



Mechanical Options Narrative	
Project Name:	New Caribou Police Facility
Project Location:	Caribou, ME
Document Date:	January 6, 2025
Project #:	530419L

Executive Summary

Dubois & King, Inc. was engaged by Artifex Architects & Engineers to develop a HVAC Options narrative for review and discussion with stakeholders for the new Caribou Police Facility. The goal is to install cost-effective HVAC systems while meeting or exceeding the code and the Owner's operational requirements.

All new construction elements and systems will conform to the following:

- The Maine Uniform Building and Energy Code
- IBC 2015 (International Building Code)
- IECC 2015 (International Energy Conservation Code)
- IMC 2015 (International Mechanical Code)
- IPC 2015 (International Plumbing Code)
- NEC 2020 (National Electrical Code)
- ASHRAE Standards
- NFPA Standards (2013)
- Local Authorities Having Jurisdiction (AHJ)
- All Other Applicable Codes, Standards and State Amendments



MECHANICAL

❖ Option #1 – 4-Pipe Fan Coils with Air Source Heat Pump

The building shall be provided with a modular Air Source Heat pump with chilled and hot water systems to be located on grade. The heat pump shall provide hot water supply/return and chilled water supply/return to the building utilizing a hydronic distribution system throughout the building serving 4-pipe fan coils to allow for simultaneous operations. The chilled water loop shall be a variable speed primary type and the hot water heating system shall be a primary/secondary configuration with the backup boiler piped in as an injection loop. The heat pump shall be sized as required to completely serve the cooling load of the building. A LP gas fired condensing boiler plant shall be utilized to supplement the air source heat pumps as required and below 10°F the heat pump shall be shut down and the boiler plant shall carry the entire load. The boiler plant shall be 100% redundant to allow for complete operation of the building in the case of a boiler failure. The boilers shall be sealed combustion type with a flue and combustion air duct routed in from the exterior.

The building shall be provided with a Dedicated Outdoor Air System (DOAS) located in the Mechanical room for ventilation air throughout the building. Fresh air shall be ducted to the return side of all the fan coils in the building as required to meet ASHRAE 62.1 and then return air from the occupied spaces and the bathrooms shall be brought back and run through the energy recovery wheel to reclaim as much energy as possible before discharging to the outdoors. The fresh air shall be provided with a chilled and hot water coil in a reheat configuration to allow for dehumidification and heating of the air stream. Occupancy sensors and control dampers shall be provided in spaces of high occupancy as per ASHRAE and IECC.

Each space shall be provided with a 4-pipe fan coil to allow for heating, cooling and dehumidification of the space. They shall be controlled by space mounted thermostats and served off the building hydronic systems. They shall be ducted to ceiling returns and diffusers. IT/Data and Electrical rooms shall be provided with 2-Pipe wall mounted cooling only fan coils.

The sally port shall be provided with an exhaust fan sized for 0.75 CFM/SF and it shall be controlled via a CO/Nox sensor and control panel located on the wall. It shall vary the fan speed as required when CO/Nox is detected in the space. Unit heaters shall be provided in the sally port for heating the space.

The evidence and weapons storage shall be provided with independent exhaust systems to the outdoors and heating and cooling fan coils as well as dehumidification. Fresh air shall be provided by the central DOAS.

A new Tridium Niagara compatible DDC BMS system shall be provided and extended to all the building systems to allow for central control and remote access. The system shall implement all space set points and occupancy schedules.

Mechanical ductwork shall be:

- Ductwork shall be made of galvanized steel and constructed in accordance with the recommendations of the ASHRAE Guide and SMACNA Guide (Current Editions). Any flexible ductwork shall be in lengths no greater than 5'-0" and shall not pass through any fire rated assemblies. Flexible ductwork shall only be allowed in concealed locations.



- Concealed above ground ductwork shall be made of galvanized steel and constructed in accordance with the recommendations of the ASHRAE Guide and SMACNA Guide (Current Edition).
- Flexible ductwork, where applicable, shall be in lengths no greater than 6'-0" and shall not pass through any fire rated assemblies.
- Ductwork insulation shall be provided as per IECC 2018 requirements. Any ductwork running through the attic shall be considered in untampered/outdoor conditions.

Mechanical piping shall be:

- 2"NPS and smaller shall be Type L Copper with soldered joints or Pro-Press mechanical joint.
- 2 ½" NPS and larger shall be schedule 40 steel, grooved with mechanical joints.

❖ **Option #2 –Air Source Hybrid VRF Heat Pump**

The building shall be provided with a Mitsubishi Air Source Hybrid VRF Heat Pump. The heat pumps shall be located on grade and shall be rated for a minimum operational temperature of -27°F. The system shall be 410a refrigerant piped between the branch controllers and the outdoor heat pumps. At the branch controllers the energy is transferred to a hydronic system and pumped to and from the VRF fan coils to minimize piping in the space to prepare for the refrigerant switchover on December 31, 2025.

A LP Gas condensing boiler plant shall be provided and piped to radiant ceiling panels in the spaces for backup heating in the case of an issue at minimum design temperatures. The radiant panels shall operate as a secondary heating source.

The building shall be provided with a Dedicated Outdoor Air System (DOAS) located in the Mechanical room for ventilation air throughout the building. Fresh air shall be ducted to the return side of all the fan coils in the building as required to meet ASHRAE 62.1 and then return air from the occupied spaces and the bathrooms shall be brought back and run through the energy recovery wheel to reclaim as much energy as possible before discharging to the outdoors. The fresh air shall be provided with hot water coil in the ductwork to allow for heating of the air stream. Occupancy sensors and control dampers shall be provided in spaces of high occupancy as per ASHRAE and IECC.

Each space shall be provided with a VRF fan coil to allow for heating, cooling and dehumidification of the space. They shall be controlled by space mounted thermostats. They shall operate as first stage heating and cooling for the spaces. They shall be ducted to ceiling returns and diffusers.

IT/Data and Electrical rooms shall be provided with wall mounted cooling only fan coils.

The sally port shall be provided with an exhaust fan sized for 0.75 CFM/SF and it shall be controlled via a CO/Nox sensor and control panel located on the wall. It shall vary the fan speed as required when CO/Nox is detected in the space. Unit heaters shall be provided in the sally port for heating the space.

The evidence and weapons storage shall be provided with independent exhaust systems to the outdoors and heating and cooling fan coils as well as dehumidification. Fresh air shall be provided by the central DOAS.



A new Tridium Niagara compatible DDC BMS system shall be provided and extended to all the building systems to allow for central control and remote access. The system shall implement all space set points and occupancy schedules.

Mechanical ductwork shall be:

- Ductwork shall be made of galvanized steel and constructed in accordance with the recommendations of the ASHRAE Guide and SMACNA Guide (Current Editions). Any flexible ductwork shall be in lengths no greater than 5'-0" and shall not pass through any fire rated assemblies. Flexible ductwork shall only be allowed in concealed locations.
- Concealed above ground ductwork shall be made of galvanized steel and constructed in accordance with the recommendations of the ASHRAE Guide and SMACNA Guide (Current Edition).
- Flexible ductwork, where applicable, shall be in lengths no greater than 6'-0" and shall not pass through any fire rated assemblies.
- Ductwork insulation shall be provided as per IECC 2015 requirements. Any ductwork running through the attic shall be considered in untampered/outdoor conditions.

Mechanical piping shall be:

- 2"NPS and smaller shall be Type L Copper with soldered joints or Pro-Press mechanical joint.
- 2 ½" NPS and larger shall be schedule 40 steel, grooved with mechanical joints.
- Refrigerant piping shall be copper type.
- Hybrid VRF piping between the fan coils and the branch controller shall be PEX as specified by the manufacturer.