



BUILDING ENGINEERING RESOURCES, INC.

**Schematic Narrative
Mechanical, Electrical, Plumbing & Fire Protection Systems**

**MIDDLEBOROUGH POLICE DEPARTMENT
MIDDLEBOROUGH, MA**

PREPARED FOR:

Kaestle Boos Associates, Inc.
325 Foxborough Boulevard
Foxborough, MA 02035

PREPARED BY:

Building Engineering Resources, Inc.
Geraldo Alba – Mechanical
Rich Fitts – Electrical
Angel Rey Vega – Plumbing/Fire Protection

SEPTEMBER 17, 2015

HVAC:

Heating and Cooling System:

- Provide a 30 ton Variable Refrigerant Flow Recovery system to heat and cool the building with one outdoor concrete pad mounted condensing unit, controls, condensate piping and all required appurtenances for a complete operational system recommended by the equipment manufactures. The VRF system shall be capable of heating and cooling the building simultaneously. Refrigerant piping shall be type ACR and shall be piped to each indoor air handling unit.
- The indoor air handling units shall be ceiling concealed type with ducted supply and return. Each unit shall be provided with a condensate pump piped to the nearest janitor's sink. Install piping per code. Provide a thermostat for each air handling unit. System shall consist of 17 zones and indoor VRF units.
- Communications Room – Provide two (2) 1.5 ton ductless split heat pump system with low ambient kit with thermostats. Provide ventilation from outdoor connected to unit.
- IT/E911 Room - Provide two (2) 1.5 ton ductless split heat pump system with low ambient kit with thermostats.

Heating Only Spaces:

- Vestibules - Provide three (3) 1.5 kW electric heat cabinet unit heater with thermostat as each vestibule.
- Sallyport – Provide one (1) 80 MBH gas fired sealed combustion high efficient (92% +) unit heaters with wall mounted thermostat.
- Storage in Sallyport - Provide one (1) 1.0 kW electric unit heater with unit mounted thermostat.
- Mechanical Room - Provide one (1) 1.0 kW electric unit heater with unit mounted thermostat.
- Auxiliary Building - Provide one (1) 80 MBH gas fired sealed combustion high efficient (92% +) unit heaters with wall mounted thermostat. One (1) 80 MBH ducted gas fired sealed combustion high efficient (92% +) unit heater with wall mounted thermostat.

Cooling Only Spaces:

- Network Room – Provide a 1.0 ton ductless split system with low ambient kit and thermostat.
- Radio Room – Provide a 0.5 ton ductless split system with low ambient kit and thermostat.

Ventilation System:

- Provide a 1000 CFM sensible and latent type energy recovery unit to ventilate and exhaust the office and locker room section of the building. Provide wall exhaust air and outdoor air intake louvers and duct to the energy recovery unit. Location of each louver shall meet all clearances required by the mechanical code. Provide supply outdoor and exhaust air ductwork to the return of the air handling unit serving each zone.
- Provide a 900 CFM sensible and latent type energy recovery unit to ventilate and exhaust the cell block area. Provide wall exhaust air and outdoor air intake louvers and duct to the energy recovery unit. Location of each louver shall meet all clearances required by the mechanical code. Provide supply outdoor and exhaust air ductwork to each space. The exhaust and supply fan shall be capable of being controlled at the fire alarm panel to control smoke and space pressurization.
- Provide a 350 CFM sensible and latent type energy recovery unit to ventilate and exhaust the training room with CO2 detection and VFD operation. Provide wall exhaust air and outdoor air intake louvers and duct to the energy recovery unit. Location of each louver shall meet all clearances required by the mechanical code. Provide supply outdoor and exhaust air ductwork to the return of the air handling unit serving the space.
- Provide a 900 CFM sensible and latent type energy recovery unit to ventilate and exhaust the maintenance garage. Provide wall exhaust air and outdoor air intake louvers and duct to the energy recovery unit. Location of each louver shall meet all clearances required by the mechanical code. Provide supply outdoor and exhaust air ductwork to the space.
- Provide a 200 CFM exhaust fan, ductwork and stainless steel hood for the weapon cleaning desk. Fan shall be controlled by a wall mounted on/off switch.
- Provide a vehicle exhaust detection (CO/NO2) system in the Sallyport. Provide a two speed exhaust fan, ductwork and wall louver. Exhaust fan shall run continuously at 200 CFM and upon alarm at 1000 CFM. Provide an intake louver with motorized damper to open upon high level alarm, damper shall be closed once CO/NO2 level has dropped.
- Provide a vehicle exhaust detection (CO/NO2) system in the Maintenance Garage. Provide a two speed exhaust fan, ductwork and wall louver. Exhaust fan shall run continuously at 200 CFM and upon alarm at 1000 CFM. Provide an intake louver with motorized damper to open upon high level alarm, damper shall be closed once CO/NO2 level has dropped.

Controls:

- Furnish and install control components for a complete operational system of all equipment. The system shall include all power, transformers, thermostats, sensors, controllers, dampers, actuators, wiring, and other accessories required for a complete installation. System shall include all hardware to operate as specified. Controls shall be provided by the Variable Refrigerant Flow (VRF) system manufacture and shall be capable of monitored and

controlled by a desktop computer via the web with graphics. The VRF controller shall control and monitor the energy recovery system. All other equipment listed shall be stand along type.

- The energy recovery unit serving the cell block space shall be capable of being controlled at the fire alarm panel to control smoke and space pressurization.

ELECTRICAL:

Site Electrical:

- Provide LED pole mounted site lighting. Provide 1 foot-candle average illumination across the parking surface. Provide concrete pole bases for all poles. Provide integral flagpole light fixtures. Provide LED canopy lighting for under the carport. Provide LED sign lighting for both sides of the roadside sign. Provide time clock controls for all site lighting. Provide power for sliding cantilever gate system motor. Gate shall have “click to enter” controls.

Electric Service:

- Provide a new electric service to the building. The new service shall be 120/208 volt, three phase, four wire, 600 Amperes. The primary service shall originate on a utility pole located on Wood Street and run underground to a utility standard padmount transformer. Provide (2) 4”schedule 40 PVC, concrete encased conduits for primary wiring from the utility pole to the transformer pad. Provide the transformer concrete pad, concrete filled bollards and grounding as required by utility company standards. Provide secondary service from the utility transformer to the main electric room under slab to the main distribution Panel. The main distribution panel shall feed both transfer switches listed below. The duct bank shall contain (2) sets of (4) #350 kcmil copper conductors in schedule 40 PVC conduit, (1) spare 4” conduit which will all be concrete encased.

Standby Generator:

- Provide a 175 kW diesel fired standby generator in a weatherproof, sound attenuated enclosure. The generator shall have a base mounted fuel tank with enough capacity to run for 72 hours under full load. Provide a concrete pad, concrete filled bollards and grounding as required by code. Provide power from the life safety panel for the battery charger and engine block heater. Provide (2) generator set mounted circuit breakers to feed (2) automatic transfer switches (ATS), (1) 500 amp for building standby power and (1) 100 amp for life safety loads. Provide a life safety panelboard downstream of the life safety ATS and a distribution panelboard downstream of the Standby ATS to feed separate panels for mechanical, receptacle and lighting loads.

Interior Lighting:

- Provide LED type 2x4 or 2x2 perforated center basket direct/indirect lay-in fixtures in all non-secure areas with wall mounted vacancy sensors in each area. Provide detention grade LED type fixtures in all secure areas.

Emergency Lighting:

- Provide emergency lighting connected to the generator to maintain one footcandle along all paths of egress throughout the building. Provide switch override relays for each switched lighting location to turn emergency fixtures “on” regardless of the switch position.

Exit Signage:

- Provide internally illuminated LED exit signs connected to the life safety panelboard for constant “on” operation. Locate signs, sign faces and directional arrows per the architectural reflected ceiling plan.

Receptacle Power:

- In each restroom provide a GFCI outlet at 42” A.F.F. on the sidewall adjacent to the sink.
- In typical offices and interview rooms, provide (1) 20 amp duplex outlet on each wall, and one Tel data outlet box in the desk location. A typical data outlet consists of a 4” square outlet box with a single gang reducer and 1” conduit turned out above the accessible ceiling with an insulated bushing.
- In storage rooms, utility rooms and janitor’s closets, provide a 20 amp duplex receptacle inside the room adjacent to the latch side of the door at 18” A.F.F., vertically aligned with the light switch.

Communications:

- Provide (4) quad 20 amp receptacles and (2) data outlets above and below the dispatch console. Provide (4) general outlets to cover convenience power for the rest of the room. Provide (2) 4” under slab conduits to the server room for cabling.
- In corridors provide 20 amp convenience receptacles spaced no further than 40 feet apart for general cleaning. Each corridor enclosed by doors, shorter than 40 feet shall have at least one convenience outlet. Provide one convenience outlet in both the men’s and women’s locker rooms.

Armory:

- Provide (2) 20 amp receptacles and (1) data outlets above the counter.

Reports:

- Provide (4) quad 20 amp receptacles and (4) data outlets below the Counter.

Training:

- Provide (10) floor boxes with (2) duplex and (2) data outlets within each box. Provide convenience outlets on the remaining walls and a data outlet under the large marker board. Provide power for overhead projector and screen.

Evidence Storage:

- Provide a dedicated outlet for refrigerator. Provide convenience outlets on each wall.

Evidence Processing:

- Provide (2) 20 amp receptacles and (1) data outlets above the counter. Provide a dedicated 20 amp single pole circuit and connection to fume hood. Provide one convenience outlet in the room.

Booking:

- Provide (2) quad 20 amp receptacles and (2) data outlets above and below the counter. Provide (1) dedicated outlet for the breathalyzer adjacent to the entrance to the booking platform.

Sallyport:

- Provide (6) 20 amp receptacles and (2) ceiling mounted cord reels. Receptacles in the Sallyport shall be mounted at 48” A.F.F. and have “in use” weatherproof covers. Provide power for overhead doors. Overhead doors shall have a red and green signal light tied to a limit switch so that the signal displays red until the overhead door has reached the full open position, then displays a green signal.

Power for Mechanical, Plumbing and Fire Protection Equipment:

- Provide power for all mechanical and plumbing equipment. Provide heavy duty disconnects, thermal switches motor controls and flexible connections to equipment. Equipment located outside the building shall be weatherproof NEMA 3R rated. Any exterior equipment shall have a GFCI rated convenience outlet with an “in use” cover.

Fire Alarm:

- Provide a complete analog/addressable fire detection, alarm and control system in compliance with NFPA 70, 72, 90A, 92A and 101. Evacuation notification shall consist of an audio evacuation tone and visual strobe signaling. Provide interface and monitoring of the building sprinkler system flow, tamper, and low pressure switches. The system shall include a digital alarm communication transmitter and two leased telephone lines for central station notification. Locate the fire alarm control panel in the Communications Room, and provide an 80 character remote annunciator and static graphic map in the lobby

Lightning Protection:

- Provide a complete lightning protection system. System shall be in compliance with NFPA 780.

Auxiliary Building:

This building shall derive its power from the main building. A sub-panelboard shall be provided in the Auxiliary Building. This board shall be rated for 60 amps at 120/208 volts 3 phase 4 wire. All branch circuits required for the Auxiliary Building shall be derived from this panel. Lighting will consist of LED type light fixtures. General purpose receptacles will be located throughout

the building. Power will be provided to all overhead door operators. Emergency lighting and Exit signage will be provided in accordance with all Codes. Provide manual pull stations, heat detectors and notification appliances with this building. Provide connection of these devices/appliances to the main building fire alarm system.

PLUMBING:

Domestic Water:

- A new 4-inch domestic water service shall be brought into the building from the street main. The domestic water service shall consist of a water meter and 2-inch copper supply main. The cold water main shall supply all plumbing fixtures requiring domestic water.
- Hot water shall be generated by a high efficiency gas fired water heater located in the Mechanical Room. The system shall feed each fixture that requires hot water and shall have a continuous hot water return line back to the water heating plant. A master thermostatic mixing valve shall be located adjacent to the water heater to ensure hot water temperatures are set at 120°F.
- Tempered water shall be provided off of the 140°F loop for any emergency showers required. The emergency shower and dedicated mixing valve shall be similar to Guardian.
- A reduced pressure zone backflow preventer shall be installed within the Mechanical Room to provide non-potable make-up water to any mechanical equipment. If necessary, an additional backflow preventer shall be installed for the landscape irrigation system.
- All new aboveground domestic water piping shall be Type L copper tube with wrought copper fittings and 95/5 solder. All new buried domestic water piping shall be Type K copper with cast brass fittings and silver solder joints.
- All domestic water piping shall be covered with molded fiberglass insulation with vapor barrier all service jacket and PVC fittings. Domestic cold water piping 1¼-inch and smaller shall have 1/2-inch insulation. Domestic cold water piping 1½-inch and larger shall have 1-inch insulation. Domestic hot water and hot water return piping 1¼-inch and smaller shall have 1-inch insulation. Domestic hot water piping 1½-inch and larger shall have 1½-inch insulation.

Sanitary and Waste System:

- A new 6-inch gravity sanitary waste line shall collect all sanitary and waste piping from plumbing fixtures within the building. The new 6-inch sanitary waste line shall

be coordinated and brought to the street sanitary main as indicated in the Site Utility Plans.

- A new 4-inch gravity garage waste system shall be provided at Sallyport and Impound bays that will service trench/floor drains located in these areas. The 4-inch garage waste shall be piped through a Massachusetts approved underground gasoline, oil and sand interceptor that shall be coordinated with the Site Utility Plans.
- All new buried sanitary and garage waste piping shall be heavy duty bell and spigot cast iron with neoprene resilient gaskets.
- Buried sanitary and garage waste piping through foundation wall shall be heavy duty bell and spigot cast iron with lead and oakum joints.
- All new above-floor sanitary waste piping shall be service weight cast iron with stainless steel mechanical couplings.
- All new above-floor sanitary waste piping 2-inches and smaller shall be Type DWV hard drawn seamless copper with wrought copper drainage fitting joints with 95/5 solder.

Vent System:

- Each fixture shall be properly vented and piped to atmosphere.
- Garage venting and sanitary venting shall run independently through the roof.
- All buried sanitary and garage vent piping shall be service weight bell and spigot cast iron with neoprene resilient gaskets.
- All above floor sanitary and garage vent piping shall be cast iron with stainless steel mechanical couplings.
- All above floor sanitary vent piping 2-inches and smaller shall be Type DWV hard drawn seamless copper with wrought copper drainage fitting joints with 95/5 solder.

Storm System:

- Storm water shall be collected by external gutters and downspouts.
- The 4" cast iron boots shall be provided and tied into on-site drainage as indicated in the Civil Drawings.

Natural Gas System:

- A new natural gas service shall be brought to the building from the street main. A meter shall be located on the exterior of the building. The gas system shall be piped

to all HVAC and plumbing equipment requiring gas fuel. Gas system pressure shall be low pressure within the building.

- An additional gas meter shall be provided at the building for the new gas-fired emergency generator.
- All new above ground natural gas piping shall be schedule 40 carbon steel with threaded malleable iron fittings or welded, as required by code.

Compressed Air System:

- The new compressed air service shall consist of an air compressor with tank, dryer and filter located in the mezzanine of the Auxiliary Building.
- All new aboveground compressed air piping shall be Type L copper tube with wrought copper fittings and 95/5 solder.

Plumbing Fixtures and Equipment:

- New plumbing fixtures shall consist of wall mounted flush valve water closets, counter mounted and wall hung lavatories, wall hung flush valve urinals, showers enclosures, a wall mounted electric water cooler, wall hung combination institutional lavatories and water closets, counter mounted stainless steel sinks, a combination emergency shower and eyewash, floor drains, hose bibbs and exterior wall hydrants.
- All new flush valves, faucets and showers shall be manual low-flow type fixtures. ADA compliant and barrier-free plumbing fixtures shall be installed as required by code.

FIRE PROTECTION:

Automatic Sprinkler System:

- A new 6-inch fire protection line shall be brought into the new building and run up to the Mechanical Room. A horizontal double check valve assembly and wet alarm check valve assembly shall be installed along with floor-zone control valve assemblies for each floor level.
- A dry system with dry alarm check valve assembly shall be installed and rise up to protect the unheated attic spaces. Dry systems will not be utilized at the Sallyport, Impound and Maintenance bays. The temperature at all spaces shall be kept to a minimum of 40°F to prevent sprinkler pipe from freezing.
- The building shall be fully sprinklered based on the current edition NFPA 13 and Massachusetts Building and Fire Codes.

- Sprinklers in common spaces with ceilings shall be quick response, chrome and recessed type. Sprinklers in common areas with no ceilings shall be quick response bronze, upright type. Mechanical areas and any other areas subject to damage shall have cages on sprinklers.
- General and attic areas shall be designed based on light hazard occupancies. Sallyport, Impound Bay, Maintenance Bays, Storage and Mechanical areas shall be designed based on Ordinary Hazard Group 1 or Group 2 occupancies. Hazardous Storage and Vehicle Storage area densities shall be coordinated with NFPA 13.
- Sprinkler spacing in light hazard occupancies shall be 225 square feet per sprinkler. Sprinkler spacing in the unheated attic areas shall be 130 square feet per sprinkler. Sprinkler spacing in Ordinary Hazard occupancies shall be 130 square feet per sprinkler maximum.
- Seismic requirements shall be based on NFPA 13 and Massachusetts Building and Fire Code requirements.
- A hydrant flow test has not been performed to date. Current flow information is not available at this time. An allowance for an in-line vertical fire pump should be carried at this time. Pump shall be based on a 750 gpm, 50 psi pump set.