**MECHANICAL**

**General**

The Basis of Design (BOD) described herein is based on the current understanding of information that was disseminated from initial documentation, meetings with City Officials, and field visits.

The scope of the project involves the interior renovations and expansion of the existing Animal Shelter into a larger facility.

Codes & Standards

The HVAC systems will be designed to comply with the requirements of the Connecticut State Building Codes as well as the State of Connecticut Department of Agriculture Animal Shelter Standards and Facility requirements. This includes, but is not limited to, the following codes and Standards:

The 2022 Building Codes of the State of Connecticut- (adopted October 2022 ) based on modified versions of

2021 edition of the International Building Code (IBC).

2021 edition of the International Existing Building Code (IEBC).

2021 edition of the International Mechanical Code (IMC).

2021 edition of the International Energy Conservation Code (IECC).

2021 edition of portions of the International Fire Code (IFC)

2021 edition of the International Energy Conservation Code (IECC).

**Design Criteria**

Indoor Design Conditions:

Indoor ambient temperature shall be maintained at all times between fifty-five (55) and eighty (80) degrees Fahrenheit, unless other temperatures are medically required by a Connecticut licensed veterinarian.

HVAC Systems

The existing HVAC consists of one heat pump system. A new air system boiler for heating and cooling should be designed to provide ambient building temperature to all staff and animals throughout the year. Condensing units for the air handlers are to be located on the north side of the building grounds. The air handlers should utilize a ducted return air system. Outside air should be provided by a common duct to a rooftop ventilator. Animal area exhaust area should be vented through a rooftop fan exhaust.

Supply diffusers and return grilles as required to accommodate the new floor plan. The HVAC systems will continue to be thermostatically controlled. New ductwork will be installed as required to accommodate the new floor plan. New ceiling diffusers will be added as well.

It is anticipated that all new HVAC work related to the space renovations will be as follows, but not limited to:

* Provide new supply ductwork, duct accessories, flexible connections, registers, grilles, & diffusers, etc. as required to suit the new layout.
* Testing and balancing of the newly installed HVAC duct systems.

All supply, return, and exhaust duct distribution concealed from view and/or run in the mechanical equipment rooms will be low-pressure, galvanized ductwork. Outdoor air intake ductwork and exhaust ducts carrying moisture laden air shall be aluminum. All supply, return, and exhaust duct distribution visible to the occupied spaces shall be round, low-pressure, spiral seamed, galvanized ductwork with insulation in the interstitial space.

All duct insulation shall have R-values compliant with the IECC.

Exhaust Systems

A new toilet exhaust shall be provided by a new exhaust fan on the roof for the existing building toilet. The existing utility closet will be added to the existing building exhaust systems.

Where any new exhaust work is required, resulting from the new space modifications, the MC shall provide new branch ductwork, duct accessories, flexible connections, ceiling grilles, etc. as necessary to locate the new exhaust in its respective space. The following spaces will require exhaust: New Dog Kennel Area and Cat Kennel Area.

Temperature Control System

The existing Building HVAC systems are thermostatically controlled. All renovations will continue to be thermostatically controlled.

**End of Section**

**PLUMBING & FIRE PROTECTION SYSTEMS**

General

This narrative is intended to provide adequate information about the scope of work for plumbing and FP systems required for the new facility.

The existing toilet will need to be field verified to determine if its code compliant as an ADA toilet.

In the event the toilet is not, modifications should be made to comply with ADA accessibility.

**Applicable Codes and Guidance**

* State of Connecticut Fire Safety Code
* Connecticut Department of Environmental Protection Rules and Regulations.
* NFPA 101 – Life Safety Code
* FM Global Standards.
* UL Underwriter Laboratories Inc.

PLUMBING

Design Criteria

Domestic Cold Water: Maximum of 80 PSI and a Minimum of 45 PSI at any plumbing fixture. Pipe sizes selected to have a maximum of 2 PSI per 100 ft pressure loss and a velocity of no higher than 6 ft/second.

Domestic Hot Water: Maximum of 80 PSI Minimum of 45 PSI at any plumbing fixture. Pipe sizes selected to have a maximum of 2 PSI per 100 ft pressure loss and a velocity of no higher than 8 ft/second. A minimum temperature of 110° F will be supplied to all fixtures.

Provide low flow plumbing fixtures.

* Water Closets (1.28 GPF)
* Lavatories (0.5 GPM)

Utility Infrastructure

Utility infrastructure is existing. Existing sanitary sewer system will remain connected to the existing piping that is located below slab. New exterior and interior floor drains to be connected to existing floor drain system. Any new plumbing fixture vents will be connected to the existing piping. All new domestic cold and hot water will be connected to the existing distribution system piping.

System Description

Sanitary Waste and Vent System:

* Horizontal waste piping will be pitched to allow for drainage by gravity.
* The piping system above and below grade shall be hub less service weight cast iron pipe and fittings with extra heavy-duty neoprene gasketed couplings, stainless steel corrugated jackets with a minimum of 4 stainless steel clamps per coupling.

Domestic Cold-Water Supply, Hot Water Supply and Hot Water Return Systems:

* Domestic cold-water supply, hot water supply and hot water return will be provided by the existing central facilities. New branches will be provided and connected to nearby existing mains.
* Isolation valves will be provided for maintenance purposes of serving areas, or fixture groups.
* The piping system shall be Type 'L' copper tube with wrought copper or brass fittings and lead-free solder joints. Pipes 2 inch and larger may be joined by roll groove mechanical couplings or brazed. Piping will be insulated.
* The system will be designed to maintain a maximum velocity of 8 fps at design flow conditions.
* Pressure reducing valves, if required, will be provided to limit pressure to between 45 psi and 80 psi.
* System will be designed to prevent water hammer conditions by providing shock arrestors for quick closing valves.

Plumbing Fixtures:

* New fixtures shall be provided for all new toilet rooms.
* Fixtures may include water closets, lavatories etc., complete with all trim, stops, hangers, accessories, supports, and carriers.
* In general, plumbing fixtures will be vitreous china.
* All plumbing fixtures to comply with the low flow requirements of the plumbing code and in accordance with all ADA requirements.

Piping and Equipment Supports:

* Piping installation or hook-up shall include a complete installation including pipe, fittings, valves, unions, traps, strainers, specialties, etc. to make piping systems and equipment operational.
* Hangers, pipe guides, rods, beam clamps, brackets, pipe anchors, other attachments, floor flanges, masonry anchors, bolts, nuts washers, etc. shall be provided to fully support all piping, and equipment installed.
* Spring hangers and vibration mounts shall be installed where recommended by equipment manufacturer

Insulation, Painting & Identification

All work installed under the contract must be insulated, painted and identified where applicable.

Tests

All pressure, performance and operating tests shall be performed and as required by agencies having jurisdiction over the work performed.

**End of Section**

Electrical

General

This narrative is intended to provide adequate information about the scope of work so an estimate for electrical equipment and systems can be provided.

Design Philosophy

**Flexibility:**

The electrical distribution systems will be designed to incorporate spare capacity and spare breakers/positions for future use.

**Serviceability:**

Electrical installations will be designed to facilitate the servicing and maintenance of the panelboards as well as other electrical and telecommunication devices/components.

**Sustainability:**

This will include lighting control systems employing dual switching, occupancy sensing and programmable scheduling controls as required per Energy Code. These strategies provide energy savings and lower maintenance costs.

LED type lighting will be used for lower energy and maintenance costs.

Codes and Standards

* National Fire Protection Association (NFPA) 70 – National Electrical Code
* 2021 edition of the International Building Code (IBC).
* 2021 edition of the International Existing Building Code (IEBC).
* 2021 edition of the International Mechanical Code (IMC).
* 2021 edition of the International Energy Conservation Code (IECC).
* 2021 edition of portions of the International Fire Code (IFC)

Electrical Demolition

Electrical contractor shall demolish light fixtures, receptacles and low voltage devices/wiring indicated on the demolition drawings. Exact requirements will be indicated on the plan drawings in the Construction Document phase (CD) of the project.

Re-use of existing back-boxes and branch circuitry will be on a case-by-case basis.

Electrical Distribution

Electrical contractor shall provide branch circuitry and homeruns to feed new receptacles, lighting, equipment, etc.

Within the project area of construction resides panelboards that will be re-used to provide the required normal power circuits. They are in adequate working condition and breakers are readily available.

It is estimated that the existing panels have enough amperage and circuit capacity for the renovations being provided. Provide new circuit breakers as required to facilitate the new branch circuitry, etc. New panel boards are not anticipated.

Coordination will occur with other trades, equipment manufacturers, etc. for exact requirements of equipment being furnished.

There is an existing panel in the utility room. It is anticipated that the existing electrical service will be adequate to accommodate the renovations. If it is determined that the additional electrical load from new HVAC equipment requires the expansion of the panel, provide the required new panel as part of the final design.

Conduit Application Indoors

Exposed areas not subject to physical damage: electrical metallic tubing (EMT).

Exposed areas subject to physical damage: rigid galvanized steel conduit (RGS) below 48” finished floor and EMT above 48” finished floor. Areas subject to physical damage include, but are not limited to mechanical and electrical rooms, etc.

Concealed: MC cable with steel jacket.

Connection to vibrating equipment: flexible metal conduit (FMC) except in wet or damp locations, use liquid-tight flexible metal conduit (LFMC). Vibrating equipment shall be as listed but not limited to transformers, hydraulic/pneumatic/electric solenoids, motor-driven equipment, etc.

Damp or Wet Locations: RGS.

Plenum Spaces: Wiring methods in plenum spaces shall conform to the requirements of NEC Section 300-22. All conduits shall be metal. Exposed cables, where used, shall be listed and approved for use in plenum.

Boxes and Enclosures: NEMA 250, Type 1.

Boxes and Enclosures in damp or wet locations: NEMA 250, Type 4.

Note: Minimum conduit size shall be ¾–inch.

Conduit Application Outdoors

Exposed: RGS.

Concealed: RGS.

Underground: Rigid non-metallic conduit (Schedule 40 PVC).

Connection to vibrating equipment: (LFMC). Vibrating equipment shall be as listed but not limited to transformers, hydraulic/pneumatic/electric solenoids, motor-driven equipment, etc.

Boxes and Enclosures: NEMA 250, Type 3R.

Conduit installed below floor slabs shall be RGS.

Note: Minimum conduit size shall be ¾–inch.

Wire and Insulation Applications

Branch Circuits Exposed: THHN conductors in conduit, #12 AWG minimum.

Branch Circuits Concealed: Steel-jacketed MC cable, #12 AWG conductors minimum.

Home Runs (from panel to the area of construction): THHN conductors in conduit.

Feeders: THHN conductors in conduit.

Fire Alarm Circuits: Fire alarm cable in conduit.

Shielded Cables: Provide shielded cables where required by the manufacturer(s). Install in raceways or cable trays as specified.

Control Circuits: Plenum-rated cable.

Each circuit is to be provided with a separate neutral and separate ground wire.

All wiring will be run concealed within furred walls and above hung ceilings, except as otherwise noted.

Note: All conductors shall be copper.

Wiring Devices

All receptacles shall be 20A, 125V grounding type duplex receptacles unless otherwise noted.

Provide a quad receptacle at each data outlet location.

Provide duplex receptacles on 40-foot centers within all corridors.

Provide receptacles in public gathering areas with integral USB receptacles. Quantities required in each space/area to be determined (TBD).

Provide receptacles in all occupied rooms. A minimum of one (1) receptacle per wall is required.

Provide receptacles/junction boxes as required for miscellaneous equipment, telecommunications, audio-visual (AV) and security systems, digital signage, etc.

Provide GFI type receptacles in unoccupied rooms and within 6 feet of a sink or water source. Quantities required in each space/area TBD.

Provide all specialty type receptacles as required.

Interior Lighting

LED lighting will typically be designed to operate at 120-volts.

In all areas with an accessible hung ceiling, the lighting will be provided by lay-in, direct/indirect LED fixtures with perforated baskets or acrylic lens (creating a full luminous housing) or as selected by the design architect.

In areas without any ceilings, ceiling flush mounted fixture lenses will be provided.

Provide dual-technology occupancy and/or vacancy sensors for switching control in occupied spaces.

Lights will be locally controlled in mechanical and electrical spaces by line-voltage wall switches.

Line-voltage wall switches will be 20 amperes, specification grade, 120/277 volts, toggle type, single pole.

All lighting shall be specified to comply with the latest energy code(s) for both power density and control requirements.

Light levels in all spaces shall meet IESNA light level standards and take into account the following foot-candle (FC) values (at work surfaces) in our design:

* Corridor – 15 FC
* Storage rooms / Toilets – 15 FC
* Mechanical / Electrical spaces – 30 FC
* Service Rooms / Public gathering – 30 FC

Exit Lighting

Provide a complete system of LED edge-lit style exit lights with red letters, mirrored and/or clear backgrounds, directional arrows as required, and multi-volt connection within all other areas of the building. Accessible exit doors will receive exit signs with the international symbol of accessibility to meet the most current ADA and ANSI code requirements.

All exit signs shall meet NFPA 101 requirements, as required integral battery packs shall be provided.

Emergency Lighting

New battery pack devices will replace the existing fixtures and will be located per new floor plan and in accordance with code requirements.

Fire Alarm System

Provide a new fire alarm system within the building. The control panel for the new system will be located in the utility room. Fire alarm pulls are currently located in the lobby and center hall, annunciator in corridor at entry door. New Fire extinguishers are to be located in the lobby, center hall and by the back door.

New devices within the area of construction will connect to the new fire alarm system.

Comply with IBC and NFPA standards. As required provide new, addressable fire devices including but not limited to: manual pull stations, smoke and/or heat detectors, flow and tamper switch supervision, duct smoke detectors, magnetic door hold-open devices (as required), ADA approved audio/visual devices, control relay modules, monitor modules, etc. to match existing system in the building.

Provide speaker/strobes as required by code.

Provide smoke/heat detectors as required by code.

Provide smoke detectors as required by code.

Fire alarm zones shall be consistent with sprinkler and smoke zones.

Provide all required programming of the new equipment in the existing fire alarm control panel to incorporate the new devices into the system.

Grounding System

Provide a system ground and all necessary bonding as required by the NEC. Provide separate insulated ground wire with each branch circuit and feeder.

Security/Data System

Security and data systems are not part of Architects scope of work, but full coordination with City of Ansonia’s vendors should be included. Additionally, the new plan should indicate data/security plan locations. Power for systems will be provided via properly located junction boxes.

**End of Section**