

POLES. THIS WORK SHALL BE INCLUDED IN THE UNIT BID PRICE FOR THE FOUNDATIONS.

ITEM 632 PEDESTRIAN SIGNAL HEAD (LED), TYPE D2, COUNTDOWN, AS PER PLAN

IN ADDITION TO THE REQUIREMENTS OF C&MS 632 AND 732 THE FOLLOWING SHALL APPLY:

1. SIGNAL HEADS AND VISORS SHALL BE CONSTRUCTED OF BLACK POLYCARBONATE PLASTIC AND MEET ITE SPECIFICATIONS.
2. PROPER EXTERIOR COLORS SHALL BE OBTAINED BY USE OF COLORED PLASTIC MATERIAL RATHER THAN PAINTING.
3. PIPE, SPACERS AND FITTINGS CONSTRUCTED OF POLYCARBONATE PLASTIC MAY BE USED IN LIEU OF GALVANIZED STEEL OR ALUMINUM.
4. THE PEDESTRIAN SIGNAL HEAD SHALL BE OF THE LED COUNTDOWN TYPE.
5. NEW ATTACHMENT HARDWARE AND FITTINGS SHALL BE USED
6. THE LIGHT EMITTING DIODE (LED) MODULES SHALL MEET THE REQUIREMENTS OF C&MS 732.04-C.

THE CONTRACTOR SHALL PROVIDE THE PROJECT MANAGER, IN WRITING, WITH THE LED MANUFACTURER NAME, SERIAL NUMBER, PART NUMBER, DESCRIPTION OF LAMP, AND DATE OF MANUFACTURE FOR ALL LED UNITS THAT ARE TO BE USED IN THE SIGNAL HEAD PRIOR TO INSTALLATION, FOR ACCEPTANCE AND WARRANTY PURPOSES.

PAYMENT FOR ITEM 632 PEDESTRIAN SIGNAL HEAD (LED), COUNTDOWN, TYPE D2, AS PER PLAN SHALL BE MADE FOR THE NUMBER OF COMPLETE SIGNAL HEAD FURNISHED AND INSTALLED, INCLUDING ALL LABOR, EQUIPMENT, MATERIALS AND NEW ATTACHMENT HARDWARE.

ITEM 632 VEHICULAR SIGNAL HEAD, (LED), (BY SECTION), 12" LENS, 1-WAY, POLYCARBONATE, AS PER PLAN, BLACK, WITH BACKPLATE

IN ADDITION TO THE REQUIREMENTS OF C&MS 632 AND 732, THE FOLLOWING REQUIREMENTS SHALL APPLY:

1. ALL SIGNAL HEADS SHALL BE RIGIDLY MOUNTED TO THE MAST ARM WITH THE YELLOW LENS LOCATED IN FRONT OF THE MAST ARM.
2. SIGNAL HEADS SHALL INCLUDE TUNNEL TYPE VISORS OPEN AT THE BOTTOMS UNLESS OTHERWISE SPECIFIED IN THE PLANS.

PAYMENT FOR ITEM 632 VEHICULAR SIGNAL HEAD, (LED), (BY SECTION), 12" LENS, 1-WAY, POLYCARBONATE, AS PER PLAN, BLACK, WITH BACKPLATE SHALL BE MADE FOR COMPLETE SIGNAL HEAD FURNISHED AND INSTALLED, INCLUDING ALL LABOR, EQUIPMENT, MATERIALS, AND NEW ATTACHMENT HARDWARE.

ITEM 632 POWER SERVICE, AS PER PLAN

THIS ITEM SHALL MEET THE REQUIREMENTS OF ODOT 632.24 WITH THE FOLLOWING ADDITIONS:

POWER REQUIREMENTS ARE 120 VOLT AC, SINGLE PHASE, 30 AMP. THE POWER SERVICE SHALL BE INSTALLED IN ACCORDANCE WITH ODOT STANDARD CONSTRUCTION DRAWING TC-83.10. WHERE APPLICABLE, THE CONTRACTOR SHALL PROVIDE A GALVANIZED CONDUIT FROM THE DISCONNECT SWITCH ENCLOSURE TO THE POLE VIA AN EMBEDDED, 1 INCH CONDUIT ELL WITH ALL NECESSARY FITTINGS. A 200 AMP COMMERCIAL METER SOCKET EQUIPPED WITH A BYPASS SWITCH MUST BE FURNISHED. AN ODOT KEYED PADLOCK IN ACCORDANCE WITH CMS 631.08 IS TO BE PROVIDED FOR THE DISCONNECT SWITCH ENCLOSURE. ALL CONNECTIONS TO THE ELECTRIC POWER LINES WILL BE MADE BY POWER COMPANY CREWS. ALL POWER SERVICES ARE TO BE UNDERGROUND FROM THE POWER SERVICE POLE TO THE CONTROLLER.

PAYMENT WILL BE MADE AT THE CONTRACT UNIT PRICE BID PER EACH OF ITEM 632 POWER SERVICE, AS PER PLAN.

ITEM 633 CABINET, TYPE TS-2, AS PER PLAN

THE CABINET SHALL BE FURNISHED AND INSTALLED ACCORDING TO CMS 633 AND 733 AND BE LISTED ON THE TRAFFIC AUTHORIZED PRODUCTS LIST (TAP). CABINETS SHALL BE

UNPAINTED NON-ANODIZED ALUMINUM WITH NOMINAL DIMENSIONS OF 36"Wx18"Dx51"H. THE GROUND-MOUNTED CABINET SHALL BE A NEMA TS-2 CABINET AND SHALL HAVE A MINIMUM OF THREE SHELVES.

CABINETS SHALL BE EQUIPPED WITH A TS2 TYPE 1 12-POSITION LOAD BAY, A PLUG IN TYPE REPLACEABLE LIGHTNING ARRESTOR AND A METAL FILTER THAT IS REMOVABLE AND WASHABLE.

CABINETS SHALL BE EQUIPPED WITH A 16 CHANNEL DETECTOR RACK AND THE NUMBER OF 4-CHANNEL DETECTOR AMPLIFIERS REQUIRED BY THE INTERSECTION PRINT.

CABINETS SHALL BE EQUIPPED WITH AN MSTP COMPLIANT INDUSTRIAL DIN RAIL MOUNTED 9 PORT FULL GIGABIT MANAGED ETHERNET SWITCH WITH 4 COMBINATION SFP/RJ45 GIGABIT PORTS AND 5 RJ45 GIGABIT PORTS. THE SWITCH SHALL INCLUDE A DIN RAIL MOUNTED REDUNDANT 24 VOLT DC POWER SUPPLY.

CABINETS SHALL BE EQUIPPED WITH A WALL MOUNTABLE SINGLE PANEL FIBER OPTIC HOUSING WITH NOMINAL DIMENSIONS OF 6.25"x5.3"x1.5". THE HOUSING SHALL BE EQUIPPED WITH A 12 SINGLEMODE FIBER ST PANEL.

THE CABINET SHALL HAVE A 110V OUTLET FOR THE FIBER OPTIC SWITCH.

THE CABINET SHALL INCLUDE A DEDICATED SINGLE POLE, 20 AMP CIRCUIT BREAKER TO SUPPLY 120VAC TO THE LUMINAIRES.

THE CABINET AND CONTROLLER SHALL BE WIRED/PROGRAMMED TO ACCOMMODATE A FLASHING YELLOW ARROW OPERATION IN THE FUTURE.

MALFUNCTION MANAGEMENT UNITS SHALL BE FROM THE TRAFFIC AUTHORIZED PRODUCT (TAP) LIST AND SHALL BE EQUIPPED WITH AN ETHERNET PORT AND AN ALPHANUMERIC DISPLAY.

CONTROLLER UNITS, CABINETS AND ALL COMPONENTS REQUIRED FOR A FULLY FUNCTIONAL CABINET.

PAYMENT FOR ITEM 633 CABINET, TYPE TS-2, AS PER PLAN WILL BE AT THE CONTRACT BID PRICE PER EACH.

ITEM 809 ATC V6.24 CONTROLLER, AS PER PLAN

THE CONTROLLER UNIT SHALL BE FURNISHED AND INSTALLED PER SS 809 AND BE LISTED ON THE TRAFFIC AUTHORIZED PRODUCTS (TAP) LIST.

THE CONTROLLER SHALL BE AN ECONOLITE COBALT ATC MODEL MEETING THE REQUIREMENTS OF NEMA TS2 AND PROVIDING UPWARD AND DOWNWARD COMPATIBILITY BETWEEN TS1 AND TS2 CABINETS.

ITEM 633 UNINTERRUPTIBLE POWER SUPPLY (UPS), AS PER PLAN

FURNISH AND INSTALL A 1100 WATT BATTERY BACKUP UPS SYSTEM TO PROVIDE UNINTERRUPTIBLE, RELIABLE EMERGENCY POWER TO A TRAFFIC SIGNAL INTERSECTION IN THE EVENT OF A POWER FAILURE OR INTERRUPTION. THE TRANSFER FROM UTILITY POWER TO BATTERY POWER SHALL NOT INTERFERE WITH THE NORMAL OPERATION OF THE TRAFFIC CONTROLLER, MALFUNCTION MANAGEMENT UNIT OR ANY OTHER PERIPHERAL DEVICES WITHIN THE TRAFFIC CONTROLLER CABINET. THE SYSTEM SHALL BE SELF CONTAINED INCLUDING ALL UPS HARDWARE, THE REQUIRED NUMBER OF BATTERIES AND ITS OWN SEPARATE VENTILATED CABINET.

THE CABINET SHALL BE DESIGNED TO MOUNT ON THE SIDE OF AN EXISTING OR PROPOSED CONTROLLER CABINET AND SHALL HAVE NOMINAL DIMENSIONS OF 48"Hx17"Wx17"D. THE UPS CABINET SHALL BE BOLTED TO THE CONTROLLER CABINET WITH THE DOOR 90 DEGREES TO THE CONTROLLER CABINET DOOR AND IN CONTACT WITH THE CONTROLLER CABINET TO ALLOW CAULKING THE TWO CABINETS TOGETHER.

THE UPS CABINET SHALL BE BOLTED TO THE CONTROLLER CABINET WITH A MINIMUM OF FOUR 1/4"-20 BOLTS. THE BOLTS AND HARDWARE SHALL BE ZINC COATED TO MINIMIZE CORROSION. THERE SHALL BE ONE 1-1/2" CLOSE NIPPLE FOR THE HIGH VOLTAGE WIRING BETWEEN THE CONTROLLER CABINET AND THE UPS CABINET AND ONE 1" CLOSE NIPPLE BETWEEN THE CONTROLLER CABINET AND UPS CABINET FOR COMMUNICATION WIRING.

THE UPS SHALL BE EQUIPPED WITH A TEMPERATURE COMPENSATED CHARGER, BATTERY HEATER MATS, AN ETHERNET ENABLED REMOTE BATTERY MONITORING SYSTEM AND A BATTERY

BALANCER. THE UPS SHALL BE EQUIPPED WITH FOUR 112Ah ABSORBED GLASS MAT BATTERIES. THE BATTERIES SHALL PROVIDE 100% OF THEIR RATED CAPACITY OUT OF THE BOX AND SHALL BE LESS THAN SIX MONTHS FROM THE DATE OF MANUFACTURE UPON INSTALLATION. THE UPS SHALL INCLUDE A GENERATOR PLUG AND A MANUAL TRANSFER SWITCH. THE INVERTER SHALL INCLUDE AN INTERNAL ETHERNET SNMP COMMUNICATION INTERFACE MODULE. THE UPS SHALL BE EQUIPPED WITH AN OHIO DEPARTMENT OF TRANSPORTATION STANDARD CONFIRMATION LIGHT AND PIGTAIL AND A MANUAL ROTARY GENERATOR TRANSFER SWITCH.

ALL LABOR, MATERIAL, EQUIPMENT, TOOLS AND HARDWARE NECESSARY TO INSTALL THE UNINTERRUPTIBLE POWER SUPPLY SHALL BE INCLUDED IN THE UNIT PRICE BID FOR ITEM 633 UNINTERRUPTIBLE POWER SUPPLY (UPS), AS PER PLAN.

ITEM 809 ADVANCE RADAR DETECTION, AS PER PLAN

THIS ITEM OF WORK SHALL CONSIST OF FURNISHING AND INSTALLING AN ADVANCE RADAR DETECTION UNIT. THE DETECTION UNIT SHALL INCLUDE THE FOLLOWING:

1. POWER SHALL BE PROVIDED FROM THE TRAFFIC CABINET.
2. ALL REQUIRED INPUTS CARDS SHALL BE INCLUDED IN THE TRAFFIC CABINET AND SHALL BE COMPATIBLE WITH CALTRANS, NEMA TS1 AND NEMA TS2 DETECTOR RACKS. THE CARDS SHALL PROVIDE TRUE PRESENCE DETECTOR CALLS OR CONTACT CLOSURE TO THE TRAFFIC CONTROLLER.
3. THE UNIT SHALL BE MOUNTED DIRECTLY TO A POLE OR MAST ARM, AS RECOMMENDED BY THE MANUFACTURER. CABLE(S) SHALL BE PROVIDED AS REQUIRED AND RECOMMENDED BY THE MANUFACTURER.
4. SURGE PROTECTION DEVICES, AS RECOMMENDED BY THE MANUFACTURER SHALL BE INCLUDED BOTH AT THE POLE WHERE THE UNIT IS LOCATED TO PROTECT THE UNIT AND IN THE TRAFFIC CABINET TO PROTECT THE CABINET ELECTRONICS.
5. THE MANUFACTURER'S REPRESENTATIVE SHALL BE ON SITE DURING INSTALLATION AND TESTING AND SHALL PROVIDE ON-SITE TRAINING ON THE SETUP, OPERATION AND MAINTENANCE OF THE UNIT.
6. THE POWER SUPPLY AND COMMUNICATION MODULES SHALL BE SECURED TO A SINGLE PANEL THAT CAN BE MOUNTED INTERIOR TO THE TRAFFIC CABINET. THE PANEL SHALL INCLUDE MODULAR-PLUG STYLE CONNECTIONS FOR UP TO FOUR (4) SENSOR CABLES. ADDITIONAL SENSORS MAY BE HARD-WIRED TO THE COMMUNICATION MODULES, AS NECESSARY.

PAYMENT FOR ITEM 809 ADVANCE RADAR DETECTION, AS PER PLAN SHALL BE MADE AT THE CONTRACT UNIT PRICE FOR EACH UNIT, COMPLETE AND IN PLACE INCLUDING ALL REQUIRED CABINET HARDWARE, MOUNTING BRACKETS, CABLES, CONDUIT, CONNECTIONS TESTED AND ACCEPTED, AND ANY OTHER NECESSARY HARDWARE TO ESTABLISH A FULLY FUNCTIONAL DETECTION SYSTEM.

ITEM 809 STOP-LINE RADAR DETECTION, AS PER PLAN

THIS ITEM OF WORK SHALL CONSIST OF FURNISHING AND INSTALLING A STOP-LINE RADAR DETECTION UNIT. THE DETECTION UNIT SHALL INCLUDE THE FOLLOWING:

1. POWER SHALL BE PROVIDED FROM THE TRAFFIC CABINET.
2. ALL REQUIRED INPUTS CARDS SHALL BE INCLUDED IN THE TRAFFIC CABINET AND SHALL BE COMPATIBLE WITH CALTRANS, NEMA TS1 AND NEMA TS2 DETECTOR RACKS. THE CARDS SHALL PROVIDE TRUE PRESENCE DETECTOR CALLS OR CONTACT CLOSURE TO THE TRAFFIC CONTROLLER.
3. THE UNIT SHALL BE MOUNTED DIRECTLY TO A POLE OR MAST ARM, AS RECOMMENDED BY THE MANUFACTURER. CABLE(S) SHALL BE PROVIDED AS REQUIRED AND RECOMMENDED BY THE MANUFACTURER.
4. SURGE PROTECTION DEVICES, AS RECOMMENDED BY THE MANUFACTURER SHALL BE INCLUDED BOTH AT THE POLE WHERE THE UNIT IS LOCATED TO PROTECT THE UNIT AND IN THE TRAFFIC CABINET TO PROTECT THE CABINET ELECTRONICS.
5. THE MANUFACTURER'S REPRESENTATIVE SHALL BE ON SITE DURING INSTALLATION AND TESTING AND SHALL PROVIDE ONSITE TRAINING ON THE SETUP, OPERATION AND MAINTENANCE OF THE UNIT.
6. A SERIAL TO ETHERNET COMMUNICATIONS MODULE AND ETHERNET CABLE (MINIMUM 7 FEET).

7. THE POWER SUPPLY AND COMMUNICATION MODULES SHALL BE SECURED TO A SINGLE PANEL THAT CAN BE MOUNTED INTERIOR TO THE TRAFFIC CABINET. THE PANEL SHALL INCLUDE MODULAR-PLUG STYLE CONNECTIONS FOR UP TO FOUR (4) SENSOR CABLES. ADDITIONAL SENSORS MAY BE HARD-WIRED TO THE COMMUNICATION MODULES, AS NECESSARY.

PAYMENT FOR ITEM 809 STOP-LINE RADAR DETECTION, AS PER PLAN SHALL BE MADE AT THE CONTRACT UNIT PRICE FOR EACH UNIT, COMPLETE AND IN PLACE INCLUDING ALL REQUIRED CABINET HARDWARE, MOUNTING BRACKETS, CABLES, CONDUIT AND CONNECTIONS TESTED AND ACCEPTED.

GUARANTEE

THE CONTRACTOR SHALL GUARANTEE THAT THE TRAFFIC CONTROL SYSTEM INSTALLED AS PART OF THIS CONTRACT SHALL OPERATE SATISFACTORILY FOR A PERIOD OF 120 DAYS FOLLOWING COMPLETION OF THE 10-DAY PERFORMANCE TEST. IN THE EVENT OF UNSATISFACTORY OPERATION THE CONTRACTOR SHALL CORRECT FAULTY INSTALLATIONS, MAKE REPAIRS AND REPLACE DEFECTIVE PARTS WITH NEW PARTS OF EQUAL OR BETTER QUALITY. EQUIPMENT, MATERIAL, AND LABOR COSTS INCURRED IN CORRECTING AN UNSATISFACTORY OPERATION DUE TO POOR WORKMANSHIP OR DEFECTIVE EQUIPMENT SHALL BE BORNE BY THE CONTRACTOR. CUSTOMARY MANUFACTURER'S GUARANTEES FOR ALL ITEMS SHALL BE TURNED OVER TO THE ENGINEER FOLLOWING ACCEPTANCE OF THE EQUIPMENT.

THE COST OF GUARANTEEING SATISFACTORY OPERATION OF THE TRAFFIC CONTROL SYSTEM WILL BE INCIDENTAL TO THE PROJECT AND INCLUDED IN THE UNIT COST OF EACH ITEM.

GROUNDING AND BONDING

THE REQUIREMENTS OF THE CONSTRUCTION AND MATERIAL SPECIFICATIONS (CMS) AND THE TC SERIES OF STANDARD CONSTRUCTION DRAWINGS ARE MODIFIED AS FOLLOWS:

1. ALL METALLIC PARTS CONTAINING ELECTRICAL CONDUCTORS SHALL BE PERMANENTLY JOINED TO FORM AN EFFECTIVE GROUND FAULT CURRENT PATH BACK TO THE GROUNDED CONDUCTOR IN THE POWER SERVICE DISCONNECT SWITCH.
 - A. PROVIDE AN EQUIPMENT GROUNDING CONDUCTOR IN METALLIC CONDUITS (725.04) IN ADDITION TO THE CONDUCTORS SPECIFIED AND BOND THE CONDUIT TO THIS GROUNDING CONDUCTOR.
 - B. WHEN AN EQUIPMENT GROUNDING CONDUCTOR IS REQUIRED IN PLASTIC CONDUIT (725.05), THE INSTALLATION SHALL INCLUDE A SEPARATE EQUIPMENT GROUNDING CONDUCTOR IN ADDITION TO THE CONDUCTORS SPECIFIED.
 - C. METALLIC CONDUIT CARRYING THE LOOP WIRES FROM IN THE PAVEMENT TO THE PULL BOX SPLICE LOCATION WILL ONLY BE BONDED AT THE PULL BOX END, AND WILL NOT CONTAIN AN EQUIPMENT GROUNDING CONDUCTOR.
 - D. IF MULTIPLE CONDUIT RUNS BEGIN AND END AT THE SAME POINTS, ONLY ONE EQUIPMENT GROUNDING CONDUCTOR IS REQUIRED.
 - E. IF AN EQUIPMENT GROUNDING CONDUCTOR IS NEEDED IN CONDUIT BETWEEN SIGNALIZED INTERSECTIONS FOR UNDERGROUND INTERCONNECT CABLE, THE GROUNDING SYSTEM FOR EACH SIGNALIZED INTERSECTION WILL BE SEPARATED ABOUT MIDWAY BETWEEN THE INTERSECTIONS.
 - F. THE MESSENGER WIRE AT SIGNALIZED INTERSECTIONS WILL BE USED AS THE CONDUCTIVE PATH FROM CORNER TO CORNER IF CONDUIT IS NOT PROVIDED UNDER THE ROADWAY. WHEN CONDUIT CONNECTS THE CORNERS OF AN INTERSECTION, AN EQUIPMENT GROUNDING CONDUCTOR SHALL BE USED IN THE EQUIPMENT.
2. CONDUITS.
 - A. THE 725.04 CONDUIT SHALL HAVE GROUNDING BUSHINGS INSTALLED AT ALL TERMINATION POINTS. THE BUSHING MATERIAL SHALL BE COMPATIBLE WITH GALVANIZED STEEL CONDUIT AND THE GROUNDING LUG MATERIAL SHALL BE COMPATIBLE FOR USE WITH COPPER WIRE. THREADED OR COMPRESSION TYPE BUSHINGS MAY BE USED.
 - B. THE 725.05 CONDUIT SHALL HAVE THE INSIDE AND OUTSIDE DIAMETERS OF THE CONDUIT DEBURRED AT ALL TERMINATION POINTS.
 - C. BOTH ENDS OF METALLIC CONDUIT SHALL BE BONDED TO THE EQUIPMENT GROUNDING CONDUCTOR.
 - D. METALLIC CONDUIT MAY BE BONDED TO METALLIC BOXES

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