Finally, the Audible Alarm Switch allows the store personnel to turn off the audible alarm in the instance of a System Alert. Once the store personnel has been made aware of the system alert and telephoned Gatekeeper Customer Service, the Audible Alert may be switched to the OFF position.

## CentralTransmitter Circuit Board

### Schematic diagram



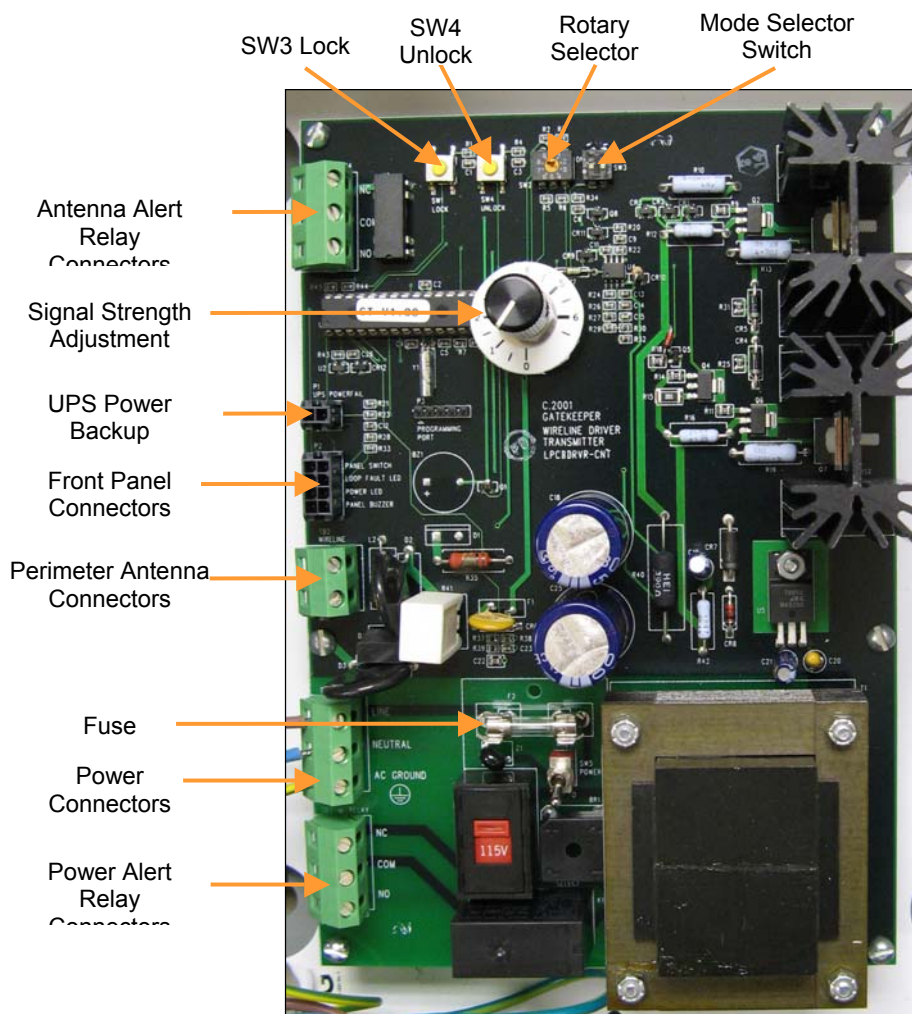
Control	Description
Mode Selector switch	Specifies the type of signal (GS2 digital, analog, EP2000 or door mode) that will be generated by the CT (page 30).
SW2 Rotary Selector switch	Specifies single locking line or locking/unlocking lines (page 55).
SW1 Lock button	Transmits a signal that locks all carts near the perimeter antenna.
SW4 Unlock button	Transmits a temporary signal that unlocks all carts near the perimeter antenna.
Antenna Alert Relay	Can notify an existing store system if the perimeter antenna is damaged (page

Control	Description
connector	31).
UPS Power Backup connector	
Front Panel connector	Connects to the CT front panel indicator lights and control switches.
Perimeter Antenna connector	Terminals for connecting the perimeter antenna to the CT.
Power connector	Terminals for connecting the AC power lines to the CT.
Power Alert Relay connector	Can notify a store system if power to the CT is cut off (page 31).
Voltage Selector switch	115/230 V selector. US settings are 115V.
SW5 On/Off switch	Cuts power to the circuit board. Does NOT deenergize the system.
Fuse	Current overload protection for the board (page 72).

### CentralTransmitter Circuit Board

#### Actual Layout

Detailed photo of the GS<sup>2</sup> CT circuit board. Note that the actual placement of components may vary slightly with different versions of the board.

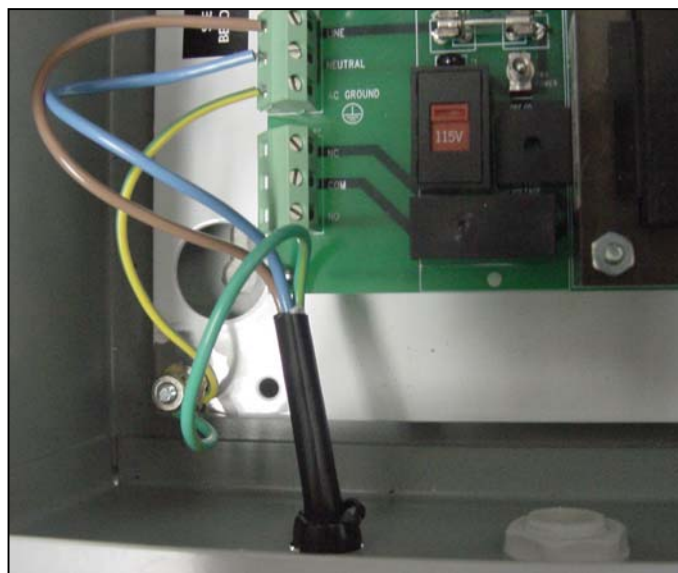
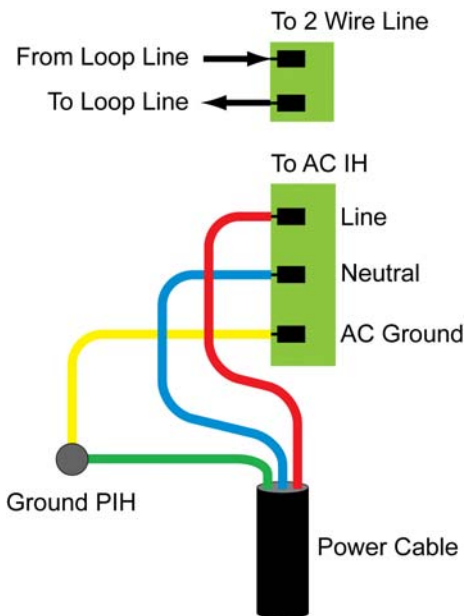




## Connecting Electrical Power to the CentralTransmitter

The CentralTransmitter may be powered using the power cord included, or by hard wiring the unit to an available circuit. The circuit for the power outlet must be equipped with a 15 Amp circuit breaker. The Transmitter does not require a designated circuit, but the circuit must have 24-hour power supply available. The circuit must be a non-switched circuit. Use the voltage selector to set the proper voltage. Do not turn on any power to the transmitter until instructed to do so in this manual.

The incoming power is terminated at TB1 AC. Terminate one wire to each of the Line Terminals. The ground wire should be green and yellow striped and should be connected to the ground screw located on the backboard before getting connected to the ground connector of the power terminal. **Do NOT power up yet!**



Connecting the Central Transmitter power cable

**NOTE:** The CentralTransmitter should be connected to an Uninterruptible Power Supply (UPS) or hard wired to a 24-hour power source. Extension cords are NOT to be used. All connections must be in compliance with local building codes.



## Calibrating the Central Transmitter

The CentralTransmitter board is an electronic signal generator which transmits a digitally encoded signal through the perimeter antenna. After the CentralTransmitter has been properly installed, the antenna is connected, and electrical power has been installed, set up and testing of locking distance is required.

1. Turn the potentiometer to zero.
2. Set the "SW5 POWER" switch to ON.
3. Wait 10-15 seconds for the transmitter to energize, then turn the potentiometer to "2.5". This should result in a locking distance of approximately three (3) feet from the perimeter antenna.
4. Go outside and test the locking range of a GS<sup>2</sup> Wheel. It should begin to lock at approximately three (3) feet from the perimeter antenna.
5. Continue checking different points of the perimeter to insure that all locking points have a consistent locking range. Confirm that all areas are protected with a locking range of approximately three (3) feet on either side of the perimeter antenna.

Remember, each time a wheel is unlocked it will be unable to lock again for 10-15 seconds. There is a delay programmed into the wheel, to allow a wheel to be removed from the influence of the locking zone, after it is unlocked. If twisted pair has been installed, verify that there are no gaps in protection between the edge of the twisted pair and the locking loop. In addition, verify that the twisted pair is not emitting a locking signal, which locks the GS<sup>2</sup> Wheel.

Confirm that the wheel will not lock anywhere inside of the store. Check all entranceways, checkout lanes, and cart corrals.

## Selecting the Transmitter Mode

The D-9110A CentralTransmitter may be configured to send out four different types of signals. The four types are Digital (GS<sup>2</sup> and GS<sup>1</sup>), Analog, EP2000, and Door Mode.

Inside the transmitter, the mode selector switch location is SW3. To change from one mode to another, first turn off the transmitter, then switch SW3 to the desired mode before powering on the transmitter again. The switch values and their corresponding signals are shown below:

SW3 Setting	SIGNAL TYPE
00 (Both Off)	GS <sup>2</sup> Digital Signal
01	Gatekeeper Analog Signal
10	EP2000 Signal
11 (Both On)	Door Mode Signal

The Gatekeeper Digital Signal will work with any digital version of Gatekeeper wheel (GS<sup>1</sup>, GS<sup>1.1</sup>, and GS<sup>2</sup>). The Gatekeeper Analog Signal will work only with a Gatekeeper Analog wheel. The EP2000 Signal will work with a GS<sup>2</sup> Wheel, Gatekeeper EP2000 wheel, and Cartronics CAPS caster. The Door Mode Signal is the same signal as the ExitManager Door Signal, and is used only when the D-9110 CentralTransmitter is used in an ExitManager configuration.

## Connecting the Alarm Relays

The CentralTransmitter Alert Relays provide the capability of forwarding CT status alerts to an existing store monitoring or security system. There are two alert relay circuits built in to the GS<sup>2</sup> board:

- Power Alert Relay – outputs a signal from the Power Alert Relay connectors in the event of a power outage to the CT.
- Antenna Alert Relay – outputs a signal from the Antenna Alert Relay connectors if the CentralTransmitter stops receiving the terminating signal from the Perimeter Antenna.

To enable these alert relay features, the store’s Alarm Service Provider should connect the leads from the appropriate store system to the Power Alert Relay connectors and/or the Antenna Alert Relay connectors, as shown on the circuit board diagram, 27.

## Information Tracker

Upon completion of the Central Transmitter installation, make a note to indicate the Date, Line Resistance (from your ohm meter), Locking Range, and technician Name in the Central Transmitter Information Tracker. This should be checked and updated on each successive service visit to the store.

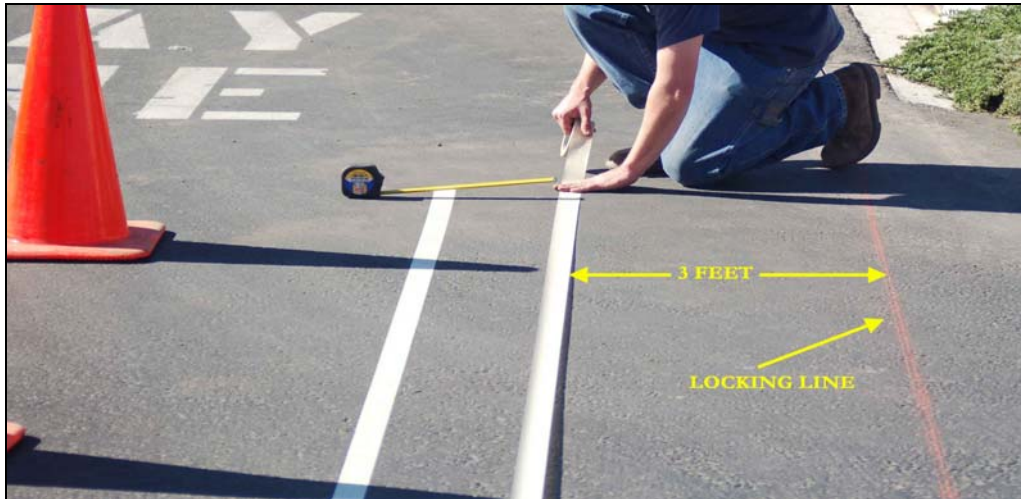
CentralTransmitter Information Tracker	
DATE	OCT 25, 2005
OUTPUT SETTING	1.5
RESISTANCE (Ohms)	2.2
LOCKING RANGE	3 FEET
FSR NAME	DENNIS JONES
DATE	DEC 2, 2005
OUTPUT SETTING	2.0
RESISTANCE (Ohms)	2.4
LOCKING RANGE	4 FT
FSR NAME	SCOTT HELMS
DATE	JAN 17, 2006
OUTPUT SETTING	1.5
RESISTANCE (Ohms)	2.4
LOCKING RANGE	3 FT
FSR NAME	PAUL BRICKSON

Information tracker with initial entry and two subsequent service entries.

## Perimeter Striping

You will need:

- Masking Tape,
- Nine (9") inch paint roller  $\frac{3}{4}$ " nap for medium rough surfaces,
- Gliden Ultra-Hide Durus Acrylic Traffic Paint (Lot# GL-0087,
- Thermoplastic striping tape (for wet conditions only).



**Measuring for the perimeter stripe**

Striping the containment area is an important part of the installation. Perimeter striping works in combination with parking lot signs and cart-mounted signs to educate and warn the customer of the new limits of cart travel. It is important that the striping is bright, clean, and straight.

Stripe any area along the antenna perimeter where carts may exit, including: major ingress/egress points such as drive ways, walkways exiting the property, and major drive lanes within the parking lot. Do not stripe areas where the perimeter antenna runs along walls, fences, or landscaping.

The perimeter stripe should be located approximately three feet (3') before the antenna path, as this is where the Gatekeeper wheel will begin to lock. The stripe should be nine inches (9") wide.

Thoroughly sweep the area clean of any debris prior to placing chalk lines and masking tape. It is helpful to section off the area using traffic cones or caution tape. Use chalk lines and masking tape to mark the area to be striped. Prior to painting, insure that the masking tape is straight and that there is no debris inside the edges of the tape. Debris will cause the paint to flow outside the edges of the tape and create smudges. Using a nine (9) inch semi-rough paint roller, apply a coat of yellow traffic paint inside the masked area. In most cases, two coats will be required. After the stripe has been painted, remove the masking tape immediately. Allow 20 minutes for the paint to dry before any traffic crosses the newly applied stripe (you may also dry with a torch).

After the paint has dried, a stencil is applied on top of the perimeter striping. The stencil is placed directly over the striping and sprayed with BLACK spray paint. A good rule of thumb is to place a stencil for every five (5) feet of striping.



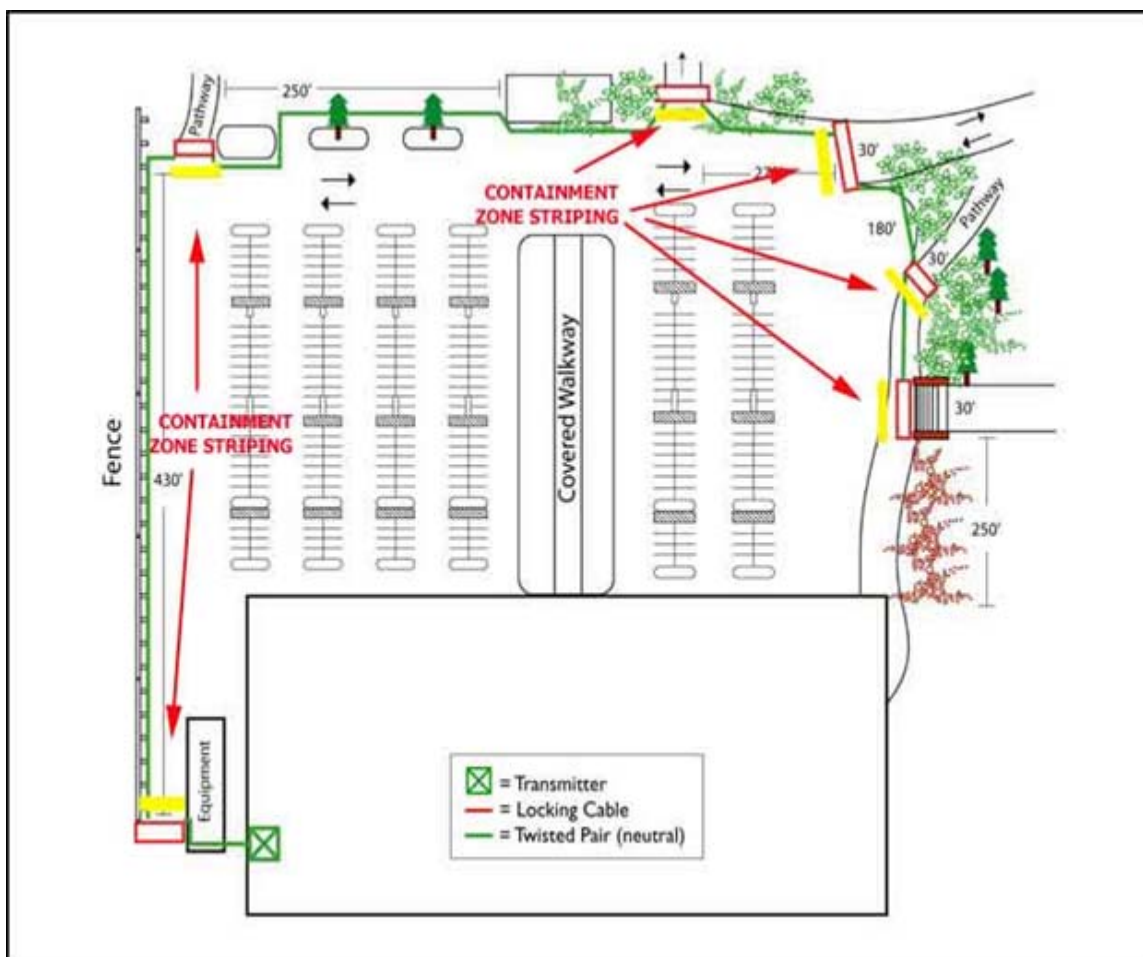
**Finished Perimeter Stripe**

### Thermoplastic striping

In the event that weather conditions do not allow the application of paint, a Thermoplastic stripe may be applied. These stripes typically come in 3' x 4" sections and are applied to the asphalt using a blow torch. If the asphalt is wet, it must first be dried using the blow torch. Once the asphalt is dry, the Thermoplastic stripe should be placed and then heated with the torch until it completely adheres to the asphalt.

### Sample Striping Layout Map

Striping locations are indicated on each of the "Sample Site Plans" in addition to the diagram below.



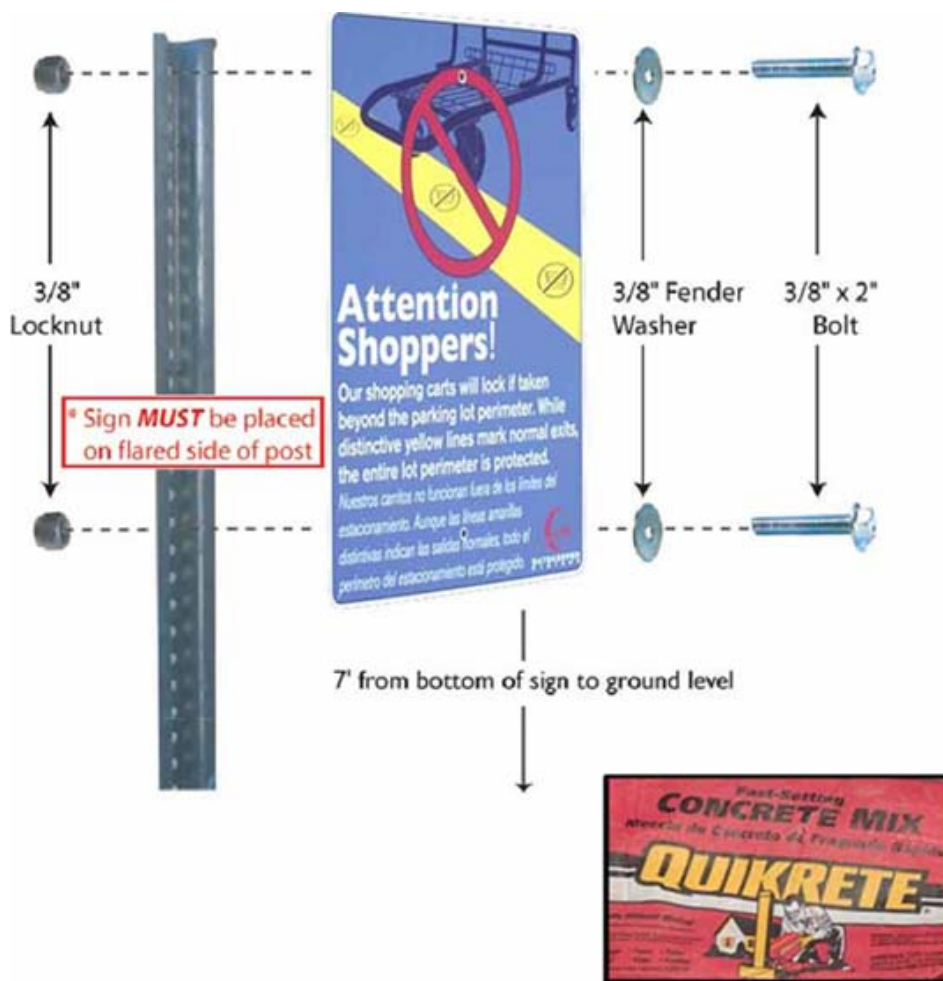
Site plan showing striping areas

## Installing the Parking lot Signs

Parking lot signs work in combination with the containment zone striping to educate shoppers as to the location of the system perimeter. Signs should be installed at locations where carts are most likely to be taken from the parking lot. Make sure that all ingress/egress points (driveways) have a minimum of one sign. Additional signs may be placed on existing lamp posts or sign posts, using sign straps. If no existing posts are available or located in logical locations for a parking lot sign, you will need to install a parking lot sign along with a sign post (instructions to follow). Parking lot signs should be installed no less the seven feet (7') from the bottom of the sign to ground level. Do not install any sign that may cause a hazard to pedestrians. Do not mount signs on a public street light, traffic signal pole, or any property not managed/owned by the store.

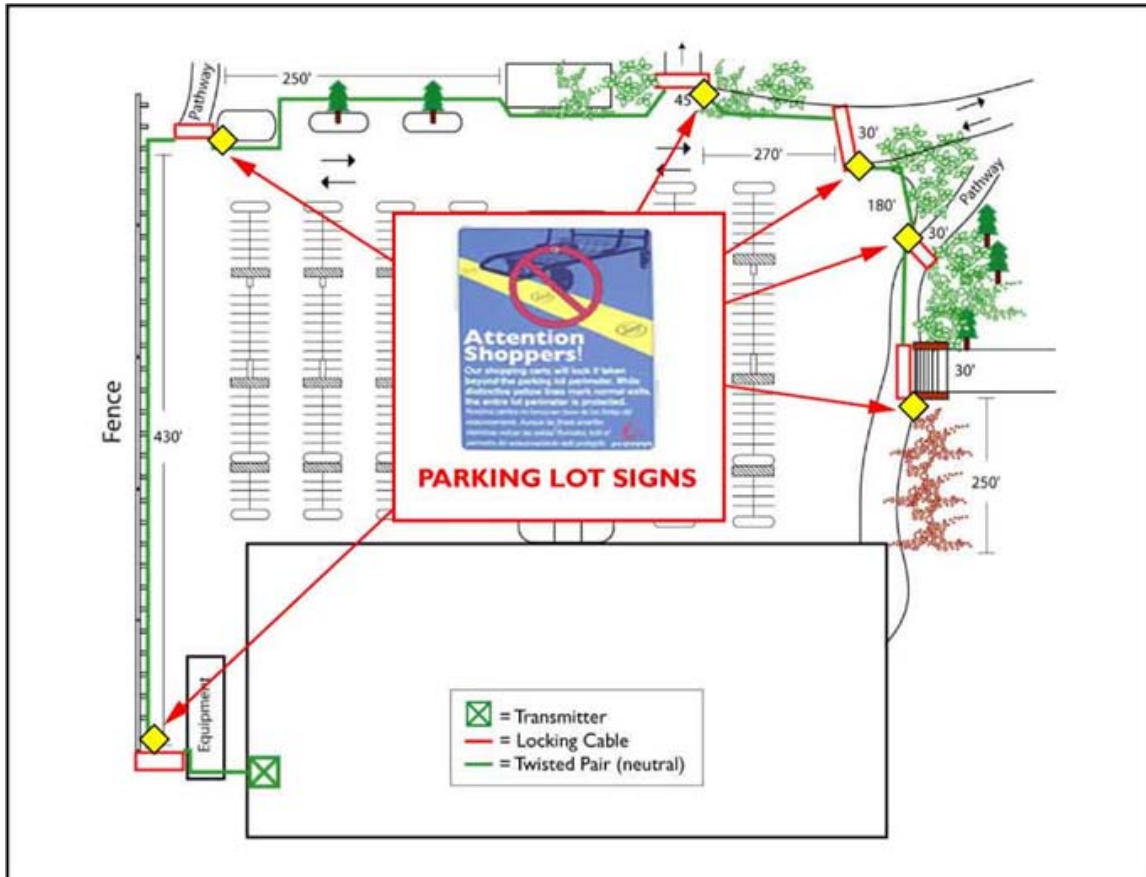
When installing the parking lot sign and sign post, the sign post should be buried no less than two feet (2') into the landscaping and the post should be placed in Quikrete or a comparable concrete mixture in order to ensure a solid base that will withstand high winds and tampering. The sign should only be installed on the flared side of the sign post, with a 3/8" fender washer placed between the bolt head and the sign.

For more details on installing the parking lot signs, see page 51.



Parking lot sign assembly

Sample Parking Lot Sign Layouts



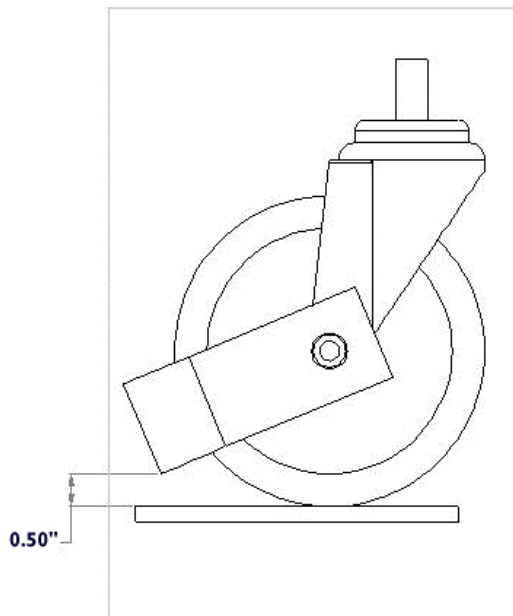
Parking lot sign detail on site map

## Installing the Anti-tilt Bars

The anti tilt bars must be tack welded BEFORE installation of the GS2 Wheel. The GS2 Wheel contains sensitive electronic parts that can be damaged.

The anti-tilt bar is mounted on the right rear horn as you push the cart. This must be a rigid non-swivel horn. If your carts have four swivel casters, do NOT use an anti-tilt bar. The GS<sup>2</sup> Wheel will be mounted on the opposite front caster from the anti-tilt bar.

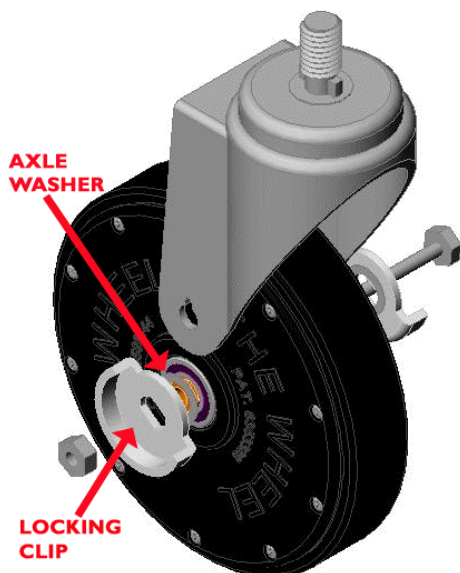
Place the anti-tilt bar on the wheel horn, align the holes over wheel axel rivets, and clamp into place. This is done with a "C-Clamp" or a pair of "Vice-Grip" clamps. Adjust the anti-tilt bar to one-half inch (1/2") from the asphalt. Once the anti-tilt bar is clamped in place, you will tack-weld the bar to the horn (tack-welds should be placed on both sides of the anti-tilt bar). If the cart is "Powder Coated", you will need to grind the welding area before you weld so that the weld penetrates the metal on both the horn and anti-tilt bar. Once the weld is complete, remove the clamp and wire brush both sides. Apply a quick spray of paint on the welds and any areas affected by the grinding to keep rust from forming on the cart.



Placement of the anti-tilt bars

## Installing the GS2 Wheel

The GS<sup>2</sup> wheel is pre-assembled on an industry-standard swivel caster and will be a direct replacement for one of the two front factory installed swivel casters (typically the left front).



Remove the original caster by removing the caster nut from the top side of the caster plate.. Once the factory installed caster is removed, replace it with the GS<sup>2</sup> Wheel assembly. Care should be taken not to over tighten the caster bolt, which would prevent the caster from swiveling. Before applying the lock nut to the caster bolt, Locktite should be applied to the caster bolt.

If the GS<sup>2</sup> Wheel is not assembled to a swivel caster, you may mount the wheel to a caster using the parts contained in a Field Installation Kit. This kit includes: two (2) locking clips, one (1) axle bolt, one (1) axle nut, and two (2) axle washers. All shipments of GS<sup>2</sup> Wheels, without swivel casters will contain a Field Installation Kit. To install, first place the washers over the axle and onto the bearings, next place the locking clips over the washers and onto the portion of the axle that extends out of the bearings. Slide the bolt through the axle, apply Locktite2 to the axle bolt, and tighten the lock nut. Take care not to over tighten the axle nut, preventing the wheel from rotating.

## Installing the Cart-Mounted Signs

Each shopping cart containing a GS<sup>2</sup> Wheel shall have a Cart-Mounted Sign Kit installed on it. If not installed by the cart manufacturer, the Cart-Mounted Sign kits will be shipped to the store by Gatekeeper Systems.

Each sign kit will contain:

- two (2) black, rectangular frames, one of which will have a vinyl sticker with the warning language,
- four (4) screws.

For example, you will need 400 black plastic frames and 800 screws to install sign kits on 200 carts.

Tools required:

- Cordless screw driver, such as a Mikita cordless drill
  - Phillips head screw driver tip (magnetic head helpful)
  - Gatekeeper part number M-1210 (#8, 3/4", phillips head screw)
1. Sandwich together the two frames (they are all identical and have matching male/female posts) around the wire of the front portion of the cart. Be sure that the warning language on the sign will face the customer, as they push the cart.
  2. Press the two frames together until you hear the snapping noise of the posts securely fastening to each other.
  3. Screw four (4) screws into the large opening on the Cart-Mounted Sign: two (2) screws on the inside of the cart and two (2) screws on the outside of the cart.



## 5 Installation Photographs

Always use Caution Tape to mark off the work area. Wear proper safety gear when operating the concrete saw. Safety gear includes a full face respirator, ear protection, and a full-body suit.



A Gatekeeper fluorescent-orange safety vest should be worn at all times.



A self-propelled concrete saw such as the Core Cut shown below is used for cutting the asphalt.



The saw cut may be cleaned using the Gatekeeper Hook. Insert the hook into the saw cut and drag it, to clean out asphalt debris.



Use the Kleen Sweep 27 push sweeper to clean up excess asphalt debris once the line has been saw-cut.



### Laying the Antenna Wire

Use a wire caddy to roll out the 14AWG antenna along the saw cut.



A crew member may then insert the antenna into the saw cut, using the Gatekeeper Antenna Roller.



### Sawing Corners

When cutting in a corner, where the antenna changes direction, use a gas powered hand saw to cut a 45-degree angle.

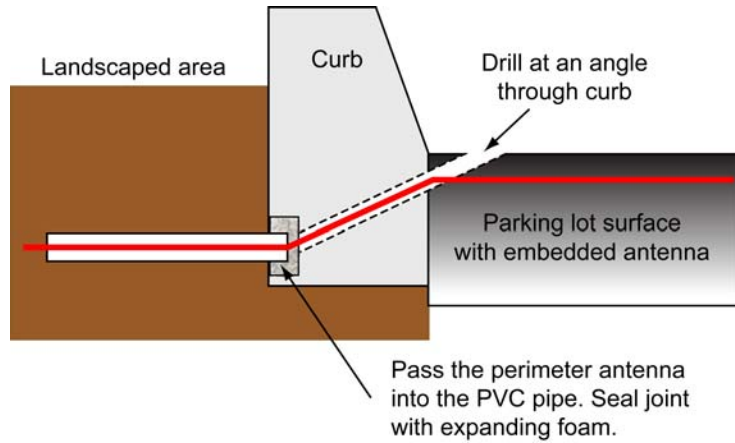


A 45-degree angle (above right) is required for all corners, as a sharp bend in the antenna may cause the locking signal to be projected in an abnormal manner



### Perimeter Antenna through Curbs

In some installations it is necessary to transition from the asphalt to a garden area. In these instances, saw cut up to the curb or island where the landscape area begins. At the beginning of the curb or transition, use a roto-hammer to drill a hole from the end of the saw cut through the curb, down into the landscape area. The path of the drill should be at a 45° downward angle. Pass the antenna from the saw cut, through the curb, and into the landscape area. Once in the landscape area, route the antenna wire inside schedule 40 PVC conduit. The conduit should be buried a minimum of 6" – 8" inches in depth.



You will need a smaller diameter bit for the pilot hole and a 1 inch bit to enlarge the bore to accommodate the PVC pipe.



First create a trench in the landscaping area and then drill through the curb using the roto-hammer drill



Using the roto-hammer, drill through the curb into the landscape area and then back from the landscape area towards the asphalt. After the pilot hole is through, use a one-inch (1") bit to ream out the inside of the bore to accommodate the PVC pipe.



Make the saw cuts in the asphalt near the curb using a 4 1/2 inch (or larger) angle grinder.



PVC conduit is then used to protect the antenna when it runs through the landscaping area



The end of the conduit is placed into the hole that was drilled through the curb line and expansion foam is used to seal the area where the conduit enters the curb.



Conduit should always be buried six to eight inches (6-8") below the surface of the landscaping.





## Splicing the Perimeter Antenna

As the antenna is rolled out and inserted into the saw-cut, it will be necessary to splice together sections of antenna. This job will go faster if you put together a splicing kit like the one shown below.



A sample splicing kit

### Forming the splice:

1. Strip off approximately two inches of the outside insulation from each side of the splice.
2. Strip off the inner insulation to expose about 1 inch of copper wire on each side of the splice.
3. Slide a piece of heat shrink tubing about 5 inches long onto one of the wires. Move it away from the splice for now.
4. Twist the strands together as shown in the figure at right, keeping the two wires in line with each other. DO NOT bend the wire at a 90 degree angle to form the splice.

