

# Attachment A1

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## Electrical Special Provisions

**Engine Company 15, Training Area Renovation  
2101 14<sup>th</sup> Street SE, Washington, DC 20020**

# **ELECTRICAL SPECIAL PROVISIONS FOR FEMS EC #15**

**All work under this section is to be used in conjunction with Drawings #LT-01 through LT-07 of the contract drawings.**

**1. PARKING LOT LIGHTING AND GATE SCOPE**

- 1) Furnish and install conduits, pull boxes, 5A light poles, LED luminaires, photo controls, feeder cables, cables in poles, and all necessary electrical splices.
- 2) Furnish and install double swing gate, gate operator, and card reader system.
- 3) Other essentials necessary for the satisfactory installation of the lighting and gate system shown on the plans, whether specifically mentioned or not.

Engine Company 15 will supply the power to the permanent lighting system. The Contractor shall install the new feeder cables into Engine Company 15's facilities, under their supervision and inspection.

**2. LIGHTING AND GATE GENERAL REQUIREMENTS**

All work performed under this contract shall conform to the National Electrical Code (NEC), District of Columbia Electrical Code, District of Columbia Standard Specifications (2009 Edition, also know as the Blue Book), Streetlight Electrical Specifications and District of Columbia Streetlight Policy and Design Guidelines (March 2005).

The electrical contractor must be licensed and bonded in the District of Columbia and must apply for an electrical permit to perform electrical work in public space. An electrical permit may be obtained by contacting the Public Space Permit Office located at 1100 4<sup>th</sup> Street, S.W. Washington, D.C. 20024. This application must be signed by a Master Electrician or Electrical Engineer who is licensed in the District of Columbia.

The Contractor's employees installing the electrical work must be licensed in the District of Columbia as a Master Electrician, Electrician or Apprentice Electrician. When Apprentice Electricians are working, a Master Electrician or a Journeyman Electrician must be on the project site for personnel supervision.

The Contractor shall have a copy of the drawings, Electrical Permit and all approved Catalog Cuts on the job at all times when electrical work is being performed.

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The contractor shall record all daily and weekly activities in Microsoft Office Project and submit to USRC on a weekly basis or/as directed by the Project Engineer.

Violation of any electrical code, the Special Provisions, Standard Specifications for Highways and Structures, 2009, or any other requirements will cause the work to be **STOPPED IMMEDIATELY.**

The Contractor is put on notice that long lead times are required to obtain the lighting posts from the manufacturers. Therefore, in scheduling the work, he/she shall take the long lead times into consideration. The Contractor will not be given additional time for completion of the project.

Engine Company 15 will supply power for the lighting and gate systems. All work involved with Engine Company 15 facilities shall be performed in conformance with their requirements. The Contractor shall install the new feeder cables into Engine Company 15's facilities, under their supervision and inspection.

The Contractor shall be expected to perform electrical work on D.C. cables with the knowledge that the circuits are energized.

The Contractor, upon completion of the project, shall submit five (5) complete sets of as-built drawings, as well as electronic CD-Rom files of the lighting and gate portion of the project to the Owner. The set of drawings shall bear the signature of an officer of the Contractor's organization, certifying compliance with as-built conditions.

Unless otherwise noted in the plans and this special provision, the Contractor shall be responsible for furnishing all proposed materials associated with the electrical work.

**The Contractor shall be responsible for submitting to the Owner catalog cuts and/or samples of all materials to be furnished for lighting and gate work. Procurement of all such materials by the Contractor may not begin until written approval is obtained from the Owner.**

**3. PAVEMENT RESTORATION**

As directed by the Engineer for temporary pavement restoration, the trench shall be backfilled to the bottom of the existing pavement surface. The Contractor shall apply a temporary patch over the backfill until such time as final restoration can be completed.

**4. CONCRETE ENCASEMENT**

PCC mix design for encased conduits shall conform to DDOT Blue Book 817.03 for Class F General Use, with a minimum 28-day compressive strength of 3,500 PSI on field test cylinders made in the field and cured in the laboratory. All conduits shall be encased to provide a 4 inch minimum cover all around the conduit.

If existing utilities or conduits are present in the trench, these utilities or conduits shall be surrounded with an encasement of at least 3 inches of sandy fill that is free from objects which might damage the conduit. PCC encasement shall then be placed over the sand encasement to the appropriate level.

**5. CONDUITS**

Conduits shall conform to the requirements of these Special Provisions, streetlight electrical specifications and DDOT Standard Specifications for Highways and Structures, 2009. Two (2) sizes of conduits shall be used in this project. Four-inch conduit shall be installed between pull boxes. Two-inch conduit is for the connection from the pull box to each light pole. All conduits shall be rigid, gray Polyvinyl Chloride (PVC) Schedule 40 conforming to the requirements of NEMA TC-2 and WC-1094. Conduits and fittings shall bear Underwriter's Laboratories, Inc. label. Conduit shall be in factory-supplied lengths, and shall be marked with the manufacturer's name, trade name, or trademark, nominal trade size, and type of material. All joints shall be water-tight. Solvent cement used for joining PVC conduit shall conform to the requirements of ASTM D2564.

All bends shall be of long sweep, free of kinks and of such easy curvature as to permit cable pulling without undue tension on conductors or damage to the insulation.

Conduit runs as shown on the plans may be changed to avoid underground obstructions only with written approval by the Engineer.

Unless otherwise shown, conduits shall be placed a minimum depth of 36 inches below final grade, or at greater depths if required to obtain the necessary utility clearance, and shall slope at a minimum rate of 3 inches per 100 feet of length to a foundation, or pull box.

All conduit fittings shall be free from burrs and rough places and all conduit runs shall be cleaned and swabbed before cables are installed. Cut conduits shall be reamed before fittings and cables are installed.

Standard manufactured elbows, bushings, reducers, bends, couplings, etc. of the same materials as the straight conduit pipe shall be used, as required throughout the conduit system. Bends shall meet the requirements of NEC Article 352-24.

## 6. PULL BOXES

Pull boxes shall conform to the requirements of the Contract Drawings and these Special Provisions.

Pull boxes at locations shown in contract plans shall be constructed as detailed in the Contract Drawings. Pull boxes can be pre-cast or cast-in-place and shall comply with the following requirements:

- 1) PCC Mix Design - Shall conform to DDOT Blue Book 817.03 for Class B, structural, minimum 28-day compressive strength of 4,500 psi on field test cylinders made in the field and cured in the laboratory.
- 2) Curing Material - Shall conform to DDOT Blue Book 814.03 for Membrane Cure.
- 3) Reinforcing Steel - Shall conform to DDOT Blue Book 812.02 of the Standard Specifications, for Grade 60.
- 4) Frame and Covers - Shall be gray iron casting conforming to the requirements of 815.04 of the Standard Specifications. The word "**DCSL – TS**" in 1-inch letters shall be cast in the center depression of the top of cover and shall be flush with the surface of cover.
- 5) Pre-cast Reinforced Concrete - Shall meet the requirements of DDOT Blue Book 822.04 of the Standard Specifications.
- 6) Cable racks shall be PVC with cable insulators.

Pull boxes shall be installed flush with the ground, pavement or sidewalk. The drain hole shall be filled with aggregate conforming to the requirements of DDOT Blue Book 803.02, Grading No. 67.

Conduit entering pull boxes shall be terminated flush with the inside wall. Conduits shall be aligned in as nearly a straight line as possible to allow for each of pulling cable. The space remaining between the conduit and the structure wall shall be filled or patched with concrete or acceptable equal so there will be no leakage. Pull boxes shall be seated on trench fill meeting the requirements of DDOT Blue Book 804.05 in order to prevent settlement.

**7. CABLES**

All underground current carrying conductors used for lighting shall be copper, stranded type, RHW-2, 90 C, conforming to IPCA Pub. No. S-68-516/NEMA WC8 for ethylene-propylene-rubber insulated cable. The outside jacket shall conform to IPCA Pub. No. S-19-81.

**8. SPLICES**

Splices in wires and cables shall be accomplished by means of compression pressure connections. The connectors shall be suitable for the size wire used and shall be of one-piece tubular tinned copper or bolted type copper construction. The indenture shall be such as to assure maximum electrical connection and sufficient physical strength. The connection shall be covered with cross-linked polyolfin shrinkable tubing. The tubing shall be heavy wall rated 600 V 90C and conform to UL 486D, CSA C22.2 No. 198.2 and ANSI C119.1 and Western Underground Guides 2.4, 2.5. If shrinkable tubing is not feasible for a particular connection, the connection shall be covered with Super 88 Scotch plastic electric tape manufactured by Minnesota Mining and Manufacturing Company, or type CW as manufactured by Plymouth Manufacturing Company or other approved equal half-lapped into a thickness not less than 50 percent greater than the conductor insulation. An approved waterproof coating shall be applied on the outer cover. Wires shall be tagged as specified in DDOT Blue Book 621.13.

**9. GROUNDING AND BONDING**

One copper-clad ground rod shall be installed in each pull box and light pole foundation. The grounding electrode conductor shall be sized in accordance with the National Electric Code. The ground wire shall be installed with other conductors when they were pulled. Grounding shall be accomplished as soon as materials are in place to which the grounding wires are to be attached.

Material used for installation of grounding systems shall meet the requirements specified in 621.06, and the following:

- 1) Ground Rods - Shall be copper-clad rods conforming to the requirements of UL - 467. Ground rods shall have a diameter of at least 3/4 inches and a length of at least 15 feet, (10' for use in grounding pull boxes) or minimum soil contact of 8').
- 2) Ground Wires - Shall be at least No. 8 AWG for light grounding
- 3) Ground Clamps - Shall be heavy-duty bronze, brass or galvanized malleable iron conforming to the requirements of ASTM A220, any grade.

- 4) All pull box-grounding connections including frame and cover and ground rod connections shall be made using exothermic welding.

The Contractor shall in each District owned pull box bond the neutral conductor and the system ground wire to the pull box-grounding electrode. Each metal light pole shall be grounded to the adjacent pull box with a #8 stranded copper wire, which shall be connected to the post shaft and the pull box grounding buss with a solder-less bolted post or lug, with non-corrosive components.

## **10. LED LUMINAIRE**

Provide luminaires as indicated and complete with LED light source and power supply unit. Details, shapes, and dimensions are indicative of the general type desired, but are not intended to restrict selection to luminaires of a particular manufacturer. Luminaires of similar designs, light distribution and brightness characteristics, and of equal finish and quality will be acceptable.

### **A. Light Source / Optical Requirements**

1. Luminaire shall be full cutoff or fully shielded as defined by IESNA RP-8.
2. Correlated color temperature (CCT)  $\geq 4500^{\circ}$  K.
3. Color rendering index (CRI):  $\geq 70$ .
4. Light Distribution shall be Type II/III/IV. It will be as specified in the contact document.
5. Lumen Depreciation of LED Light Source - Must comply with IESNA LM-80. LED module shall deliver at least 70% of initial lumens, when installed for a minimum of 50,000 hours.
6. Minimum Light Output shall be functionally one-to-one replaceable to up to 150, 250, and 400 watt (threshold may change in future) equivalent HPS Cobrahead producing the equal illuminance (fc) and uniformity ratio on the alleyway.
7. Minimum Luminaire Efficacy - 70 lm/W
8. LM-79 Test - Provide Independent Testing according to IES LM-79 that provides efficacy, output, color, and photometric distribution of your product. An Integrating Sphere Test will be required to provide color information. A Goniophotometer test by itself is not adequate.
9. Lifetime - Provide written explanation of how L70 Lifetime of Product is determined using the LM-80 and In-situ temperature tests referenced below.
  - a. LM-80 Test - Provide LED Package Manufacturer IES LM-80 Test Report with results showing relative (%) light output over time at 55°C, 85°C and X°C (a third temperature at the manufacturer's choice).

- b. In-Situ Temperature Test - Provide test report indicating the Temperature of the hottest LED In-Situ in ANSI/UL 1598-04 (hardwired) or ANSI/UL 153-05 (corded) environments. This temperature measurement will be used with LM-80 data to validate lumen maintenance and useful life of product. Note that this temperature measurement should be specially requested by the manufacturer as they are getting their UL testing.
- 10. Where LEDs are connected in series and a single LED failure results in greater than 5% light loss of the overall luminaire output, a bypass circuit shall be utilized. This bypass circuit shall allow the remaining LEDs in the series circuit to remain powered.
- 11. The light must appear to be a single source (regardless of the number of drivers) to the road users.
- 12. The luminaire for alleyway application shall be equivalent to LSG-LSR1/LSR2 or approved equal. The luminaire for roadway application shall be equivalent to Philips 135W80LED4K and Philips 270W160LED4K or approved equal.

## **B. Hardware Requirements**

- 1. Housing assembly:
  - a. Shall be primarily constructed of metal.
  - b. Finish shall be grey/black in color, polyester powder coated and resists rust.
  - c. Driver must be internally mounted and replaceable.
  - d. Captive screws are needed on any components that require maintenance after installation.
  - e. No parts shall be constructed of polycarbonate unless it is UV stabilized (Lens Discoloration shall be considered a failure under warranty).
  - f. The luminaire must have a self leveling mechanism.
  - g. The luminaire shall be filtered against entry of insects, rain, dust, and other offending foreign matter.
  - h. The luminaire shall be marked, using standard EE-1 NEMA marking, showing the lamp type and wattage. The marking shall be affixed to the underside of the luminaire housing and to the rear of the reflector.
- 2. Mounting arm connection (for Cobrahead only)
  - a. Luminaire shall mount on 1-1/4" to 2" arm and shall have not more than 8 inch long nor less than 5 inch horizontal insertion length on the 2 inch bracket arms and shall be adequately equipped with clamping and

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- leveling devices or a similar mechanism to allow proper clamping and positioning of the luminaire on the bracket arms.
- b. The clamping mechanism shall contain 4 bolts that do not pass through the housing. Clamping with only two bolts is not acceptable. The clamp must be able to accept a 1 1/4 to 2 inch pipe bracket without having to rearrange the clamp.
3. Photoelectric (PE) Cell Receptacle
- a. Shall have a 3-prong twist locking ANSI C136.10 photocell receptacle (for Cobrahead).
- b. Photocell adapter must be built into the housing and be directionally adjusted without the use of tools.
4. House Shield - Shall provide option for house side light control
5. Luminaire shall not weigh more than 35 lbs.
6. Dimensions (Approx.) (For Cobrahead) -Luminaire shall not be larger than 30" long x 16" wide x 6" tall.
7. Operating Environment - Luminaire shall be able to operate normally in temperatures from -40°F to 120°F
8. Cooling System - Thermal management shall be passive by design and shall consist of heat sinks with no fans, pumps, or liquids and must be resistant to debris buildup.
9. Luminaires shall be fully assembled and electrically tested prior to shipment from factory.
10. The fixture must not contain any moving parts.
11. The driver must be located inside the housing, but should be easily accessible.
12. For all mast-arm-mounted luminaires, a wildlife shield shall be included on the fixture to prevent wildlife access.
13. Optical system for roadway luminaires, including the driver, shall be sealed and rated for IP65 as defined in IEC 60529. Wiring compartments shall be IP20 compliant, but individual internal electronic components must be rated at a minimum of IP54.
14. The coating shall be capable of surviving ASTM B117 salt fog environment for 500 hours minimum without blistering or peeling.
15. The coating shall demonstrate gloss retention of greater than or equal to 90% for 1000 hours' exposure QUV test per ASTM G53 UVB313, 4 hour UV-B 60 °C/4 hour condensation 50 °C.
16. The luminaire shall have been certified compliant with ANSI C136.31 having been subjected to 100,000 cycles of 2G at the resonant frequency

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of the luminaire applied at the center of gravity of the luminaire on three primary axes without damage to the luminaire. The luminaire shall be fully functional upon completing the test.

17. The luminaire shall be fully functional after testing for thermal shock according to IEC 60068-2-14.
18. The luminaire shall be fully functional after testing for damp heat, steady state, high humidity, and high temperatures according to IEC 60068-2-78.
19. If a lens not integral to the luminaire is used, optical enclosure (lens/window) shall be constructed from clear and UV-resistant acrylic or tempered glass.
20. At least 80% of the luminaire material by weight shall be recyclable at manufacturer's stated end of life.
21. Luminaires shall incorporate modular electrical connections and constructed to allow replacement of all or part of the optics, heat sinks, power supply units, and electrical components using only a simple tool, such as a screwdriver.
22. Luminaires shall have a nameplate bearing the manufacturer's name, 125address, model number, date of manufacture, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.
23. The luminaire fixture weight and effective projected area shall not exceed the poles requirements for wind loading.
24. Roadway and area mast-arm-mounted luminaires shall have an integral tilt adjustment of  $\pm 6^\circ$ , ANSI C136.3.
25. Driver shall be protected against damage due to either an open circuit or short circuit fault condition on the driver output. The driver shall resume normal operation when the fault is removed.
26. Over-temperature protection shall be provided and cut-off output power if case temperature limit is exceeded.
27. Reduction of hazardous substances (RoHS) compliant.

**C. Power Supply/Driver Requirements**

1. Off State Power Consumption - The power draw of the luminaire including PE devices must be zero watts when in the off state.
2. On State Power Consumption - The luminaire must use at least 40% less energy compared to its commercially available High Pressure Sodium counterpart.
3. Power Factor (PF):  $\geq 90\%$
4. Operating Voltage - 120-240 volts

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5. Operating Temperature - Shall operate between -40°F and 120°F
6. Frequency - Output operating frequency must be  $\geq 120$  Hz and input operating frequency of 60 Hz.
7. Interference -Shall meet FCC 47 CFR Part 15/18
8. Startup - Must be instant restart
9. The maximum drive current to the LEDs shall not exceed that recommended by the LED manufacturer. Documentation from the LED manufacturer shall be provided showing maximum current allowed and where the current output from the driver is not what is flowing into the LEDs. A schematic with calculations shall be provided to show what driver current does flow to the LEDs.
10. Maximum case temperature and measurement location shall be clearly marked on the driver case.
11. Fluctuations in line voltage up to 15% shall have no visible effect on the luminous output.
12. Operating frequency: 60 Hz  $\pm$  5%.
13. Total current harmonic distortion (THD) for current:  $\leq 15\%$ .
14. Drivers shall be UL 8750 compliant.

**D. Wiring Requirements**

1. All factory electrical connections shall be made using crimp, locking, or latching style connectors. Twist-style wire nuts and tap-style strip less connectors are not acceptable.
2. Local area network (LAN), wireless, radio, modem, power line carrier, and other communication methods other than hard-wired switches for LED light fixture control shall be non-proprietary and compatible with control monitoring system available in the market.

**E. Surge Protection Requirements**

1. The luminaire manufacturer shall provide surge protection on each luminaire and certify that it has been tested in accordance with ANSI/IEEE C62.41.2 guidelines. Surge rating 10 kV, 10 kA.

**F. Warranties**

LED fixture warranties shall be provided in accordance with Specifications and the following:

1. Luminaire must have a minimum five (5) Year warranty due to any failure. The Warranty shall provide for the repair or replacement of defective

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electrical parts including but not limited to the light source and power supplies/driver for a minimum of eight (8) years. Shipping shall be included.

2. The LED luminaire warranties shall begin on the date of final acceptance of the installation by the DDOT officer or designated representative.

The contractor shall install luminaires in accordance with the design engineer's and manufacturer's requirements and shall obtain written concurrence from the luminaire manufacturer that the installation is compliant with their requirements. The signed memo, including post-installation field measurements, shall become part of the warranty package and be included in the final deliverables to the DDOT.

3. The contractor shall provide to the DDOT contracting officer written documentation of its ability to satisfy a worst-case, catastrophic warranty claim. The documentation shall clearly disclose the country in which the factory of fixture origin is located and the name of the company or organization that owns the factory (including all parent companies and/or organizations and their respective countries of corporate citizenship).

**11. LAMPS**

Shall meet the requirements of DDOT Blue Book 820.03.

**12. ELECTRONIC PHOTOCONTROL AND CYCLE DETECTION DEVICE AND ELECTRONIC BUTTON TYPE PHOTO CONTROL**

Shall meet the requirements of DDOT Blue Book 820.03.

**13. ELECTRICAL TESTS**

Applicable Tests shall be performed in accordance with DDOT Blue Book 621.16 and 621.06. Defects in materials or workmanship in the installation as disclosed by the test shall be corrected or replaced by the Contractor without additional compensation. A written report shall be submitted for approval. ALL GROUND RODS INSTALLED UNDER THIS CONTRACT SHALL BE TESTED WITH THE PROJECT ENGINEER IN ATTENDANCE AND A WRITTEN REPORT SHALL BE SUBMITTED FOR APPROVAL.

**14. FURNISH AND INSTALL PULL BOX**

ITEMS: 618 920

Shall meet the requirements of DDOT Blue Book 618.11.

**15. FURNISH AND INSTALL SCHEDULE 40 PVC RIGID CONDUIT**

This S.P. Replaces DDOT Blue Book 618.12.

**GENERAL-** The Contractor shall furnish all labor, tools, material and equipment necessary for excavating, shoring, de-watering, steel plating (necessary steel plating of the roadway for moving traffic as directed by the Engineer), installation of conduit(s), concrete encasement P.C.C. Wet Mix 3,500 PSI), back filling, compaction of fill, and temporary patch and maintenance of the cuts until the permanent repairs are made as directed by the Engineer. The Contractor shall excavate the trench as called for on the project plans. The Contractor is put on notice that within the area where trench excavation will take place for the installation of conduit and pull boxes. The trenches shall be braced according to the local and federal regulations. All conduit(s) shall be Schedule 40 PVC and shall be installed to proper line and grade. The trench shall be opened completely between pull boxes or between the end of the existing conduit to be added to the new location or between pull boxes and the proposed light before installing any conduit. Conduit(s) shall be installed with a minimum of 36" of cover below final grade and shall be installed in dry trenches. The conduit shall be installed in full lengths using manufactures' supplied bends and couplings. When the Contractor must make field cuts, the conduit's ends shall be reamed to remove any rough edges before joining them together. The joints shall be cleaned, cemented and the lengths of the conduits coupled together tightly. Where two or more conduits are being installed in the same trench, the Contractor shall use spacers between the conduit runs. All conduit runs shall be complete and points of penetration of the wall of pull boxes shall be sealed before any concrete encasement is installed.

At the end of each workday, the Contractor shall seal the ends of the all conduits to prevent the entrance of dirt and water into the conduit system.

If the Contractor is to add on to (splice on to) existing conduit, the splice will be done with an approved coupling. The Contractor shall as part of this Pay Item clean, proof, install a Poly String and seal all conduits using approved conduit plugs prior to installing cables. The Contractor shall run a mandrel, not less than 1/4" smaller than the diameter of the conduit through each conduit in the presence of the Engineer. All conduits that a mandrel cannot be pulled through shall be cleaned and/or replaced and shall be re-proofed at no additional cost to the District. Included within this pay item is the temporary patching of the trench and maintenance of the patch until final repairs have been made.

**MEASURE AND PAYMENT** – The unit of measure will be per **LINEAR FOOT**. Payment will include all labor, tools, materials, equipment, excavation, shoring, de-watering, steel plating of roadway, concrete encasement, penetration of pull boxes, back filling, compaction of fill, temporary patching, maintenance of the cut

until the permanent repairs are made, and all incidentals necessary to complete the work specified herein.

**16. FURNISH AND INSTALL LIGHT CABLES**

Work under this Pay Item shall meet the requirements of DDOT Blue Book 618.20.

**17. FURNISH AND INSTALL COPPER GROUND WIRE**

Work under this pay Item shall meet the requirements of DDOT Blue Book 618.22.

**18. FURNISH AND INSTALL 5A POLE**

Work under this Pay Item shall meet the requirements of DDOT Blue Book 618.28.

**19. FURNISH AND INSTALL LED LUMINAIRE**

Work under these Pay Items shall meet the requirement of DDOT Blue Book 618.35.

**20. FURNISH AND INSTALL INDUCTIVE LOOP DETECTOR**

Work under these Pay Items shall meet the requirement of DDOT Blue Book 617.14. (See Exhibit 1)

**21. FURNISH AND INSTALL METAL DOUBLE-SWING GATE**

Please see DRAWING LT-06 for metal double-swing gate information. The contractor shall use this product or proven equivalent and accepted by the owner.

**22. FURNISH AND INSTALL METAL GATE SWING CONTROL SYSTEM**

Please see the attached document for metal gate swing control system. The contractor shall use this product or proven equivalent and accepted by the owner. (See Exhibit 3)

**23. FURNISH AND INSTALL GATE ACCESS CONTROL**

Please see the attached document for entrance terminal/card reader system. The contractor shall use this product or proven equivalent and accepted by the owner. The enclosure w/ pedestal for the access control components shall be rated for outdoor use with a minimum NEMA 4X rating for enclosures. (See Exhibit 2)

# Exhibit 1

## Direct Burial Preformed Loop

*To be installed in a concrete pour, gravel road, under asphalt, and pavers*



Loop Kit Includes:  
4-8 ground stakes  
4-8 cable ties  
3 lead-in loop labels

### Install the highest quality loop, save time, and reduce service calls by using a **BD Loops** preformed loop

- For installation under concrete, asphalt, gravel, and pavers.
- 14 AWG loop wire designed for superior performance.
- Tested 3 ways at the factory: with a megohmmeter, inductance meter, and a live detector.
- Installation kit includes: cable ties, ground stakes, and loop lead-in labels.
- Easy to follow installation instructions.
- Loop wire meets UL standard 493 for direct burial.
- Pre-phased at factory, allowing installers to easily take advantage of loop phasing.

| Driveway width |            | Recommended loop size |            | BD Loops part # |              |               |
|----------------|------------|-----------------------|------------|-----------------|--------------|---------------|
| Residential    | Commercial | Residential           | Commercial | 40ft lead-in    | 60ft lead-in | 100ft lead-in |
| 9ft            | -          | 4x5 or 3x6            | -          | RL18-40         | EL18-60      | -             |
| 10ft           | -          | 4x6 or 3x7            | -          | RL20-40         | EL20-60      | -             |
| 12ft           | 10ft       | 4x8                   | 6x6        | RL24-40         | EL24-60      | EL24-100      |
| 14ft           | 12ft       | 4x10                  | 6x8        | -               | EL28-60      | EL28-100      |
| 16ft           | 14ft       | 4x12                  | 6x10       | RL32-40         | EL32-60      | EL32-100      |
| -              | 16ft       | -                     | 6x12       | RL36-40         | EL36-60      | EL36-100      |
| -              | 18ft       | -                     | 6x14       | -               | EL40-60      | EL40-100      |
| -              | 20ft       | -                     | 6x16       | RL44-40         | EL44-60      | EL44-100      |
| -              | 24ft       | -                     | 6x20       | RL52-40         | EL52-60      | EL52-100      |

Custom sizes also available - call local distributor for pricing and delivery

**BD Loops** 5362 Bolsa Ave. unit C, Huntington Beach, CA 92649

Phone 714 890-1604 ♦ Fax 714 890-1603 ♦ Cell 714 334-6978 ♦ Email [bdloops@aol.com](mailto:bdloops@aol.com)

[www.BDLoops.com](http://www.BDLoops.com)

# Direct Burial Preformed Loop Advantages

**Description:**

Used for installations under concrete, asphalt, pavers, or gravel roads. The most common installation is the loop tied directly to the rebar before concrete is poured. Wire is UL 493 certified designed for a direct burial application. Unlike loops wrapped through PVC, the BD Loop does not have an air pocket resulting in fewer repeat service calls due to phantom detections caused by ground vibration. Our loops are built with a high quality solid 14AWG wire that out performs other preformed loops with twice as much copper per foot allowing better detections. Solid 14AWG wire also results in the loop being very ridged giving the installer the opportunity to easily set-up and layout the loop and prevents the loop from falling in-between the rebar pattern. Twisted jacketed lead-in prevents “coil back” from normal twisted lead-in, preventing wasted time untangling lead-in wires. The loop wire has arrows indicating the direction of current allowing easy understanding of phasing. Each loop comes with an installation kit including easy to understand instructions, cable ties for installation on top of rebar, ground stakes for under gravel roads, and stickers for easy identification after the loops have been installed.

## What makes our loop design superior?

| <i>Feature</i>  | <i>Benefits</i>   |
|---|---|
| Thicker 14-gauge loop wire, 4 times more copper than 20-gauge wire. | More copper means increased tensile strength and a tougher, more durable loop.                              |
| UL 493 Direct burial rated loop wire.                               | The right product is being used for the job resulting in an immense lifespan.                               |
| Loops sold as a kit.  | Supplied instructions, ground stakes, cable ties, and loop labels for easy installation.                    |
| Pre-phased at the factory.  | Saves time and prevents confusion when installing two loops in series to one detector.                      |
| Soldered connections  | Solid connections that won't corrode or break over time.  |
| Flex yoke design pre-fitted with ½ inch PVC coupler.                | Saves installation time and material cost.  |
| No air pocket in loop wire design.                                  | Will not float to surface during a concrete pour and also eliminates faults trips due to ground vibrations. |
| Compact size and reduced weight.                                    | Saves on shipping cost and warehouse space.   |

**Custom loop orders received by 3:00 PM EST (12 PM PST) will be shipped the same day.**

Contact your distributor for pricing. See more at [www.BDLoops.com](http://www.BDLoops.com)



**ESPAÑOL**

Scan this or visit:

[www.bdloops.com/bdloops\\_downloadsB.html](http://www.bdloops.com/bdloops_downloadsB.html)



vC2

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Phone 714 890-1604 ♦ Fax 714 890-1603 ♦ Cell 714 334-6978 ♦ Email [bdloops@aol.com](mailto:bdloops@aol.com)

[www.BDLoops.com](http://www.BDLoops.com)

# Direct Burial Installation Instructions\*

*Preformed direct burial installation tips and directions*

➔ **This is not a Saw-Cut Loop** for all saw-cut applications use **BD Loops** preformed 3/16" saw-cut loop.

## Installation in Concrete

See Reverse side of this page.  
(Pictures included)

## Installation Under Pavers

**If the sub-base is concrete or a slurry do not use this loop. Saw-Cut in a loop instead.**

Determine loop position and footprint to include lead-in run to gate operator. Be sure to use the correct loop size.\*

Dig a 2" wide by 3-4" deep trench in the pattern of the loop and lead-in. (See Figure 1)

Fill Trench with one inch of sand.

Place loop in trench and run lead-in through 1/2" schedule 40 or 80 rigid PVC. Glue all PVC joints with a proper PVC solvent cement.

Cover loop and lead-in PVC run with 2 1/2" of sand.



The ground stakes included with the loop are to help hold the loop down while laying out a trench pattern. When the loop is placed in the trench the ground stakes are no longer necessary and should be discarded.

## Installation under Asphalt

Position and shape the loop on sub-base. Be sure to use the correct loop size.\*

Pull lead-in through 1/2" schedule 40 or 80 rigid PVC. Glue all PVC joints with a proper PVC solvent cement.

Dig a 2" wide by 3-4" deep trench in the size and place of the loop footprint and lead-in.

Fill the trench with one inch of sand base.

Lay the loop and lead-in run in the trench on top of sand base and use supplied ground stakes to secure the loop corners.

Cover loop and lead-in PVC run with 2 1/2" of sand.

**BD Loops cannot come in direct contact with hot asphalt. Call BD Loops for any questions and to find a solution.**

## Installation in Gravel Road

Position and shape the loop on sub-base. Be sure to use the correct loop size.\*

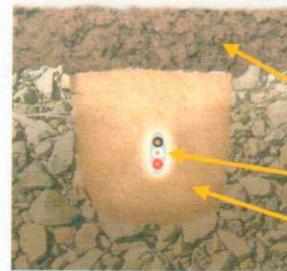
Pull lead-in through 1/2" schedule 40 or 80 rigid PVC. Glue all PVC joints with a proper PVC solvent cement.

Dig a 7" to 10" deep trench in the size and place of the loop footprint and lead-in.

Fill the trench with one inch of sand base.

Lay the loop and lead-in run in the trench on top of sand base and use supplied ground stakes to secure the loop corners.

Cover loop and lead-in PVC run with 2 1/2" of sand. Compact sand around the loop then fill in with road base.



Loop should be encased in sand.

Soil  
Loop  
Sand

Figure 1

**Harness Wire: Solder all connections**

**Plug/Screw Connectors: Tint all connections**

## Basic loop layout guidelines to follow

### Reverse and Exit Loops

- 4ft from the gate/door.
- Swing gates require 3ft from its complete open and closed position.
- 2ft from each curb.
- 4ft from every other loop.

### Shadow loops

- Loop lies under the swing path.
- 3-4ft from the gates in its complete open and closed position.
- 0-2ft from the curb. (Single Swing Gate)

Detection height is determined by approximately 2/3 of the short leg of the loop. Residential 4ft short leg (Detection of standard size vehicles only).

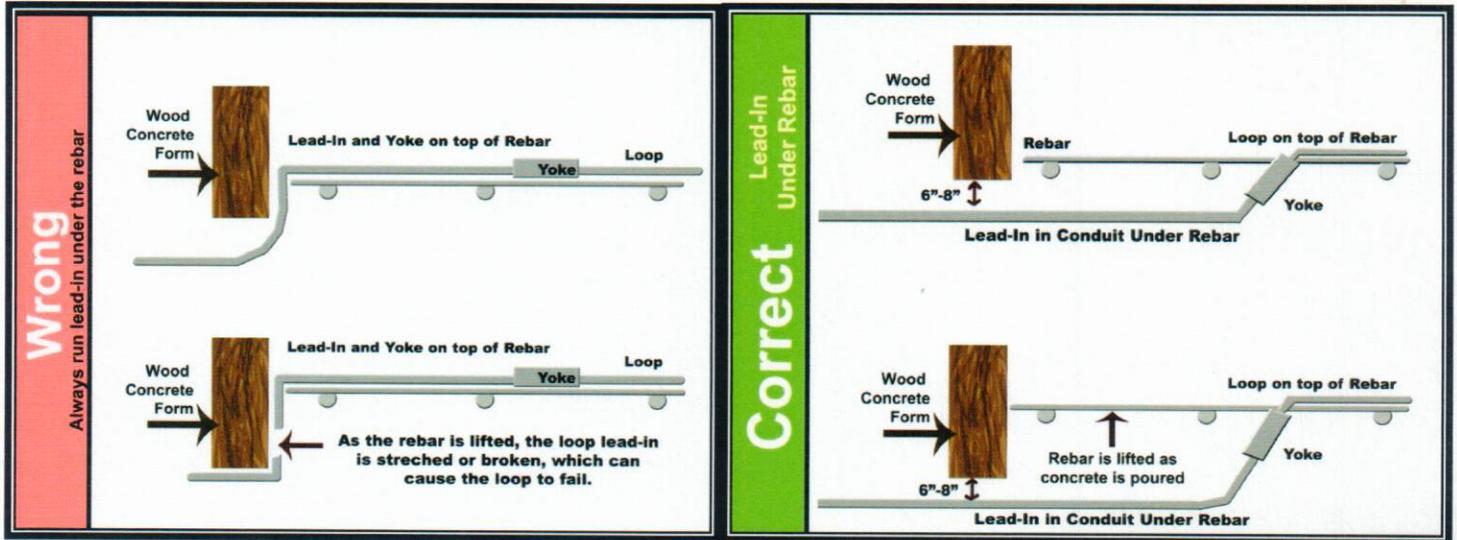
Commercial 6ft short leg (Detect higher bed vehicles).

\*Check BDLoops.com for the latest installation instructions

# Installing **BD Loops** in Concrete Over Rebar

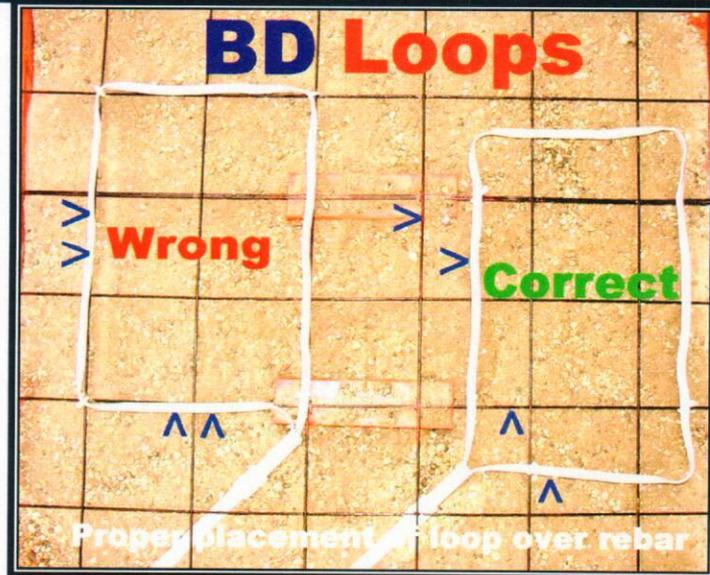
When installing **BD Loops** over rebar make sure to follow these simple instructions:

- Determine loop position and lay loop on top of rebar (never below).
- Offset the loop from the rebar pattern (see picture below) then use supplied cable ties to secure loop in place.
- Always run the lead-in underneath the rebar. (see picture below)
- Run the lead-in 6-8" under the concrete form.
- **Run the lead-in in conduit (Schedule 40 or 80 recommended) making sure to glue all PVC joints with a proper PVC solvent cement.**



In the picture to the right notice how the "Correct" loop is offset from the rebar pattern. The loop is coming in contact with the rebar as little as possible. ----->

Visit [BDLoops.com](http://BDLoops.com) to download and print **Warning Signs** and a **Loop Sign Off Form** to help protect inductance loops from the damage that a concrete crew can cause during a concrete pour.

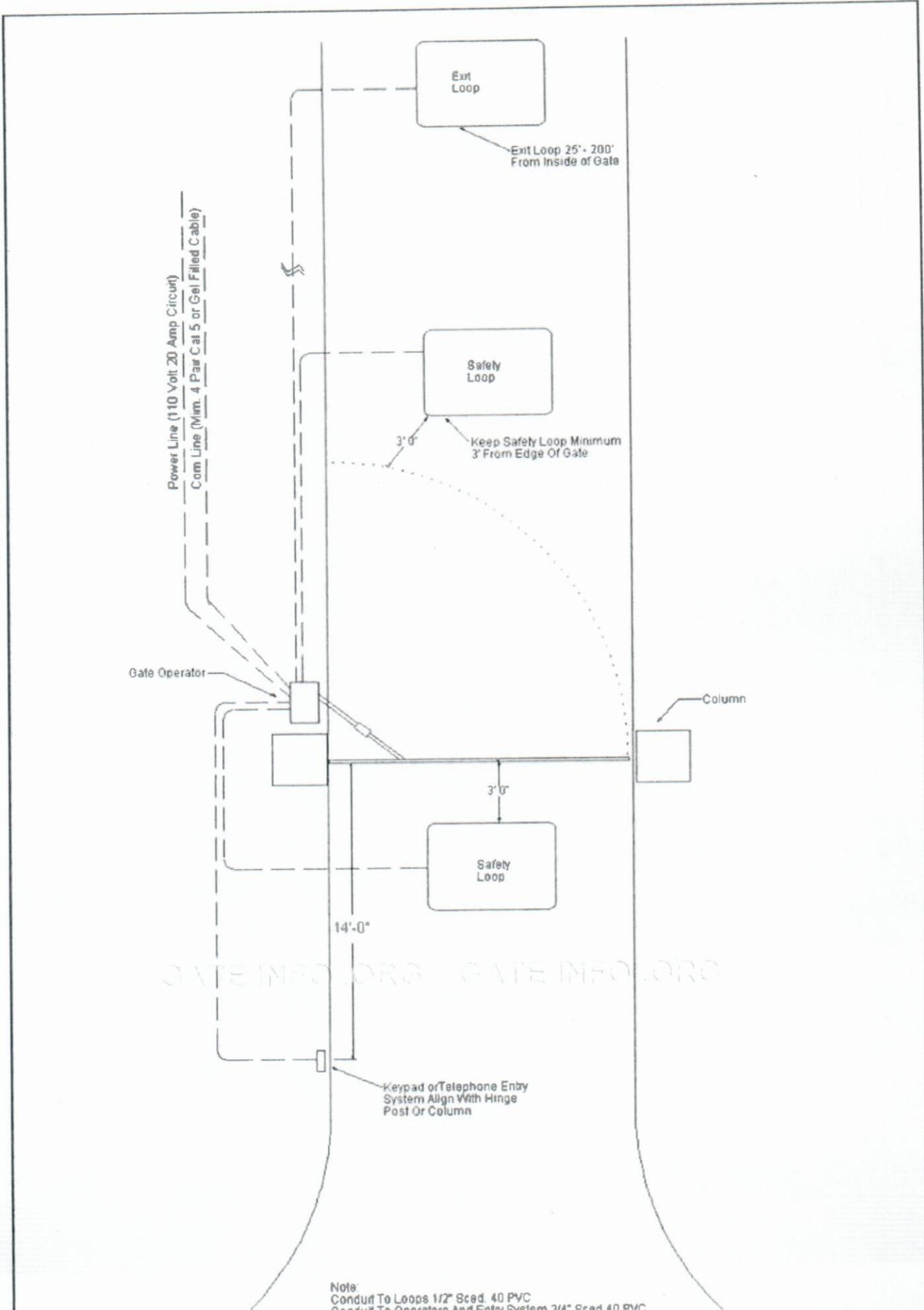


## Instrucciones ESPAÑOL

Scan this or visit:

[www.bdloops.com/bdloops\\_downloadsB.html](http://www.bdloops.com/bdloops_downloadsB.html)





Exit Loop

Exit Loop 25'-200'  
From Inside of Gate

Power Line (110 Volt 20 Amp Circuit)  
Com Line (Min. 4 Pair Cat 5 or Gel Filled Cable)

Safety Loop

3'-0"

Keep Safety Loop Minimum  
3' From Edge Of Gate

Gate Operator

Column

Safety Loop

3'-0"

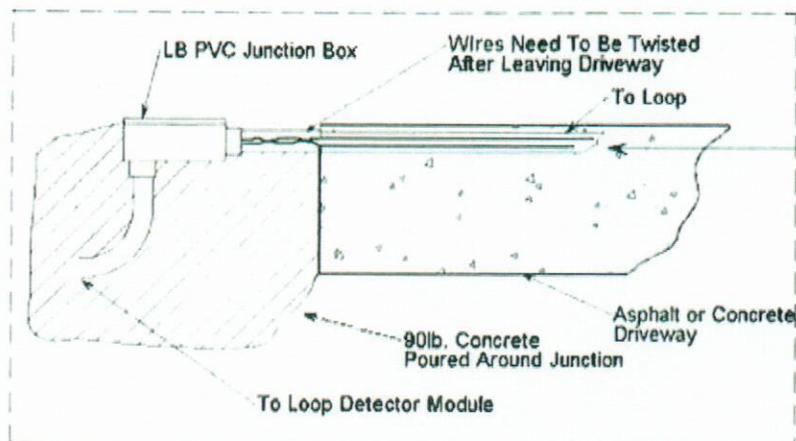
14'-0"

GATE INFO.ORG GATE INFO.ORG

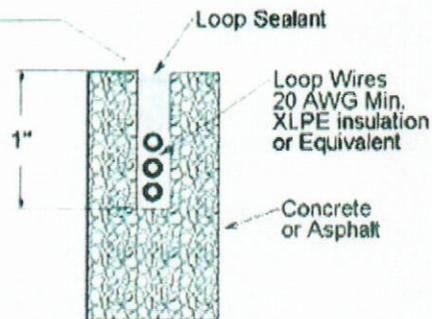
Keypad or Telephone Entry  
System Align With Hinge  
Post Or Column

Note:  
Conduit To Loops 1/2" Sched. 40 PVC  
Conduit To Operator and Entry System 3/4" Sched. 40 PVC

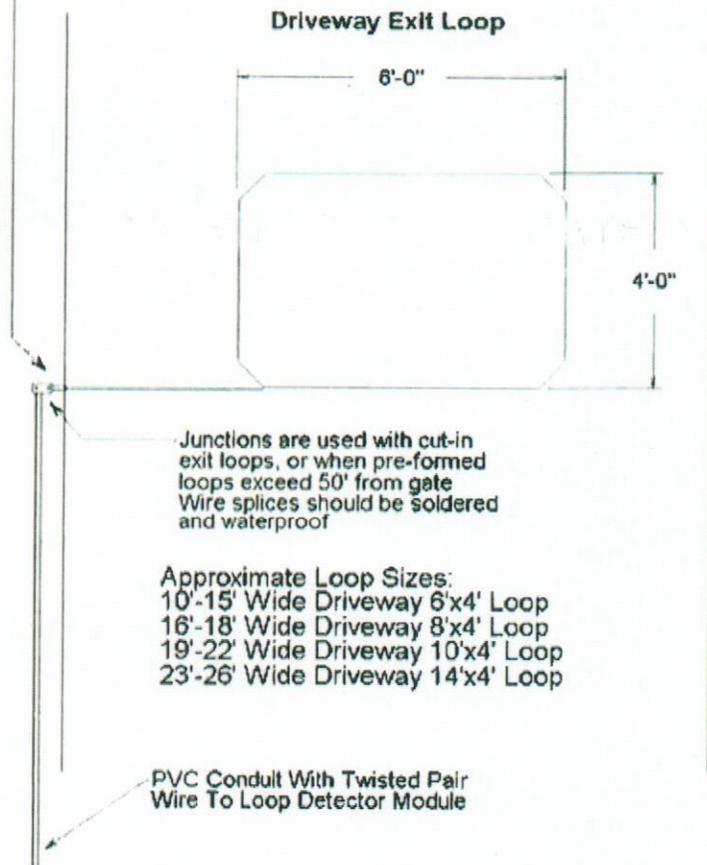
### Exit Loop Junction Detail



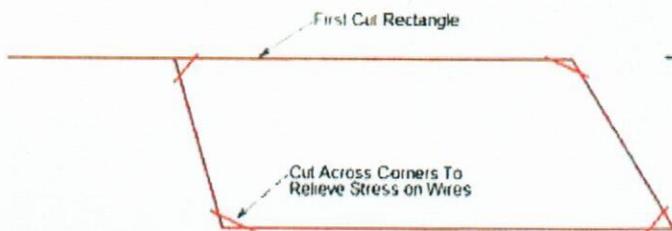
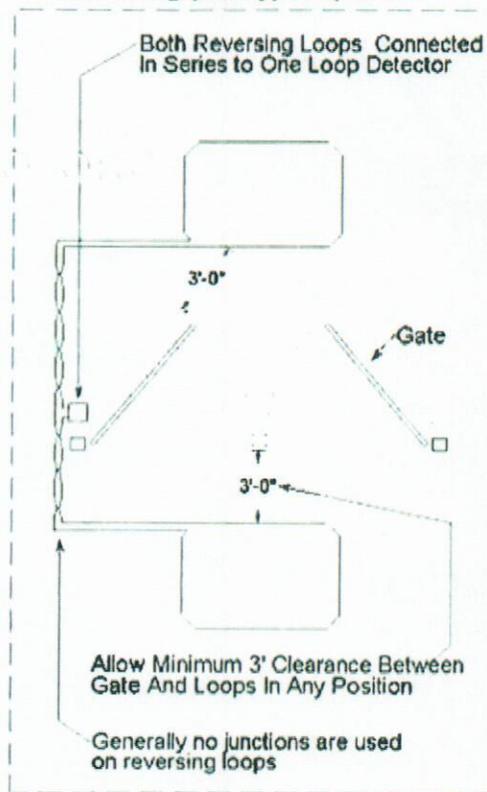
### Loop Cut-In Detail

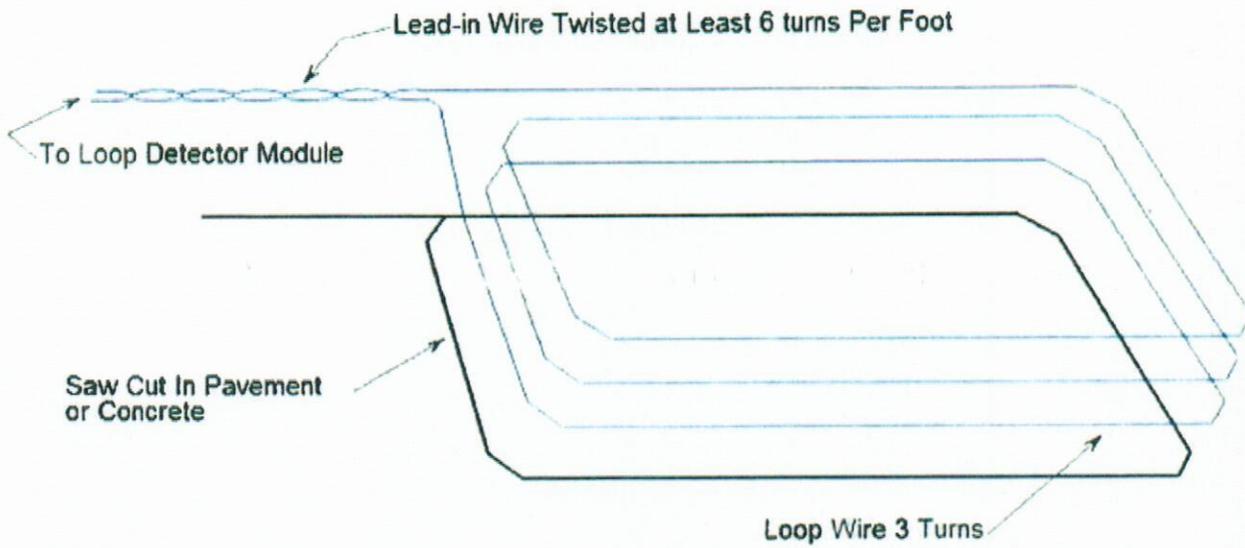


### Driveway Exit Loop

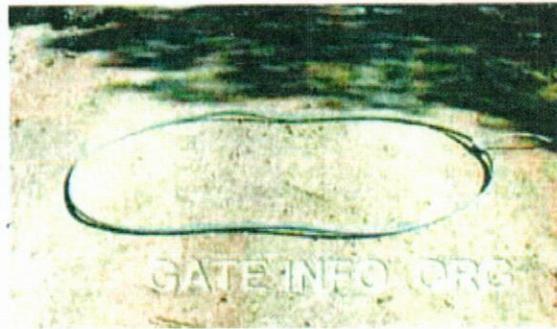


### Reversing (Safety) Loop Detail





Installing a cut-in loop



Pre-formed loop. Laid in before pavement poured