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Electrical

‘Quality Control Plan’.

July 2017 Edition

ELECTRICAL QUALITY CONTROL

The following specifications outline the electrical inspections that the Contractor shall carry out for all City of Peterborough electrical operations. Inspections shall be undertaken in accordance with the requirements of the OPSS specifications and the City of Peterborough Electrical Standard Specifications and Standard Drawings July 2017 Edition. It will be the responsibility of the Contractor to undertake the required inspections and complete, sign and date the relevant checklists. The Contractor will work in conjunction with a 3rd party Electrical Verification Engineer. The name of the Electrical Verification Engineer, selected from the Ministry of Transportation's RAQS, shall be submitted to the City of Peterborough's Contract Administrator prior to initiation of construction. All inspection results will be documented for review by the Contract Administrator upon request and shall be submitted to the Contract Administrator three (3) business days prior to signal turn-on.

Upon installation of electrical items, the Contractor shall carry out **Proof of Performance** inspections in conjunction with the Electrical Verification Engineer. Proof of Performances certificates, stamped and signed by the Electrical Verification Engineer, shall be submitted to the Contract Administrator three (3) business days prior to signal turn-on.

All Electrical Items

Prior to installation and construction, the Contractor shall verify that the materials delivered to the site are supplied as per contract specifications. Materials will be inspected for evidence of physical damage and to ensure that the part and model numbers match the material purchase orders. The Contractor shall also ensure that all accessories and associated materials have been provided in correct quantities and are in working order.

The Contractor shall test electrical items to ensure they are in proper working order and that there is no physical damage as a result of construction.

The Contractor shall keep detailed records including Pre-Installation and Installation Check Lists (Appendix A) which will be signed and dated. These signed check lists must be made readily available to the Contract Administrator.

At the completion of construction, three (3) business days prior to signal turn-on, a Proof of Performance certificate for each of the electrical components (Appendix B) shall be given to the Contract Administrator. These forms shall be signed by the Electrical Contractor. The forms shall also be stamped and signed by a qualified Electrical Verification Engineer.

Electrical Chambers

All electrical chamber related inspections shall be undertaken in accordance with the requirements of the Contract Documents and OPSS 602 specifications.

Prior to installation, the Contractor shall visually inspect electrical handwells to ensure that delivered materials are supplied as per contract specifications. Placement shall be confirmed prior to installation of the electrical chambers including alignment, offset and grade.

Upon installation, the Contractor shall check the electrical chambers to ensure that the correct number of sleeves and openings are installed as well as pulling irons, duct sleeves and frames and covers. Ducts entering handwells shall be checked to ensure proper orientation. Frames shall be checked to ensure that they are connected to the system ground.

Ducts

All duct related inspections shall be undertaken in accordance with the requirements of the Contract Documents and OPSS 603 specifications.

Prior to installation, the Contractor shall inspect the duct materials to ensure that size, colour, pipe materials, and quantities conform to the contract specifications and that there are no obvious imperfections. Trench excavation, alignment and depth will be inspected prior to installation.

Ducts will be checked to ensure that they are free of debris, water, breakage or distortion by pulling a mandrel through the ducts. The mandrel shall be solid, round and have a diameter of 6mm less that the nominal duct diameter.

Upon installation but prior to backfilling, the Contractor shall confirm that the installed ducts are the correct size and number and that they are installed at the correct depth. A visual inspection shall be undertaken to ensure that ducts are free of debris, are properly secured and terminated and meet contract requirements. Wobble joints shall be checked to ensure that they are installed in accordance with contract specifications. Ducts that terminate in power supplies with wiring shall be checked to ensure that they are sealed.

Cables

All wiring related inspections shall be undertaken in accordance with the requirements of the Contract Documents and OPSS 604 specifications.

Prior to installation, the Contractor shall check material delivered to the site to ensure that it is supplied as per contract specifications and that there are no obvious imperfections.

Upon installation, the Contractor shall check the cables to ensure that they are installed and spliced in accordance with contract requirements. Voltage testing shall be undertaken for a random selection of 10% of the low voltage and extra low cable systems in conformance with OPSS 604 requirements.

The following tests shall be carried out,

Continuity Testing
Two (2) runs of wire shall be connected together at one end. At the opposite end, an ohmmeter shall be used to measure the resistance in the resulting loop. The measured resistance will be deemed acceptable if it does not exceed the nominal resistance of the cable, plus 20% per splice or connection.

Resistance to Ground Test
The resistance to ground test will be conducted with the wire run not connected. A megger shall be connected with one lead to a suitable ground, and the other lead connected to the wire under test. 1000 volts shall be applied to the wire, and the measurement taken.

The cables shall be visually inspected to ensure that wires are properly secured and terminated.

Grounding

All grounding related inspections shall be undertaken in accordance with the requirements of the Contract Documents and OPSS 609 specifications.

Prior to installation, the Contractor shall check that the material delivered to the site has been supplied as per the contract specifications and that they are of the correct colour and type. Grounding and bonding materials and connections will be checked to ensure that they are CSA approved and comply with the Electrical Code. Grounding lugs will be checked to ensure that they are the correct size and type.

Upon installation, the Contractor shall perform testing as per the requirements of OPSS 609. The resistance to ground between equipment enclosures and the grounding grid shall be tested at all power supply locations to ensure that the grounding system complies with the requirements of OPSS 609. Readings shall not exceed 25 ohms. In soils of low conductivity, additional ground electrodes and ground wires shall be added as required. These measurements will be undertaken when frost penetration does not exceed 150 mm. Continuity tests will be undertaken to ensure that the grounding is connected properly. Pole handholes and electrical chambers shall be checked to ensure they have been properly grounded.

Luminaries

All luminaire related inspections shall be undertaken in accordance with the requirements of the Contract Documents and OPSS 617 specifications.

Prior to construction, the Contractor shall check the material delivered to the site to ensure that they are supplied from the approved list, and that they have the correct lamp, photometrics, ballast and ratings as per specifications. Also, ensure that they are properly labelled and dated.

Upon installation, the Contractor shall carry out a visual inspection to ensure that luminaries are aligned correctly, that placement and condition of luminaries and associated hardware and materials are good, and that the luminaries operate properly when the system is energized. Low voltage tests shall be performed on associated wiring system to ensure it meets contract requirements. Fuses shall be checked to ensure that they are of the correct amperage and type as per electrical design.

Power Supply Equipment

All power supply equipment related inspections shall be undertaken in accordance with the requirements of the Contract Documents and OPSS 614 specifications.

Prior to construction, the Contractor shall check the material delivered to the site to ensure that it conforms to contract specifications. The Contractor shall also ensure that ESA label of approval is obtained prior to installation.

Upon installation, the Contractor shall inspect the power supplies to ensure that they are mounted at the correct height using specified brackets. A visual inspection shall be carried out to ensure that the specified grounding is complete and a continuity test will be undertaken to ensure the grounding is connected properly.

Poles

All pole related inspections shall be undertaken in accordance with the requirements of the Contract Documents and OPSS 615 specifications.

Prior to their installation, the Contractor shall check all poles for dents, scratches and other imperfections. The contract drawings and layout of poles shall be reviewed and the pole locations including elevations, stations and offsets checked on site to ensure that they are correct.

Upon installation, the Contractor shall carry out an inspection to ensure that poles have been properly installed, that the handholes are correctly orientated, that the poles are plumb and that the anchorage assemblies and frangible bases are installed and tightened in compliance with contract requirements.

Footings and Pads for Electrical Equipment

All footings and pads for electrical equipment related inspections shall be undertaken in accordance with the requirements of the Contract Documents and OPSS 616 specifications.

Prior to construction, the Contractor shall review the contract drawings and layout of concrete pole footings and pads for electrical equipment and the locations including station and offset checked on site to ensure that they are correct.

Upon installation, footing and pad elevations will be checked to ensure they are level, at the correct elevation, station and offset, and in conformance with project requirements. A visual inspection will be undertaken to ensure that anchorage assemblies are properly oriented and tested to ensure they are in working order. The finished surface of the concrete will be inspected for deficiencies.

Traffic Signal Equipment

All traffic signal equipment related inspections shall be undertaken in accordance with the requirements of the Contract Documents and OPSS 620 specifications.

Prior to installation, the Contractor shall check all traffic signal equipment to ensure that the equipment is as per the contract documents, it is the correct size, type and quantity.

Upon completion of installation, components shall be tested and proven as indicated in the contract. The traffic signals shall be flashed out three (3) business days prior to activation in the presence of the Contract Administrator and a qualified verification engineer. The Contractor shall confirm that the location and orientation of the mast arms, traffic signal heads and pedestrian heads are correct. Cables are to be visually inspected to ensure that the appropriate riser wires have been installed and that the wires are properly secured and terminated and labelled.

Megger testing is to be performed on cables to check that insulation values of conductors are in accordance with OPSS requirements, and to ensure that they are energized and in working order without activating the traffic signals for public display. All low voltage and extra low voltage testing shall conform to OPSS 604.

Traffic Signal Controller

All traffic signal controller related inspections shall be undertaken in accordance with the requirements of the Contract Documents and OPSS 623 specifications.

Prior to installation, the Contractor shall inspect the traffic signal controller to ensure that the manufacturer's certificate for pre-installation testing of equipment has been received and is acceptable. The equipment shall be checked to ensure that it is the correct size, type and quantity as per the contract documents.

Upon completion of installation, components shall be tested and proven as indicated in the contract. The Contractor shall perform a conflict monitor test and check the signal operation to ensure that it conforms to the timing plan and operation parameters. All loop detectors shall be tested to ensure that they are in working order and in conformance with the contract requirements. Final testing and inspection of the traffic signal controller shall be in the presence of the Electrical Verification Engineer.

Traffic Actuation Equipment

All traffic actuation equipment related inspections shall be undertaken in accordance with the requirements of the Contract Documents and OPSS 623 specifications.

Prior to installation, the Contractor shall inspect the equipment and shall check to ensure that it is the correct size, type and quantity as per the contract documents.

Upon installation, but prior to sealing of slots, the loop wiring shall be tested for continuity, for leakage to ground and for inductance. Resistance to ground shall be 10MΩ or greater. Inductance shall be within 25% of the value indicated in the contract using a 100kHz signal at 5V.

Upon completion of installation, the Contractor shall repeat the test at the controller cabinet to ensure that they are in working order and conform to the contract requirements. The Cables shall be visually inspected to ensure that all wires are properly secured and terminated. Extra low voltage testing results conform to OPSS requirements.

INSPECTION TASKS CHECKLIST SUMMARY

All Electrical Items	**OPSS 106**
• Check delivered material to verify that it is being supplied as per the contract specifications.	

- Check for evidence of physical damage.
- Ensure part and model numbers match the material purchase orders.
- Ensure quantities match the purchase orders and accessories and associated material have been provided.
- Prepare as-built drawings.

Electrical Chambers **OPSS 602**

- Check delivered material to verify that it is being supplied as per the contract specifications.
- Check the type, alignment, offset and grade of the handwells prior to installation.
- Ensure that the correct number of sleeves and openings are installed.
- Ensure correct positioning and installation of pulling irons, duct sleeves, and frames and covers.
- Ensure that backfill material is placed in accordance with contract documents.
- Ensure that backfill material is compacted to required target densities.
- Check that ducts entering handwells are installed in the proper orientation.
- Check that frames and covers are connected to the system ground.

Ducts **OPSS 603**

- Check delivered material to verify that it is being supplied as per the contract specifications.
- Ensure that the size, type and colour of the conduit are as specified in the contract.
- Ensure that locations and quantities are as per contract documents.
- Ensure that ducts are free of debris, water, breakage or distortion.
- Check that unused ducts are plugged, that unused ducts contain tracer wire and mule tape.
- Check trench excavation for size and depth prior to installation.
- Ensure that ducts are placed at the correct elevation prior to backfilling.

Cables **OPSS 604**

- Check delivered material to verify that it is being supplied as per the contract specifications.
- Check material for obvious imperfections.
- Check that cables are installed, tested and spliced as indicated in the contract.
- Check that cables have been properly labeled.
- Review low voltage and extra low voltage testing results for conformance to OPSS 609.
- Check that ducts terminating in power supplies with wiring are sealed.

Grounding	**OPSS 609**

- Check delivered material to verify that it is being supplied as per the contract specifications.
- Check that insulated ground wire is of the correct colour and type, as specified in the contract.
- Ensure grounding and bonding materials and connections are CSA approved and comply with the Contract Documents.
- Ensure ground lugs are the correct size and type.
- Review testing results on grounding equipment for conformance to OPSS 609.
- Check that inaccessible ground connections are installed as specified.
- Review resistance to ground testing results and ensure that the grounding system complies with the contract specifications.
- Check that metal components throughout the contract are grounded.

Luminaries	**OPSS 617**

- Check delivered material to verify that it is being supplied as per the contract specifications.
- Check that the luminaries delivered have the correct lamp, photometrics and ballast and that they are dated.
- Check that luminaries are aligned correctly in relation to the roadway, that the lamp.
- Check that the lamp socket is properly set and that the luminaire housing is properly hinged and sealed.
- Check that connections are clearly marked and identified and that nameplates and labels are clearly marked.
- Ensure that the manufacture’s name, catalogue number and wattage are on the exterior of the luminaire.
- Check that the supply voltage and frequency, and nominal operating voltage of the lamp are on the interior of the luminaire.
- Check that the socket position is indicated on the interior of the luminaire.
- Check that the schematic wiring diagram is attached to the ballast.
- Perform visual check of placement and condition of luminaries and associated hardware and materials.
- Check that luminaries operate properly when the system is energized.
- Review low voltage testing results on wiring system to ensure it meets contract requirements.
- Check that fuses are of the correct amperage and type.

Power Supply Equipment	**OPSS 614**

- Check delivered material to verify that it is being supplied as per the contract specifications.
- Ensure that the ESA label of approval is obtained prior to installation.
- Perform visual inspection on the installed power supply equipment to ensure that all parts are as per contract documents and correspond with shop drawings.
- Check that the specified ground is complete.
- Review the cable and grounding system testing results for conformance to contract requirements.
- Review low voltage testing results on wiring for conformance to contract requirements.

Poles	**OPSS 615**
• Check delivered material to verify that it is being supplied as per the contract specifications. • Check poles for dents, scratches and other imperfections. • Inspect the work to ensure that poles have been properly installed, that the poles are plumb and that anchorage assemblies and frangible bases are installed and tightened in compliance with contract requirements. • Check that pole foundations and poles are installed to the correct elevation, station and offset.	
Footings and Pads for Electrical Equipment	**OPSS 616**
• Upon installation, footing and pad elevations will be checked to ensure they are level and in conformance with project requirements. • Visually check that anchorage assemblies are properly oriented and tested to ensure they are in working order. • Inspect the finished surface of the concrete for deficiencies.	
Traffic Signal Equipment	**OPSS 620**
• Check material to ensure that it is the correct size, type and quantity. • Check that the signal heads and mast arms are the correct size and type. • Check that the signal heads have been orientated correctly. • Components have been tested and proven as indicated in the contract. • Traffic signals have been flashed out three (3) days prior to activation in the presence of the Contract Administrator and a qualified verification engineer. • Cables have been visually inspected to ensure that the appropriate riser wires have been installed and that the wires are properly secured and terminated. • Carry out megger testing on cables to ensure that insulation values of conductors are in accordance with OPSS requirements. • Certificate of Conformance has been submitted to the Contract Administrator three (3) days prior to traffic signal activation	
Traffic Signal Controller	**OPSS 623**
• Ensure that the manufacturer's certificate for pre-installation testing of equipment has been received and is acceptable prior to installation. • Check equipment to ensure that it is the correct size, type and quantity. • Upon completion, ensure that components have been tested and proven as indicated in the contract. • Check signal operation to ensure that it conforms to the timing plan and operational parameters. • Check conflict monitor. • Check loop detectors to ensure that they are in working order and conform with the contract requirements. • Carry out megger testing on cables to ensure that insulation values of conductors are in accordance with	

contract requirement. • Visually inspect cables to ensure that wires are properly secured and terminated. • Certificate of Conformance has been submitted to the Contract Administrator three (3) days prior to traffic signal activation
Traffic Actuation Equipment **OPSS 623**
• Check equipment to ensure that it is the correct size, type and quantity. • Test loops to ensure that they are in working order. • Visually inspect cables to ensure that wires are properly secured and terminated. • Review extra low voltage testing results to ensure they are in conformance with OPSS 609 requirements.

APPENDIX A

INSPECTION FORMS

Inspection Stage	
	Pre-installation
	Installation

Check List for Electrical Chambers

Contract No:_____ ***Item No.: _____***

Identification of Chambers Inspected: _____

Type of Inspection	Date of Inspection	Meets Criteria	Notes
Material has been supplied as per the contract specifications.			
Chamber type is as per contract.			
Correct number of sleeves and openings are installed.			
Pulling irons, duct sleeves and frames and covers are correctly positioned and installed.			
Prior to installation: alignment, offset and grade of handwells are installed as per contract.			
Ducts entering handwells are installed in the proper orientation.			
Backfill being placed is in accordance with what is indicated in the contract			
Backfill material is compacted to required target densities.			
All unused holes are filled and water proofing is applied where applicable			
Frames are connected to the system ground.			

Contractor: _____

Inspected By: _____

Date: _____

Inspection Stage	
	Pre-installation
	Installation

Check List for Ducts

Contract No:_____ ***Item No.: _____***

Identification of Ducts Inspected: _____

Type of Inspection	Date of Inspection	Meets Criteria	Notes
Material has been supplied as per the contract specifications.			
Size, type and colour of the conduit is as specified in the contract.			
Ducts are free of debris, water, breakage or distortion.			
Mandrel has been pulled through duct system.			
Unused ducts are plugged.			
Ducts terminating in power supplies are sealed.			
Locations and quantities of ducts are as per contract documents.			
Ducts are placed at the correct depth (to be done prior to backfilling).			
Connection to poles, chambers and other devices meet the requirements of the contract.			

Contractor: _____

Inspected By: _____

Date: _____

Check List for Cables

Inspection Stage	
	Pre-installation
	Installation

Contract No:_____ ***Item No.: _____***

Identification of Cables Inspected: _____

Type of Inspection	Date of Inspection	Meets Criteria	Notes
Material has been supplied as per the contract specifications.			
No obvious imperfections in the cables.			
Cables are installed, tested and spliced as indicated in the contract.			
All wires are properly secured and terminated.			

Chart for Low Voltage Cable Testing

Cable Type	From	To	Distance	Resistance (ohms) (Continuity)	Resistance to Ground

Contractor: _____

Inspected By: _____

Date: _____

Inspection Stage	
	Pre-installation
	Installation

Check List for Grounding

Contract No:_____ ***Item No.: _____***

Identification of Grounding Inspected: _____

Type of Inspection	Date of Inspection	Meets Criteria	Notes
Material has been supplied as per the contract specifications.			
Insulated ground wire is the colour and type specified in the contract.			
Grounding, bonding materials and connections are CSA approved and comply with the Electric Code.			
Ground lugs are the correct size and type.			
Testing results on ground equipment conform to OPSS 609.			
All inaccessible ground connections are installed as specified.			
Resistance to ground testing results comply with the requirements of the contract specifications			
The grounding system complies with the requirements of the contract specifications			
All metal components throughout the contract are grounded.			

Ground Tests

Location	Ground Rods	Resistance

Contractor: _____

Inspected By: _____

Date: _____

Check List for Roadway Luminaires

Inspection Stage	
	Pre-installation
	Installation

Contract No:_____ Item No.: _____

Identification of Luminaires Inspected:_____

Type of Inspection	Date of Inspection	Meets Criteria	Notes
Material is as per contract documents.			
There is no physical damage to the unit.			
Lamp socket is properly set.			
Luminaire housing is properly hinged and sealed.			
Luminaries have the correct lamp, photometrics and ballast and are dated.			
All connections are clearly marked and identified and all nameplates and labels are clearly marked.			
Luminaries are correctly aligned in relation to the roadway.			
Manufacture's name, catalogue number and wattage are on the exterior of the luminaire.			
Supply voltage and frequency, and nominal operating voltage of lamp is on the interior of the luminaires			
Socket position is indicated on the interior of the luminaire.			
Schematic wiring diagram is attached to the ballast.			
Luminaries operate properly when the system is energized.			
Fuses are of the correct amperage and type.			

Contractor: _____

Inspected By: _____

Date: _____

Inspection Stage	
	Pre-installation
	Installation

Check List for Power Supply Equipment

Contract No:_____ Item No.: _____

Identification of Power Supplies Inspected: _____

Type of Inspection	Date of Inspection	Meets Criteria	Notes
All material has been supplied as per the contract specifications.			
There is no obvious physical damage.			
Enclosure is properly sealed.			
Conduit and wiring is properly mounted and routed.			
Equipment is properly labeled and mounted; and the number and sizes are as specified in the contract.			
Specified ground is complete.			
Installed equipment has been visually inspected.			
Low voltage testing results on wiring conform to contract requirements.			

Contractor: _____

Inspected By: _____

Date: _____

Inspection Stage	
	Pre-installation
	Installation

Check List for Poles

Contract No:_____ Item No.: _____

Identification of Poles Inspected: _____

Type of Inspection	Date of Inspection	Meets Criteria	Notes
Material has been supplied as per the contract specifications.			
Pole foundations and poles are installed to the correct elevation, station and offset.			
Poles have no dents, scratches or other imperfections.			
All poles have been properly installed, poles are plumb and anchorage assemblies and frangible bases (where applicable) are installed and tightened in compliance with contract requirements.			
Pole handholes are properly oriented.			

Contractor: _____

Inspected By: _____

Date: _____

Inspection Stage	
	Pre-installation
	Installation

Check List for Footings and Pads

Contract No:_____ Item No.: _____

Identification of Footings Inspected: _____

Type of Inspection	Date of Inspection	Meets Criteria	Notes
Anchorage assemblies are properly oriented and tested to ensure they are in working order.			
Concrete pads and footings have been oriented as per contract documents.			
All footing and pad elevations are level and in conformance with project requirements.			
Finished surface of the concrete has been visually inspected for deficiencies.			

Contractor: _____

Inspected By: _____

Date: _____

Inspection Stage	
	Pre-installation
	Installation

Check List for Traffic Signal Equipment

Contract No:_____ Item No.: _____

Identification of Traffic Signal Equipment Inspected: _____

Type of Inspection	Date of Inspection	Meets Criteria	Notes
All equipment is the correct size, type and quantity.			
All components have been tested and proven as indicated in the contract.			
Mast arms and brackets are the correct size as per contract requirements.			
Signal heads are the correct type and size as per contract requirements.			
Signal heads are properly oriented.			
Appropriate riser wires have been installed.			
Cables have been visually inspected to ensure that all wires are properly secured and terminated.			
Low voltage test results conform with OPSS requirements.			

Contractor: _____

Inspected By: _____

Date: _____

Inspection Stage	
	Pre-installation
	Installation

Check List for Traffic Signal Controller

Contract No:_____ Item No.: _____

Identification of Traffic Signal Controller Inspected: _____

Type of Inspection	Date of Inspection	Meets Criteria	Notes
Ensure that the manufacturer`s certificate for pre-installation testing has been received and is acceptable.			
All equipment is the correct size, type and quantity.			
All components have been tested and proven as indicated in the contract.			
Signal operation has been checked to ensure that it conforms to the timing plan and operational parameters			
All traffic loops in working order and conform to the contract requirements.			

Contractor: _____

Inspected By: _____

Date: _____

Check List for Traffic Actuation Equipment

Inspection Stage	
	Pre-installation
	Installation

Contract No:_____ ***Item No.: _____***

Identification of Loop Inspected: _____

Type of Inspection	Date of Inspection	Meets Criteria	Notes
All equipment is the correct size, type and quantity.			
Upon installation, but prior to sealing of slots, the loop wiring has been tested for continuity, leakage to ground and inductance.			
All traffic loops have been tested at the controller to ensure that they are in working order and conform to contract requirements.			
Cables have been visually inspected to ensure that all wires are properly secured and terminated.			
Extra low voltage testing results conform OPSS requirements.			

Loop Detector Tests

Loop No.	Location	Inductance (μH)	Resistance (Ohms)	Notes

Contractor: _____

Inspected By: _____

Date: _____

APPENDIX B

PROOF OF PERFORMANCE CERTIFICATES

Proof of Performance Certificate for Electrical Chambers

***Contract No:*_____ *Item No.:*_____ *Date:*_____**

Description: _____

Identification of Chambers Inspected: _____

Type of Inspection	**Meets Criteria**
Chamber type is as per contract.	
Correct number of sleeves and openings are installed.	
Pulling irons, duct sleeves, and frames and covers are correctly positioned and installed.	
Alignment, offset and grade of chambers are installed as per contract.	
Ducts entering handwells are installed in the proper orientation.	
Backfill being placed is in accordance with what is indicated in the contract.	
All unused holes are filled and water proofing is applied where applicable.	
Frames are connected to the system ground.	

Notes: _____

_____

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_____

Inspected By: _____

Date: _____

The above noted inspection is hereby certified by

_____ , P.Eng.

P.Eng. Stamp

Proof of Performance Certificate for Ducts

***Contract No:*_____ *Item No.:*_____ *Date:*_____**

Description: _____

Identification of Ducts Inspected: _____

Type of Inspection	Meets Criteria
Size, type and colour of the conduit is as specified in the contract.	
Ducts are free of debris, water, breakage or distortion.	
Unused ducts are plugged.	
Ducts terminating in power supplies are properly sealed.	
Locations and quantities of ducts are as per contract documents.	
Ducts are placed at the correct depth prior to backfilling.	
Marker tape and conduit markers are as per specifications.	
Connection to poles, chambers and other devices meet the requirements of the contract.	

Notes: _____

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Inspected By: _____

Date: _____

The above noted inspection is hereby certified by

_____ , P.Eng.

P.Eng. Stamp

.***Proof of Performance Certificate for Cables***

Contract No:_____ Item No.:_____ Date:_____

Description: _____

Identification of Cables Inspected: _____

Type of Inspection	**Meets Criteria**
Type, size and number of cables are as specified in the contract.	
No obvious imperfections.	
Cables are installed, tested and spliced as indicated in the contract.	
Wires are properly secured and terminated.	

Notes: _____

_____

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_____

Inspected By: _____

Date: _____

The above noted inspection is hereby certified by

_____ , P.Eng.

P.Eng. Stamp

Chart for Low Voltage Cable Testing

Contract No:_____ Item No.:_____ Date:_____

Description: _____

Identification of Cables Inspected: _____

Cable Type	From	To	Distance	Resistance (ohms) (Continuity)	Resistance to Ground

Notes: _____

_____

_____

_____

_____

Inspected By: _____

Date: _____

The above noted testing was witnessed and is hereby Certified by _____ , P.Eng.

P.Eng. Stamp

Proof of Performance Certificate for Grounding

***Contract No:*_____ *Item No.:*_____ *Date:*_____**

Description: _____

Identification of Grounding Inspected: _____

Type of Inspection	**Meets Criteria**
Type and size of ground wire is as specified in the contract.	
Type and number of ground electrodes is as specified in the contract.	
Ground lugs are the correct size and type.	
Testing results on ground equipment conform to OPSS 609.	
Resistance to ground testing results, have been reviewed and the grounding system complies with the contract specifications.	
All components required to be grounded are grounded.	

Notes: _____

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Inspected By: _____

Date: _____

The above noted inspection is hereby certified by

_____ , P.Eng.

P.Eng. Stamp

Ground Tests

Location	Ground Rods	Resistance

Notes: _____

_____

_____

_____

_____

Inspected By: _____

Date: _____

The above noted testing was witnessed and is hereby

Certified by _____ , P.Eng.

P.Eng. Stamp

Proof of Performance Certificate for Roadway Luminaires

Contract No:_____ Item No.:_____ Date:_____

Description: _____

Identification of Roadway Luminaries Inspected: _____

Type of Inspection	**Meets Criteria**
No physical damage to the unit.	
Lamp socket is properly set.	
Luminaire housing is properly hinged and sealed.	
Luminaries have the correct lamp, photometrics and ballast and are dated.	
All connections are clearly marked and identified and that all nameplates and labels are clearly marked.	
Luminaries are correctly aligned in relation to the roadway.	
Manufacture's name, catalogue number and wattage are on exterior of luminaire.	
Supply voltage and frequency, and nominal operating voltage of lamp is on the interior of the luminaires	
Socket position is indicated on the interior of the luminaire.	
Schematic wiring diagram is attached to the ballast.	
Luminaries operate properly when the system is energized.	
Fuses are of the correct amperage and type.	

Notes: _____

_____

Inspected By: _____

Date: _____

The above noted inspection is hereby certified by

_____ , P.Eng.

P.Eng. Stamp

Proof of Performance Certificate for Power Supply Equipment

***Contract No:*_____ *Item No.:*_____ *Date:*_____**

Description: _____

Identification of Power Supply Equipment Inspected: _____

Type of Inspection	**Meets Criteria**
Pre-installation inspection has been carried out.	
No physical damage upon completion of installation.	
Enclosure is properly sealed.	
Conduit and wiring is properly mounted and routed.	
Equipment is properly labeled and mounted; and the number and sizes are as specified in the contract.	
Specified ground is complete.	
Low voltage test and ground test results conform to contract requirements.	

Notes: _____

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Inspected By: _____

Date: _____

The above noted inspection is hereby certified by

_____ , P.Eng.

P.Eng. Stamp

Proof of Performance Certificate for Poles

Contract No: _____ ***Item No.:*** _____ ***Date:*** _____

Description: _____

Identification of Poles Inspected: _____

Type of Inspection	Meets Criteria
Poles are installed to the correct elevation, station and offset.	
No dents, scratches and other imperfections.	
Poles have been properly installed and are plumb.	
Anchorage assemblies and frangible bases are installed and tightened in compliance with contract requirements.	
Pole handholes are properly oriented.	

Notes: _____

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Inspected By: _____

Date: _____

The above noted inspection is hereby certified by

_____ , P.Eng.

P.Eng. Stamp

Proof of Performance Certificate for Footings and Pads

***Contract No:*_____ *Item No.:*_____ *Date:*_____**

Description: _____

Identification of Footings and Pads Inspected: _____

Type of Inspection	Meets Criteria
Anchorage assemblies have been visual inspection and are properly oriented.	
Pads and footings have been oriented as per contract documents.	
Depth and location of footing or pad is correct.	
Number and orientation of conduit is correct.	
Footing and pad elevations have been checked and are level and in conformance with project requirements.	
Finished surface of concrete has been grooved and an 'X' placed where ducts enter.	
Finished surface of the concrete has been inspected for deficiencies.	

Notes: _____

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Inspected By: _____

Date: _____

The above noted inspection is hereby certified by

_____ , P.Eng.

P.Eng. Stamp

Proof of Performance Certificate for Traffic Signal Equipment

Contract No:_____ Item No.:_____ Date:_____

Description: _____

Identification of Traffic Signal Equipment Inspected: _____

Type of Inspection	**Meets Criteria**
Size and type of signal heads is as specified in contract.	
Signal heads are properly oriented.	
Mast arms and brackets are the correct size as per contract requirements.	
Spacing and mounting heights of traffic signal heads is correct.	
Pedestrian pushbutton location is as specified in contract.	
Pedestrian pushbuttons operate correctly.	
All components have been tested and proven as indicated in the contract.	
Cables are energized and in working order without activating the traffic signals for public display.	
Cables have been visually inspected to ensure that all wires are properly secured and terminated correctly.	

Notes: _____

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Inspected By: _____

Date: _____

The above noted inspection is hereby certified by

_____ , P.Eng.

P.Eng. Stamp

Proof of Performance Certificate for Traffic Signal Controller

***Contract No:*_____ *Item No.:*_____ *Date:*_____**

Description: _____

Identification of Traffic Signal Controller Inspected: _____

Type of Inspection	**Meets Criteria**
All components have been tested and proven as indicated in the contract.	
Cables are energized and in working order without activating the traffic signals for public display.	
Cables have been visually inspected to ensure that all wires are properly secured and terminated correctly.	
Controller has been visually inspected to ensure that controller and conflict monitor programming is installed correctly.	
Setting of timing controls, switches and programming controls is correct.	
Conflict monitor was tested.	
Prior to turn-on, the intersection was flashed out.	
Loop detectors were tested and are as specified in the contract.	

Notes: _____

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Inspected By: _____

Date: _____

The above noted inspection is hereby certified by

_____ , P.Eng.

P.Eng. Stamp

Proof of Performance Testing for Loop Detectors

Contract No:_____ Item No.:_____ Date:_____

Description: _____

Identification of Loop Detectors Inspected: _____

Loop No.	Location	Inductance (μH)	Resistance (Ohms)

Notes: _____

_____

Inspected By: _____

Date: _____

The above noted testing was witnessed and is hereby

Certified by _____, P.Eng.

P.Eng. Stamp