
VOLUME 2.5
THE REGIONAL MUNICIPALITY OF PEEL
STANDARD SPECIFICATIONS
FOR
TRAFFIC SIGNALS, STREETLIGHTING AND ELECTRICAL WORK

E.1 INTRODUCTION

The Agency is seeking a Vendor to supply and install and modernize permanent traffic signals, temporary overhead traffic signals, midblock pedestrian signals, streetlights, and flasher systems. The Vendor shall also provide consultation and inspection of existing traffic signals and streetlighting infrastructure within the Region of Peel. Work will be ordered on an as needed basis, quotes provided to the Agency shall be submitted in the unit rates provided by the successful Vendor in this bid call.

E.2 ELECTRICAL QUALIFICATIONS

The Vendor's field representative shall be a qualified electrician certified under the "The Apprenticeship and Tradesmen's Qualification Act" or with someone who is similarly qualified by training and experience that is acceptable to the Agency and has International Municipal Signal Association (IMSA) certification. The Vendor's representative shall have a minimum of ten (10) years previous experience in the assembly or maintenance of traffic signals as well as related experience in the overall fields of traffic signal and streetlighting installations. The Vendor's qualified field representative must be present and on-site whenever electrical work is being carried out within the Region of Peel.

E.3 ABBREVIATIONS

AASHTO	-	means "American Association of State Highway and Transportation Officials"
AGENCY	-	means "Region of Peel"
AODA	-	means "Accessibility for Ontarians with Disabilities Act"
ASA	-	means "American Standards Association"
ASTM	-	means "The American Society of Testing Materials"
AWG	-	means "American Wire Gauge"
CEC	-	means "Canadian Electrical Code"
CSA	-	means "Canadian Standards Association"
ESA	-	means "Electrical Safety Authority"
ECRA	-	means "Electrical Contractor Registration Agency"
ELV	-	means "Extra Low Voltage"
ETL	-	means "Intertek Electrical Testing Labs"
EVP	-	means "Emergency Vehicle Pre-emption"
GTT	-	means "Global Traffic Technologies" (Formerly 3M)
HONI	-	means "Hydro One Networks Inc."
HTA	-	means "Highway Traffic Act"
IES	-	means "Illuminating Engineering Society"
IMSA	-	means "International Municipal Signals Association"
ITE	-	means "Institute of Transportation Engineers"
LED	-	means "Light Emitting Diode"
MUTCD	-	means "Manual on Uniform Traffic Control Devices"
OESC	-	means "Ontario Electrical Safety Code"
OPSD	-	means "Ontario Provincial Standard Drawings"
OPSS	-	means "Ontario Provincial Standard Specification"
OTM	-	means "Ontario Traffic Manual"
PSN	-	means "Public Sector Network"
SDLC	-	means "Synchronous Data Link Control"
TAC	-	means "Transportation Association of Canada"
TSMR	-	means "Traffic Signal Maintenance Report"

TSP - means "Transit Signal Priority"

Whenever a publication of any one of the above or similar organization is mentioned in these specifications, such mention shall refer to the latest issue of the said publication, including all appendices and revisions thereto.

E.4 TENDERED PRICES

The lump sum prices, metre prices or unit prices quoted in the Online Bidding Forms shall, unless otherwise stated or specified, include the furnishing of all materials, supplies, and equipment while providing all the expertise, labour, construction tools, equipment, utilities, transportation services necessary to perform and complete all the work required as per the specifications and drawings.

Claims for compensation for additional tax cost shall be submitted by the Vendor to the Agency. Such claims for additional tax costs shall be submitted not later than 30 days after the date of substantial performance of the work.

Where the Vendor benefits from a change in the Canadian Federal or Provincial Government taxes, the Vendor shall submit to the Agency a statement of such benefits. This statement shall be submitted not later than 30 days after the date of substantial performance of the work.

The Agency reserves the right to make deductions from regular progress payment to compensate for the estimated benefit from decreased tax costs. Such deductions will be set-off from contract payments pending receipt of the statement itemizing the benefits which have resulted from a decrease in tax costs, at which time the final payment adjustment will be determined.

E.5 REGION OF PEEL'S ELECTRICAL TRAFFIC CONTROL SIGNAL AND STREETLIGHTING STANDARDS

All Region of Peel's Electrical Traffic Control Signal Standard Drawings shall apply. It shall be the Vendor's responsibility to have the most recent drawings, PHM's and Region of Peel electrical standard drawings in their possession before the start of construction. All changes to the proposed shall be pre-approved, redlined, and documented with the Agency

Region of Peel Electrical Standards Link:

<https://www.peelregion.ca/pw/other/standards/linear/drawings/traffic-index.htm>

E.6 ELECTRICAL CODE, RULES AND REGULATIONS

All work shall be performed in accordance with ESA and CSA Standards, Ontario Electrical Safety Code (OESC), or the latest revisions thereto, including all appending bulletins which are applicable to the work.

All work shall be governed by and performed in accordance with Federal, Provincial and Local laws and by-laws pertaining to the work, as well as by the latest issue of CSA standards pertinent to the work.

In the event of conflict between regulations, the strictest regulation shall apply.

E.7 HYDRO ONE NETWORKS INC. (HONI)

In response to Health Canada's radiofrequency exposure guidelines commonly known as Safety Code 6 (2015), HONI has issued a letter for works near HONI collectors and repeaters/routers which are used to wirelessly collect data.

To ensure compliance with the maximum exposure levels for controlled and uncontrolled environments, HONI requires all its joint use partners to follow the procedures. If the Vendor needs to carry out any work on any existing attachments within **20cm or 32cm** of HONI collectors and repeaters/routers, the Vendor must first contact HONI to request disconnection of the relevant collectors and repeaters/routers at least 48 hours prior to carrying out the work. The Vendor must contact HONI's applicable regional contact to inform an emergency disconnect is required. If it is after regular business hours, the vendor must call Hydro One at 1-800-434-1235. HONI will disconnect the relevant collectors and repeaters/routers at no cost.

E.8 FEES, CERTIFICATES, INSPECTIONS, AND PAYMENT

The Vendor shall obtain permits for all work and shall file applications for inspection with the appropriate local Hydro authorities and the Ontario Electrical Safety Authority as required by the progress of the work. The Vendor shall pay all fees related to permits, applications, and inspections as required. Upon completion of the work, the Vendor shall obtain final approval from the appropriate local Hydro Authorities and shall submit one copy (or in digital format) the Certificate and / or passed ESA to the Agency.

E.9 ROAD OCCUPANCY PERMIT AND TRAFFIC REQUIREMENTS

The Vendor shall be provided with a Region of Peel Road Occupancy Permit at the pre-construction meeting. The Vendor shall comply with all conditions stated therein. The Road Occupancy Permits are always required on-site.

Where required, the Vendor shall obtain the necessary roadwork permit from the area municipality should the work extend onto its right-of-way.

The Vendor shall supply, place, and maintain all barricades, warning signs, delineators, and flashing lights necessary for the protection of the public and the work zone. These shall be in effect for the duration of the Contract, and in accordance with the latest issue of the Manual of Uniform Traffic Control Devices (MUTCD), Ministry of Transportation and as outlined in the Ontario Traffic Manual's (OTM) Book 7 – Temporary Work.

The Vendor shall always have a competent person on duty for emergency calls after construction hours and during weekends. It shall be the Vendor's responsibility to supply the Agency with the name and telephone number of the person to be contacted during these periods.

The Vendor shall, in any event and in particular when directed by the Project Manager, supply an adequate number of flaggers to direct traffic during construction, in accordance with the procedure outlined in the pamphlet "Correct Methods of Traffic Control" issued by the Construction Safety Association of Ontario.

The cost of all signs, barricades, flasher, safety fencing and flaggers shall be at no additional cost to the Agency.

All signs, flashers, barricades, and delineators shall be cleaned and maintained throughout the duration of the Contract at the Vendor's expense.

No work will be allowed if there are no flag persons on full time duty when two lanes, one direction each way, of traffic cannot be maintained.

E.10 UTILITY LOCATES

The Vendor shall ensure all applicable locates, through Ontario One Call, are attained prior to any excavation or layout of proposed underground infrastructure. The Vendor shall contact Ontario One Call for all utility locates, unless otherwise instructed by the Agency.

The Vendor shall locate and expose, using a locate service provider, any existing utilities within 1m of the proposed underground infrastructure. Exposure or daylighting within 1m of any existing traffic signal and streetlighting infrastructure must be by non-destructive hand dig or hydro vac methods. No extras shall be considered for non-destructive exposure methods regardless of existing material to be excavated. All restoration shall be inclusive, and no extras shall be considered.

All proposed underground infrastructure shall be built in accordance to minimum horizontal offsets from existing underground infrastructure as set by the Agency's PUC requirements where feasible.

E.11 UTILITIES AND SUPPORT OF EXISTING UTILITIES

The Vendor shall note that Supplemental General Condition SG.15 (Volume 2) is in full effect and is supplemented as follows:

The Vendor shall be held responsible for the protection of all services, whether aerial or underground, including telephone cables, hydro cables, watermains, sanitary sewers, gas mains, etc., during the time of construction and will be held liable for any damage to same. Prior to commencing any excavation operations, the Vendor shall give 72 hours notice to utility companies concerned and arrange for, at the Vendor's own expense, stake outs and any temporary relocations that may be required. The Vendor shall hand dig to accurately locate any underground utility if required, and this cost shall be included in the unit prices bid.

Existing services and utilities shall be supported with supports designed by the Vendor and stamped by a Professional Engineer licensed in Ontario and submitted to the Engineer for review prior to commencing excavation. Support designs shall also be approved by the appropriate operating authority or utility company.

E.12 MAINTENANCE OF EXISTING ILLUMINATION

The successful Vendor shall maintain existing luminaires operational, wired overhead if necessary, until new lighting is in operation and disconnection is authorized by the Agency for the duration of the project and passing evaluation is provided by the Agency.

If the duration of the project extends longer than five (5) months, it is expected of the Vendor to perform a night inspection to ensure all lights are operational. The Vendor is to provide this information to the Agency.

E.13 PRE-CONSTRUCTION ACCEPTANCE INSPECTION

Prior to commencement of work the Vendor shall arrange with the Agency a pre-construction site inspection to identify and document the existing conditions within the project. The Vendor shall document with high definition video and/or pictures of existing streetscape conditions such as, but not limited to the following: sidewalk, grass, boulevards, curbs, utilities, private property appurtenance etc. The project manager may decide not to start the project until this has been completed by the Vendor with no repercussion to the Agency.

The Vendor shall also perform a night inspection to document and advise the Agency any streetlights that are not operational, in which case the Agency will plan to repair. Upon notification by the Agency, the Vendor shall confirm all lights are operational prior to project ownership. Failure to do so will result in the Vendor being responsible for any lights out within the project limits, regardless of timing.

Once the Vendor has submitted a copy of the inspection to the Agency the project limits shall be under the Vendor's responsibility to maintain. Transfer of responsibility shall be as per warranty and/or substantial completion requirements.

E.14 ILLUMINATION DURING ENERGIZATION/DISCONNECTION OF STREETLIGHTING SYSTEMS

The Vendor shall perform night inspections upon energizing and disconnecting the system. Documentation of the night inspection must be forwarded to the Agency within 24 hours upon energization/disconnection of the system. The Vendor shall document the status of all lights within the project limits. Resolution of outages shall be completed immediately.

The Vendor shall be liable for any incident concerning deficient lighting where the deficiency was observed and not corrected or repaired within 24 hours.

E.15 TESTING

Tests on electrical wiring and material shall, unless otherwise specified, conform to the OESC, and shall include insulation value readings and resistance to ground readings.

Testing shall only be performed by a certified electrician and shall be done in the presence of the Agency, local Hydro Authority and/or ESA Inspectors, as requested.

The Vendor shall provide all necessary instruments, equipment and personnel required to satisfactorily carry out prescribed tests at their own expense.

The following tests shall be performed as directed by the Agency:

- All conduits and duct systems shall be proven free of stones, dirt, water, or other debris by pulling a test mandrel 6mm smaller in diameter than nominal conduit or duct size through each individual conduit or duct.
- All circuits shall be proven continuous and free of short circuits or ground faults.
- All circuits shall be proven free of unspecified grounds and the resistance to ground for all circuits shall be no less than 50 mega ohms.
- All circuits shall be proven to be operable. Each control or switching device shall be operated no less than 10 times and each circuit no less than eight (8) hours.
- The resistance to ground for the power service facility ground, the controller ground, and the intersection system ground shall be proven not to exceed 25 ohms. The Vendor shall perform the necessary tests and record the values on the form provided by the Agency.
- The Vendor shall measure the incoming voltage at the power service facility and shall record the value on the form provided by the Agency.

In addition to the above tests, the Vendor shall, where directed by the Agency, perform any tests called for where performance of the electrical system indicates a deficiency. The Agency may conduct tests on materials other than electrical materials as described elsewhere in the specifications for the contract.

Where any tests indicate faulty workmanship or unacceptable electrical measurements, the Vendor shall repair or replace the faulty equipment at their own expense and to the satisfaction of the Agency.

The Vendor or its duly appointed representative shall oversee all testing and shall assume full responsibility for any damage which may occur to the equipment installed because of such testing.

Prior to energizing the traffic control signals, the Vendor shall "Flash-out" all field circuits, perform a conflict monitor check as per the Region of Peel's Conflict Monitor Check Sheet and log accordingly in the TSMR logbook.

Such testing mentioned herein shall not be submitted for payment but considered as part of the unit prices bid for every new installation or modification to existing traffic signal infrastructure.

E.16 COORDINATION

The Work shall be coordinated with the other work required by different trades to minimize the disturbance, alteration, or damage to the adjacent or adjoining facilities. Coordination shall be done by the Vendor unless otherwise requested by the Agency.

The Vendor is required to coordinate the installation of vehicle detection loops to ensure installation in the top course asphalt, in advance of pavement markings being placed.

Except as provided for in the Specifications, or as may be approved by the Agency, adjacent or adjoining facilities shall not be disturbed, altered, or damaged in any way.

E.17 LAYOUT OF INFRASTRUCTURE

The Vendor shall layout the structures with a surveyor. The Agency shall provide a Microstation or AutoCAD file to the Vendor to determine co-ordinates for each structure to be marked with stakes, flags and/or paint in the field by the Vendor's surveyor. All information on stakes shall be neat and legible. The survey layout may include, but is not limited to electrical chambers, pole bases, traffic controller base, power supply, streetlight poles, sidewalks, and curbs. The Vendor shall be responsible for maintaining the field layouts until the infrastructure is built to its final accepted state. The Vendor will be responsible for ensuring that all parts of the works are performed correctly and for the provisions of all necessary instruments, materials, vehicles, equipment, and labour for the construction layout. Survey layout work shall be carried out by competent personnel who have been trained for this type of work.

The Vendor shall advise the Agency once the layout has been completed for Agency field approval. For any discrepancy or concerns regarding field layouts or any part of the contract drawing the Vendor shall contact and arrange to meet with the Agency to address the issue.

Should any discrepancy arise during any parts of the work, the Vendor shall, at their own expense, rectify such error to the satisfaction of the Agency, unless such error is based on incorrect data supplied by the Agency.

The Vendor shall supply the Agency with all necessary information to enable the Agency's representative to review the field layout. The Vendor shall give the Agency a minimum 48-hour notice prior to pouring of the concrete. In addition, concrete bases/footings shall not be constructed until after the curb and gutter have been placed and accepted by the Agency's Inspector unless otherwise advised by the Agency's Traffic Signal section.

All labour, equipment, vehicles, material, administration, meetings, and co-ordination throughout the duration of the contract shall be inclusive within the Vendor's bid and all expenses shall be borne by the Vendor. Should any additional surveyor layouts be required after the initial completed survey, it shall be completed on a time and material basis or as a requested lump sum.

E.18 MOBILIZATION/FOLLOW-UP VISITS

The Agency shall not assume additional charges incurred by the successful Vendor because of re-mobilization of forces or equipment to complete the work as outlined in this Document. Should the Agency deem it necessary for the successful Vendor to return to any site to install additional equipment after traffic control signals have been activated, it shall be the sole responsibility of the Vendor to include all associated charges for the full completion of the work in its price for the installation of traffic control signals.

Additional equipment/materials supplied and installed shall be paid as per tendered items.

Further, re-mobilization fees shall not be paid to the Vendor to correct any outstanding deficiencies associated with the installation of traffic control signals.

Due to the nature of the works, where the Agency seeks to install new traffic signals or modify existing signalized intersections, the Vendor will continuously be on call when work arises. The Vendor shall exercise due diligence when taking this into consideration of pricing the tendered quantities as there shall be NO mobilization fees or re-mobilization fees paid.

E.19 ADJUSTMENT OF EQUIPMENT

All equipment shall be installed in a neat and orderly manner. Minor adjustments to equipment required to improve the appearance of the installation shall be carried out at the Vendor's expense when ordered by the Agency. At no time shall a signal head be installed which block the visibility of an existing signal head.

The Vendor shall adjust during nighttime conditions to any equipment if so required to provide optimum performance. All such adjustments shall be carried out at the Vendor's expense.

The Vendor shall report any discrepancies or omissions that may be observed by staff to the Agency to address.

E.20 NEW MATERIALS

Unless otherwise provided for in the contract or contract drawings, all materials shall be new and of a uniform pattern throughout the work. All materials or components or custom equipment shall be CSA approved, where applicable, and comply with the requirements of the ESA with respect to their application.

All materials, equipment and apparatus used in the contract shall be "Made in Canada" unless otherwise specified or approved by the Agency.

E.20.1 Substitution of Materials

Where materials are identified specifically by the manufacturer's trade name or catalogue number and suffixed with the word "only", no substitution of the specified material will be allowed unless the material cannot be delivered in time to complete the work in proper sequence, or if for any reason the manufacturer has terminated production of the material. In such cases, the Vendor shall submit to the Agency a request

for substitution accompanied by proof of equality and cost comparisons in the form of Certified Quotations from suppliers of both specified and proposed materials. Responsibility for any delay caused by the unavailability of or the difficulty of procuring materials shall be that of the Vendor.

Where materials are identified by a manufacturer's trade name or catalogue number and suffixed with the word "or equal", materials of equivalent design and quality may be substituted subject to the approval of the Agency.

Where materials are identified as alternative by use of the word "OR", the design of the system shown on the drawings corresponds to the material named first in the description and substitution of the material is subject to approval of Shop Drawings, performance data, test reports and production samples when requested by the Agency.

Materials not specified particularly, and which are indicated elsewhere as being required, (including minor accessories such as connectors, fasteners, tape, etc.) which are considered incidental to the work, shall be standard construction grade materials supplied in accordance with CSA Standards where applicable, to suit the application as required by recognized trade practice.

The Agency may approve any new product that the Vendor wishes to substitute during a contract. The Agency may require up to six (6) weeks to approve the product and this approval time shall not cause delay to the works. The Vendor shall be responsible to prepare a report on why the new product should be substituted and how it is equal to or better than the original.

All materials to be used for the electrical work and associated work on the contract, shall be supplied by the Vendor, unless otherwise specified.

All materials, equipment and apparatus used in the contract shall be "Made in Canada" unless otherwise specified or approved by the Agency.

The Agency shall reserve the right to negotiate directly with manufacturers and suppliers for materials required within a contract and the Vendor can apply contract agreed handling and administration costs to the equipment supplied.

E.20.2 Storage of Materials

All materials shall be stored in accordance with manufacturer's instructions to prevent damage, soiling or surface finish spoilage.

New poles shall be stacked to prevent bending or warping and shall be protected against any condition which may cause chipping or pitting of the finish.

The Agency shall not compensate the Vendor for any storage of equipment or materials. The Vendor shall be responsible for providing storage of any equipment or material for the project at the Vendors expense.

E.20.3 Material Requirements

All materials to be used for the electrical work and associated work, for the duration of the project, shall be supplied by the Vendor, unless otherwise specified. All 400mm pipe brackets and mast arms shall be aluminium. All clips, bolts, nuts, and other fittings shall be stainless steel or cast aluminium.

E.20.4 Agency Materials – Pickup and Delivery

All materials supplied by the Agency shall be picked up at the Agency's Signal Shop located at 230 Advance Boulevard, Brampton Bay Door #26 by the Vendor unless otherwise specified. All surplus traffic signal materials returned to the Agency shall be delivered to the Agency's Signal Shop and placed in storage as directed by the Agency. All other materials identified by contract items shall be disposed of at a suitable landfill site.

The Vendor shall provide 24 hours advance notice when delivering materials to the yard. It shall be the Vendor's responsibility to obtain a signed receipt for the materials from the Agency's representative upon delivery of the material. The Vendor assumes full responsibility for all Agency equipment once it has been picked up from and/or until the item has been delivered and signed for at the Agency's Signal Shop.

The Vendor will be required to obtain materials, such as Oversize Street Name Signs or other equipment required to complete the project, from other municipalities within the Region of Peel at no additional cost.

E.21 DRAWINGS AND SPECIAL PROVISIONS

While these Standard Specifications have been sub-divided into sections, this is solely for the purpose of convenience and expediency. The Vendor shall in no way be relieved of any responsibility, for satisfactory completion of the entire systems, regardless of which sub-division of the Special Provisions or on which drawing any item of work should appear.

Should any particular item of work be omitted from a drawing typically showing the work performed by the Vendor, or from the sub-division of the Special Provisions normally covering that work, no claims for extra work will be permitted, provided that the particular item of work has been shown or specified elsewhere.

Unless otherwise specified, the Drawings and Special Provisions are intended to cover everything typically requisite and necessary for the complete. Should anything be omitted that is considered essential to proper workmanship construction, or to fulfill the intent of these Special Provisions, shall be provided by the Vendor the same as though included in the drawings and mentioned in the Special Provisions.

Bid prices will be payment in full for supply of all materials and labour, including wire, parts, accessories, and equipment necessary to install, test and place in operation, each unit, and complete systems.

E.22 SHOP DRAWINGS

The Vendor shall submit Shop Drawings of the following upon request for any new non-standard equipment or manufacturer, for the Agency's review and approval:

Concrete Poles	Signal Brackets	Decorative Poles
Luminaires (All Types)	Vehicle Signal Heads	Pre-set Anchors
Luminaire Mast Arm	Pedestrian Signal Heads	Steel Poles
Signal Mast Arm	Tactile Plates	Power Supply
Ground Plate	APS Pushbutton	Electrical Chamber

Shop Drawings may be reviewed by the Agency and Hydro Authority to ensure conformity with the design concept of the project and compliance with the contract documents.

Prior to submission of Shop Drawings to the Agency, the Vendor is required to review Shop Drawings. By this review, the Vendor represents that they have determined and verified field measurements, field construction criteria, catalogue numbers and similar data, and that it has checked and coordinated each Shop Drawing with the requirements of the contract documents. The Vendor shall indicate the review of each Shop Drawing by stamp, date, and signature of an industry competent person.

The Vendor shall take due diligence in reviewing the requirements and specifications before the purchase of any equipment to ensure compatibility and to meet Agency requirements.

E.23 REVIEW AND APPROVAL OF PLANS

The Vendor shall inspect the plans and project site to note any modifications that are deemed to be required for their own purposes.

The Vendor shall directly report of any alteration or removal and subsequent replacement of an adjacent or adjoining structure or other facility not provided for in the contract to the Agency. The Vendor shall properly document the required works and provide solutions for the Agency to review to be able to provide appropriate action items and compensation. Lack of documentation or lack of advance notice to the Agency shall result in poor project evaluation and may result in the Vendor requiring restoration to any damages at their cost.

All modifications to the plans must be consistent with the purpose of the overall scheme of the design. All modifications must be approved by the Agency and be consistent with the local Hydro or other Utility regulations or specifications.

The Vendor shall maintain on site one (1) complete set of electrical plans and specifications where all modifications to the work will be recorded. Prior to acceptance of the work, the Vendor shall submit the modifications to the Agency.

E.24 WORKMANSHIP

All workmanship shall be in every respect, in accordance with the best modern and quality practices. Whenever the General Conditions, Special Provisions, Form of Tender or the direction of the Agency admit to a reasonable doubt about what is permissible, and when they fail to state the quality of any work, the interpretation that requires the best quality of work shall be followed by the Vendor.

E.25 PROGRESS

A period of six (6) weeks is permitted for each traffic control signal installation awarded under the Contract, based on a start date mutually agreed upon by the Vendor and Agency. Progress of the work must be maintained on a continuous and organized basis. Intermittent work is not acceptable except as required by the Work Schedule or approved by the Agency.

The Vendor must notify the Agency when it becomes aware that the agreed upon progress schedule cannot be met. Should the project extend beyond the completion date without reason, a "Poor" performance rating will be recorded. An eight percent (8%) administration charge will be assessed to the Vendor to cover the Agency's costs related to completing outstanding aspects of the project, should the Agency be required to finish the task.

E.26 PROVISIONAL ACCEPTANCE OF THE ELECTRICAL WORK

The streetlighting work is subject to the inspection and acceptance of the local Hydro Authority as required by the local area municipality. The traffic signal work is subject to inspection by the Agency's signal maintenance contractor and acceptance by the Agency.

The Vendor shall notify the Agency in writing when, in the opinion of the Vendor, the work has been satisfactorily completed at which point the Agency will inspect the work. When it is found by the Agency to be completed in accordance with the plans and specifications, they will give notice in writing to the Vendor of the provisional acceptance of the work. The provisional acceptance of the work by the Agency is without prejudice to the rights of the Agency, and the obligations of the Vendor with respect to the repair of deficiencies discovered after completion.

Any defects in the work arising from faulty installation, material supplied by the Vendor, or workmanship deficiencies discovered or occurring within 12 months from the date fixed by the Agency, shall be made good by the Vendor at their expense as the provisional acceptance of the work by Agency.

If any such defect is not promptly remedied to the satisfaction of the Agency by the Vendor, the latter shall be responsible for all loss and damage to the Agency through such defect. The Agency may proceed to do the work itself at the Vendor's risk and expense, and the cost thereof shall be payable forthwith by the Vendor to the Agency.

Provided the Vendor is not otherwise in default under the terms of the contract, and subject to the provisions of the Vendor's liability in this section, the Vendor's liability in respect of the work, whether in contract, tort, or otherwise, except as to

damage to other property of the Agency or the Agency's right of indemnity, shall cease upon the fulfillment by the Vendor of the Vendor's obligations under this clause, provided that any part of the work made good under this clause shall be subject to all the provisions of this clause, for a further period of 12 months, from the date when the same has been made good as aforesaid.

E.27 FINAL ACCEPTANCE OF THE WORK

The final acceptance of the work will be 12 months after the date of the provisional acceptance of the work except when deficiencies are discovered after completion, in which case it shall, in respect of such deficiencies, be 12 months after the date upon which such defects are made good. The Vendor shall notify the Agency in writing, requesting final acceptance of the work, and the Agency will then arrange for the work to be inspected. When it is found by the Agency to be completed in accordance with the plans and specifications, the Agency will give notice in writing to the Vendor of the final acceptance of the work.

A 12-month guarantee on all workmanship, materials and equipment supplied by the Vendor shall be required. The Vendor will not be required to provide on-call emergency repair support after regular business hours within the warranty period. All maintenance during the warranty period will be performed by the Region's Maintenance Contractor.

The Region will determine whether any maintenance work required during the warranty period can be attributed to the Vendor's original work and if such responsibility is assigned, the Region will bill the Vendor for the appropriate charges.

E.28 BASIS FOR PAYMENT

E.28.1 Measured Quantities

Quantities of the work carried out shall be measured, using the OPSS or individual item method, a minimum of once at the completion of the installation on an agreed upon date within two days after completion. All quantities shall be recorded by the Agency on the Items/Quantity sheet and shall be signed by both parties. A copy of the Items/Quantity sheet shall be submitted to the Vendor and it shall reflect the measured quantities.

The Agency shall set-up a meeting to meet with the Vendor on site, for the verification of quantities. The costs for the Vendor to attend shall be included in the costs and Schedule of Unit Prices, and no extra costs shall be paid by the Agency. Should the Vendor fail to cancel or attend on the prearranged date for measuring quantities, the Agency shall measure the quantities and all measurements shall be taken as final for the portion of the work.

E.28.2 Payment

The Vendor shall be allowed two invoices per installation. The Agency shall make a payment upon receipt of an invoice at the one hundred (100) per cent completion of each installation, based on the measured quantities determined by the Agency and the Vendor ten (10) per cent of

the value of the installation shall be retained by the Agency. At the completion of **ALL** Contract works to the satisfaction of the Agency, the 10 per cent shall be released in accordance with the *Construction Lien Act (R.S.O. 1990)*.

Unit prices will be payment in full for the supply of all necessary materials, labour, tools, equipment, supplies and other incidentals and for performing all work under this Contract. Where there is an increase or reduction in the quantities listed in the Form of Tender, Schedule of Unit Prices, compensation shall be based on the unit prices provided.

E.29 PAYMENT ON EXTRA WORK

The Vendor is advised that Section GC8.02.04, Payment on Time and Material Basis of the General Conditions and SG.11.3, Payment on Time and Material Basis of the Supplemental General Conditions from Region of Peel Volume 2 is in full force and effect except as amended herein:

E.29.1 Clause 8.02.04.01, Definitions is amended to include the following:

- Extra Work means additional quoted work ordered by the Agency to be carried out by the Vendor and their subcontractors. Extra Work shall also mean approved additional quoted work claimed by the Vendor as work not included under the original Contract.

E.29.2 Clause 8.02.04.04, Payment for Labour is replaced by the following:

- The Vendor shall use all available Provisional Items for extra labour as listed in the Form of Tender, Schedule of Unit Prices of the executed Documents and no further markup, payroll burden, overhead or profit shall be applied on Extra Work items ordered by the Agency whether the Extra Work is ordered based on a quotation or Time and Material basis. The Vendor shall not include Provisional Items and unit rates associated with extra labour as listed in the Form of Tender, Schedule of Unit Prices in the overall invoicing for Extra Work.
- In the event the Vendor uses a specialized trade and or the labour rates for that trade used are not listed in the Schedule of Unit Prices of the executed Documents, the Vendor shall submit a proof of an hourly rate, payroll burden and overhead costs to the Agency for review. Only then the Agency shall pay the Vendor the actual hourly rate, payroll burden and overhead costs. The Agency shall pay the Vendor for all non-listed labour used on each Extra Work item at an upset limit of a maximum 105 percent of the sub-total cost of all non-listed labour required to complete the Extra Work.

E.29.3 Clause 8.02.04.05, Payment for Material is replaced by the following:

- The Agency shall pay the Vendor for material used on each Extra Work item at an upset limit of a maximum 105 percent of the sub-total base cost of the material, whether the work is to be completed by the Vendor or their subcontractors.

E.29.4 Clause 8.02.04.08, Payment for Work by Subcontractors, is replaced by the following:

- The Subcontractor shall use all available Provisional Items for extra labour as listed in the Online Bidding Forms, Schedule of Prices of the executed Documents and no further markup, payroll burden, overhead or profit shall be applied on Extra Work items ordered by the Agency whether the Extra Work is ordered based on a quotation or Time and Material basis. The Subcontractor shall not include Provisional Items and unit rates associated with extra labour as listed in the Form of Tender, Schedule of Unit Prices in the overall invoicing for Extra Work.
- In the event the Subcontractor uses a specialized trade and or the labour rates for that trade used are not listed in the Schedule of Unit Prices of the executed Documents, the Subcontractor shall submit a proof of an hourly rate, payroll burden and overhead costs to the Agency for review. Only then the Agency shall pay the Subcontractor the actual hourly rate, payroll burden and overhead costs. The Agency shall pay the Subcontractor for all non-listed labour used on each Extra Work item at an upset limit of a maximum 105 percent of the sub-total cost of all non-listed labour required to complete the Extra Work.

E.30 TRAFFIC CONTROL

E.30.1 Maintenance of Vehicular Traffic Operation

The Vendor shall ensure that traffic movement is not unduly restricted due to the presence of their vehicles and equipment on the Highway. All traffic signing, as outlined in OTM Book 7 – Temporary Work, shall be maintained during the work.

The Vendor shall submit a completed Traffic Protection Plan to the Agency before field work commences. Traffic Protection Plan will be reviewed through request of Road Occupancy Permit.

E.30.2 Maintenance of Traffic Signal Operation

The Vendor shall perform the work in such a way that minimum down times are required on existing signal installations. Where modifications to detection systems are required, the Vendor shall cause the signals to cycle by removing the detector amplifier's fuse, as approved by the Agency.

Where modifications to an existing signal installation are required, at no time shall any part of the signal installation be left de-energized, nor shall the installation of a new signal head block the visibility of an existing operating signal head. The Vendor shall ensure that the workers on-site always have access to a cell phone.

As part of Traffic Control the Vendor may be required to complete the following:

-
- Relocate traffic signal heads for improved alignment and visibility for road users
 - Cover unused traffic signal with a traffic signal jacket or an opaque black garbage bag
 - Cover pedestrian pushbutton not accessible
 - Cover certain signal phases along with associated signages (e.g. Fully protected left turns along with Rb-41 and Rb-81
 - All appropriate signages shall be implemented accordingly such as No Left turns, Road Closed, No Pedestrian Access

The Agency may implement penalties where unsafe traffic control is observed and not attended within a certain required time frame as specified in the tender items.

The Vendor shall be charged the full cost of any required emergency maintenance calls that are as a direct result of their work that occur within the 12-month warranty period.

E.30.3 Capital Maintenance

For any capital projects that require any traffic signal or streetlighting modification that last longer than five (5) months, the Vendor will be responsible for all regular Spring and/or Fall maintenance works as per Agency specifications. Typical inspections include the following as required, Conflict Monitor Testing, Span Height Verification, Signal Infrastructure Inspection, Detection System Inspection, Night Inspection and Fire Pre-emption Testing.

Traffic signal and streetlighting minimum maintenance requirements must be met as outlined in Ontario Regulation 239/02 Minimum Maintenance Standards for Municipal Highways.

The Vendor, as directed by the Agency, shall perform Conflict Monitor Testing, Flash-out for any traffic signal modification and report any safety or deficiency concerns that need to be addressed. The Agency shall determine the course of action for any safety or deficiency concerns, if required.

The Vendor, as directed shall conduct night inspections of streetlighting systems documenting any deficiencies and shall report them to the Agency for further direction.

The Vendor shall allow the Agency's Maintenance Contractor to test the Fire pre-emption system as required.

The Vendor is responsible for all repairs on a continuous 24/7 basis, even during winter shutdown and must respond to after-hours calls immediately. Alternate arrangements shall be documented and agreed upon by the Project Manager, Contract Administrator and Vendor.

E.30.4 Pay-Duty Police Officers

The Vendor shall arrange and pay for any pay-duty police supervision necessary to direct traffic during any stage that would interfere with normal traffic flow. Pay-duty police supervision shall be required whenever a “flash condition” or a power outage occurs. The Vendor shall not be entitled to any additional compensation for the cost of the police officers’ time.

E.30.5 Energizing Traffic Signals

The Agency or designate must be present when the Vendor energizes the traffic signals for full operations. The Vendor shall provide a minimum of 72 hours advance notice to the Agency when the signals are scheduled to be energized. The Agency reserves the right to cancel any traffic signal activations when the Agency has not been advised of within the 72-hour notice period. If extreme weather conditions present a safety concern, then the Agency and the Vendor can agree to re-schedule energizing the traffic signal.

The Vendor shall have a licensed electrician (experienced with energizing traffic signal installations) present when energizing a temporary or permanent traffic signal. When energizing the signals for acceptance, a Flash-out and a Conflict Monitor check must be completed.

Temporary and/or permanent traffic control signal installations must be energized after all vehicle/pedestrian detection has been installed, all central computer control hardware relocated, and all fire pre-emption hardware installed.

All traffic signal installations must be fully operational, furnished and complete which shall include but not limited to; pushbuttons, audible pedestrian pushbuttons, pre-emption equipment, detection equipment, pavement marking and signage on activation date. Failure to do so may reflect poorly in the performance evaluation and may affect the Vendor’s pre-qualified status at the Agency’s discretion.

E.31 GROUND/CONCRETE INSTALLATIONS

Regardless of existing surface materials, all restoration to meet or exceed existing conditions, shall be included in the unit price at no additional cost.

All duct entry points to a concrete base shall be scribed with an “X” on top of all poured concrete items.

If installed within native soil, the pole base or power supply base shall be 50mm (+/- 25mm) above finished grade.

If installed within or adjacent to hard surface such as concrete or asphalt, the pole or power supply base shall be flush to grade as not to create a tripping hazard. Unless otherwise documented in the drawings or advised by the Agency.

Concrete infrastructures, such as electrical chambers and footings, shall not be installed until the permanent curbs and gutters have been installed to ensure proper vertical alignment is achieved to the adjacent hard surfaces.

E.32 VENDOR QUALIFICATIONS, EXPERIENCE AND EQUIPMENT

The Agency has outlined the following **MINIMUM** requirements for both the Vendor firm experience, Vendor employee experience and Vendor employee being committed to Work on this assignment.

NOTE: UPON AGENCY REQUEST THE SUCCESSFUL VENDOR MUST PROVIDE PROOF OF THE BELOW QUALIFICATIONS. FAILURE TO PROVIDE THE BELOW MINIMUM QUALIFICATIONS MAY LEAD TO TERMINATION OF THE CONTRACT AND LIQUIDATED DAMAGES BEING APPLIED.

E.32.1 Vendor Experience

The Vendor **must** have a minimum of ten (10) years' experience in construction and modification of traffic signal and streetlighting systems for the Public Sector.

- The Bidder shall complete Appendix 5.8 Online Bidding System Forms, Step 3 References and Subcontractors and provide the following requirement:
 - Provide a list, minimum of three, ongoing or past projects listing; the project name, the project cost, the Project Manager with their contact information or the current department heads, project start and completion dates.

E.32.2 Vendor Staff Experience and Qualifications

- The Vendor shall have a minimum of two (2) designates with five (5) years contract administration experience who shall have managerial authority to administer all aspects of building permanent traffic signals, temporary traffic signals, permanent streetlighting systems, temporary streetlighting systems, various streetlighting/traffic signal modifications and project consultations upon Agency request.
- All electrical works shall be completed by qualified electricians certified under the *"The Trades Qualification and Apprenticeship Act"*
- The Vendor shall have a minimum of one (1) fully licensed electrician with a minimum of ten (10) years' experience in traffic signals and streetlighting on a full-time basis within their company.
 - The Vendor must provide their electrical contractor's license number from ECRA/ESA in accordance to Ontario Regulation 570/05.
 - The Vendor's electricians must provide proof of their qualification with either a copy of their Certification of Qualification from their Ontario College of Trades, a

national equivalent such as a Red Seal certification or their electrical license.

- The Vendor must have at least two (2) journeymen electricians who have IMSA Traffic Signals Level II certifications completed or to be completed within a year of this contract.
 - The Vendor's journeyman electricians must provide proof of their qualification with either a copy of their Certification of Qualification from their Ontario College of Trades, a national equivalent such as a Red Seal certification or their electrical license.

E.32.3 Vendors Fleet

Upon Agency request the Successful Vendor **must** provide documentation showing that they have a minimum vehicle fleet size as follows below. The Agency must be able to verify such equipment via site visit to the Vendor's yard as required.

- **Service Truck:** Three (3) one (1) ton light trucks equipped with lockable external bins with necessary tools for general installation, repair, and maintenance works. Each truck must contain items used for frequent/general repairs, installations, and maintenance.
- **Aerial High Reach Bucket Truck:** Three (3) two (2) ton trucks fitted with hydraulically operated articulated boom with, properly fitted buckets and having a minimum working height of 10.7 m and one (1) bucket truck with ability to reach a working height of 15.0 metres for the installation, maintenance, and repair work on all types of traffic control devices and related equipment.
- **Auger Truck:** Two (2) fifteen (15) ton Gross Vehicle Weight (GVW) trucks mounted with a digger-derrick capable of auguring 760mm or 600mm X 3m holes. The Contractor must own one such vehicle and must have access to the second such vehicle within 24-hour notice.
- **Dump Truck:** One (1) truck with a minimum rating of twelve (12) ton gross vehicle weight (GVW).
- **Pole Trailer:** One (1) trailer capable of transporting one-piece pole of up to fifteen (15) metres in length.

E.32.4 Vendors Equipment

Upon Agency request the Vendor **must** provide documentation showing that they have a minimum equipment as follows below. The Agency must be able to verify such equipment via site visit to the Vendor's yard as required.

- **Compressor:** Two (2) thirty-five hundred (3500) litres per minute air compressor complete with all necessary hoses and jack hammers together with several portable pavement breakers.
- **Pavement Saw:** Two (2) sixty (60) horsepower self-propelled pavement-saw fitted with diamond tipped blades designed to make a cut at least 50mm to 100mm wide by 50mm deep.

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- **Generator:** Two (2) portable generators capable of providing 120V for operation of certain power tools.
 - **Tamper:** Two (2) jumping jack type tamper with as many plate widths as may be required up to 300mm wide for tamping.
 - **Mini Excavator:** Two (2) mini excavators with bucket, hammer attachment and a backfill blade.

E.33 CONTRACT ITEMS

E.33.1 Traffic Cabinet Concrete Base

The bid item price shall include all labour, equipment, vehicles, and materials required to supply and install a concrete base. Traffic cabinet bases shall be constructed in accordance with the Region of Peel Electrical Traffic Standards Drawings #4-4-1, as applicable. Final orientation shall be as per drawings or shall be determined in the field and approved by the Agency's designate as required.

In situations for MTO locations where they require an MTO specified cabinet concrete base, the Vendor shall be required to supply a cabinet skirt to raise the cabinet and shall provide a detailed drawing of the cabinet skirt from the manufacturer to the Agency.

The Vendor may be required to install a pole mounted controller during temporary stages and at locations where space is limited. The controller shall be installed as indicated on the drawings and in accordance with OPSP 2510.01.

Ducts entering the traffic cabinet base shall be sealed with electrical duct seal putty.

Method of payment shall be supply and install for each traffic cabinet base as per Region of Peel Electrical Traffic Standards Drawing #4-4-1. Concrete shall be placed, vibrated, cured, protected, and finished conforming to OPSS.MUNI.904 and shall be formed as one monolithic slab. All concrete shall be 32 MPa. The method of installation shall be at the sole discretion of the Vendor. Special works such as, but not limited to, hydro vac or other special methods due to existing utility locations shall be included within the item to supply and install.

E.33.2 Electrical Chambers

The bid item price shall include all labour, equipment, vehicles, and materials required to supply and install an electrical chamber. Electrical chambers shall be constructed according to OPSP 2112.01, 2112.02, 2112.04, respectively and additionally OPSP 2117.02, 2118.02, and 2123.03. The requirements for the installation of the concrete electrical chambers shall be in accordance with OPSS 602.

If installed within or adjacent to hard surface such as concrete or asphalt the electrical chamber shall be flush to grade as not to create a tripping hazard.

Poured concrete shall be placed, vibrated, cured, protected, and finished conforming to OPSS.MUNI.904 and shall be formed as one monolithic structure. All concrete shall be 32 MPa. The method of installation shall be at the sole discretion of the Vendor. Special works such as, but not limited to, hydro vac or other special methods due to existing utility locations which shall be included within the item to supply and install.

All steel junction box/electrical chamber-lids shall be grounded and bonded to the ground wire network.

Method of payment shall be supply and install for each unit. Supply and install of electrical chambers shall include , but is not limited to, drainage pads, frames, covers, any height adjustments to meet grades required, anti-seize lubricants, backfilling with clear stone (maximum 20mm), tamping excavated material to 100% proctor density, drilling of ground connections (if required) and all necessary hand dig or hydro vac excavation when within 1m of existing infrastructure locates regardless of existing material. Bell ends shall be grouted and parged inside the chamber if the conduit enters the chamber horizontally. Regardless of existing surface materials, all restoration shall meet or exceed existing conditions shall be included in the unit price at no additional costs.

E.33.3 Concrete Base/Footing for Poles or Power Supply

The bid item price shall include all labour, equipment, vehicles, and materials required to supply and install concrete pole base or power supply base. All pole or power supply concrete bases shall be as per Region of Peel Electrical Traffic Standards Drawing #4-7-1 and #4-7-2.

Concrete shall be placed, vibrated, cured, protected, and finished conforming to OPSS.MUNI.904 and shall be formed as one monolithic structure. All concrete shall be 32 MPa. The method of installation shall be at the sole discretion of the Vendor. Special works such as, but not limited to, hydro vac or other special methods due to existing utility locations which shall be included within the item to supply and install.

Method of payment for supply and install shall be for each unit. Supply and install of concrete base/footing shall, but is not limited to, prefabricated anchor assemblies, reinforcing steel, steel ties, pre-set anchor bolts, anti-seize lubricants, backfilling, tamping excavated material to 100% proctor density, drilling of any ground connections (if required), proper expansion joints during restoration and all necessary hand dig or hydro vac excavation when within 1m of existing infrastructure locates regardless of existing material.

Regardless of existing surface materials, all restoration to meet or exceed existing conditions, shall be included in the unit price at no additional costs.

E.33.4 Traffic Conduits

This bid item price shall include all labour, materials, vehicles, and equipment required to supply and install traffic conduits. The Vendor shall supply and install conduits as per OPSS 603.

All rigid and flexible ducts used shall be to:

1. CSA Standard C.22.2 No. C211.2-06 for Rigid conduit; and
2. CSA Standard C.22.2 No. C227.1-06 for Flexible conduit.

All road crossings are to be installed using an underground boring/directional bore method only. If three (3) boring attempts prove to be unsuccessful, the Vendor shall notify the Agency so that the Agency may verify the boring attempts and consider alternatives. Should it be determined that boring is not possible, the Vendor shall provide an open-cut crossing at the same bid price as provided for underground boring. Installation of traffic conduits, regardless of method, such as directional bore method or open trenching method in either boulevard or median shall include all works such as, but not limited to, removing existing surface material such as native soil, asphalt, concrete (which may include rebar), backfilling, tamping excavated material (native soil or granular base) to 100% proctor density and proper expansion joints. Regardless of existing surface materials, all restoration to meet or exceed existing conditions, shall be included in the unit price at no additional costs.

At intersections where, underground conduits are to be installed for future traffic signals, as shown on the drawing, the Vendor shall supply and install a continuous #6 AWG (green) insulated ground wire. A minimum of 1.5m of ground cable shall be coiled in each electrical chamber. Where necessary, a split bolt connector shall be used or as per revised ESA standard requirements. The Vendor shall also supply and install No. 10 annealed fish wire or equal strength polyline through each duct going to a pole base/power supply base/electrical chamber/controller cabinet base.

The Vendor is advised that an existing conduit system may be present, as indicated on the drawings. All conduits shall be inspected, and the Vendor shall ensure they are free of obstructions or blockage. Any obstructions shall be cleaned prior to using the conduits. Where a blockage cannot be cleared, the Vendor shall report it to the Agency for authorization to proceed on repairs as directed.

Traffic installation methods shall be as per the following methods:

- Directional Boring
- Open Cut (Earth/Native Soil/Base granular)
- Open Cut Hard Surface (Concrete/Asphalt)
- Open Cut Hard Surface (Patterned Concrete/Special Masonry Works)

Method of payment for supply and install shall be per linear metre. Supply and install of traffic conduits shall include, but is not limited to, duct sealants, duct caps for unused ducts, fittings, couplers, entry into existing electrical chambers, earth excavation, daylighting or exposing underground infrastructure when within 1m of existing underground infrastructure and all restoration to meet or exceed existing conditions.

Field quantities for payments shall be measured between center to center of the infrastructure and shall not consider any of the deflections of the bore hole shot. Center to center measurements may include, but not limited to the following:

- pole to pole
- pole to electrical chamber
- electrical chamber to electrical chamber
- electrical chamber to power supply
- electrical chamber to Hydro tie point
- existing conduit point to existing conduit point
- electrical chamber to traffic cabinet

E.33.5 Wiring

This bid item price shall include all labour, materials, vehicles, and equipment required to supply and install wiring. The Vendor shall supply and install wiring as per OPSS 604. Each supply and install item shall also include all fittings and connectors, such as but not limited to marettes, zip ties, crimped connectors, specialized waterproof gel connectors, Panduit tags and shall be neatly laid out or coiled. Unused wires shall be marretted individually within junction points. New installations shall have no breaks, such as splice joints, in between runs and shall only be terminated at junction boxes, pole hand holes or electrical chambers as per Region of Peel standards.

Method of payment shall be per linear metre. Field quantities for payments shall be measured between center to center of the infrastructure and shall not consider any deflections of the conduit. Center to center quantity measurements may include, but not limited to:

- pole to pole
- pole to electrical chamber
- electrical chamber to electrical chamber
- electrical chamber to power supply
- electrical chamber to Hydro tie point
- existing conduit point to existing conduit point
- electrical chamber to traffic cabinet

Each conductor wire/cable run shall be included in the quantity, such as the incoming and outgoing from a pole to an electrical chamber or for each separate loop detector cable run required for each specific detection zone or phase.

E.33.5.1 Traffic Cable

Traffic signal cables used shall be #14 AWG colour coded and as per OPSS 2409, IMSA or an approved equal, according to the requirements of the ESA, prior to installing the cable. The cable jacket shall be polyethylene. Refer to the Region of Peel Electrical Traffic Standards Drawings #4-3-1-A, #4-3-1-B, #4-3-3-A, #4-3-3-B and #4-3-2 for typical traffic signal wiring schematics.

It shall be the Vendor's responsibility to provide functional signal operation that is compatible with the timing and phasing of the controller unit provided for each location.

E.33.5.2 Power Feed and Streetlighting Wires

All power feed cables shall be installed from the source location to the traffic signal controller and/or intersection luminaires, as shown on the drawings.

Streetlighting projects within the City of Mississauga shall be supplied with cables as per the pre-approved listing given below with no alternates and no approved equals:

Manufacturer	Manufacturer Item No.
Prysmian	205629C
General Cable	121515M
Nexans	661438

Table 1 City of Mississauga and Alectra pre-approved listings (2018)

Streetlight projects within the City of Brampton or the Town of Caledon shall be supplied with cables which meet or exceed specification listed below.

Description
Power feed cables to the traffic signal intersection shall be 2-1/C #8 AWG (black and white) copper stranded RWU XLPE (min. PE) (-40°C)
Power feed cables to the traffic signal intersection luminaires shall be 2-1/C #8 AWG (red and white) copper stranded RWU XLPE (min. PE) (-40°C)
Power feed cables from Hydro Utility Line into the traffic signal power supply shall be 3-1C #2 AWG (black, red, and white) RWU 90 stranded XLPE (min. PE) 600V rating
City of Mississauga Streetlighting shall all use 3/C #6 AWG (black, red, green) CU stranded RWU90 for a 240V circuit
City of Brampton or Town of Caledon shall be 3/C #6 AWG (black, red, white) CU stranded RWU90 with XLPE jacket

E.33.5.3 Ground Wire

The Vendor shall supply and install electrical grounding equipment as per OPSS 609 (where applicable) and Region of Peel Electrical Traffic Standards Drawings #4-1-1, #4-1-2, #4-1-3, #4-1-4, #4-1-5 and #4-3-2.

The Vendor shall supply and install 1-1/C #6 AWG solid RWU (Green) insulated copper ground wire in the underground duct system as per Region of Peel standards.

All connections shall be bonded to the leads between poles, electrical chambers, neutral of overhead streetlighting and ground rods or ground plates with compression sleeve connectors or as per revised ESA code.

E.33.5.4 Loop Detector Run Wires/Pushbutton Cables

The Vendor shall supply and install 2/C #14 AWG ELV shielded detector cable runs from each vehicle detector splice point to the traffic controller. These cables shall be rated for 600V, have a polyethylene outer jacket, and have a drain wire.

All loop detector run cables shall be connected to the appropriate controller cabinet terminals as identified on the cabinet wiring diagram and in accordance with the Region of Peel Electrical Traffic Standards Drawing #4-2-1.

The Vendor shall also supply the same cables for audible pedestrian pushbuttons and regular pushbutton as directed.

E.33.6 Electrical Power Service Connections (Supply and Installation)

The Vendor shall refer to Region of Peel Electrical Traffic Standards Drawings #4-1-1, #4-1-2, #4-1-3, #4-1-4, and #4-1-5 for typical power service supply details. However, the Vendor shall comply with all applicable local Hydro Authority and ESA requirements. The Vendor shall be responsible for arranging all necessary inspections/connections and shall file required applications mandatory for connection to the power source. The Agency shall provide the local Hydro Authority with all appropriate documentation required to set up the invoicing account between the Agency and the Hydro Authority.

The Vendor shall install in-pole breakers as per the area municipality requirements. Detailed requirements can be found within the City of Mississauga, City of Brampton, and Town of Caledon specifications.

This work shall be carried out in coordination with and, if required, under the supervision of the local Hydro Authority.

The Vendor shall install the complete service facility with ground plates as soon as possible to permit hydro connection prior to the completion of the aboveground signal infrastructure. The Vendor shall arrange for ESA inspections and shall forward a copy to the Agency via email. The local

Hydro Authority shall connect the power service facility to the power supply at a specified time once it receives the ESA approval.

The Agency shall submit a written application to the local Hydro Authority and shall give a minimum of two (2) weeks advance notice of the proposed work date(s) to arrange power supply connection.

For traffic signal intersections, the power supply shall be a 120V/240V two phase 100 amp rated for the main breaker. It shall include a one 30-amp circuit breaker labelled for streetlighting and one 40-amp breaker labelled for the traffic signal system. The power supply shall be a CSA approved weatherproof electrical enclosure such as a Square D Catalogue Number CQ018M100RB100 model or an approved alternate.

Installation of the power service shall be completed within the first ten (10) working days of the project to allow Hydro Authority sufficient time to provide power prior to date of signal turn on.

Method of payment shall be supply and install for each power supply service connection point. It shall include labour, materials, vehicles and equipment such as, but not limited to, vertical conduit, conduit coupling, conduit caps, frost expansion joints, 1.5m spaced clips for wood poles, 1.5m spaced banding for concrete poles, excavation, back filling, tamping surrounding ground to 100% proctor density, all vertical wiring, ground wiring, ground wire moulding, compression connectors, ground plates, circuit breakers, in pole breakers, fuses, enclosures, the 600mm diameter concrete base with Richmond anchorage (only applicable to Base Mounted Power Supply), ESA inspections, connectors and full restoration of excavated material to meet or exceed existing conditions regardless of surface material for a fully functional power supply point.

E.33.7 Ground Rod/Plates

The Vendor shall supply and install electrical grounding equipment as per OPSS 609 (as applicable) and Region of Peel Electrical Traffic Standards Drawings #4-1-1, #4-1-2, #4-1-3, #4-1-4, #4-1-5 and #4-3-2.

The Vendor shall supply and install #6 AWG type RWU (Green) insulated copper ground wire in the underground duct system as per Region of Peel standards. All connections shall be bonded to the leads from poles and ground rods or ground plates with compression sleeve connectors.

Ground plates shall be secured by means of exothermic weld connections with a compression connector to allow for #6 AWG (green) ground wire and shall be ESA approved.

Ground plates shall not be less than 6mm thick, 406mm in length and 254mm in width and shall be installed as per CEC Rule 10-700 and CEC Rule 10-702.

Each corner boulevard electrical chamber shall have a ground plate and the power supply shall have a minimum of two ground plates.

The Vendor shall test all system and grounding components. The Vendor shall test the resistance to ground between the equipment enclosures and the grounding grid. Readings shall not exceed 25 ohms. These measurements shall be performed when frost penetration does not exceed 150 mm. In soils of low conductivity, ground plates and ground wires shall be added as required.

Method of payment shall be supply and install for each ground rod/plate. It shall include all labour, material, vehicles, and equipment. Each ground device shall include all excavation, backfilling, tamping the ground to 100% proctor density, compression connectors, conductor connectors vertical ground cable, ground moulding, tapping and connecting onto electrical chamber covers and full restoration of the surrounding ground to meet or exceed existing conditions regardless of existing surface material. Hard surface restoration beyond the noted allotted square metre may be negotiated at the time it is observed and identified as per Special Provisions, Section 24, Review and Approval of Plans.

E.33.8 Vehicle Detectors

The Vendor may be requested to install alternate means of detections, such as overhead detectors and wireless in-road sensors (e.g. Trafficware's Pod system). It is the Vendor's responsibility to educate themselves on the installation and operation of these technologies to provide a fully operating system as per Agency requirements. In addition, the Vendor shall be familiarized on integrating the detection device to the controller unit. Where the Vendor lacks knowledge or experience about a particular device and requires supplier or manufacturer support, the Vendor shall contact and arrange for training and set up of the device in a timely manner that shall not affect the completion of the project. If necessary, the Vendor shall arrange with all equipment suppliers or manufacturers to provide training and education to ensure proper operation. Any additional expense incurred for such support shall not be considered and shall be borne by the Vendor.

E.33.8.1 Loops

Vehicle detector loops shall be installed in the road surface in accordance with Region of Peel Electrical Traffic Standards Drawing #4-2-1, OPSD 2520.01, OPSD 2520.02 at the locations specified on the drawings or as advised in the field by Region of Peel Traffic signal staff. Final placement is to be determined in the field in coordination with Agency staff.

Detector loops shall be in place prior to signal activation unless otherwise directed by the Agency.

A 25mm Electrical Non-Metallic Tubing for each individual loop lead wires shall be installed from the edge of roadway to the electrical chamber, as indicated on the drawings.

Loop lead-in wires shall be spliced to run wires in the pole handhole. Where a lead-in splice is made in an electrical chamber, the Vendor shall use waterproof gel connectors such as 3M DBR6 direct buried splice kit or an approved alternate.

The Vendor shall coordinate the placement of detector loops in the top course asphalt, such that they are installed prior to the pavement markings being placed. The crosswalk markings are not to be installed until all vehicle detection loops have been completed.

Method of payment shall be for supply and install for each loop detection zone. It shall include all labour, materials, vehicles, and equipment for a fully functioning detection zone. Each loop shall include drilling/hand digging through curb or earth from the roadway to the electrical chamber, installing 25mm PVC conduit for each loop, parging entry points into an electrical chamber, testing, labelling, ground restoration and all specialty waterproof connectors to the demarcation point where the loop run cables terminate.

E.33.8.2 Overhead Detectors

The following subsections cover overhead detection units that are pre-approved by the Agency and are preferred equipment. The Agency will continue to test and review new emerging technologies to update the pre-approved overhead detectors. At the discretion of the Agency's traffic signals representative, new units may be installed on a case by case basis as approved by the Agency.

When the Agency supplies the detector, the Vendor shall:

- Leave sufficient length of cable coiled, unconnected at each detector location, for relocation/adjustment, as required; and
- Leave 1.0m length of cable left coiled unconnected in the controller cabinet.
- Leave a minimum of 2.0m coiled slack at each handwell

Depending on the type of vehicle detector shown on the drawing the Vendor shall be required to supply and install the proper cable to operate the vehicle detector. There shall be no splices in between cable runs unless specified by the manufacturer. The detector shall be installed in the locations indicated on the drawings unless otherwise directed by the Agency.

Proper wire cutters are to be used when working with these types of cables. Failure to do so will lead to the replacement of the cable at the Vendors cost if damage has occurred.

Should the Vendor be required to install overhead detector systems on temporary traffic signal installations, the detector unit(s) shall be installed on wood poles. Where installing on wood poles is not possible, the Vendor shall supply and install all hardware and equipment necessary to install the detector unit on overhead span wire. The requirements for the installation of an overhead vehicle detector shall be in accordance with OPSS 620.

Should the work involve multiple traffic stages, the Vendor is responsible for adjusting and recalibrating the detector units as directed by the Agency or Contract Administrator during staging traffic signal operation. Modification of detection zones may be due to traffic management plan changes and/or to maximize level of service. For maintenance purposes, the Vendor shall adjust and recalibrate the detector unit(s) up to three (3) occurrences per construction stage. After three (3) occurrences, the Vendor may charge on a time and material basis.

The Vendor shall return all temporary overhead detector units and brackets/harnesses to the Agency's Signal Shop when they are no longer required. It will be the Vendors responsibility to arrange with the Agency to receive the equipment at 230 Advance Boulevard.

Method of payment to supply and install shall include labour, materials, vehicles, and equipment necessary to install overhead detector unit(s). The overhead detector unit shall include, but is not limited to, recommended lead-in wires, runner wires to and from the traffic cabinet to the detector, vertical wiring, junction boxes, detector card (shelf mounted or rack mounted), detector CPU module, specialty splice connectors, banding, programming, all detection zones indicated on the drawing and testing to ensure a fully functioning detection system.

The Vendor shall be aware of typical Agency intersection size which range from two (2) lanes up to seven (7) lanes configurations for each approach. The estimated furthest cable length may be up to 200m which reaches the corner opposite to the traffic controller cabinet. Special scenarios where the cable required is more than 200m, such as midblock applications, the extra cable shall be paid on a material basis and the Vendor shall apply applicable overhead.

The Vendor shall pre-program all detection zones as per design drawings prior to signal turn on unless otherwise directed by the Agency.

E.33.8.2.1. Wavetronix Smart Sensor

The unit model to supply and install shall be the Smart Sensor Matrix for stop bar application. It shall be installed as per manufacturer recommendations.

Wires shall be as supplier recommended Fortran Traffic Systems Ltd CSA CMG 1PR 18AWG 2PR 22AWG Shielded 60C LL83251.... CSA AWM II A/B105C 600V FT4 LL67-97.... (UL) ITS (-50C) SUN RES E320347 PLTC or as most recent revised recommendation.

E.33.8.2.2. Iteris Vantage Vector

The unit model to supply and install shall be the Iteris Vantage for stop bar and long-distance application. It shall be installed as per manufacturer recommendations.

The Vector uses a Siamese Belden 8281 Coax Cable and 3 Conductor 16 AWG for power.

E.33.8.2.3. Iteris Next

The unit model to supply and install shall be the Iteris Next for stop bar and long-distance application. It shall be installed as per manufacturer recommendations.

The Next Camera uses a simply CAT5 Shielded cable.

E.33.8.2.4. New Overhead Technology

New technologies shall include any detection system that has not been identified in this document at the time the tender was awarded. The Agency may negotiate a price for the new technology. The Vendor shall provide a price on the install per approach or for all directions which may include presence and long-distance detection zones. The noted technology shall be of similar install to the Wavetronix smart sensor, Iteris Next or Iteris Vantage, in that it shall be one detector appurtenance on a pole or mast arm, with lead-in/runner wires between the controller cabinet to the sensor. The Agency may supply the units, or the Vendor may be asked to purchase the detection unit, hardware, mounting hardware, cables, and control unit for a complete functioning installation. The Vendor shall be compensated through an extra through Volumes 2 rates for purchasing the equipment.

E.33.9 Traffic Signal Heads

All signal heads supplied under the contract shall be LED. All LED signals shall be as per Region of Peel Electrical Traffic Standards Drawings, OTM Book 12, OTM 12A, HTA, OPSS 2460, CSA certified and shall meet or exceed ITE specifications. All LED modules shall have an incandescent appearance, whereby no individual LED will be visible in regular daylight. and not a pixelated appearance. All LED Modules shall

be Electrical Testing Labs (ETL) verified as per Intertek's directory of LED Traffic Signal Modules Certified Products revision March 20, 2018. All LED modules shall have a minimum warranty of 5 years from the date of activation.

All vehicle and pedestrian housings shall be of yellow polycarbonate UV stabilized housings with yellow square, cowl or tunnel visors and matte black in the interior of the visor as approved by the Agency and as shown on the Region of Peel Electrical Traffic Standards Drawing #4-5-1, #4-5-2, #4-7-4, OTM Book 12 and OPSS 2460. Backboards shall be of UV stabilized polycarbonate material or an Agency approved equal, suitable for mounting vehicle signal heads on plumbizer or on double arm pipe brackets mounting equipment, as indicated on the drawings. Signal heads shall be supplied with necessary bird stops and neoprene gasket on the top of the head only.

All signal heads shall include a 500mm brackets (as indicated on the signal drawing such as for center median poles and pedestrian signal heads), T-Type Nipple plumbizers, clamp mount Versa-Brac, cushion hangers or other mounting hardware which shall be aluminum with cast aluminum fittings and stainless-steel mounting hardware. All fastening components shall be stainless steel screws, washers, nuts, and bolts. The

The Vendor will also be required to use black powder coated pipe brackets at decorative pole locations at no additional cost.

All vehicle signal heads on mast arms shall be mounted with a plumbizer and must have two full size reinforcing plates mounted at the bottom interior of the red section and top interior of the amber section, as a minimum. In addition, vehicle signal heads shall have a safety feature of an aircraft cable as per Standard Drawing.

All signal heads that are not operational shall be covered with "Traffic Jackets" as distributed by Sentinel Pole & Traffic Equipment Limited, or an approved equal, complete with mounting hardware. Inactive vehicle signal heads on plumbizers can also be tilted facing down with the LED indication not visible to the road users. Inactive pedestrian signal heads can be turned to face towards the pole with the LED indication not visible to road users.

The bird stop shall only be installed on the top head frame and the washer shall be as per OPSD 2524.01.

Installation shall be as per Region of Peel Standard Drawings #4-3-1-A, #4-3-1-B, #4-3-2, #4-3-3-A, #4-3-3-B, #4-5-1, #4-5-2, #4-7-4 OPSD 2524.01 and OPSS 2409. Any unclear specifications shall be verified with the Agency.

<http://www.peelregion.ca/pw/other/standards/linear/drawings/>

Method of payment to supply and install each signal head shall include all labour, materials, vehicles, and equipment for a fully functioning unit. It shall include, but is not limited to, 500mm aluminum pipe brackets, plumbizer, astro-bracket, cushion hanger, cast aluminum fittings, steel banding, stainless steel mounting hardware, black powder coated mounting equipment at no additional cost (when installing black decorative poles), housings, visors, bird stops, washers, wire connectors, solid riser wires from the hand hole to the signal housing unit, adjusting mounting height and drilling new entry holes to meet vertical clearance standards, repositioning mast arm to be parallel with the crosswalk for visibility, covering unused apertures with a steel plug and spray painting all apertures with grey zinc-rich paint (or grey galvanizing paint for steel poles).. Additional descriptions may be noted in the tender items.

E.33.9.1 Vehicle Signal

Vehicle signal heads may include Highway, Oversized Highway, Type 1, Type 2, Type 9, Type 11. Please see the tender items for other signal heads not described.

E.33.9.2 Programmable Vehicle Signal

Optically programmable traffic signal heads may be used to provide precise lane control for traffic signal displays. The Vendor shall provide a Shop Drawing or a detailed specification sheet for the programmable traffic vehicle signal to be used for pre-approval.

Additional programmable vehicle signal types may be described in the tender items.

E.33.9.3 Pedestrian Signal

The housing equipment shall be of square polycarbonate housing. The Vendor shall supply and install as itemized in the tender items.

The “Bi-Modal Walk” and “Don’t Walk” Pedestrian LED signal head section shall be within one unit, superimposed in the same unit. All LED pedestrian signals shall meet TAC, HTA R.R.O. 1990 Regulation 626 Traffic Control Signal Systems and shall resemble the outline/symbol as identified in OTM Book 12 and must be approved by the Agency.

The Pedestrian Countdown Signal (PCS) head section shall be transitional style countdown during “Flashing Don’t Walk” only, and rest in blank display. All PCS shall meet or exceed ITE specifications, resemble the outline/symbol as identified in OTM Book 12 and OTM Book 15, and must be approved by the Agency. The countdown displays shall have an incandescent look, whereby no individual LED will be visible in regular daylight.

E.33.9.4 Bicycle Signal

Bicycle signals shall be of LED modules and shall be as per HTA specifications. The LED module shall have an incandescent appearance and not pixelated. All LED modules shall have a minimum warranty of 5 years from the date of activation.

Bicycle signal housing shall be all black UV stabilized polycarbonate material with black tunnel visors and without backboards.

E.33.10 Traffic Signal Mast Arms

The Vendor shall supply and install traffic signal mast arms in accordance with the Region of Peel Electrical Traffic Standards Drawing #4-5-1, OPSS 2460, OPSD 2501.01 and OPSD 2501.02, as applicable.

Single member mast arms shall be spun aluminum or with black powder coated (as required) and shall be in accordance with the drawing. Mast arms shall be complete with hot-dipped galvanized steel collar pole face plate type and adjustable pole back plate. The thickness of the plates shall be in accordance with the manufacturer's requirements.

The Agency may also request straight single mast arms for pedestrian crossovers (PXO) or crossrides. These arms do not have a rise. These arms shall be requested as per contract drawings and shall be at no additional cost.

The Vendor is required to install a ¼ "-20 set screw between the mast arm and mounting shoe to prevent rotation of the mast arm.

A joint site visit with the Agency representative and Vendor is required to finalize mast arm lengths after the completion of all pole bases.

Method of payment shall be for supply and install for each mast arm shall include all labour, materials, vehicles, and equipment. The mast arm shall be fully equipped with mounting hardware including, but not limited to a steel pod for steel octagonal poles, black mounting pods for decorative poles (at no additional costs), or bolts for wooden poles. The mast arm conductor entry holes shall be painted with a zinc rich or a galvanizing paint and shall be fitted with a rubber grommet.

E.33.11 Streetlight Arm

The Vendor shall supply and install the appropriate streetlight arms as indicated on the design drawing or as directed by the Agency representative. The Vendor shall comply with local municipality standard drawings where the Agency does not have standard drawings.

The Vendor may be required to supply and install streetlight arms on either wood poles, concrete, or metal poles as per the signal drawing.

Streetlights installed shall meet the requirements of the area municipality standards and governing Hydro Authorities.

The Vendor may be required to supply and install black aluminum streetlight arms.

Streetlighting arm unit prices shall be as per the tender items.

Method of payment shall be for supply and install for each streetlight arm shall include all labour, materials, vehicles, and equipment. It shall be fully equipped with mounting hardware regardless of pole type (wood, concrete, steel, or aluminum), bolts, nuts, steel banding, rubber grommets, drilling entry holes and shall be installed as per manufacturer and Agency specifications.

E.33.12 Traffic Signal Poles/Streetlight Poles

The vendor shall supply and install traffic signal and streetlight poles as per applicable Region of Peel Electrical Traffic Standard Drawings #4-5-1, #4-7-1, #4-7-2 and OPSS MUNI 615.

Poles shall be CSA certified as required.

All pole installation shall be an all-inclusive price for each install. Extras such as utility conflicts, locate delay errors, shale, and pole relocation adjustments requirements on the day of excavation shall not be considered.

The Vendor shall ensure that all poles are plumb.

The Vendor shall field drill all apertures on all steel or aluminium poles at the appropriate location for internal wiring and attachment of mast arms, brackets, and pushbuttons. All apertures shall be treated with a zinc rich or galvanizing paint and fitted with a rubber grommet.

All hand holes cover screws shall be treated with anti-seizing lubrication.

All civil excavation and restoration shall be included within each all-inclusive supply and install pole item regardless of existing surface material. Poles installed in concrete may require up to 2m² of concrete restoration. Hard surface restoration may include concrete, asphalt, and special coloured concrete shall meet Agency or as required local municipality specifications and requirements. All restoration shall meet or exceed existing conditions and shall be included in unit price at no additional costs.

E.33.12.1 Steel Poles

All steel poles shall be hot-dipped, galvanized and of strength and rigidity to withstand, without failure, the accepted "design and pressure" for Southern Ontario.

All traffic signal steel poles shall be POWCO or SPINA series, as shown on the signal drawing, or Agency approved equal.

Combination traffic signal/streetlight poles shall be octagonal base mounting, POWCO or SPINA series or Agency approved equal.

Method of payment to supply and install each steel pole shall include all labour, materials, vehicles, and equipment. It shall include all wire connectors, all hardware, wire splicing, all vertical wiring, bare ground wire to the ground system, all hardware and pole caps.

E.33.12.2 Aluminum Poles

The Vendor shall confirm the bolt circle dimensions of the base plate prior to ordering, as they may differ from the norm.

Method of payment to supply and install each aluminum pole shall include all labour, materials, vehicles, and equipment. It shall include all wire connectors, all hardware, wire splicing, all vertical wiring, bare ground wire to the ground system, all hardware and pole caps.

E.33.12.3 Decorative Black Aluminum Poles

All decorative traffic signal poles shall be black powder coated aluminum. The Vendor shall confirm the bolt circle dimensions of the base plate prior to ordering, as they may differ from the norm.

Method of payment to supply and install each decorative black aluminum pole shall include all labour, materials, vehicles, and equipment. It shall include all wire connectors, all hardware, wire splicing, all vertical wiring, bare ground wire to the ground system, all hardware and pole caps.

E.33.12.4 Concrete Poles

Concrete streetlight poles shall be supplied in accordance with the local Hydro Authority's standard drawing. All concrete streetlight poles shall be Class 'D' direct buried, unless otherwise shown, and shall be similar models constructed by the same manufacturer. Concrete spun poles shall meet OPSD 2410.01 and OPSD 2225.010. OPSD 2225.10 is amended by deleting reference to "concrete encasement" and replacing it with "limestone screening" or "U-Fill".

Where required, remove the existing pole, and excavate the hole to suit the installation of the new pole. If required, connect to existing streetlighting cables to maintain the luminaire in operation.

Pole holes are to be augured or excavated using hand dig method or a non-destructive hydro-vac system. All excavated material shall be removed from site daily to leave the site free of any debris build up.

The Vendor shall install flexible duct inside the pole wiring aperture at the base of a direct buried pole to prevent pinching or damage to the streetlight cables.

Specialty black poles shall be supplied and installed at no additional costs.

Method of payment to supply and install each concrete pole shall include all labour, materials, vehicles, and equipment. It shall include all hardware, wire connectors, vertical wiring, bare ground wire to the ground system, temporary cable connections, excavation, augering/hydro vac, flexible duct to the inside of the pole wiring aperture at the base of the direct buried pole to prevent pinching or damage to the conductors. It shall include backfilling, compaction, and surrounding restoration.

E.33.12.5 Wood Poles

All wood poles supplied by the Vendor shall be 12.5m minimum height, class three (3), unless otherwise shown. Wood poles shall be installed, as indicated on the drawings, in accordance with the appropriate Region of Peel Electrical Traffic Standards Drawings and OPSD 2238.01 and 2540.01. All backfill shall be limestone screening and hand tampered securely in place.

OPSD 2540.01 is amended to note that all steel messenger cables installed shall be 9mm Grade 160.

Class two (2) wood poles shall be used for spans at and greater than 60m.

Where wood poles are installed in the vicinity of existing overhead hydro cable, a minimum offset (as per local Hydro Authority) shall be maintained or where it is impractical to achieve this offset, the installation of the pole shall be coordinated with the appropriate local Hydro Authority.

Method of payment to supply and install each pole shall include all labour, materials, vehicles, and equipment. It shall include back guying, grounding, all vertical wiring, P.V.C junction boxes, rigid P.V.C. conduits, steel straps for conduits every 1.2m (minimum), conduit protection via protective moulding stapled, augering/hydro vac, excavation, backfilling, compaction and surrounding restoration.

E.33.12.6 Pushbutton Poles (With Footing)

Pushbutton poles shall be 1.5m in height, aluminum and installed with a concrete footing. Pushbutton poles shall be as per OPSD 2558.00 and the footing shall be as per OPSD 2200.041.

The Vendor shall supply black powder coated pushbutton poles at no additional costs unless otherwise separated within the tender items.

Method of payment to supply and install each pushbutton pole shall include all labour, materials, vehicles, and equipment. It shall include all hardware, wire connectors, wire splicing, all vertical wiring, prefabricated anchor assemblies, pre-set anchor bolts, backfilling, tamping excavated material to 100% proctor density, drilling of any ground connections (if required), proper expansion joints during restoration and all necessary hand dig or hydro vac excavation when within 1m of existing infrastructure locates regardless of existing material.

E.33.13 Pushbuttons

The Vendor shall supply and install pedestrian pushbuttons on the poles which are part of the traffic signal system as shown on the signal drawing. The pushbuttons and interface module shall be installed according to the manufacturers' specifications. Pushbuttons are to be installed using drill/tap method and fastened using ¼"-20 stainless steel machine screws or as manufacturer specified requirements. All openings around the pushbutton and the wiring aperture shall be sealed with outdoor clear silicone. A 1-2/C #12 AWG riser cable shall be installed in the riser conduit from the pushbutton to the splice point.

The Agency may supply the pushbutton signs. The signs are to be installed using standoff brackets and metal banding as shown in the Region of Peel Electrical Traffic Standards Drawing #4-5-1.

Pushbutton signs that are supplied by the Vendor shall be as per OTM Manual unless otherwise instructed by the Agency.

Pushbuttons shall have a minimum warranty of five (5) years.

Approved equals must be pre-approved by the Agency and the Vendor must provide a detailed specification sheet and drawings or cut sheets.

Method of payment shall be for supply and install for each pushbutton which shall include all labour, materials, vehicles, and equipment for a fully functioning unit. It shall include, but not limited to, all hardware, programming, wire connectors, splice connectors, vertical wiring, drilling new entry holes to meet vertical clearance standards, covering unused apertures with a steel plug and spray painting all apertures with grey zinc-rich paint (grey galvanizing paint for steel poles) for a fully functioning unit that meets Agency specifications and requirements.

E.33.13.1 Pedestrian and Bicycle Pushbutton

Pushbuttons shall be rectangular, yellow in colour, flush mounted onto the pole and have a tactile arrow appropriately aligned with the crossing and a latching LED once activated.

The following pushbutton models are acceptable for use.

- Polara Bulldog III Product Order # R-DBL3-(AL/AR)-Y-2H
- Campbell 4EVR with LED and Tactile Arrow and Latch

Pushbuttons attached to wood poles shall have a modular cup/housing to allow conduit access.

Pushbuttons attached to round aluminum poles shall include the modular cup/housing to allow conduit access and flush mounted to the pole.

E.33.13.2 Accessible Pedestrian Signal (APS) Pushbutton

APS pushbuttons shall be yellow in colour, shall be able to operate over single pair of wire, have a vibrating tactile arrow with an audible tone, have a latching indicator, have a confirmation tone with vibration when the button is pushed, have extended push functions, have SDLC capabilities, have cuckoo and Canadian melody tones and shall be AODA compliant. The pushbutton shall include pedestrian crosswalk signage with instructions of pedestrian operation as per Agency standards.

The mode of operation and tones shall be specified by the Agency.

The following pushbutton models are acceptable for use. Alternate equivalents may require up to three (3) weeks to review for approval by the Agency.

Product Name	Manufacturer	Description
EZ Communicator Navigator	(Polara Engineering Incorporated)	2 Wire System
iN25B	(Polara Engineering Incorporated)	2 Wire System

E.33.14 Traffic Signs

Where required, the Vendor shall supply and install signs to the pole with steel banding and stand-off brackets, in accordance with the Region of Peel Electrical Traffic Standards Drawings #4-5-1, #4-6-1 and #4-6-2.

All signs supplied by the Vendor shall be according to OTM Book 5. The Vendor shall install signs onto telespar posts, wood posts, hydro pole, traffic signal pole, streetlighting pole, wood posts (e.g. 100mm X 100mm pressure treated posts), wood poles, concrete poles as required and traffic signal arms which may need bucket trucks.

Method of payment to supply and install each sign shall include all labour, material, vehicles, and equipment. It shall include all hardware, washers, bolts, screws, steel banding, special mounting equipment where

applicable, excavation and full restoration to meet or exceed existing surface conditions.

E.33.14.1 Supply and Install Traffic Sign

The Vendor shall supply and install all signs as shown on the drawing.

E.33.14.2 Install Traffic Sign

The Vendor shall install all signs as show on the drawing.

The sign shall be supplied by the Agency.

The Vendor shall be required to pick up the sign at a facility within the Region of Peel as directed by the Agency's representative.

E.33.14.3 Supply and Install Sign Post (Telespar or Wood Post)

All sign posts proposed for installation on soil or gravel shall be installed on a 100mm x 100mm x 5m pressure treated wood post, supplied by the Vendor, and installed with appropriate lag screws.

All sign posts proposed for installation in asphalt or concrete shall be installed with telespar post, to be supplied by the Vendor. The installation method shall be in accordance with the Region of Peel.

Excess wood post or telespar shall be trimmed unless otherwise advised by the agency.

Restoration in soft surface shall include all native back fill of native soil or as required other granular material. Restoration in hard surface shall be applicable for all concrete, coloured or patterned concrete and asphalt surfaces.

E.33.14.4 Installation of Oversize Street Name Signs

The Vendor shall be required to install an oversized street name sign onto a mast arm, in accordance with the City of Brampton's Drawing #445 and City of Mississauga's Drawing #2430.150 (supplied in the Region of Peel Electrical Traffic Standards) and the requirements of the area municipality. The signs and mounting brackets shall be made available to the Vendor.

The Oversize Street Name Signs and mounting brackets may be supplied by the Agency and shall be picked up by the Vendor from a facility within the Region of Peel as directed by the Agency.

Where the oversize street name signs are indicated to be installed on overhead span wire, the Vendor shall supply all appropriate hardware. Where required, the Vendor shall remove existing hardware from the signs supplied by the Agency at no additional costs and install appropriate hardware as necessary.

E.33.15 Controller Field Installation/Reconfigure Modifications

The Vendor shall install the traffic cabinet, controller, hardware, and other equipment as supplied by the Agency in accordance with the signal drawings and appropriate standards required for the intersection to be fully operational. The Vendor shall connect all field signal circuits and vehicle detector run wires as shown on the cabinet-wiring diagram. The Vendor shall perform "Flash-out" and "Conflict Monitor" field checks prior to energizing the signals for operation. The Vendor's electrician will sign/date the Conflict Monitor sheet prior to final energization of the permanent traffic signals.

The Vendor shall ensure the connection of any existing or new traffic systems communications cable, hardware and other related devices are always fully operational and maintained.

The Vendor shall provide eight (8) weeks advance notice for the cabinet to be built. The Vendor must give a minimum of 48-hour notice to the Agency before picking the traffic signal controller. The cabinet shall be picked up at a facility within the Region of Peel as directed by the Agency representative.

It shall be the Vendor's responsibility to provide functional signal operation compatible with the timing and phasing of the controller unit provided. Further, any modifications required to a new or existing cabinet to provide a fully functional traffic signal shall be made by the Vendor. If required, the Vendor shall arrange with suppliers or manufacturers for training/support of their products, at the Vendor's own expense.

The Vendor shall be able to complete same day modification to an existing cabinet as required. For example, when a new phase such as a left turn phase is implemented the Vendor shall have a qualified electrician complete works such as, but not limited to, re-wiring cabinet outputs, adding load bays, deactivating load bays and making appropriate field/signal wiring outputs. Other works may be for pole replacements or swaps. In all scenarios the Vendor shall provide pay duty officers at their cost to manage intersection traffic while the signals are off.

The Vendor may be required to install a pole mounted controller where required. The controller shall be installed as indicated on the drawings and in accordance with OPSD 2510.01. The Vendor shall provide all applicable steel strapping, bolts, conduits, and couplers. The Vendor may be required to supply and install the cabinet skirt as directed by the Agency.

The Vendor shall document all tests and checks completed within the Traffic Signal Maintenance Report (TSMR) on the day of turn on.

The Vendor shall document any special cabinet hard wiring modifications on the cabinet drawing with a red pen. The Vendor must notify the Agency of such changes.

The Vendor shall supply and install as further detailed in the tender item description.

E.33.16 Roadway Lighting Luminaire

The Vendor shall supply and install streetlighting, multi-use trail lighting or pathway lighting as per the drawing and shall meet the requirements of the local Municipality and local Hydro Authority specifications and standards.

Installation of luminaire with mast arm shall be in accordance with the local Hydro's standard drawing.

The photoelectric controller (photocell) shall be as per OPSS 2485 and the requirements set forth within the specifications below, unless otherwise advised by the Agency.

Method of payment to supply and install each luminaire shall include all labour, materials, vehicles, and equipment for a fully functioning unit. It shall include, but not limited to, all hardware, programming, vertical wiring, wire connectors, splice connectors, fuse kits, fuse holders, fuses, boots, drilling new entry holes to meet vertical clearance standards, covering unused apertures with a steel plug and spray painting all apertures with grey zinc-rich paint (grey galvanizing paint for steel poles) for a fully functioning unit that meets Agency specifications and requirements.

E.33.16.1 Brampton Streetlighting

The City of Brampton's luminaires shall operate at 4000 kelvin colour temperature; have 7-pin photocell receptacles for arterials and collector roadways and with zero (0) to ten (10) volt dimming drivers.

City of Brampton's luminaires shall be supplied and installed as per the tender quantities list.

E.33.16.2 Caledon Streetlighting

The Town of Caledon's luminaires shall operate at 3000 kelvin colour temperature; have 7-pin photocell receptacles for arterials and collector roadways and with zero (0) to ten (10) volt dimming drivers. Please refer to the Town of Caledon Outdoor Lighting standard for all requirements and submissions required with each project.

Town of Caledon's luminaires shall be supplied and installed as per the tender quantities list.

E.33.16.3 Mississauga Streetlighting

The City of Mississauga requires all streetlighting luminaires to be supplied with a NEMA 7-pin photocell receptacle certified to ANSI C136.41. The luminaires shall also be supplied with individual

adaptive control modules. The following are details for the adaptive control modules:

Model # **RME-XB#** Plug-in 7-pin node with a voltage range of 110-480V, for use in Mississauga and programmed for Zone ZXX_XX*, as manufactured by:

Contact:	Bernard Tetu
Phone:	+1-418-2641263
Email:	btetu@dimonoff.com
Address:	DimOnOff Inc. 2025 Lavoisier, suite 135, Québec QC Canada G1N 4L6; +1(418)-682-3636; WWW.DIMONOFF.COM

* Zone ZXX_XX, programming of the zone number will be based on the location of the installation. This information may be obtained from the City's Streetlighting section.

The Vendor shall contact the City of Mississauga's streetlighting section, via e-mail, prior to install for instructions on documenting adaptive control serial numbers. The contacts for the City of Mississauga are as follows:

Contact Name	Email
Trevisan Marcuzzi	Trevisan.Marcuzzi@mississauga.ca

The luminaires are itemized as small, medium, and large. All luminaires shall have an operating input voltage of 120 volts to 277 volts (noted as P1) and shall operate at 4000 kelvin colour temperature. Additional luminaire info shall be indicated on the design drawings noting the secondary optics, number of LEDs, fixture colour and drive current.

An example of a luminaire order number is, **CNX-LRL4-P1-2M-40-48-L-XX7-GRY-1500**, (XX7 = 7-pin receptacle). Luminaires may be ordered from,

Contact:	Jason Lightfoot
Phone:	647-889-1400
Email:	jason.lightfoot@conxcorp.com
Address:	Conxcorp Ltd. 6350 Netherhart Road - Unit 2, Mississauga, ON L5T 1K3

Mississauga luminaires shall be supplied and installed as per the tender quantities list.

E.33.17 Fire Pre-Emption EVP/TSP Installation

The Vendor shall supply and install fire pre-emption equipment when directed. The Vendor shall install the manufacturer recommended cable, terminators, connectors, control unit/card and connect all the equipment for a fully functioning pre-emption system regardless of the system type.

The Vendor shall make the equipment and system ready for the Agency's maintenance contractor to test. For new signal installs, testing shall be completed before the signal activation date. The Vendor shall provide appropriate staff as required, should the Agency's maintenance contractor require support for testing.

All testing is to be completed by the Agency's Maintenance Contractor.

The Vendor shall pick up the equipment at a designated location within the Region of Peel as required.

The Vendor shall supply and install EVP/TSP equipment as further described within the tender items.

E.33.17.1 Caledon and Mississauga Fire Pre-emption

In Caledon and Mississauga locations, the Vendor shall supply and install 3/C #20 AWG, Global Traffic Technologies (GTT, formerly 3M) SPEC 138 pre-empt cable from each signal pole to the traffic controller, as shown on the drawings. Adequate spare cable will be left coiled at the detector location and in the signal cabinet for final connection by the Agency's forces.

The Vendor shall also supply and install GTT Opticom 721 Detectors, with mounting brackets, at each location as shown on the drawings.

The detectors and detector cards may also be supplied by the City.

E.33.17.2 Brampton Fire Pre-emption

In Brampton locations, the Vendor will be directed to install an EMTRAC wireless pre-emption system. All equipment shall be supplied by the City of Brampton and the Vendor will be responsible for all installation and setup. The Agency will be responsible for proper operation of the EMTRAC system through the equipment testing.

The Vendor may be required to supply and install the Emtrac cable. The cable used shall be **Belden 7810A coaxial cable** or an approved equal. The approved BNC connectors or plugs are **Emerson 26-8016** and **Terrawave Solutions CON-12-400** or an approved equal. Refer to the manufacturer's instruction manual for all other installation procedures.

E.33.18 Temporary and/or Overhead (O/H) Signal Installation

The Vendor may be requested to provide an overhead or a temporary signal installation, as shown on the contract drawings and in accordance with OPSD 2540.01, 2545.01, 2242.02, and 2245.01, as applicable.

The Vendor shall arrange for connection of electrical power with the local Hydro Authority and shall pay for all costs associated with installation, energizing, maintenance, operation, and removal of the temporary service connections and traffic control equipment.

Where the project has indicated multiple temporary staging installations, the removal of temporary installation shall be included for each supply and install tender item and shall be paid as per OPSS 106.10.05.

During capital projects, the Vendor shall perform all routine and emergency maintenance work required for proper operation of the temporary traffic signal and roadway lighting systems as per Capital Maintenance. At minimum, the O. Reg. 239/02 Minimum Maintenance Standards for Municipal Highways must be met unless otherwise advised by the Agency.

Newly installed overhead traffic signal system spans shall be tightened after 30 days of signal turn on/activation to ensure proper span and mounting heights are maintained as per contract drawings. These works shall be done at no additional cost to the Agency.

Method of payment for each item shall be for supply and install which shall include all labour, materials, vehicles, and equipment.

E.33.18.1 Overhead Traffic Signal Heads

The Vendor shall supply and install signal heads on span wires or mast arms in an overhead or temporary installation. All vehicle and pedestrian signal heads shall be as per **Traffic Signal Heads** section (Section E.33.9).

All signal heads shall be supplied with span wire hangers. Both the upper and lower signal head mount shall be reinforced with a steel plate in each section.

The Vendor, as directed by the Agency, may be required to install signal heads with mast arms directly to wood poles, as per OPSS 2461 and OPSD 2501.02.

All signal heads that are not to be operational during designated construction stages shall be covered with 'Traffic Jackets' as distributed by Sentinel Pole & Traffic Equipment Limited, or an approved equal, complete with mounting hardware.

Overhead traffic signal heads shall include up to 10m of coiled wire from the junction box to the signal head. The signal head shall be able to move an additional 5m along the span from the

location indication of the drawings. Any additional lateral movements beyond 5m shall be noted as extra conductor and added within the cable run quantity.

E.33.18.2 Back Guy Anchors

The Vendor shall supply and install back guys for wood poles and hydro poles, as indicated in the drawings, in accordance with OPSD 2540.01 and OPSD 2235.01. The Vendor shall supply and install back guy anchors as further described in the tender items.

Where it is impractical to install the normal back guy, a sidewalk strut type back guy shall be provided. All back guys shall be installed prior to the installation of suspension spans, cables, signal heads and luminaires.

Where the ground is softer and anchors cannot be placed properly, the Vendor shall pour concrete footing/posts using concrete formwork such as "sonotubes" and set anchor within the concrete footing. These works shall be included within the pricing where there are sidewalks or other concrete footings to be poured within the project. In temporary situations where the Vendor does not have any concrete work for the project, the Vendor may use fast setting pre-mix concrete bags such as "quikcrete" or other similar products and shall be set to maximum setting strength.

E.33.18.3 Steel Messenger Cable

The Vendor shall supply and install steel messenger cable and all associated mounting hardware, as indicated on the signal drawings and in accordance with OPSD 2540.01.

OPSD 2540.01 is amended to note that all steel messenger cables installed shall be 9mm Grade 160.

The messenger cable is to be spanned between poles using thimble eyebolts that are to be bolted through wood poles or steel banded spool insulators for steel poles as per Agency specification.

Wherever aerial cable crosses under high voltage hydro lines, the Vendor shall arrange with the appropriate local Hydro Authority for the neutral conductor to be raised to clear the top span by a minimum distance as per local Hydro Authority. If they are unable to achieve this separation, the Vendor shall arrange with the local Hydro Authority to protect the neutral with a flexible line insulator hose. The covers shall be installed as per Electrical Utility Operations Manual, section "Rubber and Fibre Protective Equipment" and shall extend no less than the minimum distance as per local Hydro Authority on each side of the outmost high voltage conductor. The minimum distance as per local Hydro Authority working clearance from high voltage conductors shall be maintained.

Cable spans greater than 60m which require support cable hangers as per OPSD 2540.01 shall be at no additional cost.

The Vendor shall arrange with the appropriate local Hydro Authority for the attachment of overhead traffic signal equipment on their existing concrete hydro poles at the intersection, as required.

E.33.18.4 Traffic Signal Cable

The Vendor shall supply and install overhead traffic signal cable, as indicated on the drawings and in accordance with OPSD 2540.01. Traffic signal cables shall be as per the **Wiring** section (Section E.33.5) and shall be sun resistant.

The Vendor shall ensure that no portion of the overhead span installation to be lower than 5.8m over the travelled portion of the roadway. The Vendor shall record the clearance heights measured within the Traffic Signal Maintenance Report (TSMR) and provide documentation to the Agency.

E.33.18.5 Power Feed Cables and Streetlighting

The Vendor shall supply and install overhead power feed cable for both the traffic controller and streetlights, as shown on the drawings and in accordance with OPSD 2540.01. The power feed cables shall be as per **Wiring** section (Section E.33.5) and shall be sun resistant.

E.33.18.6 Ground Cable

The Vendor shall supply and install overhead ground cable, grounding for the messenger cable and the overhead system, which shall conform to the appropriate local Hydro Authority requirements and in accordance with OPSD 2540.01. The ground wire shall be as per **Wiring** section (Section E.33.5) and shall be sun resistant.

E.33.18.7 Ground Rods/Ground Plate

The requirements for the installation of grounding equipment shall be in accordance with OPSS 609.

At wood poles near a ground rod, the Vendor shall install a ground wire from the upper span to the lower span and then to the ground rod inside a protective moulding stapled to the pole. Supply of all vertical wiring, wire connectors and moulding shall be included within the item. The ground rod/plate shall be as per **Ground Rod/Plates** section (Section E.33.7).

E.33.18.8 Wood Post/ Portable Stand for Pedestrian Pushbutton

The Vendor may be required to provide a wood post or stand, on which to install the pedestrian pushbuttons and signs. The Agency may supply all pushbutton signs.

Where indicated on the drawing, a pushbutton with corresponding sign shall be mounted on a 100mm x 100mm x 5m pressure treated direct buried wood post. Wood posts shall be direct buried to a minimum depth of 1.0m and backfilled with limestone screening, compacted as required. Sufficient cable shall be coiled to permit relocation, if required.

Where indicated on the drawing, a pushbutton with corresponding sign shall be mounted on a portable stand and must be constructed to withstand outdoor / inclement conditions in Ontario and weighted down to prevent tipping. Sufficient cable shall be coiled to permit relocation, if required.

A 13mm steel or plastic riser conduit shall be fastened to the wood post or moveable stand from the pushbutton to the top.

Under temporary traffic control conditions, the Vendor is responsible for maintaining the pedestrian posts/stands in their proper location and ensuring full operation during all stages of construction. Moveable pedestrian stands should be placed on level ground and pedestrian accessible location and may require relocation during construction. All relocation expenses shall be borne by the Vendor.

E.33.18.9 Overhead Fire Pre-emption Installation

Should be Vendor be required to supply and install GTT 721 detectors on overhead span wires, the Vendor shall supply and install 3/C #20 AWG, GTT SPEC 138 pre-emption cable from each fire pre-emption detector head location to the traffic controller, as shown on the drawings and according to the Region of Peel Electrical Traffic Standards Drawing #4-7-5.

In the City of Brampton, the Vendor shall be required to install the EMTRAC unit.

The Vendor shall supply the equipment when directed. The Vendor shall install the manufacturer recommended cable, terminators, connectors, control unit/card and connect all the equipment for a fully functioning pre-emption system regardless of the system type.

The Vendor shall make the equipment ready for the Agency's maintenance contractor to test. For new signal installs testing shall be completed before the signal activation date. The Vendor shall

provide appropriate staff as required, should the Agency's maintenance contractor require support for testing.

Adequate spare cable will be left coiled at the detector location and in the signal cabinet for final connection. All necessary hardware/brackets to ensure safe and consistent operation shall be supplied by the Vendor.

E.33.19 Removals and/or Salvage

The requirements for removal of electrical equipment shall be in accordance with OPSS 610.

The Vendor shall be responsible for removing all equipment identified on the drawings. The Vendor shall meet with the Agency on site to identify what equipment shall be salvaged or disposed of. Salvaged equipment must be delivered to the Agency's yard within a week. The Vendor is required to restore the areas to as good as or better than original condition. The contract price shall include all costs related to the removal of all ancillary hardware such as brackets, clamps, and cables. Proper and environmentally responsible disposal of all removed equipment identified for removal and/or delivered to local Hydro's or Agency's yard.

The Vendor shall deliver any equipment to be salvaged to 230 Advance Boulevard, Brampton, Bay Door number 26. The Vendor shall provide 48-hour notice of delivery to arrange for receiving.

Any salvaged equipment damaged during the removal operation shall be repaired or replaced by the Vendor at the Vendor's expense.

The Vendor is also advised that several existing traffic signal locations within the Region of Peel are operating Red Light Cameras. The equipment at these locations will be removed by the Agency's forces prior to the Vendor starting any works.

The Vendor shall remove all "Stop", "Intersection Ahead", "Keep Right" and "Hazard" signs, and any other signs as directed by the Agency.

Method of payment shall include all labour, vehicles, materials, and equipment to remove each item or as described as lump sum within the tender document.

E.33.20 Uninterruptable Power Supply (UPS) (Supply and Installation)

The Vendor may be required to supply and install ALPHA UPS, or other approved equal, that shall be capable of being a side mounted or pad mounted. It shall house a minimum of four (4) batteries and bypass switches. Dimensions of the UPS shall not exceed 50"H x 17"W x 17"D. The UPS enclosure must not interfere with the opening of the traffic cabinet door.

All four (4) batteries must meet their specifications out of the box immediately after the initial 24-hour top off charge. Batteries that require

cycling to meet the AH rating specifications are not acceptable. The UPS shall provide a minimum four (4) hours of full run-time operation at 500 watts with an additional nine (9) hours of Red Flash operation at 125 watts.

It shall also have two (2) independently programmable timers, zero (0) to eight (8) hours, with two (2) times-of-day restrictions on each timer, providing dry contacts to provide red flash operation at user definable times of day. The UPS and batteries shall be easily replaced with all needed hardware and shall not require any special tools for installation.

Method of payment shall be as per each pad mounted or pole mounted uninterruptible power supply. The supply and install of UPS shall include all labour, materials, vehicles, and equipment. Each UPS shall include the appropriate weatherproof electrical enclosure, circuit breakers, circuit breaker enclosures, fuses, wiring connections, conduit fittings/couplings, vertical lengths of conduit, ground wire moulding, and vertical lengths of ground wire as required by the manufacturer of the UPS for a fully functioning system.

E.33.21 System Communications

The Vendor may be required to include connections to the Public Sector Network (PSN) fibre-optic system. A 50mm conduit is to be supplied and installed by the Vendor, as shown on the drawings, from the nearest PSN access point to the traffic controller location. The PSN facilities shall be installed in the traffic cabinet by other forces and the Vendor will assist in the completion of any PSN works.

The Vendor may be required to install or relocate wireless radio equipment, such as antennas, cables, and cabinet equipment to make the system fully operational. Equipment and programming assistance may be supplied by the Agency.

Any existing communications in place shall be maintained during all stages of construction.

The Vendor may be required to store the equipment for the duration of the project which shall not incur any additional costs

Method of payment shall include all labour, materials, vehicles, and equipment. It shall include a crew of 2 electricians and 2 bucket trucks providing an hourly rate dedicated to support and assistance to third party vendors, approved by the Agency, to install the communications systems such as, but not limited to installing antennas, communication cables, special hardware and performing cable connections for a fully functioning communications system. Within this item the Vendor may also be asked to install access points or antennas on behalf of third-party vendors. The Vendor may have to supply and install pre-approved or install existing bracket modules within the Region of Peel on poles or in cabinets at no additional costs. Hardware such as bolts, nuts and steel banding shall be

included within this item. 50mm conduit runs shall be supplied and installed as per the traffic conduits section specifications (Section E.33.4).

E.33.22 Remove and Re-Install

The Vendor shall remove and re-install existing appurtenance from and to a pole, wood post, telespar or a traffic signal arm, as directed by the Agency from within the same project work zone limit. The Vendor shall document conditions of the existing signs with pictures, for inventory purposes, which shall be sent to the Agency representative.

The Vendor, as directed, shall be responsible for storing the existing equipment until such a time that the equipment is required for installation. The Vendor shall be responsible for replacing any lost or damaged equipment that are stored by the Vendor. Damaged equipment shall be replaced with equivalent or new equipment at the Vendor's expense.

The Vendor shall supply all mounting hardware, labour, materials, vehicles, and equipment required to remove and relocate any such appurtenance listed in the tender items.

Method of payment shall include all labour, materials, vehicles, and equipment to "remove" each item or "remove and relocate" each item or "remove as lump sum" as described within the tender items.

E.33.23 Flagmen

The Vendor shall provide appropriate traffic management plans as suggested by OTM book 7 and any additional Agency's Road Occupancy permit traffic control requirements. The Vendor may be required to use flagmen in certain situations such as work that requires bi-directional traffic on a single lane.

The Vendor shall supply all labour, materials, vehicles, and equipment to meet safe traffic management plans and shall be paid per lane closed per workday or as otherwise described within the tender document.

E.33.24 Hydro Vac Services

The Vendor may be required to provide Hydro Vac services for works such as daylighting existing infrastructure and documenting findings as required by the Agency. There may be other circumstances where the Agency may require Hydro Vac services.

The Vendor shall supply all labour, materials, vehicles, and equipment for Hydro Vac services.

The Vendor shall supply all labour, materials, vehicles, and equipment for Hydro Vac services. Work for this item shall be completed in compliance with the Guideline for Excavation in the Vicinity of Utility Lines published by Electrical Safety Authority and Ontario Regulation 210/01 – Oil and Gas Pipeline Systems – made under the Technical Standards and Safety Act, 2000.

Method of payment shall be an hourly rate and shall include all travel time to and from the yard and disposing of material.

Basis and Measurement for Payment

Measurement for payment shall be per metre along the centerline of excavation, measured from centre to centre of handwells and/or pole bases. Payment shall be made at the unit price per metre excavated, backfilled, and shall be full compensation for all labour, materials and equipment required to complete the work as specified in the Contract Documents.

E.33.25 Traffic Signal Inspection

The Vendor may be required to inspect the Agency's existing traffic signal infrastructure. This may include all aboveground, underground infrastructure and all appurtenance pertaining to the traffic signal system. The inspection shall include observations, electrical meter readings, taking pictures, preparing a hand sketch of the intersection and documenting findings and concerns. All findings are to be emailed to the Agency's representative.

The Vendor shall supply all labour, materials, vehicles, and equipment to complete the inspection as indicated in the tender items listed.

E.33.26 Defrost Conduit

The Vendor may be required to defrost frozen underground conduits to proceed with winter works. The Vendor shall defrost through steam methods. The Vendor may provide other defrosting methods which may be approved by the Agency.

The Vendor shall supply all labour, materials, vehicles, and equipment to defrost per linear metre of conduit. The Vendor may be required to use fish wire to determine the length defrosted.

E.33.27 Survey

The Vendor may be required to survey existing traffic signal or streetlighting infrastructure. The Vendor shall provide the surveys in MicroStation CAD format (.dgn). The Vendor shall ensure the CAD files follow the Agency's required formats as per link below.

<https://www.peelregion.ca/public-works/design-standards/pdf/cad-sub-req-capital-works-june2015.pdf>

The Vendor shall supply all labour, materials, vehicles, and equipment to survey aboveground traffic signal and streetlighting infrastructure as well as field located underground conduits.

Method of payment shall be as described within the tender document.