

# Roads

## Master Specification

### RD-EL-C4 Installation of Safety Cameras

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## Document Management

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## RD-EL-C4 Installation of Safety Cameras

### 1 General

- 1.1 This Part specifies the requirements for the installation of safety cameras.
- 1.2 "Detector Feeder Cables" means cables complying with AS 2276.2.
- 1.3 Documents referenced in this Part are listed below:
- a) AS/NZS 2276 Cables for Traffic Signal Installations.
  - b) AS 2339 Traffic Signal Posts and Attachments.
  - c) AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules).
  - d) AS/NZS 3008 Electrical installations - Selection of cables - Cables for alternating voltages up to and including 0.6/1 kV - Typical Australian installation conditions.
  - e) AS/NZS 5000 Electric cables - Polymeric insulated - For working voltages up to and including 0.6/1 (1.2) kV.
  - f) SAPN Utilities Service and Installation Rules.
- 1.4 The work shall comply with the following Departmental Standard Drawings (the Drawings):

**Table RD-EL-C4 1-1 DIT Standard Drawings**

Drawing No.	Sheet No.	Title
S-4055	66	Plastic Pits - Non Secured Concrete Lids & Surrounds
	67	Plastic Pits & Secure Steel Lids - Class A & Surrounds
	68	Plastic Pits & Secure Steel Lids - Class A & B Surrounds
	69	Plastic Pits & Lockable Steel Lids - Class A & B Surrounds
	70	Secure & Lockable Steel Lid Components
S-4500	1	Detector Loop Layout
	2	Cable Layout
	3	Safety Camera – Infrastructure Detail Layout
	4	Detector Loop Layout – Infrastructure Layout Detail
	5	Safety Camera – Wiring Schematic
S-4515	2	Standard Drawing - Traffic Signals Post - Post Footing and Installation
S-4537	6	Traffic Signals Post - Post Types And Post Mounting Details
	4	Safety Camera Mounting Post - Traffic Signals
	5	Safety Camera - Footing & Pole Details

- 1.5 These drawings are available from the following web site:  
<https://www.dpti.sa.gov.au/standards/roads-all>.
- 1.6 All electrical installations shall be carried out by an electrical worker who is licensed in South Australia to perform any electrical works. All connections to Telstra shall be carried out by an ACMA licensed provider. Prior to the commencement of this work, the Contractor shall provide evidence of the License(s) and a **Hold Point** shall apply.

### 2 Construction of Footings

- 2.1 Any cast-in-place concrete shall comply with ST-SC-S1 "Normal Class Concrete". The top surface of concrete shall be finished with a wooden float to a smooth even surface.
- 2.2 Camera and Flash post footings shall be constructed in accordance with Departmental Standard Drawings.

### 3 Trench Work, Conduits and Pits

- 3.1 Under-road boring shall comply with RD-EW-C3 "Boring".
- 3.2 Excavation and backfill of trenches shall comply with RD-EW-C2 "Trench Excavation and Backfill".
- 3.3 Reinstatement of any existing pavements to be retained shall comply with RD-PV-C6 "Reinstatement of Existing Pavements".
- 3.4 All pits and conduits specifically for the installation of Safety Cameras shall conform to Drawing S-4500, sheet 3.
- 3.5 The supply and installation of conduits and pits for the installation of Safety Cameras shall comply with RD-EL-S3 "Supply and Installation of Conduits and Pits" and shall:
  - a) conform to Sheet S-4500, sheet 3; and
  - b) be lockable and suitably marked with "ELECTRICAL", "COMMUNICATION" or "DETECTOR".

### 4 Cabling

#### General

- 4.1 Installation of cables shall be as detailed in the Safety Camera Wiring Diagrams, Cable Connection Schedules and in conjunction with the Duct Layout Drawing. All cables shall be continuous and without joins except at termination points.
- 4.2 All installed cables that run through a cable pit shall have approximately 1 metre of spare cable in a loop in each cable pit.
- 4.3 All Extra Low Voltage (ELV) cables terminated by the Contractor under a screw terminal shall be fitted with bootlace crimps or appropriate crimp lug.
- 4.4 Where applicable, the Principal will nominate a cable pit adjacent to the traffic signal controller for the Contractor to provide lengths of Low Voltage (LV) and ELV cables to finalise the electrical installation. These cables shall be sealed at the ends to prevent moisture ingress. The length of cables shall allow for:
  - a) 1 m of spare in the pit;
  - b) the conduit run to the controller; and
  - c) 2 m for termination in the traffic signal controller.
- 4.5 Cables shall be drawn through ducts using draw cords and shall be installed through pits and ducts without causing damage to the cable. Excessive strain shall not be placed on any individual core, individual cable or group of cables during the drawing in process. A draw cord shall remain in the duct after the installation of the cable to enable to installation of additional cables in the future.

#### Consumer Mains Service Cable (LV Cable)

- 4.6 At a site where the supply is not taken from a traffic signal controller, a consumer mains service cable shall be installed between the SAPN Service Point (SP) and the underground service pit as shown on the Duct Layout Drawing and in accordance with SAPN Drawings.
- 4.7 Where the electrical service point cannot be located conveniently close to the underground service pit and the consumer mains service cable is installed to the underground service pit via the underground cable draw-in pits, this cable shall be installed in a separate duct to all other cables unless otherwise specified on the Duct Layout Drawing and fixed with insulated saddles to the walls of such pits and clearly labelled as "CONSUMER MAINS SERVICE" in each pit.
- 4.8 The length of spare supply cable required at the underground service pit and the SAPN service point shall be as follows:
  - a) Signal Controller Base (where applicable): 2 m

- |                              |   |
|------------------------------|---|
| b) Underground Service Pit:  | 0.75 m each end of active core only. Neutral core continuous. |
| c) Electrical Service Point: | 1.5 m   |

## Supply Cable

### General

- 4.9 Notwithstanding any Voltage Drop and Impedance Loop calculations, the minimum cable size shall be 4 mm<sup>2</sup> circular Active and Neutral, with 2.5 mm<sup>2</sup> Earth. If Voltage Drop and Impedance Loop calculations require higher cable sizes than that stated above, a **Hold Point** shall apply.
- 4.10 Electrical distribution dimensioning from the Service Point involving Voltage Drop and Impedance Loop calculations shall be undertaken by the Contractor and recorded on the Electrical Certificate of Compliance (ECC) certificate.
- 4.11 The supply cable shall terminate into a RCD Socket Outlet in the test enclosure (refer Attachment R56C). The main LV cable connections shall be looped at the line terminals of the RCD Socket Outlet and continue into the camera housing and shall be terminated at the mains junction box.

### Consumer Mains Service Cable

- 4.12 Where the supply is from a dedicated Service Point, it shall run directly to the RCD Socket Outlet in the Test Enclosure. Consumer mains service cables shall be protected by a 10 A Type "C" curve circuit breaker.

### Traffic Signal Controller Service Cable

- 4.13 Where the supply is from a traffic signal controller it shall run from the pit adjacent to the controller to the RCD Socket Outlet in the Test Enclosure.
- 4.14 Upon completion of the Works, the Principal will finalise the LV and ELV electrical wiring from the nominated cable pit adjacent to the traffic signal controller to a dedicated 10Amp 'C' curve circuit breaker in the traffic signal controller to protect the LV circuit.

## Flash Supply Cable

- 4.15 The flash supply cable shall be installed from the camera enclosure to the upper mounting terminals on the flash pole.
- 4.16 The Contractor shall:
- connect the flash cables;
  - terminate the harnesses in the flash pole upper mounting assembly (Note: LV and ELV segregated terminals); and
  - install the duct cover, plastic bag and final cap on the upper mounting assembly.

## Category 5e (Cat5e) Communication Cable

### General

- 4.17 Cat5e cables shall be pink system 2000 compliant.

### Signal Interface Cable

- 4.18 A Cat5e cable shall be installed from the nominated cable pit adjacent to the traffic signal controller to the camera terminal block plate. Sufficient cable length shall be allowed for termination.
- 4.19 The Cat5e cable shall terminate in the camera housing with a RJ-45 male plug and shall follow the 568A Cat5 Standard. This cable shall be long enough to plug into the Camera Computer Unit (CCU).
- 4.20 The Cat5e communication cable shall terminate into a RJ-45 socket in the test enclosure.

### South Australia Police (SAPOL) Test Point Cable

- 4.21 The SAPOL test point cable shall be of sufficient length to:
- a) terminate in a RJ45 socket in the test enclosure; and
  - b) terminate with a RJ45 plug in the camera housing router.

### Flash Control Cable

- 4.22 The flash control cable shall be installed from the camera enclosure to the upper mounting terminals on the flash pole.
- 4.23 The Contractor shall:
- a) connect the flash control cable;
  - b) terminate the harnesses in the flash pole upper mounting assembly (Note: LV and ELV segregated terminals); and
  - c) install the duct cover, plastic bag and final cap on the upper mounting assembly.

### Test Enclosure Alarm Cable

- 4.24 The Test Enclosure Alarm Cable shall be installed as per the Drawings.

### ADSL (Telstra) Cable

- 4.25 The ADSL cable shall be installed in a separate corrugated conduit and shall terminate in the Principal supplied socket. The socket shall be affixed using pressure sensitive adhesive Velcro to the side of the camera housing.
- 4.26 Where the ADSL cable is double insulated, the outer sleeve shall be removed for the cable running inside the camera housing.

## 5 Installation of Equipment

### Camera Pole and Housing

- 5.1 The camera pole shall be installed so that the test enclosure is orientated with the door facing away from the intersection.
- 5.2 The holding down bolts in the base foundation shall be treated with a rust inhibiting lubricant prior to erection of the pole. The base plate shall be firmly bolted down to the concrete foundation. The pole shall be tightened down to the base plate ensuring the galvanized outer surface of the pole is not damaged.
- 5.3 The Contractor shall lay all the cables and the Telstra conduit inside the camera pole.
- 5.4 In addition the Contractor shall undertake the following:
- a) stand and secure the camera pole with nuts and washers ensuring that the pole is plumb using non-corrosive metal packing shims, seal the pole to the caisson tubing, install the mounting collar to the camera housing, install on pole and generally align towards the traffic signal intersection;
  - b) install the camera security collar;
  - c) seal off cavities with black plastic and backfill with washed sand at the base of the camera pole; and
  - d) install the concrete tops to footpath level.

### Flash Pole and Flash Unit

- 5.5 For camera flash pole and flash unit installation, the Contractor shall undertake the following:

- a) lay all cables inside the safety camera flash pole;
- b) allow approximately 1 metre for cables to be stored, in a coil, in the camera flash pole base and for termination in the upper mounting assembly;
- c) treat the holding down bolts, the threaded end of the pole and the threaded base plate with a rust inhibiting lubricant prior to erection of the pole. The base plate shall be firmly bolted down to the concrete foundation;
- d) stand and secure camera flash pole with nuts and washers ensuring that the pole is plumb, using non-corrosive metal packing shims;
- e) install and generally align towards the traffic signal intersection the camera flash unit arm with bandit strap. The arm shall be installed pointing away from the kerb to prevent tall vehicles damaging the flash unit;
- f) install the camera flash unit and, if applicable, align to the middle lane(s) stop bar;
- g) at the base of the pole, seal off cavities with black plastic and backfill with washed sand; and
- h) install the concrete tops to footpath level.

## Test enclosure

### General

- 5.6 The Contractor shall install the test enclosure on the camera pole by:
- a) installing 20 mm PVC male and female bush for communication cables and 32 mm PVC male and female bush for LV cables (refer Attachment C).
  - b) installing 4 x M10 x 30 mm stainless steel Allen head socket set screw / stud, cup point, into the camera pole, use Holdtite – Nickel Antisieze on the thread where entering the pole.
  - c) installing the enclosure onto the 4 set screw / studs by applying a bead of neutral curing silicone sealant to seal the enclosure to the pole and secure with 4 x 21 mm stainless steel flat washers and 4 x M10 stainless steel hexagonal nuts.

### Test Enclosure Door Alarm Switch

- 5.7 The test enclosure door alarm switch shall be mounted onto the RJ45 switch plate using 4 6BA x 6.4 mm countersunk set screws. The Cat5e door alarm cable shall be terminated at the n/o contacts of the switch using the blue / white-blue wires. The connection in the camera enclosure shall be terminated by disconnecting the grey wire from terminal 17 on the camera housing terminal block plate and connecting with a splice connector (3M ScotchLock UY2-2 Position) to the test enclosure cable using the white-blue core. The blue core shall be connected to terminal 17 on the camera housing terminal block.

## ADSL (Telstra) Cable

- 5.8 The Contractor shall allow approximately 500 mm corrugated conduit inside the camera housing and approximately 1 metre of Telstra cable for termination.
- 5.9 The Telstra conduit shall be a solid white conduit from the communication pit and shall protrude into the camera pole approximately 300 mm and connect through a DC2527T adaptor (refer Attachment D) to the white corrugated conduit that continues into the camera housing. If available, the Contractor shall install the Telstra cable from its supply point to the camera pole housing. If the Telstra cable is not available then a nylon draw string shall be provided to allow for the Telstra cable to be drawn through the communication conduit from the pit to the camera housing. When the Telstra cable is available, it shall then be terminated by the Contractor.

## 6 Detector Loop Installation

### General

- 6.1 This clause only applies where the installation of detector loops is included in the scope of works.
- 6.2 Prior to the installation of detector loops, the Contractor may be required to undertake a trial at the Principal's Walkley Heights Depot. At the trial, the Contractor will be required to undertake the following:
- setting out using appropriate templates;
  - cutting to the required depth, layout and tolerances;
  - clean up of excess water and debris from cutting operations to meet environmental requirements;
  - installation of cable and application of sealant; and
  - termination of loop cable and feeder cable.
- 6.3 Following completion of the trial a **Hold Point** shall apply.
- 6.4 If specified, the Contractor shall plane out the existing asphalt to the extent marked on the pavement to a minimum depth of 80 mm and reinstated with AC10M asphalt. Completion of the asphalt reinstatement shall constitute a **Hold Point**.
- 6.5 Following marking out of any detector loops and prior to any cutting of the asphalt pavement a **Hold Point** shall apply.

### Detector Loop Cables

- 6.6 Detector loops shall be installed as specified on Drawings S-4500. Loops located at the intersection stop bar shall be the quadropole type, while other loops shall be the passage type. Loop cable shall comply with Australian Standards.
- 6.7 A slot shall be cut to the pattern shown, and of the dimensions detailed on Drawing No. S-450, to suit the individual detector loop requirements. The cut depth detailed on Drawing No. S-4500 shall be strictly adhered to where cuts intersect to prevent any variation in level between cuts. All cuts shall be straight. Over-run of cuts shall be kept to a minimum to maintain a depth of 35 mm.
- 6.8 The Contractor shall remove all cutting residue and clean out slots prior to the installation of loop cable, in accordance with environmental requirements.
- 6.9 The loop cable shall be laid in the slot in accordance with diagrams on Drawing No. S-4500.
- 6.10 The loop cable shall be securely held in the slot, and the slot sealed with the specified sealant. Approved sealant shall be applied in accordance with the manufacturer's instructions.

### Detector Feeder Cables

- 6.11 Detector feeder cables shall be drawn in separate conduits to LV and LV/ELV cables unless otherwise specified on the Duct Layout Drawing.
- 6.12 The length of detector feeder cable tails required at the detector pit shall be 500 mm.

## Safety Camera Loop Detectors

### General

- 6.13 Camera loop detectors shall be installed within the variance of +/- 1% and as specified in the site specific approved traffic signal drawing and Drawing S-4500 sheet 3.
- 6.14 Each camera loop detector lead in cable pair, from the camera loop detector to the final connection in the camera loop detector pit, shall maintain a twist of a minimum of 5 twists per 300 mm.

- 6.15 The Contractor shall measure each camera loop detector at the camera loop detector pit for:
- loop inductance;
  - loop resistance;
  - Q factor;
  - loop frequency; and
  - insulation resistance to earth for each camera loop detector.
- 6.16 Typical loop detector ranges are:
- Inductance 80  $\mu$ H to 300  $\mu$ H.
  - Resistance 1.5 $\Omega$  to 2.5 $\Omega$ .
  - Q Factor 13 to 20.
  - Frequency 34 kHz to 42 kHz.
  - Insulation Resistance to Earth > 200 M $\Omega$ .
- 6.17 The results shall be recorded on the form: "DETECTOR PIT – SAFETY CAMERA LOOP DETECTOR ANALYSIS" (refer Attachment A).
- 6.18 This shall constitute a **Hold Point** before terminations are carried out in the camera loop detector pit.

#### Loop Detector Feeder Cables and Electrical Measurements

- 6.19 Loop detector feeder cables shall be installed from the camera loop detector pit to the camera pole base. (Note: 2 cables per monitored lane are required.)
- 6.20 The Contractor shall allow sufficient cable for termination at the camera housing and at the camera loop detector pit.
- 6.21 Prior to terminating the camera loop detector feeder cables in the camera housing, they shall be electrically measured for:
- loop inductance;
  - loop resistance;
  - Q factor;
  - loop frequency; and
  - insulation resistance to earth for each camera loop detector.
- 6.22 The results are to be recorded on the form: "CAMERA HOUSING – SAFETY CAMERA LOOP DETECTOR ANALYSIS" (refer Attachment B). Provision of this form shall constitute a **Hold Point**.
- 6.23 Each camera loop detector feeder cable shall be identified in the camera housing with a cable label, cable tied to the outer sheath, and permanent marking identifying the loop detector number, i.e. DETECTOR 1, DETECTOR 2, etc.
- 6.24 The camera loop detector feeder cables shall be terminated in the camera housing terminal block in accordance with the manufacturer's requirements.

#### Connections

- 6.25 The loop detectors shall be connected to the loop detector feeder cables in the loop detector pit.
- 6.26 Each loop detector feeder cable shall have heat shrink tubing with thermoplastic adhesive applied to the end where the cable that exposes the internal cores is cut. The feeder cable shall have the screen cut off at this point as the screen shall be earthed at the camera enclosure only. The heat shrink shall extend approximately 20 mm past the cut and encapsulate the cores and approximately 50 mm over the cable.

- 6.27 The loop detector cable shall be connected to the loop detector feeder cable by stripping each cable and twisting the bared cables together and soldering the ends. The final soldered connection shall be approximately 10 mm in length.
- 6.28 To facilitate maintenance, all loop detector pots shall be capable of being extended 500 mm outside of the loop detector pit.
- 6.29 The connections shall be secured inside a loop detector pot and the pot filled with 3M Scotchcast resin.

### Survey

- 6.30 Unless specified otherwise, the Contractor shall survey installed camera loop detectors using a current Departmental prequalified Surveyor. A list of prequalified members is available at [https://www.dpti.sa.gov.au/contractor\\_documents/prequalification](https://www.dpti.sa.gov.au/contractor_documents/prequalification).
- 6.31 The issuing of the camera loop survey certificate (refer Attachment C) shall constitute a **Hold Point**.

## Traffic Signal Loop Detectors

- 6.32 Unless specified otherwise, the Contractor shall arrange for the traffic signal loop detectors to be installed as shown on the traffic signal site diagram and in accordance with RD-EL-C2 "Installation of Traffic Signals", Clause 10 "Detector Loop Installation".

## 7 Commissioning

### General

- 7.1 Prior to the commissioning of any safety camera, the Contractor shall:
- allow in the Contractor's program at least 2 days for testing with the Principal;
  - liaise with the Principal to arrange a suitable date for commissioning following completion of electrical testing; and
  - provide the Electrical Certificate of Compliance.
- 7.2 The Contractor shall attend the commissioning to complete the works. After the camera has been commissioned, the Contractor shall remove all temporary traffic control devices and associated equipment from site.

### Site Acceptance Test

- 7.3 At commissioning, the Contractor shall undertake a Site Acceptance Test. The Contractor shall produce a Site Acceptance Test Schedule detailing the results of the following tests:
- each camera post and the attached equipment is satisfactorily erected and is properly aimed at the appropriate traffic; and
  - the installation does not allow any unsafe situation.

## 8 Hold Points

- 8.1 The following is a summary of Hold Points, referenced in this Part:

Document Ref.	Hold Point	Response Time
1.6	Provision of Electrical Workers Licence prior to commencement of electrical work	2 hours
4.9	Where calculations indicate higher cable sizes are required	2 working days
6.3	Upon completion of the asphalt reinstatement.	1 working day (metro) 2 working days (other locations)

Document Ref.	Hold Point	Response Time
6.4	Following marking out of detector loops.	1 working day (metro) 2 working days (other locations)
6.5	Detector Pit - Safety Camera Loop Detector Analysis.	1 working day
6.22	Camera Housing - Safety Camera Loop Detector Analysis	1 working day
6.18	Provision of loop detector survey certificate.	2 working days
6.31	Provision of Traffic Signal Loop Detector Analysis.	1 working day
6.31	Notification that traffic signal loop detectors have been connected.	1 working day

## 9 Verification Requirements and Records

### Test Records

9.1 The Contractor shall undertake the testing specified in this Clause and provide written evidence of compliance with the lot package.

**Table RD-EL-C4 9-1 Test Records**

Document Ref.	Subject	Property	Test Procedure	Test Frequency	Acceptance Limits
6.4	Detector Loop Integrity	Loop Continuity	Measure with continuity tester	Each Loop	Full continuity
		Insulation Resistance	Measure the insulation resistance between the loop circuit conductors and a good earth point with the two conductor ends comprising the loop circuit connected together	Each Loop	The insulation resistance between the loop circuit conductors and a good earth point shall be 10 Megohms or greater measured at a test voltage of 500 V DC applied for at least a minute
		Inductance of loop circuit	Measure with no vehicles over or traversing the loop and with no other adjacent loop circuit energised	Each Loop	Not more than 20% from the theoretical value

### Other Records

9.2 The Contractor shall supply the following records:

**Table RD-EL-C4 9-2 Other Records**

Document Ref.	Subject	Record to be Provided
7.1	Commissioning	Electrical Certificate of Compliance
7.2	Commissioning	Site Acceptance Test Schedule

## 10 Appendix 1: Detector Pit – Safety Camera Loop Detector Analysis

Site Details						
Camera Type						
Location Address						
Approach Monitored						
Lanes Monitored	1	2	3	4	5	
Loop Detector Details						
Lane	1	2	3	4	5	Unit
*Loop Inductance 1st Loop						$\mu\text{H}$
*Loop Inductance 2nd Loop						$\mu\text{H}$
Loop Resistance 1st Loop						$\Omega$
Loop Resistance 2nd Loop						$\Omega$
"Q" Factor 1st Loop						-
"Q" Factor 2nd Loop						-
Loop Frequency 1st Loop						kHz
Loop Frequency 2nd Loop						kHz
Insulation Resistance 1st Loop						$\text{M}\Omega$
Insulation Resistance 2nd Loop						$\text{M}\Omega$
*Recommended Inductance 80 $\mu\text{H}$ to 300 $\mu\text{H}$						
Mains Supply						
Mains Voltage						
Flash Unit Supply						
Mains Voltage						
General Alignments						
Camera						
Flash unit						
Date						
Contractor's Name (Print)						
Contractor's Signature						

## 11 Appendix 2: Camera Housing – Safety Camera Loop Detector Analysis

Site Details						
Camera Type						
Location Address						
Approach Monitored						
Lanes Monitored	1	2	3	4	5	
Loop Detector Details						
Lane	1	2	3	4	5	Unit
*Loop Inductance 1st Loop						$\mu\text{H}$
*Loop Inductance 2nd Loop						$\mu\text{H}$
Loop Resistance 1st Loop						$\Omega$
Loop Resistance 2nd Loop						$\Omega$
"Q" Factor 1st Loop						-
"Q" Factor 2nd Loop						-
Loop Frequency 1st Loop						kHz
Loop Frequency 2nd Loop						kHz
Insulation Resistance 1st Loop						M $\Omega$
Insulation Resistance 2nd Loop						M $\Omega$
*Recommended Inductance 80 $\mu\text{H}$ to 300 $\mu\text{H}$						
Mains Supply						
Mains Voltage						
Flash Unit Supply						
Mains Voltage						
General Alignments						
Camera						
Flash unit						
Date						
Contractor's Name (Print)						
Contractor's Signature						

## 12 Appendix 3: Test Enclosure







### 13 Appendix 4: Telstra C2527T Adaptor



## 14 Appendix 5: Detectors



### 15 Appendix 6: Safety Camera Loop Certification

SCLC # 00 \_\_\_\_\_  
SAPOL SITE # \_\_\_\_\_  
SITE DETAILS

DIT TS # \_\_\_\_\_ LANE \_\_\_\_\_ OF \_\_\_\_\_ LANES SURVEYED  
ROAD (CAMERA INSTALLED ON) \_\_\_\_\_  
INTERSECTING ROAD(S) \_\_\_\_\_  
LOCATION \_\_\_\_\_  
DIRECTION OF TRAVEL \_\_\_\_\_

(NOTE: Lane reference is based on lanes with induction loops only and not necessarily the physical traffic lane, as not all lanes are installed with induction loops)

#### MEASUREMENTS

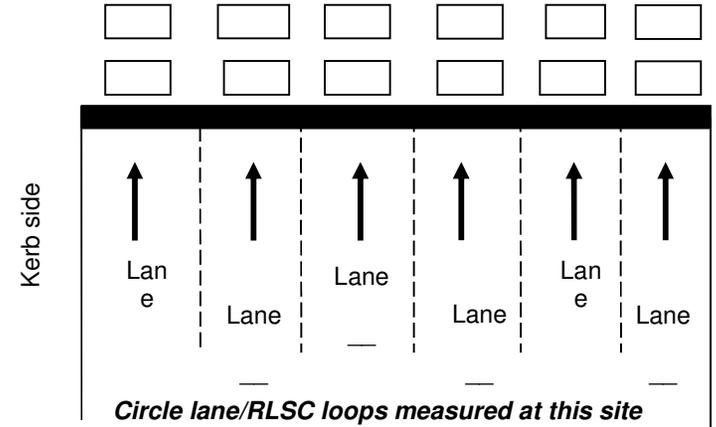
DATE (LOOP SURVEY CONDUCTED)# \_\_\_\_\_ MAKE OF MEASURING DEVICE \_\_\_\_\_  
MEASUREMENTS UNDERTAKEN BY \_\_\_\_\_ SERIAL # OF MEASURING DEVICE \_\_\_\_\_  
QUALIFICATION \_\_\_\_\_ CERTIFICATION # OF MEASURING DEVICE \_\_\_\_\_

#### CERTIFIED

SIGNATURE\* \_\_\_\_\_ FULL NAME (PRINT) \_\_\_\_\_  
COMPANY NAME \_\_\_\_\_

SURVEYED MEASUREMENTS Red Light / Speed Camera (RLSC) Loops

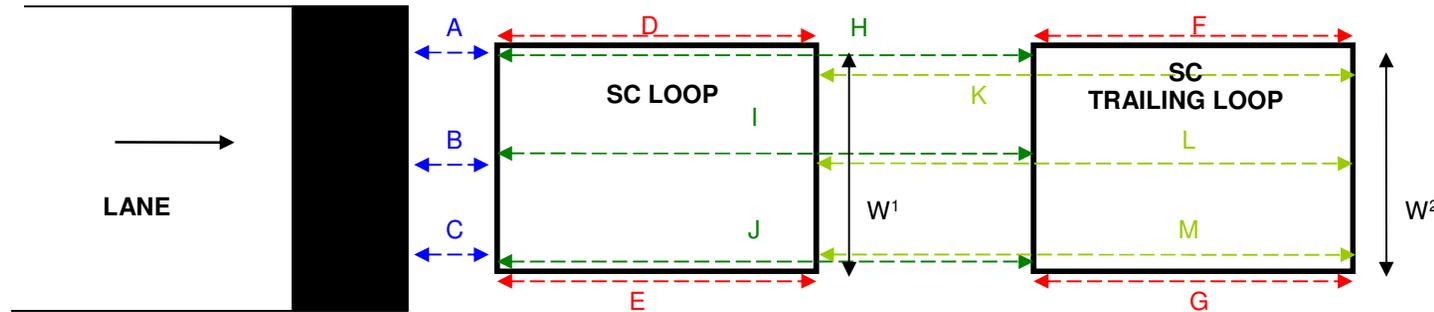
Length	Inset from Edge of Loop	Measured Distance (m)	Standard Distance (m)	Variance +/- (m)*	Tolerance Limit ( $\pm 1\%$ )^
A	0.2 m		N/A	N/A	N/A
B	0.5 W1		N/A	N/A	N/A
C	0.2 m		N/A	N/A	N/A
D	0.2 m		1.0		$\pm 0.010$
E	0.2 m		1.0		$\pm 0.010$
F	0.2 m		1.0		$\pm 0.010$
G	0.2 m		1.0		$\pm 0.010$
H	0.2 m		2.5		$\pm 0.025$
I	0.5 W1		2.5		$\pm 0.025$
J	0.2 m		2.5		$\pm 0.025$
K	0.2 m		2.5		$\pm 0.025$
L	0.5 W2		2.5		$\pm 0.025$
M	0.2 m		2.5		$\pm 0.025$



Notes:

^ Tolerance is  $\pm 1\%$  of standard measurements

\* Highlight any out of tolerance measurements



W<sup>1</sup> = \_\_\_\_\_ m

W<sup>2</sup> = \_\_\_\_\_ m

SIGNATURE \* \_\_\_\_\_

DATE CONDUCTED \* \_\_\_\_\_

## 16 Appendix 7: Traffic Signal Loop Detector Analysis

### Site Details

Camera Type

Location Address

Approach Monitored

Lanes Monitored	1	2	3	4	5
-----------------	---	---	---	---	---

### Loop Detector Unit

Lane	1	2	3	4	5	Unit
------	---	---	---	---	---	------

*Loop Inductance						$\mu\text{H}$
------------------	--	--	--	--	--	---------------

Loop Resistance						$\Omega$
-----------------	--	--	--	--	--	----------

Insulation Resistance						$\text{M}\Omega$
-----------------------	--	--	--	--	--	------------------

\*Recommended Inductance 80  $\mu\text{H}$  to 300  $\mu\text{H}$

Date

Contractor's Name (Print)

Contractor's Signature