GENERAL NOTES:

1. THE FOLLOWING NOTES APPLY UNLESS OTHERWISE INDICATED.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
3. DO NOT SUBSTITUTE MATERIALS UNLESS PRIOR APPROVAL IS OBTAINED FROM THE ENGINEER.
4. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ALL EQUIPMENT FOR REVIEW AND APPROVAL BY CLIENT REPRESENTATIVE. THE FOLLOWING SHOP DRAWINGS TO BE SUBMITTED AND STAMPED BY PROFESSIONAL ENGINEER REGISTERED FOR THE PROVINCE OF NEWFOUNDLAND AND LABRADOR:
   - 4.1. POLE FOUNDATION
   - 4.2. DAVIT POLE
5. CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS REQUIRED TO PERFORM THE WORK AND SHALL COMPLY WITH THE PERMIT REQUIREMENTS AND CONDITIONS.
6. CONTRACTORS SHALL VERIFY ALL EXISTING CONDITIONS, DIMENSIONS, ELEVATIONS, ETC.,IN FIELD AND NOTIFY THE CLIENT REPRESENTATIVE OF ANY DISCREPANCIES PRIOR TO THE START OF CONSTRUCTION OR SHOP DRAWINGS.
7. THE CONTRACTOR SHALL PROVIDE ALL LABOUR, MATERIAL AND EQUIPMENT REQUIRED TO COMPLETE THE WORK IN CONFORMANCE WITH THE DESIGN AND TO THE SATISFACTION OF THE CLIENT REP.
8. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND SAFETY PROCEDURES. THE ENGINEER SHALL NOT BE RESPONSIBLE FOR THE ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTORS OR THEIR AGENTS OR EMPLOYEES OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK.
9. ALL DISTURBED AREAS TO BE RETURNED TO ORIGINAL CONDITIONS OR BETTER UNLESS NOTED OTHERWISE BY THE PWC REPRESENTATIVE.
10. CONTRACTOR SHALL VISIT THE SITE AND ESTABLISH CONDITIONS PRIOR TO SUBMITTING THE TENDER.
11. CONTRACTOR SHALL ARRANGE AND PAY FOR ALL INSPECTIONS, EXAMINATIONS, CERTIFICATIONS AND APPROVALS REQUIRED FOR PERFORMANCE OF WORK.
12. PRIOR TO ORDERING EQUIPMENT, CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AND CONFIRM ACTUAL REQUIRED ON SITE EQUIPMENT LOCATIONS.
13. CONTRACTOR SHALL REPORT ANY DISCREPANCIES TO CLIENT REPRESENTATIVE BEFORE ORDERING EQUIPMENT OR PROCEEDING WITH CONSTRUCTION.
14. ALL ITEMS SHOWN ARE NEW UNLESS SPECIFICALLY NOTED OTHERWISE.
15. CONTRACTOR SHALL SUPPLY AND INSTALL ALL NEW ITEMS UNLESS SPECIFICALLY NOTED OTHERWISE.
16. CONTRACTOR SHALL PROVIDE ALL LIFTING, HOISTING, RIGGING, AERIAL ACCESS AND OTHER EQUIPMENT REQUIRED FOR PERFORMANCE OF WORK UNLESS NOTED OTHERWISE.
17. CONTRACTOR SHALL INSTALL ALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
18. CONTRACTOR SHALL RECORD THE ACTUAL INSTALLATION ON A SET OF CONSTRUCTION DRAWINGS AND RETURN TO THE CLIENT UPON COMPLETION OF WORK.
19. SUBCONTRACTORS SHALL BE FAMILIAR WITH THE WORK OF ALL OTHER TRADES SO THAT THEY CAN INCLUDE FOR ALL WORK NECESSARY UNDER THIS CONTRACT TO FULFILL THE INTENT OF THE DRAWINGS AND SPECIFICATIONS.
20. THE DRAWINGS ARE IN GENERAL SMALL SCALE, AND MEASUREMENTS SHALL NOT BE SCALED FROM THESE DRAWINGS. WHERE DIMENSION FIGURES ARE SPECIFICALLY SHOWN, THESE ARE TO PROVIDE A SPECIFIC REFERENCE POINT FOR THE INSTALLATION OF DEVICES. WHERE THERE IS A CONFLICT THAT REQUIRES CHANGES, REFER THE CONFLICT TO CLIENT FOR RESOLUTION BEFORE SUCH INSTALLATION IS DONE INCORRECTLY.
21. CONTRACTOR SHALL OBTAIN AND PAY FOR A SET OF FULL SIZE WHITE PRINTS. AS THE JOB PROGRESSES, MARK THESE DRAWINGS TO ACCURATELY INDICATE THE LOCATION OF INSTALLED WORK. THE WHITE PRINTS SHALL BE AVAILABLE FOR INSPECTION AT THE SITE AT ALL TIMES. INCORPORATE ALL CHANGES MADE DURING CONSTRUCTION. SUBMIT RED LINE MARK-UP DRAWINGS TO CLIENT UPON PROJECT COMPLETION.
22. CONTRACTOR TO PROVIDE A GEODETIC AS-BUILT SURVEY AS WELL AS A CSV FILE WITH ALL XYZ POINTS REFERENCED TO THE COORDINATE SYSTEM SPECIFIED ON C101. SURVEY POINTS SHALL BE CAPTURED FOR ALL NEW INFRASTRUCTURE INSTALLED ABOVE GROUND AND BELOW GROUND AS WELL AS WORK AREA EXTENTS REQUIRED FOR EXCAVATIONS AND TRENCH BOTTOMS. ANY ADDITIONAL TOPOGRAPHIC SURVEY REQUESTED DURING CONSTRUCTION NEAR WORK AREAS WILL BE CONSIDERED INCIDENTAL TO THE WORKS.
23. ALL WORK SHALL BE DONE IN A WORKMANLIKE MANNER. ANY WORKMANSHIP, UNSATISFACTORY IN THE OPINION OF THE CLIENT REPRESENTATIVE, SHALL BE REPLACED WITHOUT COST TO CLIENT.
24. CONTRACTOR SHALL MAINTAIN SITE IN TIDY CONDITION FREE FROM ACCUMULATION OF WASTE PRODUCTS AND DEBRIS. UPON OBTAINING SUBSTANTIAL PERFORMANCE OF THE WORK, REMOVE SURPLUS PRODUCTS, TOOLS, MACHINERY, AND EQUIPMENT FROM THE SITE. COMPLETION OF CLEANUP IS REQUIRED FOR TOTAL PERFORMANCE OF THE WORK IN A BROOM-CLEAN CONDITION.
25. CONTRACTOR SHALL INSTALL TEMPORARY CONSTRUCTION SIGNAGE IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) OF CANADA (LATEST EDITION) AND IN ACCORDANCE WITH NLDTWI REQUIREMENTS.
26. THE CONTRACTOR SHALL ERECT TEMPORARY CONSTRUCTION FENCING TO COMPLETELY ENCLOSE THE CONSTRUCTION SITE AND PROTECT THE SITE FROM PUBLIC USE.
27. MAINTAIN MINIMUM DISTURBANCE IN ALL AREAS. CONTRACTOR SHALL RESTORE ALL AREAS AS DIRECTED BY THE CLIENT REPRESENTATIVE.

EROSION AND SEDIMENT CONTROL (ESC):

1. CONTRACTOR TO ENSURE COPIES OF ALL PERTINENT APPROVALS AND PERMITS ARE HELD ON-SITE. THIS SHALL INCLUDE THE CONTRACTOR'S OWN EROSION AND SEDIMENT CONTROL PLAN, ENVIRONMENTAL CONTROL PLAN, AND ANY SUBSEQUENT REVISIONS.
2. THE CONTRACTOR SHALL INCORPORATE A ROUTINE END-OF-DAY CHECK TO ENSURE THE INTEGRITY OF PROTECTION MEASURES USED.
3. MAINTAIN EROSION AND SEDIMENT CONTROL (ESC) MEASURES FROM THE TIME OF INSTALLATION UNTIL AFTER ALL AREAS DRAINING TOWARDS THEM HAVE BEEN STABILIZED. CONTRACTOR SHALL REMOVE CONTROL ONLY AFTER ALL SURFACES HAVE BEEN ESTABLISHED.
4. CONTRACTOR SHALL MONITOR METEOROLOGICAL CONDITIONS AND FORECAST AS A PROACTIVE MEANS TO MINIMIZE THE POTENTIAL FOR EROSION.
5. VISUALLY INSPECT SEDIMENT AND EROSION CONTROL MEASURES ON A DAILY BASIS AND BEFORE AND AFTER HEAVY PRECIPITATION. DOCUMENT ANY CHANGES AND REPAIR AS NECESSARY.
6. INSTALL PROTECTION METHODS AS REQUIRED BY THE SITE CONDITIONS TO PREVENT SEDIMENT FROM ENTERING WATERCOURSES AND SEWERS.
7. THE CONTRACTOR SHALL PREPARE THEIR OWN ESC PLAN FOR APPROVAL BY THE ENGINEER PRIOR TO CONSTRUCTION. THE PLAN SHALL BE CONTINUALLY UPDATED AS SITE CONDITIONS DICTATE.
8. MAINTAIN A STOCKPILE OF APPROPRIATE EROSION CONTROL AND ENVIRONMENTAL PROTECTION MATERIALS ON SITE AT ALL TIMES.
9. CONTRACTOR SHALL PERFORM WORK TO MINIMIZE DISTURBANCE TO SURROUNDING PROPERTIES AND MINIMIZE EXPOSED OPEN GROUND.
10. STABILIZE ALL EXPOSED SLOPES AND OTHER AREAS NOT SUBJECT TO REWORKING AS SOON AS FINISHED GRADES ARE ESTABLISHED.
11. DO NOT PUMP, DRAIN OR PERMIT WATER CONTAINING SUSPENDED MATERIALS TO ENTER INTO WATERWAYS OR SEWERS.
12. INSTALL SILT BAGS IN ALL EXISTING NEARBY CATCH BASINS DURING CONSTRUCTION.
13. CONTRACTOR IS RESPONSIBLE FOR DUST CONTROL AT THE SITE. DUST SHALL BE PREVENTED THROUGH APPLICATION OF WATER TO EXPOSED DRY GROUND TO PREVENT DUST FROM BEING GENERATED AND BLOWN FROM THE SITE TO ADJACENT PROPERTIES.

SAFETY NOTES:

1. THE CONTRACTOR SHALL HAVE COMPLETE CONTROL OF THE WORK AND SHALL EFFECTIVELY DIRECT AND SUPERVISE THE WORK SO AS TO ENSURE CONFORMANCE WITH THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES, AND FOR COORDINATING THE VARIOUS PARTS OF THE WORK UNDER THE CONTRACT.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION SAFETY AT THE SITE AND FOR COMPLIANCE WITH THE RULES, REGULATIONS AND PRACTICES, REQUIRED BY THE APPLICABLE CONSTRUCTION SAFETY LEGISLATION. THE CONTRACTOR SHALL BE THE CONSTRUCTOR UNDER THE NEWFOUNDLAND OCCUPATIONAL HEALTH AND SAFETY ACT, NEITHER THE ENGINEER OR THE CLIENT REPRESENTATIVE ARE CONSTRUCTORS UNDER THE ACT.
3. OBSERVE ALL APPLICABLE PROVINCIAL OCCUPATIONAL HEALTH AND SAFETY ACT REGULATIONS AND OTHER APPLICABLE OWNER SAFETY REQUIREMENTS INCLUDING THE USE OF SAFETY GLASSES, HARD HATS, AND PROTECTION OF AREA WHEN WORKING OVERHEAD. THE CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR CONSTRUCTION SAFETY AT ALL TIMES.
4. THE CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS THE ENGINEER AND CLIENT REPRESENTATIVE IN CONNECTION WITH ANY INFRACTIONS OR ALLEGED INFRACTIONS OF THE CONTRACTOR WITH RESPECT TO ANY ACTS, CODES, REGULATIONS, ETC.
5. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHEN WORKINGS NEAR EXISTING POWER LINES AND UTILITIES AND COMPLY WITH ALL SAFETY REGULATIONS WITH RESPECT TO CLEARANCES.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATES OF UTILITIES PRIOR TO CONSTRUCTION.

CIVIL MATERIALS NOTES:

1. REMOVE ALL UNSUITABLE MATERIALS FROM BENEATH NEW WORKS UNTIL SUITABLE GROUND IS OBSERVED AS APPROVED BY ENGINEER.
2. ALL COMPACTION EQUIPMENT SHALL BE APPROVED BY ENGINEER.
3. IMPORTED STRUCTURAL FILL SHOULD CONSIST OF A WELL-GRADED QUARRIED MATERIAL OR SAND AND GRAVEL PIT-RUN MATERIAL, FREE OF ORGANICS, AND HAVE A MAXIMUM PARTICLE SIZE OF 200MM. DURING FILL PLACEMENT, LIFT THICKNESS SHOULD BE COMPATIBLE WITH TYPE OF COMPACTION EQUIPMENT AND MATERIAL USED (I.E. GRADATION, PARTICLE SIZE, ETC.). GENERALLY, MATERIAL SHOULD BE PLACED IN COMPACTED LIFTS NOT TO EXCEED 300MM AND COMPACTED TO 100% OF THE MATERIAL'S STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD) FOR STRUCTURAL APPLICATIONS (ASTM D698 PROCEDURE). REFER TO RESULTS OF STANTEC GEOTECHNICAL REPORT FOR SOIL AND BEDROCK CONDITIONS IN THE LOCATION OF THE SEARCH AND RESCUE BUILDING.
4. FOR FOUNDATIONS PLACED ON COMPACTED ENGINEERED FILL, AN ALLOWABLE SOIL BEARING PRESSURE OF 150 KPA (SLS) MAY BE USED; TOTAL AND DIFFERENTIAL SETTLEMENTS ARE NOT EXPECTED TO EXCEED 25MM AND 19MM, RESPECTIVELY.

UNDERGROUND ELECTRICAL CONDUIT

1. THE CONDUIT SHALL BE RIGID P.V.C., GRAY IN COLOUR AND MEET THE REQUIREMENTS OF CSA C22.2 NO. 211.2 OR CSA C22.2 NO. 211.0FT4
2. THE CONDUIT SHALL BE SET IN TRENCHES EXCAVATED TO UNDISTURBED SOIL OR IN PREVIOUSLY CONSTRUCTED SUBGRADE.
3. CONDUIT SHALL BE JOINTED TO GIVE A FIRM BUT NOT WATER TIGHT FIT AND CARE SHALL BE TAKEN TO INSURE THE PIPE OR FITTINGS DO NOT BECOME DAMAGED.
4. UNLESS OTHERWISE DIRECTED BY THE ENGINEER THE CONDUIT SHALL BE INSTALLED AT A POSITIVE SLOPE FROM JUNCTION BOXES WITH A MINIMUM SLOPE OF TWO PERCENT (2%).
5. THE TOP OF THE CONDUIT SHALL NOT BE LESS THAN 900MM BELOW FINISHED GRADE.
6. AFTER THE PIPE HAS BEEN PROPERLY LAID AND BACKFILLED, A MANDREL NOT LESS THAN 300MM LONG AND HAVING A DIAMETER OF 6MM LESS THAN THE DIAMETER OF THE CONDUIT SHALL BE PULLED THROUGH EACH RUN TO ENSURE THAT IT IS NOT BLOCKED. A STIFF BRISTLE BRUSH SHALL THEN BE PULLED THROUGH EACH DUCT TO REMOVE ALL SAND AND OTHER FOREIGN MATTER. THE ENDS OF THE CONDUIT SHALL THEN BE CAPPED WITH APPROPRIATE P.V.C. END CAPS.
7. A "FISH LINE" OR WIRE SHALL ALSO BE PLACED IN EACH CONDUIT AS AN AID IN PULLING THE PERMANENT LINES. IF THE PULLING OF PERMANENT WIRES IS NOT PART OF THE CONTRACT, THEN THE CONTRACTOR SHALL INSTALL A MINIMUM TWELVE (12) GAUGE GALVANIZED STEEL WIRE IN THE CONDUIT FOR THE PURPOSE OF PULLING THE PERMANENT WIRES.

POLE BASES, JUNCTION BOXES & CONTROLLER PADS

1. TRAFFIC POLES SHALL BE HOT DIPPED GALVANIZED STEEL HAVING OFFSETS AND MOUNTING HEIGHTS AS SPECIFIED ON THE CONTRACT DRAWINGS.TYPE: AS INDICATED.
2. ANCHOR BOLTS AND TEMPLATES FOR BASES AND CONTROLLER PADS SHALL BE SUPPLIED BY THE POLE OR EQUIPMENT SUPPLIER AND INSTALLED BY HE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSURING THE NCHOR BOLTS ARE INSTALLED AT THE PROPER ORIENTATION TO THE STREET. OF ORIENTATION SHALL BE PERPENDICULAR TO THE CENTRELINE OF THE TREET UNLESS OTHERWISE DIRECTED. ANCHOR BOLTS TO BE TACK WELDED AND SECURELY BRACED TO MAINTAIN PROPER ALIGNMENT DURING POURING OF CONCRETE. EXPOSED THREADS TO BE PROTECTED TO PREVENT CONTACT WITH FRESH CONCRETE.
3. PREFAB PULL BOXES 330 X 600 (13" X 24") AS DETAILED ON THE DRAWING AND AS MANUFACTURED BY QUAZITE OR SYNERTECH ARE ACCEPTABLE. PREFAB PULL BOXES SHALL HAVE THE WORD "TRAFFIC" PRINTED ON ITS COVER. THE PULL BOX SHALL BE HEAVY DUTY AND ABLE TO WITHSTAND A MINIMUM WHEEL LOAD OF 10000 KG.

ELECTRICAL - GENERAL PROVISIONS

1. DO COMPLETE INSTALLATION IN ACCORDANCE WITH CSA C22.1:21 EXCEPT WHERE SPECIFIED OTHERWISE.
2. COMPLY WITH CSA CERTIFICATION STANDARDS AND ELECTRICAL BULLETINS IN FORCE AT TIME OF TENDER SUBMISSION.
3. DO OVERHEAD AND UNDERGROUND SYSTEMS IN ACCORDANCE WITH CAN C22.3:20 NO. 1 EXCEPT WHERE SPECIFIED OTHERWISE.
4. DO UNDERGROUND SYSTEMS IN ACCORDANCE WITH CAN3. C22.3:20 NO. 7.
5. ABBREVIATIONS FOR ELECTRICAL TERMS: TO CSA Z85.
6. PERMITS AND FEES:
   - 6.1. SUBMIT TO ELECTRICAL INSPECTION DEPARTMENT (SERVICE NL) AND SUPPLY AUTHORITY NECESSARY NUMBER OF DRAWINGS AND SPECIFICATIONS FOR EXAMINATION AND APPROVAL PRIOR TO COMMENCEMENT OF WORK. PAY ASSOCIATED FEES. ENGINEER WILL PROVIDE THREE (3) SETS OF DRAWINGS AT NO COST.
   - 6.2. FURNISH CERTIFICATES OF ACCEPTANCE FROM ELECTRICAL INSPECTION DEPARTMENT TO ENGINEER ON COMPLETION OF WORK.
7. OPERATING VOLTAGES: TO CAN3-C235:15. CONTROL AND DISTRIBUTION DEVICES AND EQUIPMENT TO OPERATE SATISFACTORILY AT 60 HZ WITHIN NORMAL OPERATING LIMITS ESTABLISHED BY ABOVE STANDARD. EQUIPMENT TO OPERATE IN EXTREME OPERATING CONDITIONS ESTABLISHED IN ABOVE STANDARD WITHOUT DAMAGE TO EQUIPMENT.
8. INSPECTION:
   - 8.1. FURNISH CERTIFICATES OF ACCEPTANCE FROM AUTHORITIES HAVING JURISDICTION ON COMPLETION OF WORK.
   - 8.2. PAY CHARGES FOR ANY CHANGES REQUIRED BY INSPECTION AUTHORITIES.
9. MATERIALS 7 EQUIPMENT:
   - 9.1. EQUIPMENT AND MATERIAL TO BE CSA CERTIFIED AND MANUFACTURED TO STANDARD QUOTED.
   - 9.2. WHERE THERE IS NO ALTERNATIVE TO SUPPLY EQUIPMENT WHICH IS NOT CSA CERTIFIED, OBTAIN SPECIAL APPROVAL FROM INSPECTION DEPARTMENT.
   - 9.3. FACTORY ASSEMBLE CONTROL PANELS AND COMPONENT ASSEMBLIES.
   - 9.4. TRAFFIC CONTROLLERS TO BE CSA CERTIFIED UNDER SA 1500-11383 TESTS.
10. TESTING, ACCEPTANCE AND GUARANTEE
    - 10.1. THE WORK OF THE CONTRACT SHALL BE TESTED AND INSTALLED AND ANY DEFECTS IN OPERATION SHALL BE REMEDIED IMMEDIATELY. TEST REQUIRED BY LOCAL AUTHORITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, NOT WITHSTANDING ITEM 810.03. WHEN THE WORK IS COMPLETED, IT SHALL BE TESTED IN ITS ENTIRETY AND SHALL BE IN GOOD WORKING ORDER BEFORE THE OWNER'S CERTIFICATE OF ACCEPTANCE SHALL BE ISSUED.
    - 10.2. A WRITTEN GUARANTEE SHALL BE SUPPLIED TO THE AHJ BY THE CONTRACTOR COVERING THE PROMPT MAKING GOOD OF ANY AND ALL DEFECTS IN MATERIAL AND WORKMANSHIP FOR THE PERIOD OF ONE (1) YEAR FROM THE DATE OF ACCEPTANCE AND MAKING GOOD OF ANY SUCH DEFECTS.
11. WIRE IDENTIFICATION:
    - 11.1. IDENTIFY WIRING WITH PERMANENT INDELIBLE IDENTIFYING MARKINGS, EITHER NUMBERED OR COLOURED PLASTIC TAPES ON BOTH ENDS OF PHASE CONDUCTORS OF FEEDERS AND BRANCH CIRCUIT WIRING.
    - 11.2. MAINTAIN PHASED SEQUENCE AND COLOUR CODING THROUGHOUT.
    - 11.3. COLOUR CODE: TO CSA C22.1:21.
    - 11.4. USE COLOUR CODED WIRES IN COMMUNICATION CABLES, MATCHED THROUGHOUT SYSTEM.
12. CONTROLLER WITH TIMING AND CONTROL OPTIONS (MANDATORY)
13. ENCRYPTED WIRELESS RADIO SYSTEM WITH 2.4 GHZ TECHNOLOGY
14. USER SELECTABLE MULTIPLE CHANNELS TO GROUP DIFFERENT BEACONS AND ENSURE A ROBUST WIRELESS SIGNAL
15. INSTANTANEOUS WIRELESS ACTIVATION: <150MS WITH WIRELESS RANGE UP TO 300M. FOR FLASH SYNCHRONIZATION BETWEEN MORE THAN ONE UNIT AT THE SAME LOCATION, EACH SYSTEM IS AVAILABLE WITH AN OPTIONAL ONBOARD RADIO. THE RADIO SYSTEM SHALL OPERATE AT 2.4GHZ. THE SYSTEM SHALL HAVE A MINIMUM OF 14 UNIQUE CHANNELS THAT CAN BE CONFIGURED ON-SITE TO AVOID INADVERTENT ACTIVATION OF NEARBY SYSTEMS. THE ANTENNA SHALL BE A LOW-PROFILE "BUTTON" SHAPE THAT CANNOT BE BENT OR BROKEN BY VANDALS.
16. STAINLESS STEEL (35.5" X 16" X 11.5") POLE MOUNT (REFERENCE: PART NUMBER: CCGMSU; TO BE USED AS POLE MOUNT)
17. CABINET TO BE INSULATED
18. HANDLE, LOCKING MECHANISM AND LOUVERS
19. BATTERIES: ALPHACELL XTV BATTERIES OR BETTER. THE SOLAR ENGINE SHALL HOUSE TWO 7 AMP-HOUR 12-VOLT NOMINAL SEALED VALVE-REGULATED AGM LEAD-ACID MAINTENANCE-FREE BATTERIES. EACH BATTERY SHALL BE EQUIPPED WITH A FAST-ACTING 7A CARTRIDGE FUSE ON THE POSITIVE LEAD. THE BATTERY CHARGING SYSTEM SHALL BE 3-STAGE AND INCORPORATE TEMPERATURE-COMPENSATION TO PREVENT BATTERY OVERCHARGING IN HOT WEATHER. BATTERIES SHALL BE DESIGNED FOR A DEMONSTRABLE SERVICE LIFE OF 5 YEARS. THE OPERATING TEMPERATURE RANGE OF THE BATTERY SHALL BE -40° TO 140°F (-40° TO 60°C).
20. SURGE PROTECTION MANDATORY
21. SOLAR PANEL, MOUNTING OPTION & SOLAR CHARGER: TBD BY MANUFACTURER'S FINAL DESIGN SPECIFICATIONS AND FLASHING BEACON SYSTEM CHOSEN. ALL BATTERIES AND ELECTRONICS SHALL BE MOUNTED IN THE SOLAR ENGINE. THE SOLAR ENGINE SHALL INCLUDE ONE 18V NOMINAL SOLAR PANEL RATED AT 15 WATTS WITH BYPASS DIODE. NOMINAL VOLTAGE OF THE SYSTEM SHALL BE 12V. THE SOLAR PANEL SHALL BE NO LARGER THAN THE FOOTPRINT OF THE SOLAR ENGINE ENCLOSURE. ELECTRICAL CONNECTIONS ON THE BACK OF THE SOLAR PANEL SHALL BE CONTAINED WITHIN AN ENCLOSURE THAT PREVENTS ACCIDENTAL CONTACT WITH EITHER OF THE POWER LEADS. THE SOLAR CHARGING SYSTEM SHALL USE MAXIMUM POWER POINT TRACKING (MPPT).
22. TO BE BUILT TO CSA STANDARD (SPECIAL INSPECTION ACCEPTABLE)
23. TO BE SUPPLIED BY A MANUFACTURER OPERATING UNDER AN ISO9001:2015 QUALITY MANAGEMENT SYSTEM WITH CERTIFICATION IN GOOD STANDING
24. OPTIONAL CONFIGURATION REQUIREMENTS
    - 24.1. THE SYSTEM SHALL PROVIDE CONFIGURABLE NIGHTTIME INTENSITY SETTINGS RANGING FROM 10% TO 100% OF DAYTIME INTENSITY.
    - 24.2. THE SYSTEM SHALL BE CAPABLE OF ENABLING OR DISABLING AMBIENT BRIGHTNESS AUTO-ADJUSTMENT. THIS FEATURE ALLOWS THE SYSTEM TO PROVIDE OPTIMAL OUTPUT BRIGHTNESS IN RELATION TO AMBIENT LIGHT LEVELS. IF ENABLED, THE AMBIENT BRIGHTNESS AUTO-ADJUSTMENT SHALL ADJUST OUTPUT TO A RANGE BETWEEN 50% AND 100% OF DAYTIME INTENSITY.
    - 24.3. THE USER INTERFACE SHALL PROVIDE VIEWING AND/OR PROGRAMMING ACCESS FOR THE FOLLOWING:

- DAYTIME INTENSITY
- FLASH PATTERN
- NIGHT INTENSITY SETTING
- ADJUSTMENT FOR AMBIENT DAYTIME BRIGHTNESS
- SELF-TEST / BIST (BUILT-IN SELF-TEST) INCLUDING THE DETECTION OF SHORTS OR OPEN CIRCUITS IN THE FIXTURE OUTPUTS
- BATTERY STATUS - GENERAL DESCRIPTION AND ACTUAL BATTERY VOLTAGE
- DAY OR NIGHT STATUS, AS DETERMINED BY DEDICATED PHOTOSENSOR NOT SOLAR PANEL OUTPUT
- SOLAR PANEL VOLTAGE
- AUTOMATIC LIGHT CONTROL (ALC). IF THIS SAFETY FEATURE IS ENABLED, IT ALLOWS THE CONTROLLER TO TEMPORARILY REDUCE THE INTENSITY OF THE LED BEACON(S) TO MAINTAIN ENERGY EQUILIBRIUM. THE USER INTERFACE SHALL REPORT THE AMOUNT OF DIMMING BEING APPLIED IN THE RANGE OF 10% TO 100%.
- FIRMWARE VERSION NUMBER

GROUNDING - SECONDARY

1. MATERIALS:
   - 1.1. GROUNDING EQUIPMENT TO CSA c22.2:17 No. 41.
   - 1.2. COPPER GROUNDING CONDUCTORS TO ASA G7.1
2. EQUIPMENT:
   - 2.1. CLAMPS FOR GROUNDING OF CONDUCTOR SHALL BE SUITABLE FOR DIRECT BURY; SIZE FOR CONDUCTOR AND SECURED TO GROUND.
   - 2.2. ROD ELECTRODES, GALVANIZED STEEL 19mm DIAMETER BY 3 METRES LONG.
   - 2.3. SYSTEM AND CIRCUIT, EQUIPMENT, GROUNDING CONDUCTORS, BARE STRANDED COPPER, UNTINNED, SOFT ANNEALED, UNARMOURED, SIZE AS INDICATED.
   - 2.4. INSULATED GROUNDING CONDUCTORS: TYPE TW
3. INSTALL COMPLETE PERMANENT, CONTINUOUS, SYSTEM AND CIRCUIT, EQUIPMENT, GROUNDING SYSTEM INCLUDING ELECTRODES, CONDUCTORS, CONNECTORS, ACCESSORIES AS INDICATED TO CONFORM TO REQUIREMENTS OF ENGINEER AND LOCAL AUTHORITY HAVING JURISDICTION OVER INSTALLATION. WHERE EMT IS USED, RUN GROUNDING WIRE IN CONDUIT.
4. ELECTRODES:
   - 4.1. INSTALL ROD, ELECTRODES AND MAKING GROUNDING CONNECTIONS AS INDICATED.
   - 4.2. BOND SEPARATE, MULTIPLE ELECTRODES TOGETHER.
   - 4.3. USE SIZE 3/0 AWG COPPER CONDUCTORS FOR CONNECTIONS TO ELECTRODES.
5. INSTALL SYSTEM AND CIRCUIT GROUNDING CONNECTIONS TO NEUTRAL OF PRIMARY AND SECONDARY SYSTEMS AS INDICATED.

WIRES & BOX CONNECTORS 0-1000V

1. MATERIALS: FIXTURE TYPE SPLICING CONNECTORS: WITH CURRENT CARRYING PARTS OF COPPER SIZED TO FIT COPPER CONDUCTORS 10 AWG OR LESS. ACCEPTABLE MANUFACTURER: 3M SCOTCHLOK.
2. INSTALLATION: REMOVE INSULATION CAREFULLY FROM ENDS OF CONDUCTORS, TWIST WIRE FIRMLY TOGETHER AND INSTALL SUITABLE SOLDERLESS CONNECTOR. ALL WIRE SPLICES BETWEEN CONTROL LOOPS AND LEAD-IN WIRES SHALL BE SOLDERED AND INSULATED WITH 3M HEAT SHRINK MATERIAL. ALL SPLICES SHALL THEN BE WATERPROOFED WITH RTV SEALANT AND PLACED WITHIN A SECTION OF SUPPORTED PVC PIPE.

INSTALLATION OF CABLES IN TRENCHES AND CONDUITS

1. ENSURE ALL CONDUITS ARE CLEAN BEFORE INSTALLING CABLES.
2. INSTALL CABLES AS INDICATED IN CONDUITS.
3. DO NOT PULL SPLICED CABLES INSIDE CONDUITS.
4. INSTALL MULTIPLE CABLES IN CONDUIT SIMULTANEOUSLY.
5. USE CSA APPROVED LUBRICANTS OF TYPE COMPATIBLE WITH CABLE JACKET TO REDUCE PULLING TENSION.
6. BEFORE PULLING CABLE INTO CONDUITS AND UNTIL CABLES PROPERLY TERMINATED, SEAL ENDS OF CABLES WITH MOISTURE SEAL TAPE.
7. AFTER INSTALLATION OF CABLES, SEAL CONDUITS ENDS WITH CONDUIT SEALING COMPOUND.

WIRES & CABLES 0-1000V

1. TRAFFIC LIGHT CONTROL CABLE
   - 1.1. #14 AWG COPPER CONDUCTOR, WITH POLYETHYLENE INSULATION.
   - 1.2. TWELVE (12) CONDUCTOR CABLE.
   - 1.3. EACH WIRE TO BE COLOUR CODED..
   - 1.4. NON-METALLIC, MOISTURE RESISTANT FILLERS SHALL BE USED AS REQUIRED.
   - 1.5. OVERALL PVC JACKET SUITABLE FOR USE IN UNDERGROUND CONDUIT AND EXTREME TEMPERATURE FLUCTUATIONS.
   - 1.6. MANUFACTURED TO IMSA 19.1.
2. POWER SUPPLY CABLE
   - 2.1. STRANDED AND SIZED AS INDICATED.
   - 2.2. COPPER CONDUCTORS WITH 1000 V INSULATION OF CHEMICALLY CROSS-LINKED THERMOSETTING POLYETHYLENE MATERIAL RATED RW90.
3. INSTALLATION OF TRAFFIC LIGHT CONTROL CABLE
   - 3.1. MAKE CABLE TERMINATIONS BY USING METHODS REQUIRED BY THE EQUIPMENT MANUFACTURER.
   - 3.2. AT CABLE TERMINATIONS, USE THERMOPLASTIC SLEEVING OVER BARE CONDUCTORS.
   - 3.3. SPLICE SHALL ONLY BE AT THE POLE HAND HOLE LOCATIONS.
   - 3.4. WHERE REQUIRED, COLOUR CODE WIRES USING TAPE APPLIED FOR A MINIMUM OF 50MM AT ALL BOXES AND TERMINATIONS. DO NOT PAINT WIRE.

TRAFFIC CONTROL EQUIPMENT

1. THAT THE CONTRACTOR SHALL INSTALL EQUIPMENT, SUPPORTS AND INTERCONNECTIONS TO PROVIDE FULLY OPERATIONAL TRAFFIC CONTROL SYSTEMS.
2. THE WORK SHALL INCLUDE THE SUPPLY, INSTALLATION, MODIFICATION, AND TESTING OF ALL MATERIALS AND SYSTEMS REQUIRED TO PROVIDE TRAFFIC SIGNAL SYSTEMS, TRAFFIC CONTROL DEVICES, AND OTHER DEVICES THAT ARE FULLY FUNCTIONAL AND PERFORM THEIR INTENDED FUNCTION AS SPECIFIED IN THE CONTRACT DOCUMENTS.
3. THAT, THE INSTALLATION MUST BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATION.
4. SIGNAL HEADS - STANDARD THREE (3) SECTION
   - 4.1. ALL STANDARD SIGNAL HEADS TO BE YELLOW POLYCARBONATE, CONSISTING OF THREE (3) 30CM X 30CM SECTIONS, ONE (1) RED LED, ONE (1) AMBER LED, AND ONE (1) GREEN LED, COMPLETE WITH REINFORCING PLATES, WITH THE TERMINAL BLOCK LOCATED IN THE SECOND SECTION
   - 4.2. FROM THE TOP. ACCEPTABLE MANUFACTURERS: ECONOLITE, FORTRAN, EAGLE OR APPROVED EQUAL.
   - 4.3. SIGNAL HEADS SHALL BE INSTALLED FACING THE DIRECTION OF APPROACHING TRAFFIC. LED MODULES OR INCANDESCENT LAMPS OF THE SIZE AND TYPE SPECIFIED IN THE CONTRACT DOCUMENTS SHALL BE INSTALLED. INCANDESCENT LAMPS SHALL BE INSTALLED WITH POSITIVE ELECTRICAL CONTACT IN THE SIGNAL HEAD LAMP HOLDERS. LAMP HOLDERS FOR INCANDESCENT LAMPS SHALL BE TURNED SO THAT THE GAP IN THE LAMP FILAMENT IS FACING UPWARDS.
   - 4.4. SIGNAL HEADS SHALL BE COVERED WITH OPAQUE COVERS AND REMAIN SECURELY IN PLACE UNTIL ALL TESTS HAVE BEEN COMPLETED AND THE SIGNAL HEADS ARE PUT INTO OPERATION.
   - 4.5. SIGNAL HEADS SHALL BE ADJUSTED FOR MAXIMUM VISIBILITY AND FOCUSING PRIOR TO FINAL TIGHTENING OR SEALING OF HARDWARE. UNUSED TOP AND BOTTOM HUBS IN SIGNAL HEADS SHALL BE PLUGGED WITH BIRD STOPS AND THE TOP HUB SHALL HAVE A GASKET.
5. OUTBOARD SIGNALS ARE TO BE INSTALLED ON A SPRING CUSHIONHANGER. INBOARD SIGNALS ARE TO BE INSTALLED ON A BALANCE ADJUSTER AND MID-SPAN HANGER ASSEMBLY.
6. SPRING CUSHION HANGERS - ACCEPTABLE MANUFACTURERS: SENTINEL POLE AND TRAFFIC EQUIPMENT, FORTRAN, ECONOLITE OR APPROVED EQUAL.
7. BALANCE ADJUSTERS - IRON TYPE - ACCEPTABLE MANUFACTURERS: PELCO, EAGLE, OR APPROVED EQUAL.
8. MID-SPAN HANGERS - IRON TYPE WITH SIGNAL CLOSURE KIT AND ADJUSTABLE SET-SCREWS - ACCEPTABLE MANUFACTURERS: PELCO, EAGLE, OR APPROVED EQUAL.
9. POST-TOP ASSEMBLIES - IRON TYPE WITH SIGNAL CLOSURE KIT- ONE-WAY POST TOP AND BRACKET ASSEMBLY FOR SINGLE SIGNAL HEAD INSTALLATIONS AND A TWO-WAY POST TOP AND BRACKET ASSEMBLY FOR DOUBLE SIGNAL HEAD INSTALLATIONS AS SPECIFIED ON CONTRACT DRAWINGS. ACCEPTABLE POST TOP MANUFACTURERS: FORTRAN, PELCO, OR APPROVED EQUAL.
10. MAST ARMS:
    - 10.1. THE ATTACHMENT POINT OF THE MAST ARM ON THE POLE SHALL BE SET TO OBTAIN THE REQUIRED CLEARANCE FROM FINISHED GRADE TO THE BOTTOM OF THE SIGNAL HEAD.
    - 10.2. MAST ARM ATTACHMENT TO STEEL POLES USING U BOLTS OR POLE PLATES SHALL BE TIGHTENED TO A POINT WHEN THE POLE JUST BEGINS TO DEFORM.
    - 10.3. MAST ARMS SHALL BE INSTALLED PERPENDICULAR TO THE THROUGH LANES OF TRAFFIC BEING SERVED.
11. TRAFFIC SIGNAL HEAD SUPPORTS:
    - 11.1. SILICON BASED SEALER SHALL BE APPLIED TO THE ASSEMBLY AS SPECIFIED IN THE CONTRACT DOCUMENTS.
    - 11.2. TRAFFIC SIGNAL HEADS SHALL BE SUPPORTED AS SPECIFIED IN THE CONTRACT DOCUMENTS.
    - 11.3. TRAFFIC SIGNAL HEAD SUPPORTS SHALL BE FASTENED ONTO THE TENON OF THE MAST ARM OR ONTO THE TRAFFIC SIGNAL POLE ITSELF. TRAFFIC SIGNAL HEAD SUPPORTS SHALL BE ADJUSTED AND SECURED.
12. WIRING:
    - 12.1. TRAFFIC SIGNAL CABLE SHALL BE INSTALLED BETWEEN THE SIGNAL HEAD AND THE POLE HANDHOLE OR THE POLE MOUNTED PVC JUNCTION BOX. WIRING SHALL BE RUN THROUGH THE MAST ARMS, SIGNAL HANGERS, AND THE UPPER ARM OF DOUBLE ARM BRACKETS. A MINIMUM LENGTH OF 600 MM OF RISER CABLE SHALL BE LEFT IN POLE HANDHOLES.
    - 12.2. RISER CABLES SHALL BE CONNECTED TO LED MODULES OR INCANDESCENT LAMP HOLDER LEADS VIA TERMINAL BLOCKS OR WITH INSULATED WING NUT VIBRATION PROOF SPRING CONNECTORS. TERMINATION OF SPARE CONDUCTORS AND HANDHOLE OR JUNCTION BOX CONNECTIONS SHALL BE MADE WITH INSULATED SPRING CONNECTORS. ALL INSULATED WIRE CONNECTORS SHALL BE HELD IN PLACE WITH THREE HALF LAPS OF ELECTRICAL VINYL TAPE. UPON COMPLETION OF CONNECTIONS, ALL CONDUCTORS SHALL BE NEATLY BUNDLED TOGETHER AND SECURED WITH FOUR LAPS OF ELECTRICAL VINYL TAPE.
    - 12.3. SIGNAL HEADS SHALL BE BONDED ACCORDING TO OPSS 609 AND THE ONTARIO ELECTRICAL SAFETY CODE USING THE DESIGNATED BONDING CONDUCTOR IN THE CABLE, AND CONNECTED SECURELY TO THE SIGNAL HEAD AND THE POLE GROUND STUD OR THE SYSTEM GROUND WIRE IN PVC JUNCTION BOXES.
    - 12.4. CABLES SHALL BE IDENTIFIED AT ALL ACCESS POINTS AND LABELED AS SPECIFIED IN THE CONTRACT DOCUMENTS. CABLES SHALL BE IDENTIFIED USING TAGS WITH PERMANENT WATERPROOF MARKINGS.
13. POLE MOUNTED CONTROLLER CABINETS:
    - 13.1. POLE MOUNTED CONTROLLER CABINETS SHALL BE INSTALLED COMPLETE WITH MOUNTING BRACKETS, HARDWARE, STAINLESS STEEL STRAPPING, AND POLE MOUNTED CONDUITS AND FITTINGS AND SHALL BE LOCATED AND ORIENTED AS SPECIFIED IN THE CONTRACT DOCUMENTS.
14. SECURITY:
    - 14.1. CONTROLLER CABINETS SHALL BE KEPT LOCKED AT ALL TIMES, EXCEPT WHEN WORK IS BEING PERFORMED ON THE CONTROLLER CABINET EQUIPMENT. UPON COMPLETION OF THE WORK, ALL KEYS TO THE CONTROLLER CABINET SHALL BE GIVEN TO THE CONTRACT ADMINISTRATOR.
15. TRAFFIC SIGNAL CONTROL PROGRAMMING AND TIMING:
    - 15.1. ALL CONTROLLER AND CONFLICT MONITOR PROGRAMMING SHALL BE INSTALLED AND ALL TIMING CONTROLS, SWITCHES, AND PROGRAMMING CONTROLS SHALL BE SET.
    - 15.2. THE CONTRACT ADMINISTRATOR SHALL PROVIDE THE TRAFFIC SIGNAL INTERVAL TIMING TO THE CONTRACTOR. THE CONTRACTOR SHALL INSTALL THE TRAFFIC SIGNAL TIMING INTO THE TRAFFIC SIGNAL CONTROLLER. THE CONTRACTOR SHALL VERIFY THAT THE TRAFFIC SIGNAL TIMING IS CONSISTENT AND COMPLETE PRIOR TO INSTALLING IT.
16. PEDESTRIAN PUSH BUTTONS:
    - 16.1. PEDESTRIAN PUSH BUTTONS SHALL BE INSTALLED AT LOCATIONS SPECIFIED IN THE CONTRACT DOCUMENTS AND INCLUDE THE INSTALLATION OF PEDESTRIAN PUSH BUTTONS AS SPECIFIED IN THE CONTRACT DOCUMENTS.
    - 16.2. PEDESTRIAN PUSH BUTTONS SHALL BE INSTALLED WITH STAINLESS STEEL SELF-TAPPING TORX SCREWS OR STAINLESS STEEL STRAPPINGS. A WIRING APERTURE SHALL BE DRILLED IN METAL POLES AND FITTED WITH A RUBBER GROMMET OR A RIGID CONDUIT SHALL BE INSTALLED ON POLES FOR WIRING ACCESS.

INSTALLATION OF TRAFFIC SIGNAL CONTROLLERS

1. POLE MOUNTED CONTROLLER CABINET:
   - 1.1. CABINETS SHALL BE INSTALLED COMPLETE WITH ALL MOUNTING BRACKETS, HARDWARE STAINLESS STEEL STRAPPING AND POLE MOUNTED CONDUITS AND FITTINGS.
   - 1.2. POLE MOUNTED CONTROLLER CABINETS SHALL BE LOCATED SUCH THAT:
     - 1.2.1. A PERSON OPERATING THE CONTROLS WILL BE FACING THE INTERSECTION.
     - 1.2.2. THE EDGES OF THE CABINET DO NOT PROTRUDE OVER A SIDEWALK OR BEYOND THE POLE IN THE DIRECTION OF THE PAVEMENT.
     - 1.2.3. POLE HANDHOLES AND PEDESTRIAN PUSH-BUTTONS REMAIN UNOBSTRUCTED.
2. POWER CONNECTION - LOW VOLTAGE FEEDER CABLES SHALL BE CONNECTED TO THE CONTROLLER CABINET. THE NEUTRAL SHALL BE CONNECTED TO THE AC-TERMINAL BUS.
3. EQUIPMENT GROUND - STRANDED COPPER GROUND CABLE SHALL BE INSTALLED BETWEEN THE CONTROLLER CABINET GROUND BUS AND THE SERVICE GROUND BUS.
4. WIRING AND CONNECTIONS:
   - 4.1. ALL CONNECTIONS TO TERMINAL BOARDS OR SCREW TYPE EQUIPMENT TERMINALS SHALL BE MADE WITH INSULATED FORK-TONGUE COMPRESSION CONNECTORS ONLY WHEN USING STRANDED CABLE. ALL WIRING TO BULKHEAD CONNECTORS ON EQUIPMENT HOUSINGS SHALL BE MADE WITH MILITARY SPECIFICATION (MS) BAYONET TYPE CONNECTORS ACCORDING TO THE CONTRACT DOCUMENTS OR IN THE MANUFACTURER'S DRAWINGS.
   - 4.2. ALL CONNECTOR JOINTS FOR USE WITH EXTRA-LOW VOLTAGE SYSTEMS SHALL BE SOLDERED, WITH THE JOINT METALS PREHEATED TO THE FLOW TEMPERATURE OF THE SOLDER.
   - 4.3. TRAFFIC SIGNAL CABLES SHALL BE CONNECTED TO THE TERMINAL BOARD ADDRESS AS PER THE MANUFACTURER INSTRUCTIONS. THE CONTROLLER OUTPUT CIRCUIT ASSIGNED SHALL MATCH THE PROPER TRAFFIC SIGNAL CABLE CIRCUIT. THE TRAFFIC SIGNAL CABLE NEUTRAL(S) SHALL BE SECURELY CONNECTED TO THE AC-BUS IN THE CABINET.
   - 4.4. EXTRA-LOW VOLTAGE CABLES AND INTERCONNECTION CABLES SHALL HAVE THE OUTER JACKET REMOVED TO EXPOSE APPROXIMATELY 150 MM OF THE SHIELDING AND/OR DRAIN WIRE. THE SHIELDING OR DRAIN WIRE FOR ALL CABLES SERVING A SIMILAR FUNCTION SHALL BE TWISTED TOGETHER AND SOLDERED WITH A GREEN #10 AWG MINIMUM INSULATED GROUND LEAD SECURELY CONNECTED TO THE CABINET GROUND BUS.
   - 4.5. UPON COMPLETION OF WIRING AND CONNECTIONS, ALL INCOMING CABLES SHALL BE BUNDLED AND HELD IN PLACE WITH NYLON CABLE TIES.
   - 4.6. UNUSED CONDUCTORS SHALL BE TERMINATED WITH INSULATED WING NUT VIBRATION PROOF SPRING CONNECTORS, LEAVING SUFFICIENT CABLE TO REACH TERMINAL BOARDS. INCOMING CABLES SHALL BE IDENTIFIED AS FOLLOWS:
     - 4.6.1. EXTRA-LOW VOLTAGE CABLE SHALL BE IDENTIFIED WITH PVC SLEEVE WIRE MARKERS HAVING THE SAME NUMBER AS THE TRAFFIC PHASE SERVED.
     - 4.6.2. TRAFFIC SIGNAL CABLE SHALL BE IDENTIFIED WITH PVC SLEEVE WIRE MARKERS PLACED OVER THE OUTER MULTI CONDUCTOR CABLE, NAMING THE CORNER OF THE INTERSECTION THAT THE CABLE IS ROUTED TOWARDS SUCH AS "NORTHEAST", "SOUTH-WEST", ETC.
     - 4.6.3. INTERCONNECTION CABLE SHALL BE IDENTIFIED SIMILAR TO TRAFFIC SIGNAL CABLE, NAMING THE DIRECTION THAT THE CABLE IS ROUTED TOWARDS SUCH AS "NORTH", "SOUTH", ETC.
5. CONTROLLER SECURITY - THE CONTROLLER CABINET SHALL BE KEPT LOCKED DURING ALL NON-WORKING TIMES. UPON COMPLETION OF THE WORK, THE CONTROLLER KEYS SHALL BE GIVEN TO THE CONTACT ADMINISTRATOR.
6. TRAFFIC SIGNAL CONTROL PROGRAMMING AND TIMING:
   - 6.1. WHEN DIRECTED BY THE CONTRACT ADMINISTRATOR, THE TRAFFIC SIGNAL OPERATION SHALL BE MANUALLY OVERRIDDEN TO OPERATE IN FIXED/ACTUATED OR MANUAL AS REQUIRED TO REDUCE OR ELIMINATE QUEUING TRAFFIC. THE DATE, START AND END TIME OF EACH MANUAL OVERRIDE OCCURRENCE SHALL BE RECORDED IN A LOG BOOK AS SPECIFIED ELSEWHERE IN THE CONTRACT DOCUMENTS.
   - 6.2. ALL ROUTINE AND EMERGENCY MAINTENANCE WORK REQUIRED FOR 24-HOUR OPERATION OF THE TEMPORARY TRAFFIC SIGNALS SHALL BE PERFORMED AS SPECIFIED IN THE CONTRACT DOCUMENTS.
   - 6.3. TRAFFIC SIGNAL INTERVAL TIMING AS PROVIDED ON THE GENERIC SIGNAL TIMING SHEET SPECIFIED IN THE CONTRACT DOCUMENTS SHALL BE INSTALLED INTO THE TRAFFIC SIGNAL CONTROLLER ONLY AFTER VERIFYING THAT IT IS COMPLETE AND CONSISTENT AND ALL CONTROLLER AND CONFLICT MONITOR PROGRAMMING IS INSTALLED AND ALL TIMING CONTROLS, SWITCHES AND PROGRAMMING CONTROLS ARE SET.
   - 6.4. THE TEMPORARY TRAFFIC SIGNALS SHALL HAVE FULL MANUAL MODE OPERATION FUNCTIONALITY TO ALLOW AN OPERATOR TO INTERRUPT THE OTHER MODES (E.G. FIXED TIME OR ACTUATED) AND RETURN TO THE PREVIOUS MODE WHEN FINISHED.

MATERIAL SPECIFICATION FOR SIGNAL HEADS

1. SIGNAL HEAD REQUIREMENTS - SIGNAL HEADS SHALL BE DESIGNED TO BE ATTACHED TO THE TRAFFIC SIGNAL HANGER ASSEMBLIES USING CUSHION HANGERS, ADJUSTABLE MID-SECTION HANGERS, OR DUAL-END HANGERS WITH STANDARD 38 MM INTERNAL PIPE SIZE GUSSETED PIPE AND FITTINGS. STRUCTURAL DESIGN OF ALUMINUM SHALL BE ACCORDING TO CSA S157.
2. SIGNAL HEAD HOUSINGS:
   - 2.1. SIGNAL HEAD HOUSINGS SHALL BE A DIE-CAST ALUMINUM OR A MOULDED POLYCARBONATE BODY WITH HINGED DOOR ASSEMBLY TO PROVIDE A WATER AND DUST TIGHT ENCLOSURE. THE OPENINGS OF THE SIGNAL HEAD HOUSING SHALL BE PROVIDED WITH A REMOVABLE SEALING DEVICE. ALUMINUM ALLOY SHALL BE ACCORDING TO CSA S157. THE POLYCARBONATE SIGNAL HEAD SHALL BE MOULDED, ULTRAVIOLET AND HEAT STABILIZED, FLAME RETARDANT RESIN, AND SHALL BE YELLOW ACCORDING TO FEDERAL SPECIFICATION COLOUR YELLOW 595B-33538.
   - 2.2. STAINLESS STEEL REINFORCING PLATES SHALL BE PROVIDED ACCORDING TO THE MANUFACTURER'S RECOMMENDATION FOR THE MOUNTING ARRANGEMENT .
3. SNOW SHIELDS - WHEN SPECIFIED IN THE CONTRACT DOCUMENTS, SNOW SHIELDS SHALL BE PROVIDED AND INSTALLED ACCORDING TO THE MANUFACTURER'S RECOMMENDATION. SNOW SHIELDS SHALL BE A ONE-PIECE INJECTION MOLDED UNIT, RESISTANT TO FADING AND DISCOLORATION WITH EXPOSURE TO DIRECT SUNLIGHT, AND CONTAIN NO ELECTRONIC HEATERS OR CIRCUITRY. THE UNIT SHALL BE ENTIRELY TRANSPARENT AND SHALL NOT DEGRADE THE LED PHOTOMETRIC REQUIREMENTS IN ANY WAY.
4. WIRING SHALL BE #18 AWG STRANDED COPPER TYPE TEW AND ACCORDING TO CSA C22.2 NO. 127.
5. GROUND TERMINALS - GROUND LUGS SHALL BE PROVIDED IN SIGNAL HEADS TO ACCOMMODATE A #14 AWG BONDING WIRE.
6. BACKBOARDS:
   - 6.1. AS A MINIMUM, BACKBOARDS SHALL BE FABRICATED FROM 1.00 MM THICK ALUMINUM SHEETS OR 3.00 MM THICK HIGH-DENSITY POLYETHYLENE SHEETS AND SHALL PROJECT A MINIMUM OF 125 MM ALL AROUND BEYOND THE SIGNAL HEAD HOUSING. THE SIGNAL HEAD BACKBOARD SHALL BE STANDARD COLOUR YELLOW ACCORDING TO FEDERAL SPECIFICATION COLOUR YELLOW 595B-33538.
   - 6.2. ALL BACKBOARDS SHALL BE OPAQUE, AND SHALL BE OUTFITTED WITH A STRIP OF 75 MM WIDE FLUORESCENT YELLOW PRISMATIC RETROREFLECTIVE SHEETING ACCORDING TO ASTM D4956, TYPE XI, AROUND THE FRONT FACING BORDER. BRACE TO HOLD POSTS IN PLUMB POSITION AND TRUE TO ALIGNMENT AND ELEVATION UNTIL CONCRETE HAS SET.
7. IENSES - LENSES SHALL BE CONVEX PRISMATIC OF THE POLYCARBONATE OR GLASS TYPE ACCORDING TO CHROMATICITY CHARACTERISTICS SPECIFIED IN ITE ST-017B AND WITH THE SIZE, TYPE, COLOUR, AND ORIENTATION SPECIFIED IN THE CONTRACT DOCUMENTS.
8. THE LED SIGNAL MODULES AT MINIMUM SHALL BE ACCORDING TO ITE ST-052.
9. ALL LED LAMPS SHALL BE APPROVED BY THE ELECTRICAL SAFETY AUTHORITY OR BY AN ORGANIZATION ACCREDITED BY THE STANDARDS COUNCIL OF CANADA.
10. LED LAMP IDENTIFICATION:
    - 10.1. EACH LED LAMP SHALL HAVE THE MANUFACTURER'S NAME, TRADEMARK, MODEL NUMBER, SERIAL NUMBER, AND DATE OF MANUFACTURE (I.E., MONTH-YEAR) MARKED ON THE BACK OF THE MODULE.
    - 10.2. THE FOLLOWING OPERATING CHARACTERISTICS SHALL BE PERMANENTLY MARKED ON THE BACK OF THE MODULE: NOMINAL OPERATING VOLTAGE; POWER CONSUMPTION, IN WATTS; AND VOLT-AMPERES.
    - 10.3. EACH LED LAMP SHALL HAVE A SYMBOL OF THE TYPE OF MODULE (E.G., CIRCLE OR ARROW) IN THE COLOUR OF THE MODULE MARKED ON THE BACK OF THE MODULE. THE COLOUR OF THE MODULE SHALL BE WRITTEN OUT NEXT TO THE SYMBOL.
    - 10.4. WHEN SPECIFIC MOUNTING ORIENTATION IS REQUIRED, EACH MODULE SHALL HAVE PROMINENT AND PERMANENT MARKING CONSISTING OF AN UP ARROW OR THE WORD UP OR TOP.
11. LED LAMP WARRANTY - THE WARRANTY PERIOD FOR EACH LED LAMP SHALL BE 60 MONTHS, COMMENCING FROM THE DATE OF SWITCH ON FOR OPERATION OF THE TRAFFIC SIGNALS IN WHICH THE LED LAMP IS USED. ANY LED LAMP DEEMED TO HAVE A VISUAL OR OPERATIONAL DEFICIENCY SHALL BE REPLACED WITHIN 30 DAYS. THE WARRANTY SHALL COVER ALL DELIVERY, PARTS, AND MATERIAL COSTS.

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REGISTERED PROFESSIONAL ENGINEER — PEG Newfoundland and Labrador — BERNIE ROBSON — SIGNATURE — 2021-11-24 — DATE — NEWFOUNDLAND & LABRADOR

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