Advanced Transportation Controller (ATC)
Standard Cabinet NEMA, P-Type Style

City of San Jose Specification

Rev date. July 21, 2021

1. **ATC Cabinet Specifications**
   - **1.1.** This specification describes the City of San Jose's P-type, Advanced Transportation Controller Cabinet (ATCC). The ATCC is part of the ATC suite of standards published by ITE, AASHTO, and NEMA to describe advanced traffic control products. The ATCC is intended for traffic control operation, but can be utilized for a variety of other purposes.
   - **1.2.** This specification describes the shelf mount version of the ATC cabinet, and shall substantially conform to the latest Advanced Transportation Controller (ATC) 5301 v02.02 standard. This specification uses a NEMA, P-type style cabinet, with the ATC subassemblies mounted either on or underneath shelves or on the cabinet side walls. Where specifically noted, the cabinet shall also comply with the 2003 NEMA Traffic Controller Assemblies specifications version 02.06.
   - **1.3.** All cabinets shall be pre-approved by the City of San Jose prior to bid letting.
   - **1.4.** The cabinet shall be designed for standard 8-phaseoperation, requiring minimum (48) channels of detector rack detection and (16) output channels.
   - **1.5.** A local representative from the cabinet manufacturer shall be available for support services. The representative shall be accessible via phone or email during normal business hours. If required, the representative must be on-site within 24 hours of notification.
   - **1.6.** The cabinet shall include these subassemblies as a minimum required for operation: Output Assembly (OA), Input Assembly (IA), Auxiliary Input/Output Assembly, Service Assembly (SA), DC Power/Communication Bus, AC Clean Power Bus, Field Input Termination Assembly (FITA), and Field Output Termination Assembly (FOTA).

2. **ATC Cabinet General Requirements**

   The cabinet shall adhere to the following requirements:
   - **2.1.** The subassemblies in the cabinet shall be readily accessible and removable with simple hand tools such as a screwdriver, and without removing any other equipment.
   - **2.2.** All cabinet components shall be mounted either on or under a shelf or on a cabinet wall. The cabinet shall not include a 19" rack.
   - **2.3.** The cabinet shall be capable of remaining in flashing operation with any of the following subassemblies removed: Input Assembly, Output Assembly, Cabinet Power Supply, and Controller.
   - **2.4.** Any components over 50 V with exposed terminals shall be protected from incidental contact per NEC requirements.
   - **2.5.** All equipment in the cabinet shall be clearly and permanently labeled.
   - **2.6.** All marker strips shall be made of material that can be easily written on using a pencil or ballpoint pen. Marker strips shall be located immediately below the item they are to identify and must be clearly visible with the items installed.
   - **2.7.** Card guides (top and bottom) shall be provided for the plug-ins.
   - **2.8.** All circuit boards shall be conformal coated to protect the boards from moisture.
   - **2.9.** All fuses, circuit breakers, switches (except police panel switches) and indicators shall be readily visible and accessible from the area accessed by opening the front door.
   - **2.10.** All circuit breakers located on the rack shall have covers to prevent accidental tripping.
   - **2.11.** All assemblies shall be modular with pluggable cabling.

2.12. Wire raceway shall be integrated as part of the cabinet allowing for neat internal and field wiring.
2.13. Door switches shall be powered by 48 VDC.
2.14. A hard clear cover shall be hinge mounted on the Auxiliary Switch Panel (Police/Maintenance panel) housed on the inside of the door to protect the switches from accidently being tripped.

3. Cabinet Enclosure

3.1. The cabinet shall be constructed from type 5052-H32 aluminum with a minimum thickness of 0.125 inches. The cabinet shall be a NEMA size 6 ("P") with external dimensions of 56-60" high, 44" wide, and 26" deep, with a tolerance of +/- 0.5" on each dimension.
3.2. The cabinet shall be designed and manufactured with materials that will allow rigid mounting. The cabinet must not flex on its mount. The size 6 ("P") cabinet is intended for base mounting only.
3.3. A rain channel shall be incorporated into the design of the main door opening to prevent liquids from entering the enclosure. The cabinet door opening must be a minimum of 80 percent of the front surface of the cabinet. A stiffener plate shall be welded across the inside of the main door to prevent flexing.
3.4. The top of the cabinet shall incorporate a 1-inch slope toward the rear to prevent rain accumulation.
3.5. The cabinet shall be supplied with the following finishes: the interior and exterior in powder coat, color Cardinal WH-14 (white) or Federal Standard # 17925. Sufficient care shall be taken in handling to ensure that scratches are minimized. All surfaces shall be free from weld flash. Welds shall be smooth, neatly formed, free from cracks blowholes and other irregularities. All sharp edges shall be ground smooth.
3.6. The cabinet shall be supplied as a UL listed version with double flanges all the way around, and with continuous welding of all external seams.
3.7. Cabinets shall be supplied with two, single hole, bolted on lift ears.
3.8. Each cabinet shall be supplied with a minimum of three removable shelves manufactured from 5052-H32 aluminum. Shelves shall be a minimum of 10 inches deep. The shelves shall include (3) sets of 1U mounting positions to install 1U rack-mounted equipment. The rack mounting holes shall be tapped for #10-32 screws.
3.9. The cabinet shall include a set of minimum three vertical "C" channels mounted on each interior side wall of the cabinet for the purpose of mounting the cabinet components. The channels shall accommodate spring mounted nuts. The rear wall shall be supplied with minimum two saw tooth rails. The saw tooth rails on back wall shall allow shelf adjustments in ½" increments. All mounting rails shall extend 3 to 5 inches from the bottom of the cabinet. Mounting location of the channels shall be determined by the manufacturer so as to achieve optimum functionality and access.
3.10. The main door and police door shall close against a weather and dust-proof, closed-cell neoprene gasket seal (Gaska Tape V715 series). The gasket material for the main door shall be a minimum of 0.250 inches thick by 1.625 inches wide. The gasket material for the police door shall be a minimum of 0.250 inches thick by 0.250 inches wide. The gaskets shall be permanently bonded to the cabinet. The gasket shall include a polyester film to prevent the gasket from sticking to the cabinet surface.

3.11. The lower section of the cabinet shall be equipped with a louvered air entrance. The air inlet shall be large enough to allow sufficient air flow per the rated fan capacity. Louvers shall satisfy the NEMA rod entry test for 3R ventilated enclosures. A removable, disposable air filter measuring 12" x 16" x 1" shall be secured to the air entrance using a spring. The filter shall fit snugly against the cabinet door wall.

3.12. The roof of the cabinet shall incorporate an exhaust plenum with a vent screen. Perforations in the vent screen shall be 0.125 inch x 0.50 inch rectangular slots.

3.13. The main door on the cabinet shall be equipped with a three-point latching mechanism with nylon rollers. It shall include an automatic door stop mechanism capable of holding the door open at approximately 90°, 120°, and 180° (degrees) under windy conditions. Manual placement of the mechanism shall not be required by field personnel. The main door shall utilize stainless steel hardware. The handle on the main door shall have a shank of ¾" diameter. The handle shall include a vertically-mounted hasp for the attachment of an optional padlock. The cabinet door handle shall rotate counter-clockwise to open. The handle shall not extend beyond the perimeter of the main door at any time. The lock assembly shall be positioned so that the handle does not cause any interference with the key when opening the cabinet door.

3.14. The main door hinge shall be a one-piece, continuous piano hinge with stainless steel construction and with a stainless steel pin running the entire length of the door. All external fasteners shall be tamper-proof.

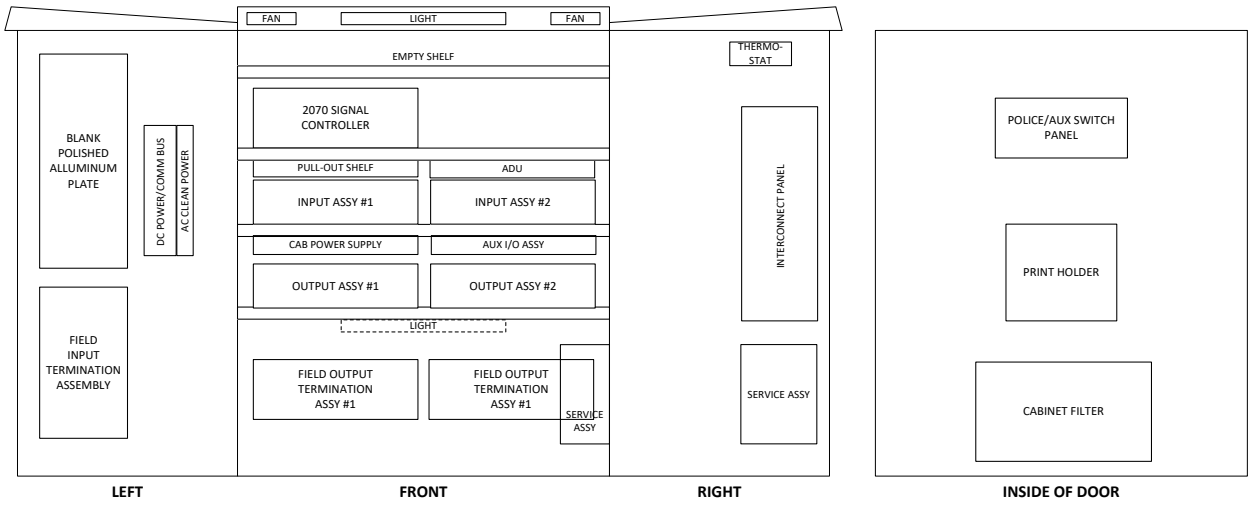
3.15. The main door shall be equipped with a Corbin #2 tumbler series lock or equivalent. A minimum of two keys shall be supplied.

3.16. The Police panel assembly door shall be provided with a CCL police lock# R557SGS or equivalent and has a minimum of one key. The police door assembly shall be flush-mounted to the main door.

3.17. All base mounted cabinets require anchor bolts to properly secure the cabinet to its base. The cabinet flange for securing the anchor bolts shall not protrude outward from the bottom of the cabinet. Four (4) ¾" x 18" long right angle anchor bolts shall be provided with the cabinet.

4. Proposed Cabinet Layout

City proposes an initial layout, as shown in Figure 1, to serve as the basis for pricing as required for this RFP. City shall work with the selected manufacturer to determine the final layout for all assembly and component installations, prior to the fabrication of the first sample cabinet. Upon City's testing of the sample cabinet, minor modifications to the layout can be made before the start of the production units.



NOTE: Not to Scale

Figure 1. Proposed ATC, P-Type Cabinet Component Layout

5. ATC Cabinet Subassemblies

5.1. Output Assembly #1 (16-Channel Shelf Mount Style)

5.1.1. The Output Assembly #1 shall accommodate 3U plug-in cards and be mounted on the shelf. The shelf mounting shall include mounting flanges to allow the rack to be bolted to the shelf.

5.1.2. The Output Assembly #1 shall accommodate and come fully loaded with eight (8) Model 2202-HV High-Density Switch Pack / Flasher Units (HDSP/FU), providing a total of 48 output channels.

5.1.3. The Output Assembly #1 shall accommodate and be provided with one (1) Model 2218 Serial Interface Unit (SIU) to provide interface and control via system SB1/SB2.

5.1.4. The Output Assembly #1 shall accommodate and be provided with one (1) Model 2212-HV Cabinet Monitor Unit (CMUip).

5.1.5. The Output Assembly #1 shall include a hinged front panel with four (4) Circuit Breakers. The front panel shall be attached with thumb screws to allow access to the wiring.

5.1.6. The Output Assembly #1 circuit breakers shall be rated at 5A. The breakers shall be Carling Technologies “B” series or approved equal. Each breaker shall protect two (2) HDSPs. The breakers shall be protected by a flip-up cover to protect against accidental activation.

5.1.7. The Output Assembly #1 shall utilize four (4) 24-pin connectors, Molex 39-28-8240 or equal, to interface the HDSP outputs to the Field Output Termination Assembly.

5.1.8. All exposed AC voltage on the Output Assembly circuit boards shall be protected using a removable Lexan cover mounted on standoffs.

5.1.9. A momentary push button shall be provided that, when pressed, energizes the 24 VDC to all the HDSPs during Flash Mode. The button shall be labeled “24 VDC BYPASS” and shall be located on the front of the Output Assembly.

5.2. Field Output Termination Assembly #1 (16-Channel)

5.2.1. The 16-Channel Field Output Termination Assembly #1 (FOTA) shall be coupled with the 16-Channel Output Assembly #1 to provide pluggable connectors for the signal output field terminals, flash programming, and flash transfer relays.

5.2.2. The FOTA shall house eight (8) Model 21H High-Density Flash Transfer Relays (HDFTR) and eight (8) Flash Program Blocks (FPB). The HDFTRs and FPBs shall be provided to control and select the color (red, yellow, or dark) during flashing operation. Eight (8) HDFTR's and sixteen (16) Red FBS's shall be provided for each FOTA.

5.2.3. HDSP Suppressors shall be provided at the field terminals for the protection of the HDSP. These suppressors shall plug in on the back side of the FOTA. Eight (8) suppressors shall be provided for each FOTA.

5.2.4. Each HDFTR position shall be labeled with the number of its associated HDSP (1-16). Each FPB position shall be labeled with the number of its associated channel (1-16).

5.2.5. The FOTA #1 shall be provided with sixteen (16) 6-position Phoenix Contact terminal block model number 1777765 plugs and 1720615 sockets.or approved equal. Each Field Terminal Block socket shall be labeled with the number of its associated channel (1-16). Additional labels shall be provided to clearly indicate which terminals correspond to the red, yellow, and green switch pack outputs.

5.2.6. The FOTA #1 shall be mounted on the sawtooth rails on the back wall and shall swing down using thumbscrews to provide access to the HDSP Suppressors and the wiring for the FOTA. The panel shall be angled to allow easy access to the field terminals.

5.2.7. The FOTA #1 shall utilize eight (8) 12-pin connectors, Molex 39-28-8120 or approved equal, to interface the HDSP outputs to the FOTA. The cables shall be long enough to allow the FOTA to swing down with no interference.

5.2.8. A 25-position AC Neutral bus bar shall be mounted at the bottom of this plate to land the signal head neutral wires.

5.3. Input Assembly #1 (24-Channel)

5.3.1. The Input Assembly #1 shall be a 3U high shelf mounted assembly providing twelve slots of 22/44 pin PCB sockets for utilizing input devices such as loop detectors, AC and DC isolators, and EVP equipment.

5.3.2. The Input Assembly #1 shall accommodate and be provided with one (1) Model 2218 Serial Interface Units (SIU) and corresponding DIN 96-pin connector. The SIUs shall provide interface and control between the Controller and the input devices via system SB1/SB2.

5.3.3. The Input Assembly shall house either 2-channel or 4-channel detection modules. The Input Assembly shall house twelve 2-channel detection modules, six 4-channel detection modules, or a combination of 2 & 4-channel modules up to 24 channels. Odd numbered slots shall support 2-channel detection modules. Even numbered slots shall be capable of supporting 2 or 4-channel detection modules.

5.3.4. The Input Assembly shall utilize twelve (12) 10-position Phoenix Contact terminal blocks, model 1757093 plugs and 1755817 sockets, or approved equal, for the connection to the Field Input Termination Assembly.

5.3.5. The Input Assembly #1 shall be furnished, fully loaded with ten (10) 2-channel, loop detector cards, EDI Model Oracle 2E or equal, and one (1) 4-channel DC isolator, EDI Model 244L or equal.

5.4. Input Assembly #2

5.4.1. The Input Assembly #2 shall be a 3U high shelf mounted assembly providing twelve slots of 22/44 pin PCB sockets for utilizing input devices such as loop detectors, AC and DC isolators, and EVP equipment.

5.4.2. The Input Assembly #2 shall accommodate and be provided with one (1) Model 2218 Serial Interface Units (SIU) and corresponding DIN 96-pin connector. The SIUs shall provide interface and control between the Controller and the input devices via system SB1/SB2.

5.4.3. The Input Assembly shall house either 2-channel or 4-channel detection modules. The Input Assembly shall house twelve 2-channel detection modules, six 4-channel detection modules, or a combination of 2 & 4-channel modules up to 24 channels. Odd numbered slots shall support 2-channel detection modules. Even numbered slots shall be capable of supporting 2 or 4-channel detection modules.

5.4.4. The Input Assembly shall utilize twelve (12) 10-position Phoenix Contact terminal blocks, model 1757093 plugs and 1755817 sockets, or approved equal, for the connection to the Field Input Termination Assembly.

5.4.5. The Input Assembly #2 shall be furnished with four (4) 2-channel, loop detector cards, EDI Model Oracle 2E or equal.

5.5. Field Input Termination Assembly (48-Channel)

5.5.1. The 48-Channel Field Input Terminal Assembly (FITA) shall be coupled with the two (2) 24-Channel Input Assemblies. The FITA shall provide a convenient landing point with barrier type terminal blocks for the field input wires in place of utilizing the pluggable connectors on the back of the input file directly.

5.5.2. The FITA shall have positions for landing forty-eight (48) two-wire inputs/outputs and their associated earth ground wires. The landing points shall be barrier type single row terminal blocks with 8-32 size nickel-plated brass terminal screws. The terminal blocks shall be Cooper Bussman model A38211204 or approved equal.

5.5.3. Each input terminal position shall be labeled with its associated channel number as well as terminals A and B for each channel.

5.5.4. The FITA shall have positions for and be provided with twenty-four (24) pluggable Detection Module Suppressors.

5.5.5. The FITA shall be mounted on the lower left side wall of the cabinet.

5.6. Service Assembly

5.6.1. The Service Assembly shall be modular. It shall house the following items:

5.6.1.1. Two (2) Model 2202-HV High-Density Switch Pack / Flasher Units (HDSP/FU)
5.6.1.2. Pluggable Cabinet Suppressor/Filter – Citel model DS72US-120S/G-F-BTT or approved equal
5.6.1.3. Main Contactor
5.6.1.4. Eight (8) HDFU output fuses
5.6.1.5. Seven (7) Circuit Breakers
5.6.1.6. GFCI duplex receptacle, NEMA 5-15 format
5.6.1.7. Earth Ground and AC Neutral bus bars
5.6.1.8. Raw AC utility power input terminal block having five screw terminals

5.6.2. The seven circuit breakers shall be provided for these functions:
5.6.2.1. Main – 30A
5.6.2.2. Clean AC Power – 15A
5.6.2.3. Raw AC Power - 15A
5.6.2.4. Secondary Raw AC Power – 15A
5.6.2.5. Output Assembly – 15A
5.6.2.6. HDFU #1 – 15A
5.6.2.7. HDFU #2 – 15A

5.6.3. The circuit breakers shall be Carling Technologies "B" series or approved equal.
5.6.4. The circuit breakers shall be protected by flip-up covers to protect against accidental activation.
5.6.5. The interior of the Service Assembly shall be accessible without using hand tools.
5.6.6. The Service Assembly shall be mounted on the lower right side wall of the cabinet.

5.7. DC Power/Communication Bus

5.7.1. The DC Power/Communication Bus shall include minimum eight (8) DB25 D-sub socket connectors, TE Connectivity model 5745886-2 or approved equal, to interconnect the SB1/SB2 communication ports of the assemblies and Controller. It shall include a termination circuit at the end of the connections (S8) to prevent radio frequency signal reflection.
5.7.2. The DC Power/Communication Bus shall include one Phoenix Contact plug block or approved equal to bring the DC power to the Bus; such power shall be distributed to the ATC Cabinet Assemblies through minimum seven (7) Phoenix Contact receptacle blocks or approved equal. The copper traces for the DC voltages shall support at least 10 Amp.
5.7.3. DC Power/Communication Bus shall be mounted on the upper left side wall of the cabinet.
5.7.4. Surge suppression shall be provided for the SB1/SB2 communication ports. One Citel data line surge protector, model DD25-24V-BTT or approved equal, shall be provided and installed on port S1.

5.8. AC Clean Power Bus

5.8.1. The AC Clean Power Bus shall include minimum six (6) NEMA 5-15 receptacles, to provide AC Clean Power to the ATC Cabinet Assemblies, the Controller and Cabinet Power Supply.

5.8.2. The AC Clean Power Bus assembly shall be mounted on the upper left side wall of the cabinet or be integrated into the DC Power/Communication Bus assembly.

5.9. Auxiliary Switch Panel

5.9.1. The cabinet shall include an auxiliary switch panel mounted to the interior side of the police panel compartment on the cabinet door. The panel shall be secured to the police panel compartment by (2) screws and shall be hinged at the bottom to allow access to the soldered side of the switches with the use of only a Phillips screwdriver. Both sides of the panel shall be silkscreened. Silk-screening on the backside of the switch panel shall be upside down so that when the panel is opened for maintenance the silk-screening will be right side up. All of the switches shall be protected by a hinged see-through Plexiglas cover. At a minimum, the following switches shall be included:

5.9.1.1. *Controller ON/OFF Switch:* There shall be a switch that renders the controller and load-switching devices electrically dead while maintaining flashing operations for purpose of changing the controller or load-switching devices. The switch shall be a general-purpose bat style toggle switch with .688-inch long bat.

5.9.1.2. *Signals ON/OFF Switch:* There shall be a switch that renders the field signal displays electrically dead while maintaining controller operation for purpose of monitoring controller operations. The switch shall be a general-purpose bat style toggle switch with .688-inch long bat.

5.9.1.3. *Stop Time Switch:* There shall be a 3-position switch labeled "Normal" (up), "Off" (center), and "On" (down). With the switch in the "Normal" position, a stop timing command shall be applied to the controller by the police flash switch or the CMU (Cabinet Management Unit). When the switch is in its "Off" position, stop timing commands shall be removed from the controller. The "On" position shall cause the controller to stop time. The switch shall be a general-purpose bat style toggle switch with .688-inch long bat. There shall be a red LED indicator light that illuminates when stop time is applied.

5.9.1.4. *Technician Flash Switch:* There shall be a switch that places the field signal display in flashing operation while the controller continues to operate. This flash shall have no effect on the operation of the controller or MMU. The switch shall be a general-purpose bat style toggle switch with .688-inch long bat.

5.9.1.5. *Vehicle Test Switches:* Eight (8) vehicle phase inputs shall have momentary pushbutton test switches with black caps. These switches shall be labeled 1, 2, 3, 4, 5, 6, 7 and 8. The switches shall terminate on an interface panel along with the (48) channel inputs of detector racks. The switches shall be programmable to any detector channel without the use of tools. The interface panel shall reside in the auxiliary panel.

5.9.1.6. *Pedestrian Test Switches:* Four (4) pedestrian phase inputs shall have momentary pushbutton test switches with black caps. These switches shall be labeled 2, 4, 6, and 8. Each switch shall have a red LED

indicator light. These LED indicators are to provide indication as PPB is actuated, and shall be located directly above the respective switch.

5.9.1.7. *Preemption Test Switches:* Four (4) preempt inputs shall have momentary pushbutton test switches with red caps. These switches shall be labeled Preempt 1, 2, 3 and 4. These switches will be wired to the Input Assembly #2, detector numbers 21, 22, 23 and 24 respectively.

5.9.1.8. *24 VDC Bypass Switch:* This 24 VDC Bypass switch shall be a momentary push button switches that, when pressed, energizes the 24 VDC to the HDSPs during Flash Mode. The button shall be labeled "24 VDC BYPASS".

5.9.2. The panel shall include a duplex receptacle with USB ports for device charging. This receptacle shall be powered by the Raw AC Power circuit breaker.

5.10. Police Panel

5.10.1. The cabinet shall include a police panel with switches for Auto/Flash, Signals On/Off, and Auto/Manual. The Auto/Manual shall enable Manual Control Enable in the controller when in the Manual position.

5.10.2. The panel shall include a connector, with the appropriate pin-out, that allows for the connection of a 12' manual control cable, furnishable by the vendor. This cable shall enable Interval Advance in the controller when depressed.

5.11. Slide-Out Drawer/Shelf

5.11.1. A telescoping slide out drawer, General Devices Part # VC4080-99-1168 or approved equal, shall be provided for document storage.

5.11.2. The slide-out drawer/shelf shall be mounted underneath the shelf, have a locking provision when fully extended, and include a lip or handle for pulling.

5.12. Interconnect Termination Panel

5.12.1. There shall be a 25-position terminal block with #6-32 screws mounted on a blank panel.

5.12.2. The panel shall be mounted vertically on the front, right side wall of the cabinet, above the Service Assembly.

6. Auxiliary Cabinet Equipment

6.1. Ventilation Fan

6.1.1. Two (2) thermostatically controlled fans shall be provided to ventilate the cabinet.

6.1.2. Each electric fan shall be equipped with ball or roller bearings and shall have a minimum capacity of 100 cubic feet of free air delivery per minute.

6.1.3. Each fan shall be protected by a finger guard.

6.1.4. The fan circuit shall be protected at 125% of the fan motor ampacity.

6.1.5. The fans shall run on 48VDC power from the cabinet power supply.

6.1.6. The fans shall be fastened to the cabinet via two thumb screws and shall not be fastened in a manner that requires any tools for removal or installation.

6.1.7. A Fan Test switch shall be provided.

6.2. Thermostat

6.2.1. The fans shall be thermostatically controlled and shall be manually adjustable to turn on between 80°F and 170°F with a differential of not more than 10°F between automatic turn on and off. The manual adjustment shall be graded in 10°F increment scale.

6.2.2. The Thermostat shall be a Bud Industries model TS-15-A or approved equal.

6.3. Cabinet Lighting

6.3.1. The cabinet shall include two (2) LED light panels to illuminate the interior of the cabinet.

6.3.2. The LED panels shall be activated by door switches and equipped with fuses.

6.3.3. One LED panel shall be mounted on the fan panel, and the other shall be mounted underneath the lower shelf to illuminate T&F panel.

7. ATC Cabinet Plugins

7.1. Model 2202-HV High-Density Switch Pack / Flasher Unit (HDSP-FU)

7.1.1. The HDSP-FU shall be compact, pluggable, modular PCB-based, and equipped with DIN connector.

7.1.2. The HDSP-FU shall be compatible with ultra-low power LED signal heads and it shall have a current monitoring feature for each output of each channel.

7.1.3. The HDSP-FU shall use real-time standardized high speed SB3 communications with the Cabinet Monitor Unit to send a complete set of RMS voltage and load current measurements.

7.1.4. The HDSP-FU shall be 4.5” H x 6.5” D and shall be equipped with a handle, reset push button switch, six RYG LED indictors, four flasher LED indicators, one power LED indicator and two Rx/Tx LED indicators.

7.1.5. The HDSP-FU can function as either a switch pack (HDSP) or as a flasher unit (HDFU).

7.1.5.1. When installed in the Output Assembly, the High-Density Switch Pack (HDSP) shall provide two RYG channels of operation (6 individual field outputs).

7.1.5.2. When installed in the Service Assembly, the High-Density Flasher Unit (HDFU) shall function as a four output flasher.

7.2. Model 2212-HV Cabinet Monitor Unit (CMUip)

7.2.1. The Cabinet Monitor Unit (CMUip) shall be compact, pluggable and modular.

7.2.2. The CMUip shall use real-time standardized 614.4 Kbs SDLC communications with the ATC to transfer command and response data on Serial Bus #1 (SB1).

7.2.3. The CMUip shall be capable of monitoring up to 32 physical switch pack channels (RYG) and shall have optional four virtual channels.

7.2.4. The CMUip shall provide a Flasher Alarm feature. This alarm shall not put the cabinet into a Flash condition.

7.2.5. The CMUip shall analyze the ATC output commands and field input status to isolate the failure source by channel and color.

7.2.6. The CMUip configuration programming shall be provided by an interchangeable Datakey nonvolatile memory device. This rugged key shall store all CMUip

configuration parameters and shall eliminate programming using jumpers, diodes, or DIP switches.

7.2.7. The CMUip shall maintain a nonvolatile event log recording the complete intersection status as well as time stamped previous fault events, AC Line events, configuration changes, monitor resets, cabinet temperature and true RMS voltages and currents for all field inputs.

7.2.8. The signal sequence history log stored in nonvolatile memory graphically shall display up to 30 seconds of signal status prior to the fault trigger event with 50 ms resolution to ease diagnosing of intermittent and transient faults.

7.2.9. The 2212-HV model shall be compatible with the 2202-HV HDSP/FU for 120VAC output cabinets.

7.3. Model 2218 Serial Interface Unit (SIU)

7.3.1. The Model 2218 Serial Interface Unit (SIU) shall be compact, pluggable and modular.

7.3.2. The SIU shall use real-time standardized 614.4 Kbps SDLC communications with the ATC to transfer command and response data on Serial Bus #1 (SB1).

7.3.3. The SIU shall be equipped with 54 programmable input/output pins, four optically isolated input pins, one line sync reference input pin and 4 address select input pins. The optically isolated inputs shall work with either 12 VAC or 24 VDC.

7.3.4. The SIU outputs shall be rated at 150 mA continuous sink current. Each output shall provide a 500 mA typical current limit and shall be rated to 50 V and utilize a voltage clamp for inductive transient protection.

7.3.5. The SIU shall be equipped with a front panel LED indicator that can report the current SIU assembly address assignment of the SIU for cabinet configuration verification.

7.3.6. The SIU shall require a nominal supply voltage of 24 VDC (+/-2 VDC). A voltage of 16 VDC or less shall be considered loss of power and a voltage of 18 VDC or greater shall be considered adequate for operation. The SIU shall not require more than 300 mA over the voltage range of 16 VDC to 30 VDC and the power surge shall be limited to a maximum of 1.25 Amperes from initial application of DC power. The SIU shall not be damaged by insertion to, or removal from, powered input or output assemblies. The SIU shall operate normally for 700 milliseconds after power loss.

7.4. Model 2220 Auxiliary Display Unit (ADU)

7.4.1. The ADU shall install in a 1U height of the rack space and shall provide a menu driven user interface to the enhanced features of the CMUip monitor including the built-in Diagnostic Wizard.

7.4.2. The ADU shall provide 32 channels of Red, Yellow and Green LED indicators that display full intersection status and 32 Blue fault status LED indicators to identify faulty channels.

7.4.3. The ADU shall provide proper electrical termination to SB3.

7.4.4. The ADU shall have a 4 line by 20 character menu driven, liquid crystal display with backlight and heater.

7.4.5. The ADU built-in Diagnostic Wizard shall automatically pinpoint faulty signals, offer trouble-shooting guidance and automatically isolate and identify problems.

7.4.6. The ADU shall be equipped with Event Logging, displaying the CMUip time-stamped nonvolatile event log records with the complete intersection status as well as AC Line events, monitor resets, temperature and true RMS voltages and currents.

7.5. Model 2216-24-HV Cabinet Power Supply (CPS)

7.5.1. The Model 2216-24-HV Cabinet Power Supply is a modular 19 inch rack mounted power supply device providing the DC voltages necessary for operating the ATC Cabinet. Power Factor Correction shall be provided. The PS2216-24-HV provides a regulated 24 VDC output and a regulated 48 VDC output.

7.5.2. The CPS shall be 1U (1.7") in height maximum and designed to mount into a 19 inch EIA rack. The maximum depth of the CPS shall be less than 8.0".

7.5.3. The CPS shall be powered from AC Line provided by an AC Line cord with NEMA Type 5-15 plug. The input voltage range shall from 80 to 270 VAC, 45 to 65 Hz. Power Factor Correction shall be greater than 0.95.

7.5.4. The PS2216-24-HV shall be rated at 168 Watts, and shall provide:

7.5.4.1. 48 VDC +/- 2 VDC at 1 Amp maximum

7.5.4.2. 24 VDC +/- 2 VDC at 5 Amps maximum

7.5.5. Each DC output shall be electrically isolated from AC Mains and Earth Ground.

7.5.6. The DC Output Ripple on each output shall be less than 300 mVpp when measured at 20MHz of bandwidth using a 12" twisted pair-wire terminated with a 0.1uf & 47uf capacitor.

7.5.7. The DC outputs shall attain regulated output levels within 500 milliseconds of applied AC Line voltage of 110 VAC nominal across the operating temperature range and at rated full load.

7.5.8. The DC outputs shall maintain regulated output level for a minimum of 50 milliseconds across the operating temperature range and at rated full load.

7.5.9. The CPS outputs shall be fused for over-current protection and shall be protected against voltage transients by a 1500 Watt suppressor.

7.5.10. All indicators shall be clear LEDs. Clear LEDs shall not depend on a reflector or diffusion as part of its design. Clear LEDs shall not appear to be ON when exposed to ambient light. The following indicators shall be provided:

7.5.10.1. A green AC Line indicator shall illuminate to indicate Operational input voltage is proper and the AC Line fuse is intact.

7.5.10.2. A green indicator shall illuminate to indicate the 48 VDC output is active and the fuse is intact.

7.5.10.3. A green indicator shall illuminate to indicate the 24 VDC output is active and the fuse is intact.

7.5.11. Banana style test jacks shall be provided on the front panel for each DC output and DC ground. Mating banana plug spring width shall be 0.175 inches nominal.

7.5.12. The output connector shall be a Phoenix Contact #1825161 and shall mate with a Phoenix Contact #1825352 or equivalent. Pin #1 shall be the right most pin when viewed from the rear of the supply.

7.5.13. The 48 VDC output shall be electrically isolated from the AC Line input and the 24VDC and 12 VDC outputs. The 48VDC Ground (pin #2) must be connected within the cabinet to the same AC Neutral that the Cabinet Monitor Unit (CMU) is connected to in the cabinet.

Table 2 – Power Supply Connector Pin-Out

Pin	Function
1	+48VDC
2	48VDC Ground
3	+24VDC
4	+12VDC (for 12VDV version only)
5	24/12VDC Ground
6	Chassis Ground

7.6. Model 21H High-Density Flash Transfer Relay (HDFTR)

7.6.1. The HDFTR shall be a Struthers-Dunn model 21XBXHL-48VDC or approved equal.
7.6.2. The HDFTR shall have a hermetically sealed cover and shall be moisture proof.
7.6.3. The HDFTR shall be filled with dry nitrogen to protect contacts from corrosion and to prevent condensation.
7.6.4. The HDFTR shall have a cupronickel cover that is salt water resistant.
7.6.5. The HDFTR contacts shall be rated at 10 Amps @ 120 VAC.
7.6.6. The coil of the HDFTR shall be rated at 48 VDC.
7.6.7. The HDFTR shall have an LED indicator to display contact transfer position.

7.7. Main Contactor (MC)

7.7.1. The MC shall be a combination solid-state and electromechanical relay in parallel and shall be rated at 60 Amps @120 VAC and 50 Amps @ 240VAC. The coil of the MC shall be rated at 48 VDC.
7.7.2. The MC shall be equipped with input indicator and shall have SPST- N.O. contacts.
7.7.3. The MC shall be hermetically sealed.
7.7.4. The MC shall be easily accessible without removing any covers or panels.
7.7.5. The MC shall be mounted on the Service Assembly for access to the wiring and to view the LED indicator.

7.8. Cabinet Suppressor-Filter

7.8.1. The cabinet shall be equipped with a pluggable Cabinet Suppressor–Filter, mounted in the Service Assembly. The pluggable Cabinet Suppressor-Filter shall be a Citel model DS72US-120S/G-F-BTT or approved equal.
7.8.2. The unit shall incorporate the use of warning and failure indicators and shall have a dry relay contact remote sensing circuit.
7.8.3. The unit shall include a UL1449 ed.4 Listed Type 1 Surge module and a UL1283 Listed Filter.

7.8.4. The unit shall be rated at a maximum discharge current of 75 kA and a VPR of 1500V.

7.9. Detection Module Suppressor

7.9.1. The Detection Module Suppressor shall be Hesco model HE6LC-6, Asco Power model MRA-6LC-6, or approved equal.
7.9.2. The Detection Module Suppressor shall be modular and pluggable.
7.9.3. The unit shall be epoxy encapsulated and equipped with 6-position 5.08 mm Phoenix Contact or approved equal.
7.9.4. The unit shall be able to protect 6 circuits.
7.9.5. The device operating voltage shall be 75 VAC and clamping voltage shall be 130 VDC.
7.9.6. The device dimensions shall be 2" H x 0.7" W x 1.2" D.

7.10. HDSP Suppressor

7.10.1. The HDSP Suppressor shall be modular and pluggable. The unit shall be a Hesco HE103C-9, Asco MPA303-9, or approved equal.
7.10.2. The unit shall be epoxy encapsulated and equipped with 9-position 5.08 mm Phoenix Contact connector or approved equal.
7.10.3. The unit shall be able to protect 6 circuits.
7.10.4. The device operating voltage shall be 120 VAC and clamping voltage shall be 340 VAC.
7.10.5. The unit dimensions shall be 2" H x 0.7" W x 2" D.

8. Miscellaneous

8.1. Cabinet Print

8.1.1. Fabrication drawings shall be submitted for review within thirty (30) calendar days from the date of contract award and approved prior to the fabrication of the initial and any subsequent sample cabinets.
8.1.2. Three copies of the wiring diagram sheets for the cabinet shall be furnished in a weatherproof plastic pouch placed in the cabinet. Cabinet wiring diagrams shall be on non-fading plotter paper.

8.2. Manual

8.2.1. One copy of manual documentation shall be supplied for each unit purchased. The manual shall be printed on 8.5 in by 11 in paper, with the exception that schematics, layouts, parts lists and plan details may be on 11 in by 17 in sheets, with each sheet neatly folded to 8.5 in by 11 in size.

9. Warranty Statement, Support and Sample Delivery

9.1. Warranty Statement

9.1.1. The cabinet, including cabinet wiring and all related hardware, shall be guaranteed against defective materials or workmanship for a twenty-four (24) month period from date of delivery. Units or components that are identified as being defective before the warranty has expired shall be replaced within thirty (30) calendar days. The vendor shall be responsible for all costs, including

shipping, incurred by City for all units that are installed at an intersection and fail as a result of warranty covered failure within the warranty period.

9.2. Support

9.2.1. Vendor shall provide phone technical support with a response time of two (2) hours or less during vendor's normal business hours. This technical support shall be at no additional cost during the life of the contract and during the warranty period. The technical support shall be provided by qualified personnel with extensive knowledge of the hardware characteristics of the cabinets provided in this contract.

9.3. Sample Delivery

9.3.1. A sample cabinet shall be delivered to the City for conformance testing at the address below within sixty (60) calendar days from the approval of the fabrication drawings. If the sample cabinet fails the operational test or to meet standard practice workmanship, the vendor shall be required to address and resolve all items of non-compliance within four (4) weeks of being notified of non-complying issues.

City of San Jose, Department of Transportation
Mabury Service Yard
1404 Mabury Road
San Jose, CA 95133-1034
Attn: Randy Griffith

9.3.2. Prior to delivery of each production unit, the final approved cabinet assembly shall be tested by the cabinet manufacturer or authorized local distributor to ensure proper component integration and operation. All inputs and outputs shall be tested. The cabinet manufacturer shall provide certification that the cabinet assembly has met all ATCC quality assurance tests.