

# P R O J E C T N A R R A T I V E

## LIO Anchorage State Legislative Office Building Renovation

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### Design Parameters:

The latest adopted version of the following codes and standards as amended by the Municipality of Anchorage are currently applicable for this project:

International Mechanical Code  
International Fuel Gas Code  
Uniform Plumbing Code  
International Building Code  
International Fire Code  
NFPA 13  
SMACNA – Sheet Metal Design Standards  
National Electrical Code  
Americans with Disabilities Act (ADA)  
ASHRAE/IES Standard 90.1  
International Energy Conservation Code

The design parameters listed in this document may be considered a working document as well. As the design progresses the parameters in this document may be revised as a result of changing technology, payback analysis and/or feedback from the owner.

### Mechanical & Plumbing Demolition:

All existing mechanical and plumbing systems will be demolished from the building. Remodel work will provide all new plumbing systems from the main AWWU utilities in the alley; and will be installed completely new to support the new building addition and existing structure. All existing heating and ventilation systems will be completely demolished from the building and will be replaced with new efficient systems.

### Fire Protection:

As this is a design build project the sprinkler contractor will work with a NICET licensed sprinkler designer to provide design and installation of the sprinkler system. It is anticipated that a standard wet-pipe sprinkler system complying with NFPA 13 will be provided throughout the facility. A dry-pipe sprinkler system may be necessary to protect canopies or overhangs if they are built of combustible construction.

The building height of 110' to the mechanical penthouse level in combination with the available water pressure at the site is very close to needing a fire pump to supply adequate pressure to the sprinkler heads at the top of the building. The need for a fire pump will need to be analyzed by the sprinkler designer to determine if piping can be sized to meet site conditions. Static water pressure is approximately 60 PSI; available flow at the main is 2,436 GPM at 20 PSI residual.

A single sprinkler riser will be acceptable since the building is less than 52,000 square feet per floor. Dry standpipe risers will be located in the stairwell exit enclosure(s). One dry pipe will need to extend through the roof for fire department access.

A suitably sized fire department connection line will be routed from the sprinkler riser to near the building's main entry. Sprinkler piping will need to conform to the requirements of NFPA 13.

#### Plumbing:

The new water service and sprinkler riser will be located in the basement and first floor mechanical room adjacent to the South alley to support both domestic water and sprinkler systems. The requirement for a fire pump (if necessary) will drive space constraints and locations as the design moves forward.

It is anticipated that a 6" water service will be provided for the building. The domestic water system will be separated from the sprinkler system by a double check back flow prevention device in accordance with requirements of the UPC.

Due to the height of the building a domestic water pressurization pump package will be necessary to provide adequate pressure for plumbing fixtures in the upper floors. A variable speed controlled multiple pump package will be specified to service the upper floors. The basement and lower level floors will operate using city water pressure and will be piped separate from the domestic water booster pump. The domestic water service will also include a backflow preventer. All domestic water piping will be specified to be Copper, CPVC or PEX piping.

The new sanitary sewer service will enter the building from the South alley. The pipe will be 6" diameter and enter the building above the floor level of the basement. The basement plumbing fixtures will drain to a duplex lift station that will pump the sanitary waste up to the level of the incoming sanitary sewer line. The lift station will be located in a dedicated room that is ventilated continuously at 5 air changes per hour. Sanitary piping will be specified to be cast iron no-hub or copper, drain waste and vent (DWV). ABS and PVC can be considered for areas that do not have return air plenums, or noise concerns.

Domestic hot water for the building will be provided using two separate water heaters. One water heater will be located in the first floor area and supply the lower floors that operate using city water pressure. The second water heater will be located in the mechanical penthouse and will serve the fixtures that operate using the domestic water pressure booster pump. Water heaters will be gas fired sealed combustion high efficiency equipment. A hot water recirculation system will be required to provide hot water to plumbing fixtures located on each floor. Water will be stored in the tank at 140 degrees and will be routed through a tempering valve prior to distribution to the rest of the building. The distribution temperature will be adjustable but we recommend a 115-degree temperature. Tempering valves with the appropriate ASSE listing will be utilized at public lavatories.

New plumbing fixtures will be installed throughout the facility. All the existing fixtures will be demolished. The new plumbing fixtures will be specified to include water and energy saving devices and will incorporate vandal resistant features to prevent tampering. New floor drains will be installed where required. All new floor drains will be equipped with trap primers as required by code. In addition to the new restroom groups, each legislative office floor will include a kitchen sink, dishwasher & hydration station and refrigerator. Single stall shower rooms will be provided in the basement for the small locker and exercise equipment areas.

New exterior, frost-proof hose bibbs will be provided for both the new addition and existing portion of the building. Hose bibbs will be installed around the exterior of the building at approximately 150' intervals or specifically where needed for clean-up or irrigation for planting. Hot water and cold water hose bibbs will be installed in the toilet rooms where Janitor rooms are not located adjacent to the toilet rooms.

New rainleader piping will be installed to support the new roof drains and overflow drains serving the facility. The roof drains and overflow drains will connect at the roof and tie into the primary storm drain lines inside the building; an overflow scupper will be installed where the building storm sewer leaves the building in accordance with Handout Number 39 of the Municipality of Anchorage Building Safety Division.

The existing gas meter bar has several gas meters that serve various buildings on the block. The final location of the gas meter(s) and service to the building(s) that are currently supplied from the South alley will need to be coordinated with Enstar and the various building owners.

Elevator sump pumps will be necessary; current code requires 50 GPM capacity per elevator car. The Municipality of Anchorage is currently preparing a policy that may allow 50 GPM capacity per elevator pit; this will be evaluated during the design process.

### Fuel Systems:

New natural gas piping will be provided to supply the boilers, water heater, and the rooftop HVAC unit on the roof. Due to the length of run from the meter location to the roof it is anticipated that a medium pressure gas piping system will be designed to limit the size of the gas piping. The location of the medium pressure gas piping will need to be coordinated with the architecture. Enstar has restrictions on the use of medium pressure gas piping within a building. The gas piping may have to be enclosed in a decorative chase or be routed exposed up the exterior of the building. The gas meter will be provided with a mechanical operated earthquake valve to shut off gas in the event of a significant seismic event.

In addition the gas meter and gas piping that was recently installed for the Verizon generator located on the roof of the building will need to be addressed in the remodel similar to that described above (for new gas piping to the boiler/HVAC system).

The packaged standby generator will be provided and specified by the electrical engineer. The generator will include a double wall subbase fuel storage tank with the unit for fuel storage.

### Heating:

The new boiler system will be installed in the existing penthouse mechanical room. The heating system will include two (2) sealed combustion high efficiency-modulating boilers. Two in-line mounted circulating pumps with variable frequency drives will supply heating water to the building.

Depending upon the selected boilers; piping will be either a parallel pipe design, or a primary/secondary piping arrangement with a boiler pump. The hot water supply temperature will be reset based on outside air temperature. The outside air reset schedule will increase supply hot water temperatures during peak heating season operation and decrease hot water supply temperatures to minimum levels during shoulder and summer seasons.

The building will be heated with fintube radiation. The fintube will be located continuously along the perimeter of the building to provide warmth where the heat is lost through the exterior wall. Entryway terminal heat transfer equipment will be cabinet unit heaters; storage rooms and penthouse areas will utilize hydronic unit heaters. Perimeter fintube and the terminal heating units will provide heat to the building during unoccupied hours when the air-handling units are off. Hydronic heating coils will be installed in each of the VAV boxes to provide tempering of supply air and supplemental heating for occupant comfort. Fintube, terminal heating equipment, and heating coils will be oversized to

operate with 140 degree F water to allow the high efficiency boilers to operate at condensing temperatures throughout the year.

A direct return heating system will supply the terminal heating equipment. The piping mains will be routed vertically in the ventilation shaft and tee off at each floor to serve fintube, unit heaters, and VAV box coils. Heating coils and terminal heating equipment will be provided with 2-way valves to take advantage of the variable speed pumps. Isolation valves will be provided at each floor where piping exits the shaft for maintenance and isolation for remodel work.

The primary heating system will utilize water with inhibitors for corrosion protection and stabilization a chemical feed and test station will be incorporated into the design. Glycol water systems are not necessary for the building as the rooftop HVAC unit has gas heat and there will be no heating coils exposed to freezing conditions.

#### Ventilation:

The ventilation system for the building will consist of a new packaged, gas fired, electric cool, direct expansion HVAC rooftop unit. The air distribution system will be designed to conform to ASHRAE Standard 62.1 to ensure good indoor air quality. CO2 sensors and outside air intake volumetric measurement sensors will be employed to ensure adequate ventilation rates. A post construction, pre-occupancy ventilation purge of the building is planned to remove indoor air contaminants produced by off gassing of new construction materials.

The building ventilation system will be variable air volume (VAV). Medium pressure supply air ductwork will be routed from the rooftop HVAC unit to each floor using a ventilation shaft. A combination fire/smoke damper will be required where the supply duct penetrates the shaft wall. The ventilation shaft will also provide the path for return and relief air back to the rooftop HVAC unit. Return air openings complete with combination fire/smoke dampers and sound lined elbows will be provided above ceiling at each floor to allow return air to transfer into the shaft. The space above the T-Bar ceiling on each floor will be a return air plenum.

Sound control is important between legislative suits. As such the walls will go full height for each of the suites and the corridors. An air transfer opening with a sound lined transfer boot will be located above the ceiling at the entry door of each suite to allow return air to transfer to the space above the corridor ceiling and back to the ventilation shaft.

The VAV system will be sized to cool the building using 55 degree F supply air in the ductwork distribution system. The VAV system supply air temperature will be reset based upon the air temperature required to cool the hottest room. The air

handling unit fan will modulate up or down as needed to meet the required demand load. The fin tube radiation will be controlled with the local VAV box and coil in sequence to maintain a comfortable space temperature.

Air distribution will include multiple types of inlet/outlets for the various building areas. Flow bar style diffusers are anticipated for the legislative offices and common areas supply air. A combination of flowbar and 4-way throw diffusers will supply air to the remainder of the spaces. A combination of eggcrate and bar grilles are anticipated for return and exhaust.

The packaged rooftop unit will include relief fans to ensure air turnover during economizer operation. The relief fans will include a variable frequency drive to allow capacity modulation to maintain a +0.05" (adjustable) pressure differential between the indoor and outdoor.

The main restrooms rooms, break rooms, janitor closets and other similar spaces in the facility will be served by a roof mounted variable speed domex exhaust fan. The exhaust fan will be scheduled to operate during the owner's occupied/unoccupied schedule. Ductwork will be slightly oversized to allow the addition of exhaust requirements in the future. This will allow exhaust modifications by simply rebalancing the system.

Communication closets and AV Room areas will be provided with a dedicated cooling exhaust air fan with transfer air duct to maintain space temperature. The exhaust fan will draw air from the occupied space and discharge the air into the return air plenum above the ceiling. A close on rise thermostat will start the exhaust fan when temperature rises above set point and shut off the fan when the set point is achieved. The dedicated exhaust fan will be capable of 24/7 operation allowing cooling of the communication closets when main building air handling units are shut off during unoccupied modes.

The lift station enclosure room located in the basement will include a dedicated exhaust fan that is extended to discharge to the exterior of the building. The fan will be sized to provide a minimum of 5 air changes per hour and will operate continuously.

#### IT Room Cooling:

The IT room will be provided with two completely redundant cooling systems. Each cooling system will be sized to meet 100% of the cooling load (plus some expansion) to allow back-up should one unit fail. This will also allow one unit to be taken down for service without affecting operation of the IT Room computer equipment.

Each cooling system will be specified to include humidification and dehumidification capability to maintain the space between 30% and 50% relative

humidity. Condensate will be pumped (or drain by gravity if possible) to an indirect waste location in the facility.

Each cooling system will include a remote dry cooler and duplex pump package to provide free cooling when outside air temperatures are suitable. The dry coolers (or a single two circuit dry cooler) will be located in the adjacent parking garage. Glycol piping will extend between the dry cooler(s) and the cooling units in the IT Room to transfer rejected heat from the IT Room to the exterior. During winter operation a cooling coil in the unit provides cooling. During the summer the heat rejected from the operating compressors is rejected to the exterior using the drycooler.

The system will utilize a 50/50 mixture of propylene glycol and water and will include a glycol fill tank and expansion tank. (deleted "air separator." We don't typically install air separators on dry coolers)

#### Snowmelt:

The owner is considering snowmelt for two areas of the building: the front entry/sidewalk, and the South rear entry/loading area. The two areas can be combined and supplied from a single snowmelt boiler located in the first floor mechanical room located at the South end of the building. An alternate approach under consideration will be to provide a heat exchanger and snowmelt pump at each snowmelt location and provide the energy for melting snow from the main boiler system that supplies the building.

If a separate boiler is used it will be a gas fired sealed combustion high efficiency boiler. The boiler will supply heat into a snowmelt piping distribution loop that extends to each of the snowmelt areas. A snowmelt distribution manifold will supply tubing loops at each snowmelt location. Snowmelt tubing will typically be 5/8" diameter located 6" on center (over insulation) but embedded in the slab.

A stand alone Tekmar controller would operate the distribution pumps and enable the boiler in sequence to melt snow in the two locations. A snowmelt sensor located in each of the areas can be employed to automatically start/stop the system and control idle mode between snowfalls.

#### Insulation:

The building will be designed in accordance with LEED concepts. Insulation for piping, ductwork, and equipment will be in accordance with the International Energy Conservation Code (IECC). Supply air ductwork located in the return air plenum above the ceiling plenum will require insulation. Insulation will also be installed on the air separator, as well as valves/hydrionic specialties larger than 2" diameter.

Controls:

A microprocessor based direct digital control (DDC) system will be specified for the facility. The control system will be performance specified by the engineer to meet the sequence of operations listed in the contract documents. The control system will be specified to be a Trane Tracer Building Automation system.

The control system will include a full graphics package to allow point and click access for control of mechanical system.

The boiler system will be specified to include a package boiler controller. The boiler controller will communicate with the building DDC system to provide alarm information only.

The rooftop HVAC unit and VAV boxes can be provided complete with Trane Tracer controls to seamlessly integrate into the DDC network. The main building exhaust fan would also be controlled by the DDC system.

Remaining equipment such as unit heaters, cabinet unit heaters, communication closet exhaust fans, will be controlled with standalone electric/electronic controls that do not require connection to the DDC system.