3-0 UPS PANEL MINIMUM FEATURES

3.1 GENERATOR TRANSFER SWITCH WITH UPS BYPASS AND 30 AMP EXTERNAL REVERSE PLUG.
3.2 UPS BYPASS AND UPS ISOLATION SWITCH.
3.3 DEADFRONT SAFETY PANEL BOARD WITH ALL SWITCHES, INDICATING FUSES, PLUGS, AND ISOLATION FUSES FOR EACH BATTERY PER-WIRED WITH PHENOLIC NAMEPLATES.
3.4 ALL NAME PLATES SHALL BE SCREWED ON PHENOLIC ENGRAVED TYPE.
3.5 ALL WIRE TERMINATING LUGS SHALL BE FULL WRAP AROUND TYPE.
3.6 ALL BATTERIES SHALL BE CAPTIVE SPACED FROM EXTERNAL CABINET SIDES IN EARTHQUAKE PROOF BUCKETS.
3.7 CABINET VENTILATION SHALL BE BY TWO (2) 4" X 1/4" LOUVERS TOP AND BOTTOM WITH ENCAPSULATED BUG SCREENS, CLEANABLE FILTERS, AND A 100CFM FAN TO COMPLETELY EXCHANGE AIR A MINIMUM OF 25 TIMES PER MINUTE.
3.8 ALL DC TERMINALS AND CONNECTIONS SHALL INCORPORATE SAFETY COVERS SUCH THAT THE SAFETY COVERS ARE IN PLACE FOR EVERY NORMAL MAINTENANCE MODE.
3.9 EVENT COUNTERS AND TOTAL RUN TIME COUNTERS.

4-0 UPS UNIT MINIMUM FEATURES

4.1 1400 VA SHALL PROVIDE A TRUE SINE-WAVE OUTPUT WITH A MINIMUM RATING FOR WATTAGE OUTPUT OF 950 WATTS. UPS WILL FEATURE QUICK MAKE/BREAK CONNECTORS AND PLUGS (SYSTEMS REQUIRING HARD WIRING TERMINATION TO/FROM THE INVERTER ARE UNACCEPTABLE).
4.2 UPS MUST PROVIDE FOR UTILITY SERVICE ISOLATION WHEN IN OPERATION.
4.3 SURGE ENERGY WITHSTAND 480 JOULES, 6.5KA.
4.4 COMMON MODE CLAMPING 0 NS < 5 NS, TYPICAL UL 1449.
4.5 CONDITIONED POWER - COMPUTER QUALITY.
4.6 TRANSIENT LIGHTING PROTECTION = 160 JOULES.
4.7 TRANSFER TO BATTERY TIME = 2 MS AND RETRANSFER TO UTILITY = 2 MS.
4.8 EACH BATTERY SHALL BE 24 VOLTS 18 AH WITH HEAVY DUTY ANDERSON PLUGS AND ISOLATED FUSED (DEAD FRONT PANEL MOUNTED 30 AMP) CONNECTIONS TO THE UPS FOR GREATER SYSTEM RELIABILITY AND EASE OF MAINTENANCE. SERIES WIRING IS UNACCEPTABLE.
4.9 FAN COOLING SHALL BE FUSED FOR LOCKED ROTOR CURRENT.
4.10 COOLING AIR SHALL BE DUCTED TO COOL THE FRONT AND BACK OF EACH BATTERY WITH AIR SPACE ON ALL FOUR SIDES AND TOP OF EACH BATTERY.
4.11 UPS COVERS SHALL BE 60% OPEN ON BOTH SIDES TO DIMINISH THE ENVIRONMENTAL EFFECTS OF EXTREME TEMPERATURE.
4.12 INCLUDES RS-232, USB, AND DB9 COMPUTER INTERFACE PORTS.
4.13 LOW VOLTAGE SAFETY DESIGN OF 24V DC (HIGHER VOLTAGE DC SYSTEMS ARE UNACCEPTABLE).
4.14 TYPICAL BATTERY RECHARGE TIME: FROM FULL DISCHARGE TO 95% CAPACITY WITHIN 6 HOURS.
4.15 WARRANTY: TWO (2) YEARS ON ALL BATTERY BACKUP SYSTEM COMPONENTS.

5-0 BATTERY SYSTEM

5.1 BATTERIES SHALL BE MAINTENANCE-FREE AND SEALED 24V TYPE, ABSORBED GLASS MAT/VALVE REGULATED LEAD ACID (AGM/VRLA) AND CERTIFIED TO OPERATE IN TEMPERATURE RANGE OF -13 TO + 165.2 DEGREES F.
5.2 NUMBER OF BATTERIES AND AMP-HOUR RATING SHALL BE SUFFICIENT TO OPERATE THE BATTERY BACKUP SYSTEM IN FULL TIME SIGNAL OPERATION AT 950 WATTS FOR A MINIMUM OF 6 HOURS.
5.3 BATTERIES SHALL BE PROVIDED WITH APPROPRIATE INTERCONNECT WIRING AND CORROSION-RESISTANT MOUNTING TRAYS AND BRACKETS FOR THE CABINET INTO WHICH THEY WILL BE INSTALLED.
5.4 BATTERY CHARGING SYSTEM SHALL BE REGULATED AND TEMPERATURE COMPENSATED. BATTERY
5.5 ALL INVERTER CONNECTIONS SHALL BE MADE WITHOUT THE USE OF TOOLS INCLUDING A/C INPUT, A/C OUTPUT, NORMALLY-OPEN, AND NORMALLY-CLOSED PROGRAMMABLE CONTACTS.
5.6 BATTERIES SHALL BE FURNISHED WITH HEAVY DUTY 50 AMP RATED SILVER-PLATED ANDERSON CONNECTORS AND A 100 AMP INTERNAL FUSE.
5.7 BATTERIES SHALL BE WARRANTED FOR FULL REPLACEMENT FOR TWO (2) FULL YEARS.
5.8 SYSTEM SHALL HAVE A HOT-SWAPPABLE BATTERY REPLACEMENT SYSTEM.
5.9 BATTERY REPLACEMENT WARNING SYSTEM AUTOMATICALLY PERFORMS A SELF-TEST EVERY TWO WEEKS.

6-0 BATTERY CABINET

6.1 BATTERY CABINET SHALL NOT EXCEED 46.0 INCHES H X 20.0 INCHES W X 11.0 INCHES D AND SHALL HOUSE ALL UNITS ASSOCIATED WITH BATTERY BACK-UP.
6.2 BATTERY CABINET SHALL BE COMPLETELY ENCLOSED NEMA CABINET WITH FOUR SIDES, WELDED SEAMS, DETACHED FOR NEW INSTALLATIONS OR MOUNTABLE TO SIDE OF CONTROLLER CABINET FOR RETROFIT INSTALLATIONS, 0.125-INCH THICK ALUMINUM TYPE 5052-H32, NATURAL ALUMINUM FINISH (UNLESS SPECIFIED OTHERWISE ON THE PLANS), AND STURDY ALUMINUM SHELVES.
6.3 ALL COVERS OR DOORS SHALL BE LOCKABLE. GENERATOR SET OPTION SHALL INCLUDE RECEPTACLE AND MANUAL TRANSFER SWITCH WITH PROPER CIRCUIT BREAKERS.
6.4 SHALL BE EQUIPPED WITH A LOCK KEYED WITH A #2 SIGNAL CABINET KEY. CABINET SHALL INCORPORATE A FULL-LENGTH PIANO HINGE, PAD-LOCKABLE DRAW LATCH, AND PAD-LOCKABLE WELDED IN PLACE VANDAL-PROOF TABS RATED AT 2,000 POUNDS.
6.5 AUTOMATIC TRANSFER SWITCH AND GENERATOR 30 AMP EXTERNAL REVERSE SERVICE PLUG.
6.6 HEATER WITH THERMOSTAT.
6.7 EXTERNAL INDICATING LIGHT.

(12) THIS PROJECT INVOLVES THE INSTALLATION OF A VIDEO VEHICLE DETECTION SYSTEM AT ONE INTERSECTION, THEREFORE THE CONTRACTOR SHALL FURNISH AND INSTALL AN ECONOLITE AUTOSCOPE VISION SYSTEM OR APPROVED EQUAL. ALL NECESSARY CABLES, HARNESSES, MATERIALS AND FITTINGS NECESSARY TO PROVIDE A COMPLETE AND OPERATING SYSTEM AT THE INTERSECTION. THE CAMERAS TO BE SUPPLIED ON THIS PROJECT SHALL BE SUPPLIED WITH EASYLOCK CONNECTORS.

1. VIDEO DETECTION - GENERAL
THIS SPECIFICATION SETS FORTH THE MINIMUM REQUIREMENTS FOR A SYSTEM THAT MONITORS VEHICLES ON A ROADWAY VIA PROCESSING OF VIDEO IMAGES. THE DETECTION OF VEHICLES PASSING THROUGH THE FIELD-OF-VIEW OF AN IMAGE SENSOR SHALL BE MADE AVAILABLE TO A LARGE VARIETY OF END USER APPLICATIONS AS SIMPLE CONTACT CLOSURE OUTPUTS THAT REFLECT THE CURRENT REAL-TIME DETECTOR OR ALARM STATES (ON/OFF) OR AS SUMMARY TRAFFIC STATISTICS THAT ARE REPORTED LOCALLY OR REMOTELY. THE CONTACT CLOSURE OUTPUTS SHALL BE PROVIDED TO A TRAFFIC SIGNAL CONTROLLER AND COMPLY WITH THE NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA) TYPE C OR D DETECTOR RACK OR 170 INPUT FILE RACK STANDARDS.

THE SYSTEM ARCHITECTURE SHALL FULLY SUPPORT ETHERNET NETWORKING OF SYSTEM COMPONENTS THROUGH A VARIETY OF INDUSTRY STANDARD AND COMMERCIALLY AVAILABLE INFRASTRUCTURES THAT ARE USED IN THE TRAFFIC INDUSTRY. THE DATA COMMUNICATIONS SHALL SUPPORT DIRECT CONNECT, (MODEM,) AND MULTI-DROP INTERCONNECTS. SIMPLE, STANDARD ETHERNET WIRING SHALL BE SUPPORTED TO MINIMIZE OVERALL SYSTEM COST AND IMPROVE RELIABILITY, UTILIZING EXISTING INFRASTRUCTURE AND EASE OF SYSTEM INSTALLATION AND MAINTENANCE. BOTH STREAMING VIDEO AND DATA COMMUNICATIONS SHALL OPTIONALLY BE INTERCONNECTED OVER LONG DISTANCES THROUGH FIBER OPTIC, MICROWAVE, OR OTHER COMMONLY USED DIGITAL COMMUNICATIONS TRANSPORT CONFIGURATIONS.

ON THE SOFTWARE APPLICATION SIDE OF THE NETWORK, THE SYSTEM SHALL BE INTEGRATED THROUGH A CLIENT-SERVER RELATIONSHIP. A COMMUNICATIONS SERVER APPLICATION SHALL PROVIDE THE DATA COMMUNICATIONS INTERFACE BETWEEN AS FEW AS ONE TO AS MANY AS HUNDREDS OF MACHINE VISION PROCESSOR (MVP) SENSORS AND A NUMBER OF CLIENT APPLICATIONS. THE CLIENT APPLICATIONS SHALL EITHER BE HOSTED ON THE SAME PC AS THE COMMUNICATIONS SERVER OR MAY BE DISTRIBUTED OVER A LOCAL AREA NETWORK OF PC'S USING THE INDUSTRY STANDARD TCP/IP NETWORK PROTOCOL. MULTIPLE CLIENT APPLICATIONS SHALL EXECUTE SIMULTANEOUSLY ON THE SAME HOST OR MULTIPLE HOSTS, DEPENDING ON THE NETWORK CONFIGURATION. ADDITIONALLY, A WEB-BROWSER INTERFACE SHALL ALLOW USE OF INDUSTRY STANDARD INTERNET WEB BROWSERS TO CONNECT TO MVP SENSORS FOR SETUP, MAINTENANCE, AND PLAYING DIGITAL STREAMING VIDEO.

1.1 SYSTEM HARDWARE
THE MACHINE VISION SYSTEM HARDWARE SHALL CONSIST OF THREE COMPONENTS: 1) A COLOR, 22X ZOOM, MVP SENSOR 2) A MODULAR CABINET INTERFACE UNIT 3) A COMMUNICATION INTERFACE PANEL. ADDITIONALLY, AN OPTIONAL PERSONAL COMPUTER (PC) SHALL HOST THE SERVER AND CLIENT APPLICATIONS THAT ARE USED TO PROGRAM AND MONITOR THE SYSTEM COMPONENTS. THE CONTRACTOR SHALL NOT BE REQUIRED TO SUPPLY A PC TO THE CITY UNLESS SPECIFICALLY MENTIONED BY SPECIAL PROVISIONS AND/OR CONTRACT BID ITEM. THE REAL-TIME PERFORMANCE SHALL BE OBSERVED BY VIEWING THE VIDEO OUTPUT FROM THE SENSOR WITH OVERLAID FLASHING DETECTORS TO INDICATE THE CURRENT DETECTION STATE (ON/OFF). THE MVP SENSOR SHALL OPTIONALLY STORE CUMULATIVE TRAFFIC STATISTICS INTERNALLY IN NON-VOLATILE MEMORY FOR LATER RETRIEVAL AND ANALYSIS.

THE MVP SHALL COMMUNICATE TO THE MODULAR CABINET INTERFACE UNIT VIA THE COMMUNICATIONS INTERFACE PANEL AND THE SOFTWARE APPLICATIONS USING THE INDUSTRY STANDARD TCP/IP NETWORK PROTOCOL. THE MVP SHALL HAVE A BUILT-IN, ETHERNET-READY, INTERNET PROTOCOL (IP) ADDRESS AND SHALL BE ADDRESSABLE WITH NO PLUG IN DEVICES OR CONVERTERS REQUIRED. THE MVP SHALL PROVIDE STANDARD MPEG-4 STREAMING DIGITAL VIDEO. ACHIEVABLE FRAME RATES SHALL VARY FROM 5 TO 30 FRAMES/SEC AS A FUNCTION OF VIDEO QUALITY AND AVAILABLE BANDWIDTH.

THE MODULAR CABINET INTERFACE UNIT SHALL COMMUNICATE DIRECTLY WITH UP TO EIGHT (8) MVP SENSORS AND SHALL COMPLY WITH THE FORM FACTOR AND ELECTRICAL CHARACTERISTICS TO PLUG DIRECTLY INTO A NEMA TYPE C OR D DETECTOR RACK PROVIDING UP TO THIRTY-TWO (32) INPUTS AND SIXTY-FOUR (64) OUTPUTS OR A 170 INPUT FILE RACK PROVIDING UP TO SIXTEEN (16) CONTACT CLOSURE INPUTS AND TWENTY-FOUR (24) CONTACT CLOSURE OUTPUTS TO A TRAFFIC SIGNAL CONTROLLER.

THE COMMUNICATION INTERFACE PANEL SHALL PROVIDE FOUR (4) SETS OF THREE (3) ELECTRICAL TERMINATIONS FOR THREE-WIRE POWER CABLES FOR UP TO EIGHT (8) MVP SENSORS THAT MAY BE MOUNTED ON A POLE OR MAST ARM WITH A TRAFFIC SIGNAL CABINET OR JUNCTION BOX. THE COMMUNICATION INTERFACE PANEL SHALL PROVIDE HIGH-ENERGY TRANSIENT PROTECTION TO ELECTRICALLY PROTECT THE MODULAR CABINET INTERFACE UNIT AND CONNECTED MVP SENSORS. THE COMMUNICATIONS INTERFACE PANEL SHALL PROVIDE SINGLE-POINT ETHERNET CONNECTIVITY VIA RJ45 CONNECTOR FOR COMMUNICATION TO AND BETWEEN THE MODULAR CABINET INTERFACE MODULE AND THE MVP SENSORS.

1.2 SYSTEM SOFTWARE
THE MVP SENSOR EMBEDDED SOFTWARE SHALL INCORPORATE MULTIPLE APPLICATIONS THAT PERFORM A VARIETY OF DIAGNOSTIC, INSTALLATION, FAULT TOLERANT OPERATIONS, DATA COMMUNICATIONS, DIGITAL VIDEO STREAMING, AND VEHICLE DETECTION PROCESSING. THE DETECTION SHALL BE RELIABLE, CONSISTENT, AND PERFORM UNDER ALL WEATHER, LIGHTING, AND TRAFFIC CONGESTION LEVELS. AN EMBEDDED WEB SERVER SHALL PERMIT STANDARD INTERNET BROWSERS TO CONNECT AND PERFORM BASIC CONFIGURATION, MAINTENANCE, AND VIDEO STREAMING SERVICES.

THERE SHALL BE A SUITE OF CLIENT APPLICATIONS THAT RESIDE ON THE HOST CLIENT/SERVER PC. THE APPLICATIONS SHALL EXECUTE UNDER MICROSOFT WINDOWS XP OR VISTA. AVAILABLE CLIENT APPLICATIONS SHALL INCLUDE:

MASTER NETWORK BROWSER: LEARN A NETWORK OF CONNECTED MODULAR CABINET INTERFACE UNITS AND MVP SENSORS, DISPLAY BASIC INFORMATION, AND LAUNCH APPLICATIONS SOFTWARE TO PERFORM OPERATIONS WITHIN THAT SYSTEM OF SENSORS.

CONFIGURATION SETUP: CREATE AND MODIFY DETECTOR CONFIGURATIONS TO BE EXECUTED ON THE MVP SENSOR AND THE MODULAR CABINET INTERFACE UNIT.

OPERATION LOG: RETRIEVE, DISPLAY, AND SAVE FIELD HARDWARE RUN-TIME OPERATION LOGS OF SPECIAL EVENTS THAT HAVE OCCURRED.

SOFTWARE INSTALL: RECONFIGURE ONE OR MORE MVP SENSORS WITH A NEWER RELEASE OF EMBEDDED SYSTEM SOFTWARE.

STREAMING VIDEO PLAYER: PLAY AND RECORD STREAMING VIDEO WITH FLASHING DETECTOR OVERLAY.

DATA RETRIEVAL: FETCH ONCE OR POLL FOR TRAFFIC DATA AND ALARMS AND STORE ON PC STORAGE MEDIA.

COMMUNICATIONS SERVER: PROVIDE FAULT-TOLERANT, REAL-TIME TCP/IP COMMUNICATIONS TO / FROM ALL DEVICES AND CLIENT APPLICATIONS WITH FULL LOGGING CAPABILITY FOR SYSTEMS INTEGRATION.

2. FUNCTIONAL CAPABILITIES
2.1 MVP SENSOR
THE MVP SENSOR SHALL BE AN INTEGRATED IMAGING COLOR CCD ARRAY WITH ZOOM LENS OPTICS, HIGH-SPEED, DUAL-CORE IMAGE PROCESSING HARDWARE BUNDLED INTO A SEALED ENCLOSURE. THE CCD ARRAY SHALL BE DIRECTLY CONTROLLED BY THE DUAL-CORE PROCESSOR, THUS PROVIDING HIGH-QUALITY VIDEO FOR DETECTION THAT HAS VIRTUALLY NO NOISE TO DEGRADE DETECTION PERFORMANCE. IT SHALL BE POSSIBLE TO ZOOM THE LENS AS REQUIRED FOR SETUP AND OPERATION. IT SHALL PROVIDE JPEG VIDEO COMPRESSION AS WELL AS STANDARD MPEG-4 DIGITAL STREAMING VIDEO WITH FLASHING DETECTOR OVERLAY. THE MVP SHALL PROVIDE DIRECT REAL-TIME IRIS AND SHUTTER SPEED CONTROL. THE MVP IMAGE SENSOR SHALL BE EQUIPPED WITH AN INTEGRATED 22X ZOOM LENS THAT CAN BE CHANGED USING EITHER CONFIGURATION COMPUTER SOFTWARE. THE DIGITAL STREAMING VIDEO OUTPUT AND ALL DATA COMMUNICATIONS SHALL BE TRANSMITTED OVER THE THREE-WIRE POWER CABLE.

2.1.2 POWER
THE MVP SENSOR SHALL OPERATE ON 110/220 VAC, 50/60HZ AT A MAXIMUM OF 25 WATTS. THE CAMERA AND PROCESSOR ELECTRONICS SHALL CONSUME A MAXIMUM OF 10 WATTS AND THE REMAINING 15 WATTS SHALL SUPPORT AN ENCLOSURE HEATER.

2.1.3 DETECTION ZONE PROGRAMMING
PLACEMENT OF DETECTION ZONES SHALL BE BY MEANS OF A PERSONAL COMPUTER (PC) WITH A WINDOWS XP OR VISTA OPERATING SYSTEM, A KEYBOARD, AND A MOUSE. THE PC MONITOR SHALL BE ABLE TO SHOW THE DETECTION ZONES SUPERIMPOSED ON IMAGES OF TRAFFIC SCENES.

THE DETECTION ZONES SHALL BE CREATED BY USING A MOUSE TO DRAW DETECTION ZONES ON THE PC MONITOR. USING THE MOUSE AND KEYBOARD IT SHALL BE POSSIBLE TO PLACE, SIZE, AND ORIENT DETECTION ZONES TO PROVIDE OPTIMAL ROAD COVERAGE FOR VEHICLE DETECTION. IT SHALL BE POSSIBLE TO DOWNLOAD DETECTOR CONFIGURATIONS FROM THE PC TO THE MVP SENSOR AND CABINET INTERFACE MODULE, TO RETRIEVE THE DETECTOR CONFIGURATION THAT IS CURRENTLY RUNNING IN THE MVP SENSOR, AND TO BACK UP DETECTOR CONFIGURATIONS BY SAVING THEM TO THE PC FIXED DISKS OR OTHER REMOVABLE STORAGE MEDIA.

THE SUPERVISOR COMPUTER'S MOUSE AND KEYBOARD SHALL BE USED TO EDIT PREVIOUSLY DEFINED DETECTOR CONFIGURATIONS TO PERMIT ADJUSTMENT OF THE DETECTION ZONE SIZE AND PLACEMENT, TO ADD DETECTORS FOR ADDITIONAL TRAFFIC APPLICATIONS, OR TO REPROGRAM THE MVP SENSOR FOR DIFFERENT TRAFFIC APPLICATIONS OR CHANGES IN INSTALLATION SITE GEOMETRY OR TRAFFIC REROUTING.

2.2 MODULAR CABINET INTERFACE UNIT THE MODULAR CABINET INTERFACE UNIT SHALL PROVIDE THE HARDWARE AND SOFTWARE MEANS FOR UP TO EIGHT (8) MVP SENSORS TO COMMUNICATE REAL-TIME DETECTION STATES AND ALARMS TO A LOCAL TRAFFIC SIGNAL CONTROLLER. IT SHALL COMPLY WITH THE ELECTRICAL AND PROTOCOL SPECIFICATIONS OF THE DETECTOR RACK STANDARDS. THE CARD SHALL HAVE 1500 VRMS ISOLATION BETWEEN RACK LOGIC GROUND AND STREET WIRING.

THE MODULAR CABINET INTERFACE UNIT SHALL BE A SIMPLE INTERFACE CARD THAT PLUGS DIRECTLY INTO A 170 INPUT FILE RACK OR A NEMA TYPE C OR D DETECTOR RACK. THE MODULAR CABINET INTERFACE UNIT SHALL OCCUPY ONLY 2 SLOTS OF THE DETECTOR RACK. THE MODULAR CABINET INTERFACE UNIT SHALL ACCEPT UP TO SIXTEEN (16) PHASE INPUTS AND SHALL PROVIDE UP TO TWENTY-FOUR (24) DETECTOR OUTPUTS.

2.3 COMMUNICATIONS INTERFACE PANEL
THE COMMUNICATIONS INTERFACE PANEL SHALL SUPPORT UP TO EIGHT MVPS. THE COMMUNICATIONS INTERFACE PANEL SHALL ACCEPT 110/220 VAC, 50/60 HZ POWER AND PROVIDE PREDEFINED WIRE TERMINATION BLOCKS FOR MVP POWER CONNECTIONS, A BROADBAND-OVER-POWER-LINE (BPL) TRANSCEIVER TO SUPPORT UP TO 10MB/S INTERDEVICE COMMUNICATIONS, ELECTRICAL SURGE PROTECTORS TO ISOLATE THE MODULAR CABINET INTERFACE UNIT AND MVP SENSORS, AND AN INTERFACE CONNECTOR TO CABLE DIRECTLY TO THE MODULAR CABINET INTERFACE UNIT.

THE INTERFACE PANEL SHALL PROVIDE POWER FOR UP TO EIGHT (8) MVP SENSORS, TAKING LOCAL LINE VOLTAGE 110/220 VAC, 50/60 HZ AND PRODUCING 110/220 VAC, 50/60 HZ, AT ABOUT 30 WATTS TO EACH MVP SENSOR. TWO 1/2-AMP SLO-BLO FUSES SHALL PROTECT THE COMMUNICATIONS INTERFACE PANEL.

3. SYSTEM INSTALLATION & TRAINING
THE SUPPLIER OF THE VIDEO DETECTION SYSTEM SHALL SUPERVISE THE INSTALLATION AND TESTING OF THE VIDEO DETECTION SYSTEM AS REQUIRED BY THE CITY OF NORMAN.

TRAINING, IF SPECIFICALLY REQUIRED BY THE CONTRACT, SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR "VIDEO DETECTION SYSTEM TRAINING". THE MVP SENSOR AND ITS SUPPORT HARDWARE / SOFTWARE IS A SOPHISTICATED LEADING-EDGE TECHNOLOGY SYSTEM; THEREFORE, PROPER INSTRUCTION FROM CERTIFIED INSTRUCTORS IS RECOMMENDED TO ENSURE THAT THE END USER HAS COMPLETE COMPETENCY IN SYSTEM OPERATION. TRAINING SHALL CONSIST OF CURRICULUM TAUGHT BY A REPRESENTATIVE OF THE VIDEO DETECTION SYSTEM MANUFACTURER WITH CERTIFICATION TO TRAIN ON SUCH EQUIPMENT. MATERIALS AND TRAINING SHALL BE PROVIDED FOR UP TO TEN (10) CITY OF NORMAN PERSONNEL IS AVAILABLE TO PERSONNEL OF THE CONTRACTING AGENCY IN THE OPERATION, SET UP, AND MAINTENANCE OF THE VIDEO DETECTION SYSTEM. THE USER'S GUIDE IS NOT AN ADEQUATE SUBSTITUTE FOR PRACTICAL CLASSROOM TRAINING AND FORMAL CERTIFICATION BY AN APPROVED AGENCY.

4. WARRANTY, SERVICE, & SUPPORT
FOR A MINIMUM OF TWO (2) YEARS, THE SUPPLIER SHALL WARRANT THE VIDEO DETECTION SYSTEM. ONGOING SOFTWARE SUPPORT BY THE SUPPLIER SHALL INCLUDE SOFTWARE UPDATES OF THE MVP SENSOR, MODULAR CABINET INTERFACE UNIT, AND SUPERVISOR COMPUTER APPLICATIONS. THESE UPDATES SHALL BE PROVIDED FREE OF CHARGE DURING THE WARRANTY PERIOD. THE SUPPLIER SHALL MAINTAIN A PROGRAM FOR TECHNICAL SUPPORT AND SOFTWARE UPDATES FOLLOWING EXPIRATION OF THE WARRANTY PERIOD. THIS PROGRAM SHALL BE AVAILABLE TO THE CONTRACTING AGENCY IN THE FORM OF A SEPARATE AGREEMENT FOR CONTINUING SUPPORT.

(13) THE INSTALLATION OF THE R-48 GROUND BOXES ON 12TH AVENUE SE MAY REQUIRE CONCRETE REMOVAL AND REPLACEMENT. THE PRICE BID FOR THIS ITEM SHALL INCLUDE ALL CONCRETE REMOVAL AND REPLACEMENT TO THE SATISFACTION OF THE ENGINEER.

(14) THIS PROJECT WILL REQUIRE AUDIBLE SIGNAL CAPABILITIES. THE PEDESTRIAN PUSH BUTTON ASSEMBLY SHALL BE THE 2-WIRE NAVIGATOR ACCESSIBLE PEDESTRIAN SIGNAL (APS) AS MANUFACTURED BY POLARA ENGINEERING INC. OF FULLERTON CA. OR APPROVED EQUAL. THESE NAVIGATOR PUSH BUTTONS SHALL USE SIGN OPTION T80DH-84 HIGH REFLECTIVE SIGN AND INCLUDE CUSTOM MESSAGE.

(15) RED, YELLOW AND GREEN LED TRAFFIC SIGNAL HEADS SHALL BE FURNISHED AND INSTALLED ON THIS PROJECT. THE LED TRAFFIC MODULES, LENSES, AND ALL ASSOCIATED MATERIAL AND EQUIPMENT SHALL CONFORM TO I.T.E. VEHICLE TRAFFIC CONTROL SIGNAL HEAD (VTCSH) STANDARDS IN EFFECT AT THE TIME THAT THE ORDER IS PLACED. LED HEADS SHALL BE CAPABLE OF OPERATING WITHOUT A REFLECTOR. THE SIGNAL HEADS SHALL HAVE A YELLOW BODY. BLACK DOORS AND BLACK TUNNEL VISORS.

(16) LED INTERNATIONAL HEADS DISPLAYING INCANDESCENT LOOKING FULLY-ILLUMINATED SYMBOLS (WALKING PERSON AND UPRAISED HAND) SHALL BE REQUIRED ON THIS PROJECT.

THE UNITS TO BE INSTALLED ON THIS PROJECT SHALL BE GTI LED COUNTDOWN PEDESTRIAN SIGNAL MODULES (16" X 18") MANUFACTURED BY GENERAL ELECTRIC OR AN APPROVED EQUAL.

(17) REFLECTORIZED BACKPLATES SHALL BE SUPPLIED ON THIS PROJECT IN ACCORDANCE WITH GENERAL NOTE 4 ON ODOT STANDARD DRAWING SA1-1-(LATEST REVISION).

(18) PAY ITEM IS TO RUN FROM THE PEDESTRIAN PUSH BUTTONS TO THE TERMINAL STRIP AT THE BASE OF THE POLES.

(19) THE PREEMPTION CONTROL SYSTEM SHALL INTERFACE WITH THE TRAFFIC CONTROLLER TO GIVE EMERGENCY VEHICLES APPROACHING THE INTERSECTION A GREEN INDICATION WITH ALL OTHER INDICATIONS BEING RED. ALL EQUIPMENT IN THE SYSTEM SHALL MEET NEMA ENVIRONMENTAL STANDARDS.

THE SYSTEM SHALL USE AN OPTICOM MULTIMODE EMITTER CAPABLE OF OPERATING IN BOTH INFRARED (IR) OR GPS MODES. THE EMITTER IS PURCHASED AS PART OF THE SERIES 2000 VEHICLE EMITTER KIT WHICH INCLUDES A HIGH PRIORITY RADIO/GPS CONTROL UNIT, A MULTIMODE HIGH PRIORITY EMITTER, A VEHICLE INTERFACE CABLE, AND A VEHICLE HARDWARE INSTALLATION KIT. EQUIPMENT AT THE INTERSECTION SHALL INCLUDE A PHASE SELECTOR (MODEL 764), AN AUXILIARY INTERFACE PANEL (MODEL 768), A GPS RECEIVER/RADIO UNIT (MODEL 3100), AND A CONNECTION BETWEEN THE GPS RECEIVER/RADIO UNIT AND THE PHASE SELECTOR WITH MODEL 1070 CABLE. THE OPTICOM MULTIMODE MODEL 764 PHASE SELECTOR MAY BE USED IN IR ONLY APPLICATIONS, IN GPS ONLY APPLICATIONS, OR IN IR/GPS APPLICATIONS SIMULTANEOUSLY.

THE MANUFACTURER OR MANUFACTURER'S REPRESENTATIVE SHALL PROVIDE ASSISTANCE TO THE CONTRACTOR OR AGENCY INSTALLING THE EQUIPMENT AS TO THE BEST LOCATION FOR THE DETECTOR PLACEMENT AT EACH INTERSECTION INVOLVED WITH THE PROJECT. COSTS ASSOCIATED WITH THIS ASSISTANCE SHALL BE INCLUDED IN THE COST OF OTHER ITEMS. ALL EQUIPMENT MUST BE PLAINLY MARKED AS TO THE MANUFACTURER OF THE EQUIPMENT TO PROVIDE CLEAR IDENTIFICATION AS TO THE MANUFACTURER'S MODEL AND SERIAL NUMBER OF EACH UNIT. NEMA CERTIFICATION AND TEST REPORTS SHALL BE PROVIDED UPON REQUEST BY THE ENGINEER.

(20) MAST ARM MOUNTED STREET NAME SIGNS SHOWN ON THE PLANS ARE LARGER THAN THE MAXIMUM SIZE USED IN STANDARD ODOT POLE AND FOOTING DESIGNS. THE CONTRACTOR AND SUPPLIER SHALL PROVIDE CERTIFICATION AND DESIGN CALCULATIONS FOR HIGHER LOADING REQUIREMENTS.

(21) PRICE BID FOR THIS ITEM SHALL INCLUDE THE COST FOR THE INSTALLATION OF A STEPDOWN TRANSFORMER.

| REVISIONS | | |
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| NO. | DESCRIPTION | DATE |
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R. WAYNE RUSSELL, P.E. # 16030
C.A. # 1160. RENEWAL 06-30-17

2-16-17
DATE

Traffic Engineering Consultants, Inc.
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REGISTERED PROFESSIONAL ENGINEERS OF OKLAHOMA — R. WAYNE RUSSELL — 16030

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| Design | RWR | 02/16/17 |
| Drawn | SB | 02/16/17 |

TEC A CLEAR DIRECTION

# TRAFFIC SIGNAL PAY QUANTITIES AND NOTES (2 OF 2)

State Job No. 29289(04) Sheet No. 8

CLEVELAND COUNTY

02/16/17 G:\0Projects\1-2278 12th Ave SE from SH 9 to Cedar Ln\CAD\QUANT 2.dgn