



SILVERTHORNE FIRE STATION

Schematic Design Narrative



Building a Better World
for All of Us®

Date: January 18, 2023



PROJECT OVERVIEW

APPROX
8,700
SQ. FT.

This new Fire Station is located in Silverthorne, CO, near the intersection of Blue River Parkway (Colorado Highway 9) and Golden Eagle Road. The project is located within a PUD (Planned Unit Development).

2
DRIVE-THRU BAYS

The Fire station consists of Two Drive-thru bays with a support alley and a mezzanine above it. The support alley consists of Decon, PPE, Shop and Storage spaces.

6
DORM ROOMS

The living area of the Fire Station consists of Six dorm rooms with Three bathrooms. It also features a dayroom, kitchen, fitness room and work room with all the supporting spaces. Near the main entry, two private offices are located to support the Fire Station operation.

The design, drawings and systems narrative included in this package are conceptual and preliminary in nature and will be revised or adjusted during the next phases of the project. The revisions will be based on the outcome of design workshops with all the project stakeholders and also based on the comments that we will receive as part of the entitlement proces. The revisions may also be the result of the project budgeting and value engineering process.



SITE AND UTILITIES

SITE LAYOUT

The current site layout has the fire station building located in the center of the lot. The entrance for all vehicles will be along the south property line. Fire apparatus will be able to use this entrance and enter the truck bays from the back and then exit on a dedicated emergency vehicle apron in front of the building. VisitorWay for entry and exit. Curb and gutter use will be limited to the parking areas and locations where it will be useful for drainage purposes. Using less curb and gutter will allow snow to be plowed into grass areas more easily.

The number of parking spaces for this project is based on need, not on Town requirements. The number of spaces has not been determined yet. We anticipate need at least 9 spaces to accommodate employees when the facility is fully staffed. It is possible we may have 17 spaces to facilitate overlapping parking needs during a shift change. This facility does not anticipate accommodating public visitors. One van accessible parking space is required for this parking lot.

The pavement sections for the project are not yet designed. The geotechnical report for the adjacent Public Works Facility calls for a pavement section of 6 inches of concrete over 6 inches of class 6 road base. Fully loaded fire apparatus weigh more than typical public works vehicles, so it is likely the eventual section will be thicker for the fire station. It is possible that a thinner section may be designed for areas where the heavier vehicles are not anticipated, such as the parking spaces, to save on costs.

There are additional site items that will need to be

accounted for as the design progresses that are not illustrated on the site plan at this point. There will likely be an employee patio area, flagpole, and bike rack. The site will have a dumpster and generator, which will each need to be enclosed. Snow storage will need to be accounted for.

The existing design for the Colorado Highway 9 frontage road includes a gravel area east of the pavement on the fire station property that allows larger Town vehicles from the Public Works Facility to make a wide left turn to head south on the highway. This area will need to be maintained and likely paved with asphalt.

GRADING AND DRAINAGE

The site is located between Colorado Highway 9 to the west and the Blue River to the east. The site will be graded to convey drainage away from the building. Stormwater will be captured and directed towards the Blue River. It is likely that inlets will be located in front of the building. Storm pipes will convey flows to the back of the building and through additional inlets eventually connecting to a single pipe near the northeast corner of the site. The stormwater will flow through a water quality structure, then will be piped beneath the existing multi-purpose trail and outfall to the bank of Blue River. The water quality structure may be a sand filter, bioretention filter, or, as used in the Public Works building in the adjacent lot, a pre-manufactured, below-ground water quality treatment structure. Installation of a detention pond is not anticipated at this time, as the Town engineering department previously indicated that they prefer sites adjacent to the Blue River to drain quickly during a storm event and those away from the river to drain more slowly over time.

WATER SERVICE

There is an existing 6" waterline running north-south across the front of the property in an easement. It is likely the building will require two new 6" laterals and fire hydrants will be installed in front of the building, similar to the Public Works Facility. A single service line will be run from the existing line to the building. Interior to the building, the line will split into a domestic service with an inside meter and a fire sprinkler system. Please refer to the mechanical design section for additional interior plumbing information.

SANITARY SEWER SERVICE

There is an existing 15" sanitary sewer running downhill from the south to the north behind the building in a utility easement. It is likely that the building will have a domestic service connection and a line from the garage through an exterior sand/oil separator. These lines will combine and connect to the existing sewer main behind the building.

DRY UTILITIES

Communications, electric and gas lines exist between the project and Colorado Highway 9. It is likely that the contractor will need to coordinate service line installation for all three utilities with the providers.

OTHER SITE CONSIDERATIONS

We do not anticipate coordination or permitting will be needed with CDOT as there is no work anticipated within highway right-of-way. We will avoid affecting the Blue River floodplain and do not anticipate any permitting or coordination with FEMA.



ARCHITECTURE

The Fire Stations are designed to the 2018 International Building Codes with local amendments.

The conceptual Architectural drawings are included in this package. The design will be developed further during the next stage of the design and may be revised based on additional feedback and comments received by the planning department and stakeholders.

The Fire Station, is a One-Story facility with approximately 8,700 Sq.Ft. of space. The living consists of 6 dorm rooms and 3 bathrooms together with a dayroom, kitchen and fitness room. The admin area includes two private offices and an entry. The Apparatus bay area includes two drive thru bays with support space including PPE storage, decon and station shop.

Below are the conceptual architectural finishes for the fire station:

Interior Finishes:

- Apparatus Bays, support and public areas: Sealed concrete floor.
- Dorm rooms: Carpet tiles.
- Bathrooms: Porcelain tiles.
- Fitness Room: Athletic flooring.
- Walls: Painted gypsum board.
- Apparatus bay walls: High impact resistant surfaces.

Exterior Finishes:

- Roof: Standing seam metal roof.
- Walls: Combination of fiber cement panels, metal panels and stone veneer.
- Openings: Aluminum Storefront and Windows. 14x14 overhead doors.





STRUCTURAL

INTRODUCTION

The purpose of this document is to provide a basis of design for the proposed fire station located in Silverthorne, CO. The fire station consists of 2 apparatus bays, as well as storage and living quarters. The proposed location is 26300 Highway 9 in Silverthorne, Colorado

DESIGN CRITERIA

The authority having jurisdiction is the Town of Silverthorne, CO. Silverthorne has adopted the International Building Code, 2018 Edition (2018 IBC) with local amendments. The design information, based on the more stringent of the 2018 IBC with

Silverthorne amendments and ASCE 7-16, is listed in Table 1.

The structure falls into Risk Category IV

Based on the information above the structural design will be based on the following material codes and design loads listed in:

- Table 2 - Structural and Building Design Standards
- Table 3 - Structural and Building Design Loads

Table 1: Building Design Information ¹

Design Component	ASCE 7-16/2018 IBC
Ultimate Design Wind Speed	Risk Category IV, wind speed of 116 mph
Wind Exposure Category	C
Seismic Design Category	D
Weathering	Severe
Winter Design Temperature	-13 °F
Mean Annual Temperature	35.4 °F
Snow Load ¹	80 psf (ground snow load - pg) 75 psf (balanced flat roof snow load - pf)
Frost Line Depth	40"

Table 2: Structural and Building Design Codes

Design Component	Code Description
Structural Steel	American Institute of Steel Construction (AISC) Steel Construction Manual 16th Edition
Concrete	American Concrete Institute (ACI) ACI 318-14 – Building Code Requirements for Structural Concrete, 2014 ACI 301-16 – Specifications for Structural Concrete, 2010 ACI MCP – Manual of Concrete Practice Precast Prestressed Concrete Institute (PCI) MNL 120-17 – PCI Design Handbook, 8th Edition, 2017
Masonry	Building Code Requirements and Specification for Masonry Structures TMS402/602 - 16-
Wood	National Design Specification for Wood Construction, 2018
Design Loads	American Society of Civil Engineers (ASCE) Minimum Design Loads for Buildings and Other Structures, ASCE 7-16

Table 3: Design Loads

Design Loads	Value/ Description
Live Load Roof, L_r : Floor (Living Spaces): Floor (Public Areas and Corridors): Floor (Garage and Storage):	20 psf (reducible per code) 40 psf 100 psf 125 psf axle loading
Snow Load Ground Snow Load p_g : Flat Roof, p_f : Exposure Factor, C_e : Importance Factor, I_s : Thermal Factor, C_t :	80 psf 75 psf 0.90 (Fully Exposed) 1.20 (Risk Category IV) 1.00
Wind Load Ultimate Wind Speed, V_{ult} : Wind Exposure: Internal Pressure Coef.	116 mph (Risk Category IV) ¹ C +/- 0.18
Seismic Loads Risk Category Importance Factor I_e : Mapped Spectral Response Parameters: S_s S_1 Site Class: Design Spectral Response Acceleration Parameters: S_{DS} S_{D1} Seismic Design Category: Bearing Wall Systems Basic Seismic Force-Resisting System(s): Seismic Response Coefficient (Cs): Response Modification Coefficient(s) R: Analysis Procedure:	IV 1.5 (Risk Category IV) 0.348 g (ATC Hazards by Location) 0.090 g (ATC Hazards by Location) D (assumed) 0.353g (ATC Hazards by Location) 0.144 g (ATC Hazards by Location) D Reinforced Masonry Special Reinforced Masonry Shear Walls 0.1059 5 Equivalent Lateral Force

Design Loads	Value / Description
<i>Geotechnical Criteria:</i>	
Foundation Type:	Spread Footers
Bearing Material:	Native Soil (Footers) Granular Structural Fill (Slabs)
Net Allowable Bearing Pressure:	2,500 psf (Native Soil)
Special Loads:	Fire Truck Axle Loads Equipment Loads as Specified (TBD)

MATERIALS

The structural system is expected to be comprised on concrete masonry units, structural steel members open web steel joists, and poured in place concrete. The following is a list of assumed materials and properties.

- Concrete: 4,500 psi (minimum) 28 day strength
- Steel: ASTM A992, A500, A36
- Concrete Masonry Units: f'm 2500 psi

ROOF FRAMING

The roof framing is expected to consist of open web steel joists, supported by exterior load bearing masonry wall, and interior steel beams and columns, with steel decking.

LATERAL SYSTEM

The lateral system is expected to consist of special reinforced masonry shear walls

SLAB ON GRADE

SEH anticipates a slab on grade supported on structural fill for the apparatus bays and living areas

FOUNDATIONS

Based on the most recent geotechnical report, completed in 2016, SEH expects that the building will be supported on shallow, reinforced concrete spread footers.



FIRE PROTECTION

CODE COMPLIANCE

- Applicable Local and State Building and Fire Codes and Amendments
- NFPA 13 Standard for the Installation of Sprinkler Systems
- Owner Standards and Requirements

INCOMING FIRE SERVICE MAIN

The water-based fire suppression system will be served from a new combined fire and domestic water service main supplied by an existing municipal water main. Incoming fire service main will be located in a designated water entry area below the stairs to the mezzanine. Connection to the city water main will be by the Civil Contractor. The sprinkler system and Fire Sprinkler Contractor work will begin at the point of connection at the flange inside the building. Hydrant flow tests of the municipal water main will be required and coordinated with SFE to ensure adequate capacity at the site.

Reference hydrant flow data will be provided by the water purveyor and sizing of the main and associated fire sprinkler systems will be based on those pressures and flows. Hydrant flow data will indicate whether a fire pump is required to provide the necessary pressures and flows to protect all areas of the facility.

Backflow prevention devices will an RPZ conforming to the requirements of the AHJ. A Fire Department Connection (FDC) will be provided. Location of FDC will be at designated water entry area near sprinkler risers or in nearby location approved by the AHJ. FDC type and specifications will be coordinated with

requirements of the AHJ.

AUTOMATIC SPRINKLER SYSTEM

An automatic fire sprinkler system will be provided and installed in all spaces of the building except those areas where sprinkler omittance is permitted by the standard and fire code.

Sprinkler main and branch piping sizes will be hydraulically calculated by the Fire Protection Contractor in accordance with NFPA 13.

The sprinkler system will be a wet-pipe type system. It will be zoned based on space usage and hazards as defined by the occupancy type. Each zone will be provided a control valve assembly with isolation valve, tamper switch, flow switch, and all other required appurtenances. Control assemblies will be located in the water entry area or at locations approved by the Architect and Owner.

Quick response type sprinklers will be installed throughout the building. Recessed style sprinklers will be installed in all areas with a finished ceiling. Standard upright style sprinklers will be installed in all areas without a finished ceiling. All sprinklers installed in areas where they may be subject to mechanical damage will be provided with standard protective guards. All sprinkler styles and finishes will be approved by the Owner and Architect prior to installation.

Sprinkler spacing and locations will be in accordance with the requirements of NFPA 13. Sprinkler protection will be provided in accordance with the requirements of Ordinary Hazard Group I occupancies in the apparatus bays, storage areas, and mechanical

spaces. Offices, restrooms, and living quarters will be provided with sprinkler protection in accordance with the requirements for Light Hazard occupancies per NFPA 13.

A main sprinkler drain will be provided for the sprinkler systems. The main sprinkler drain will discharge to a floor drain or to the exterior of the building in a location approved by the Owner and AHJ. A single air vent will be provided for each sprinkler zone.

All piping shall be new and conform to the requirements of NFPA 13. Fire sprinkler system piping material for all wet-pipe systems will be black steel conforming to ASTM A53, A795 or A135. Schedule 40 piping with threaded fittings will be installed for piping 2 inches in diameter and smaller. Schedule 10, schedule 5 and CPVC piping is not permitted.

Automatic Sprinkler system shall meet the minimum requirements of SFE life safety policy.

COMMERCIAL COOKING OPERATIONS

Commercial kitchen equipment or Type I hoods are anticipated as part of the design of the facility. An

automatic fire extinguishing system interlocked with the Type I hood is required.

DESIGN AND CALCULATIONS

The Fire Sprinkler Contractor will be the Engineer of Record for the sprinkler system. The design and engineering of the system will be by the Fire Sprinkler Contractor. Hydraulic calculations and shop drawings will be performed and calculated by the Contractor. Per NFPA 13, the water supply information utilized for the performance of the hydraulic calculations shall be dated within one year of system installation. These shop drawings and calculations are required to be signed and stamped by a Professional Engineer registered in the State of Colorado or signed and certified by a minimum Level IV Senior Engineering Technician of the National Institute for Certification of Engineering Technology (NICET) practicing in the Fire Protection Field. The signed shop drawings will certify that the fire sprinkler system has been hydraulically calculated in compliance with NFPA and governing codes. The signing party is required to be familiar with this type of installation and have previous similar experience.



HEATING, VENTILATION AND AIR CONDITIONING

CODE COMPLIANCE

- Applicable Local and State Building, Mechanical, Energy Conservation, Plumbing, Fire and Fuel Gas Codes and Amendments
- NFPA 70 National Electrical Code
- ASHRAE Standard 62.1 Ventilation for Acceptable Indoor Air Quality
- ASHRAE Standard 90.1 Energy Standard for Buildings Except Low-Rise Residential Buildings
- Owner Standards and Requirements including Energy Code requirements of Silverthorne

MECHANICAL DESIGN INFORMATION

The building will be designed for the following conditions:

Location:	Silverthorne, CO
Climate Zone:	7B
Elevation:	9035 ft above sea level
Summer Outside Air Conditions:	68.0 deg F / 43.7 deg F (DB/WB)
Summer Indoor Conditions:	75 deg F, 60% RH
Winter Outside Air Conditions:	-1.6 deg F (DB)
Winter Indoor Conditions:	70 deg F
Ventilation Rate:	ASHRAE 62.1

MECHANICAL SYSTEM INFORMATION

The building will be ventilated and conditioned using various independent HVAC systems. Below are the anticipated systems required:

Hot Zone

1. Apparatus Parking Area

- Low noise exhaust fans, operating 24 hours per day 7 days a week to provide minimum code required exhaust for the space per IMC Chapter 4.
- Tailpipe exhaust system to mitigate apparatus exhaust per IMC Chapter 5 and NFPA 1500.
- Radiant slab hydronic snowmelt system sized and designed to prevent snow and ice accumulation at the apparatus bay entrances and exits as well as pathways to personnel entrances and exits. Snowmelt system will consist of a dedicated condensing wall-mounted boiler that provides hydronic heating to snowmelt loops embedded in the aprons and pathways.
- Natural gas radiant tube heating will provide heating in the apparatus bays. Each radiant tube heater will be mounted no higher than the manufacturer's recommended maximum height and will be controlled by an independent local thermostat.

Warm Zone

1. Shop

- Shop equipment space will be exhausted with independent exhaust fan and will have gas heaters mounted on walls and controlled by local thermostat to provide heating. Make up air louvers with gravity dampers will be provided to balance the space pressure when exhaust fans are switched on.

2. Decon

- Decontamination areas will be provided with an independent exhaust system capable of maintaining a negative pressure in relation to adjacent spaces. ASHRAE 170 standard for

Ventilation of Health Care Facilities required a minimum 2 air changes per hour (ACH) and a minimum 6 total ACH for decontamination rooms. The exhaust system will be designed to meet these requirements. Gas heaters mounted on walls and controlled by local thermostat will provide heating. Make up air louvers with gravity dampers will provide air balance when the exhaust fans are switched on.

3. PPE Storage

- PPE Storage area will be provided with an independent exhaust system. Exhaust rates will be based on ASHRAE 62.1 exhaust requirements for locker rooms. Gas heaters mounted on walls and controlled by local thermostat will provide heating. Make up air louvers with gravity dampers will provide air balance when the exhaust fans are switched on.

4. Hose Storage

- Hose Storage will be provided with an gas heater to provide freeze protection in the unconditioned space.

5. Chemical Storage

- Chemical storage space will be exhausted with independent exhaust fan and will have electric unit heater to provide freeze protection in the unconditioned space. Make up air louvers with gravity dampers will be provided to balance the space pressure when exhaust fans are switched on.

4. Restroom

- Restroom will be provided with a gas heater to provide freeze protection. Restroom space will be exhausted with independent exhaust fan

Cold Zone

1. Restrooms

- Restrooms and showers will be provided with code required dedicated exhaust fans. Exhaust fans will be switched to turn on/off with the lights.

2. Common Areas, Offices, Laundry, Storage

- A central heating and cooling system will be provided to condition and ventilate all common areas. The system may be a split system or a packaged unit. Cooling will be provided by a direct-expansion condenser with approved refrigerant. Heating will be provided by a high efficiency gas-fired furnace. The system will be constant volume with a single thermostat located in the dayroom.
- Radiant floor heating system will be considered in lieu of the system above.
- The commercial range in the kitchen will be provided with a type I hood exhaust that is ducted to a sidewall exhaust at the nearest exterior wall.

3. Dorms

- Each dorm will be provided with heating and cooling via a mini-split heat pump with supplemental electric resistance heating. The indoor unit will be ceiling mounted and sit flush with the ceiling. A local thermostat will be located in each dorm to control temperature. Natural ventilation will be provided by operable windows.

4. Fitness

- The Fitness area will be provided with an independent heating cooling and ventilation system. The system may be a split system or a packaged unit. Cooling will be provided by a direct expansion condenser with approved refrigerant Heating will be provided by a high efficiency gas-fired furnace. The system will be constant volume with a single thermostat located in the fitness area.

TESTING, BALANCING, AND COMMISSIONING

All air systems will be tested and adjusted by a NEBB or TABB certified contractor. HVAC and Hydronic systems will be commissioned to ensure they operate as intended and meet the required conditioning and ventilation setpoints.

CONTROLS

HVAC systems will each be provided with their own thermostat located within the conditioned area. No central building automation system will be provided.

Gas monitoring sensors will control the apparatus bay exhaust system. Sensors will monitor CO and NO2 and will detect air quality to maintain permissible pollutant/contaminant ppm levels. Sensor coverage is approximately 5,000 sqft.

Apparatus tailpipe exhaust will be controlled per manufacturer's recommended practices.

Exhaust for all areas will be provided by exhaust fans that will be manually operated by switches.



PLUMBING

CODE COMPLIANCE

- Applicable Local and State Building, Plumbing, Energy Conservation, Fire and Fuel Gas Codes and Amendments
- Owner Standards and Requirements

PLUMBING FIXTURE FLOW RATE INFORMATION

The plumbing fixture flow rates will meet EPA Watersense requirements and shall not exceed:

- Water closets: 1.28 gallons per flush
- Lavatory faucets: 1.5 gallons per minute
- Sink faucets: 1.5 gallons per minute
- Shower heads: 2.0 gallons per minute

GENERAL PLUMBING FIXTURE AND SYSTEM INFORMATION

- Domestic water piping, faucets, valves and associated equipment will be lead-free
- Domestic water piping, faucets, valves and associated equipment will be lead-free.
- Isolation valves will be provided on all branch piping. These branches will be provided for each group of plumbing fixtures, each piece of equipment, or area requiring water service.
- Floor drains will be provided in restrooms.
- Floor drains will be provided in mechanical rooms and for equipment requiring drainage.
- Floor drains will have trap seal devices, ASSE 1072 listed.
- Water hammer arrestors will be provided on all water piping branches serving flush valve fixtures and equipment with solenoid valves such as clothes washers.
- Freeze-proof wall hydrants will be provided

at the exterior of the building space as requested by the Owner.

- Living unit fixtures will be approved by the Architect and Owner.
- Public and private toilet room flush valves will be standard lever type activation.
- All ADA lavatory waste piping and water supplies will be insulated with commercial grade insulation kits.
- All floor mounted equipment will be mounted on housekeeping pads.

The following fixtures are anticipated in the design:

Hot Zone

1. Apparatus Bay

- 2" fill line for engine fill (pre-meter) located between doors with quarter turn ball valves and 1-1/2" threaded adapter.
- 2" hot and cold hi-flow mixer valve hose bibs with anti-siphon between doors with manual rewind hose reel. Three to be provided in bay.
- Snow melt boiler fill line

Warm Zone

1. Decontamination Space

- Washer
- Laundry sink
- Floor drain

2. PPE Room

- Floor drain

3. Restrooms

- Water Closet – flush valve, elongated bowl, split seat, ADA
- Lavatory – standard faucet, wrist blade handles
- Floor drain
- Shower

Cold Zone

1. Restrooms

- Water Closet – flush valve, elongated bowl, split seat, ADA
- Lavatory – standard faucet, wrist blade handles
- Floor drain

2. Showers

- Shower
- Floor drain

3. Fitness Room

- Bottle Filler

4. Laundry/Pantry

- Washer

5. Kitchen

- Double basin prep sink – gooseneck faucet, rinse hose, double drain boards
- Dishwasher (x2)
- Refrigerator (x3)
- Coffee Maker
- Grease interceptor

6. MEP

- Floor drain

7. Storage

- 24x24 mop sink

DOMESTIC WATER

Building will require a new water service and meter. Backflow prevention devices, as well as pressure regulating devices will be installed as required by the AHJ.

Domestic water service will enter the building as a

combined fire and domestic service. Final location will be determined at next phase.

A centralized hot water heater and circulation system will be installed to provide hot water to fixtures. The water heating system will employ natural gas as the heating media. Tempered water will be delivered to all public hand-washing stations through point-of-use ASSE 1070 mixing valves, this includes hand washing sinks in the kitchen area. One mixing valve may serve multiple side by side fixtures. Where public faucets have a hot and cold supply the temperature downstream of the mixing valve will be set at 110 deg F maximum.

Domestic water distribution piping may be PEX piping as long as it meets code requirements and is only installed in locations approved by the manufacturer.

IRRIGATION

A separate backflow prevention device and main will be provided to supply site irrigation systems. The irrigation system will meet the minimum planning requirements of Silverthorne.

SANITARY WASTE AND VENT

Sanitary waste and vent system will be a conventional system.

Apparatus bay interior drains will drain to a sand/oil interceptor before discharging to the sanitary waste main.

Throughout the building there will be sanitary risers and vent stacks. The stacks will be located strategically to minimize the quantity required. Termination of vent stacks will require special attention, so odors do not affect air intake locations.

STORM DRAINAGE

Storm drain piping will terminate below grade and discharge to nearest storm water system.

Overflow drain piping will terminate above grade at a downspout nozzle.

The building will have separate storm and overflow systems. The storm and overflow drain systems will be based on rainfall rates as outlined in governing codes and requirements.

NATURAL GAS PIPING

This building will have a new natural gas service. Gas will be supplied by the local utility and AHJ.

The pressure downstream of the gas meter will be regulated to a maximum of 2 psig and delivered to building equipment requiring natural gas. Fixtures

requiring less than 2 psig will have point of use pressure regulators installed to provide the necessary pressure. Final natural gas information is pending confirmation from the local utility and AHJ.



ELECTRICAL

CODE COMPLIANCE

- Applicable Local and State Building and Energy Conservation Codes, and Amendments
- Latest edition of NFPA 70 National Electric Code
- Illumination Engineering Society of North America (IESNA) Guidelines
- Owner Standards and Requirements

ELECTRICAL DISTRIBUTION

A new electrical service will be provided to the new facility. The pad mounted transformer location will be coordinated with the utility company. The power system will be no greater than an 800-amp, 120Y/208 volt, 3-phase, 4-wire system. Panelboards will be located in electrical rooms and locally in the areas being served.

An emergency generator will be included in the design to provide power the entire building. The generator is expected to be a 200kW system with an exterior sound attenuated, weatherproof, skin-tight enclosure. The basis of design will be Onan. The enclosure will include a diesel fuel belly tank that is capable of 24-hour fuel supply. One automatic transfer switch (ATS) will be provided for the building. The ATS will be located in an electrical equipment room. The ATS will be designed as a bypass isolation switch, with three-pole in-phase open transition switching. The transfer switch will have digital power metering on the load side of the switch.

All switchboards and panel boards will be fully rated for the available fault current. The electrical distribution will be selectively coordinated to limit the impact of a fault condition on the facility.

Switchboards and panel boards will have copper bus bars. Conductors will be terminated with two-hole compression lugs. Distribution equipment labeling will include the available fault current rating and Arc Flash labeling with protection requirements will be required to comply with the NEC. All switch boards and panelboards will be protected with surge protection devices (SPDs).

New conductors will be copper and will be pulled in EMT conduit with steel setscrew fittings for all home runs. Metal clad cable (MC) may be utilized for under counter luminaires and will be considered for individual room circuiting from ceiling junction box above ceiling in dry locations for a maximum 25' run. Solid conduit is required in all exposed areas.

POWER

Power and Receptacle outlets will be located as follows:

Hot Zone

1. Apparatus Bays

- All apparatus bay outlets and equipment shall be circuited to a local subpanel with a minimum of twenty spare breaker positions.
- Receptacle outlets at 48 inches AFF will be located between each door and 20 feet OC on side walls. Short Lines power to each truck will be provided. Power for hose dryer, compressor, other equipment may be required.

Warm Zone

1. Decon

- Washer/dryer: 240V 50A and 120V 20A outlets
- Power for boot dryer
- Power for suit dryer

Cold Zone

1. Corridors

- Duplex outlet every 30 feet and within 15 feet of the doors.

2. Offices

- Duplex outlets in knee spaces and where equipment may require them.
- Above counter outlet that includes USB.
- One TV locations per office.

3. Kitchens

- Duplex GFCI outlets – all outlets for equipment will be on a dedicated circuit.
- Range will require a 50A circuits.

4. Restrooms

- One GFCI duplex outlet per toilet.

5. Dorm rooms

- Duplex outlets at TV, desk, and at each bed location.
- USB outlets will be included.

6. Laundry

- Residential style washer/dryer – 240V 50A and 120V 20A outlets

7. Fitness

- Outlets 6 feet OC around room
- Several circuits for fitness equipment

8. Dayroom

- Outlets and USB outlets at convenient locations.

9. MEP

- Outlets at 4 ft OC on dedicated circuits for Telecom (minimum of six dedicated outlets)

Other outlets and power will be located as required by equipment locations or user space requirements, such as for computers, copiers, etc. Refer to mechanical and architectural for additional information and locations. All rooms will be provided with receptacle outlets.

The grounding electrode system will consist of a main ground bus bar located in the main electrical room with a ground conductor sized and bonded per the NEC to main electrical equipment, a “UFER” ground installed in the building foundation, ground rods, building cold water pipe and building steel. In addition, all satellite electrical and telecommunications rooms will have an auxiliary ground bus bar to provide a clean ground path for equipment within each room.

A new centralized UPS system is not anticipated at this time.

Solar power will be considered for the roof at the apparatus bays using a power purchase agreement. A Solar Power Purchase Agreement (SPPA) is a financial arrangement in which a third-party developer owns, operates, and maintains the photovoltaic (PV) system, and a host customer agrees to site the system on its roof or elsewhere on its property and purchases the system’s electric output from the solar services provider for a predetermined period. This financial arrangement allows the owner to receive stable, and sometimes lower cost electricity. The solar services provider or another party will acquire financial benefits such as tax credits and income generated from the sale of electricity to the host customer.

Electric car charging stations may be required in the parking lot. Power to the charging stations will be provided on a separate dedicated subpanel. Each charging station subpanel will have a separate local disconnecting means per NEC. EV car charging stations will be Level 2 stations capable of providing

50A of 120V to 240V charging. Stations will offer two standard SAE J1772 charging ports.

EV ready locations may also be provided in the parking lot for additional charging stations in the future. A 50 amp 208/240V circuit will be run to each of these locations.

LIGHTING

Lighting will be designed to meet the lighting level criteria in the Illuminating Engineering Society (IES) guidelines. Lighting power densities will be at or below the thresholds required by the energy code (IECC). LED lighting will be implemented as the basis of design within the facility. Specific Lighting schemes are as follows:

Hot Zone

1. Apparatus Bays

- Suspended high bay LED troffers.
- Night Lights
- Medium base porcelain lamp holder at top of each garage door column. Switched by photocell

Warm Zone

1. Wet location troffers

Cold Zone

1. Dayroom

- Downlights with other decorative elements

2. Corridors

- 2'x2' LED architectural troffers with 12ft spacing

3. Offices

- 2'x4' LED architectural troffers

4. Fitness

- Linear ceiling mounted LED fixtures

5. Kitchen

- Recessed downlights with decorative pendants

6. Restrooms

- Recessed downlights with above mirror decorative lighting

7. Dorms

- Recessed downlights

W8. MEP/Storage

- Ceiling or chain mounted LED strip lighting

Code-required egress and exit lighting will consist of selected luminaires with battery backup. Exit signage will incorporate high efficiency and long life LED lamps. Edge-lit type with brushed aluminum trim is anticipated in front of house areas and high impact thermoplastic housings are anticipated in back of house areas.

All parking and area lighting will meet Silverthorne exterior lighting standards. Light poles will be 25 feet in height in the parking areas with a 24" light pole bases. All exterior lighting will be lamped with LEDs, and IESNA recommendations for minimum and average maintained horizontal and vertical footcandles will be followed.

Two above-grade flood lights will be utilized each for the exterior flagpole and site signage.

Exterior building lighting will include building signage flood lighting, downlighting for exterior soffits, egress lighting at walk doors, and lighting on the columns between garage doors

CONTROLS

Lighting controls will be provided to meet International Energy Conservation Code (IECC) requirements.

Offices will have automatic controls to turn lights off with manual on (vacancy sensor). Storage,

restrooms, and other similar areas will have automatic on and off (occupancy sensor). Sensors will be dual technology and will be wall or ceiling mounted to optimize performance.

Areas with skylights or windows will have dimmable daylighting controls for 15 feet within the daylight area.

Building entrances will have security dusk to dawn lighting controlled by a photocell and motion sensor. Remaining exterior lighting will be capable of being reduced by at least 30%.

An automated lighting control system will be provided for the facility exterior lighting. The interior lighting will be controlled locally. All controls will meet the current requirements of the IECC and local jurisdictions.

FIRE ALARM

Smoke and Carbon Monoxide detection will be provided as required. Each detection device and manual pull station will be addressable and report to the panel as an individual device. Addressable interface modules will be used to connect the sprinkler flow and tamper devices to the system.

Speaker/horn/strobes and other annunciation devices will be provided in required locations within the facility.

Fire alarm shall also meet minimum Life Safety Policy requirements of SFE along with NFPA.

LIGHTNING PROTECTION

The facility will be provided with a copper, Franklin-type lightning protection system consisting of grounding rods, downlead conductors with conduits, and air terminals. The new system will be provided with a UL master label.

TECHNOLOGY AND LOW VOLTAGE SYSTEMS

The pathways for each of the technology system infrastructure shall be designed and installed in accordance the latest ANSI/EIA/TIA standards, and

the National Fire Protection Association (NFPA) – all applicable standards. Each conduit shall be fitted with an appropriate plastic bushing and run to the nearest cable tray unless otherwise noted.

Wire basket cable tray will run throughout all main corridors and secondary corridors to support the cable infrastructure for the various technology systems. The cable tray shall be a 12"x4" tray. In areas where cable tray will not fit due to existing conditions, cable straps and j-hooks may be used. Straps and j-hooks shall be spaced no further than 5'-0" apart.

A minimum of four 4" conduits shall be provided to each Telecom area dedicated for backbone cabling. The conduits may be run to the nearest cable tray where possible. Two to four more 4" conduits shall be required for horizontal cabling supporting the technology systems running from the cable tray to each Telecom area. Exact quantities of 4" conduits for the horizontal cabling shall be determined in design development.

Conduit sleeves or fire rated systems such as the STI E-Z Path system shall be provided through rated walls for all system wiring not specified being in conduit. Conduit segments between endpoints/pull boxes shall not exceed 100-feet, nor contain more than a total of 180 degrees of bends. L-Bends shall not be used in any circumstances. All fire rated wall penetrations must be properly made and sealed according to National Electric Code (NEC) and National Fire Protection Association (NFPA) using approved Underwriters Laboratories (UL) methods and materials.

All network/telephone/data/dispatch wiring will be installed by owner. GC to provide conduit from accessible space to J boxes installed in identified locations (dorm rooms, dorm showers, etc).

An interior warning system at the bay doors shall be included to provide drivers absolute confirmation when the door is completely open or closed.

TELECOMMUNICATIONS

- Each standard tele/data outlet location shall have a four-inch square box with a single gang mud ring and 1" conduit stubbed to above accessible ceiling and to the nearest cable tray. All rooms shall have a minimum of one tele/data outlet. Each office shall have standard outlet locations in knee spaces and as required for equipment and computer placement. The owner may have additional locations for tele-phone/data outlets.
- The Telecommunications area will be lined with 3/4" A/C Plywood and painted to match walls. The telecom room will include the following:
- Cable TV service entrance to include a 2" conduit to cable connection point outside of the building. A homerun coax from each TV Jack in building will be included. TVs will be located in dorm rooms, offices, and dayroom. See architectural plans for additional locations.
- The Fiber Optic Termination Point will terminate in the telecom room with a 4" conduit to a Fiber Connection Point outside of the building. The home run from each data port will be by owner.
- The Telephone Termination Point will include a 4" conduit to telephone connection point outside of the building. Isolated ground block will be provided with two ground rods isolated from building electrical system. Ground rods buried remote from each other outside of building.
- Two 2" conduit paths will be provided from the telecom area to the bottom end of the antenna masts. The antenna mounts will include four 4" rigid conduit "service entrance masts" for antenna mounting points. installed 24" below ridge on back side of building. Masts shall extend 4' above roof. Masts shall be anchored deep within structure to provide lateral support for antennas extending 20' above roof (refer to structural) and shall be grounded for lightning protection.

Where conduits are terminated outside of the building, a hand hole will be provided. Location of Telecommunications room will be determined at the next stage.

PUBLIC ADDRESS / OVERHEAD PAGING SYSTEM

The paging system is to consist of speakers, volume controls, and the head end equipment. Speakers will be located throughout the facility and at the patio. It is expected that all speakers will be ceiling mounted and be located in dropped ceiling areas and therefore will not require conduit or backboxes. In areas where speakers are located in non-accessible ceilings, a 3/4" conduit will be required to each speaker. The conduits can be daisy chained together with one 3/4" conduit stubbed to the nearest cable tray. Volume control devices will require a 3/4" conduit stubbed from a double gang backbox to the nearest cable tray. Volume controls will be located in corridors and office areas.

Equipment may be as follows:

- Ceiling Speakers: Bogen HFCS1LP or equal
- Wall Mounted Volume Control: Bogen ATP10 or equal
- Public address system shall be or equal to Phoenix Station Alerting System.

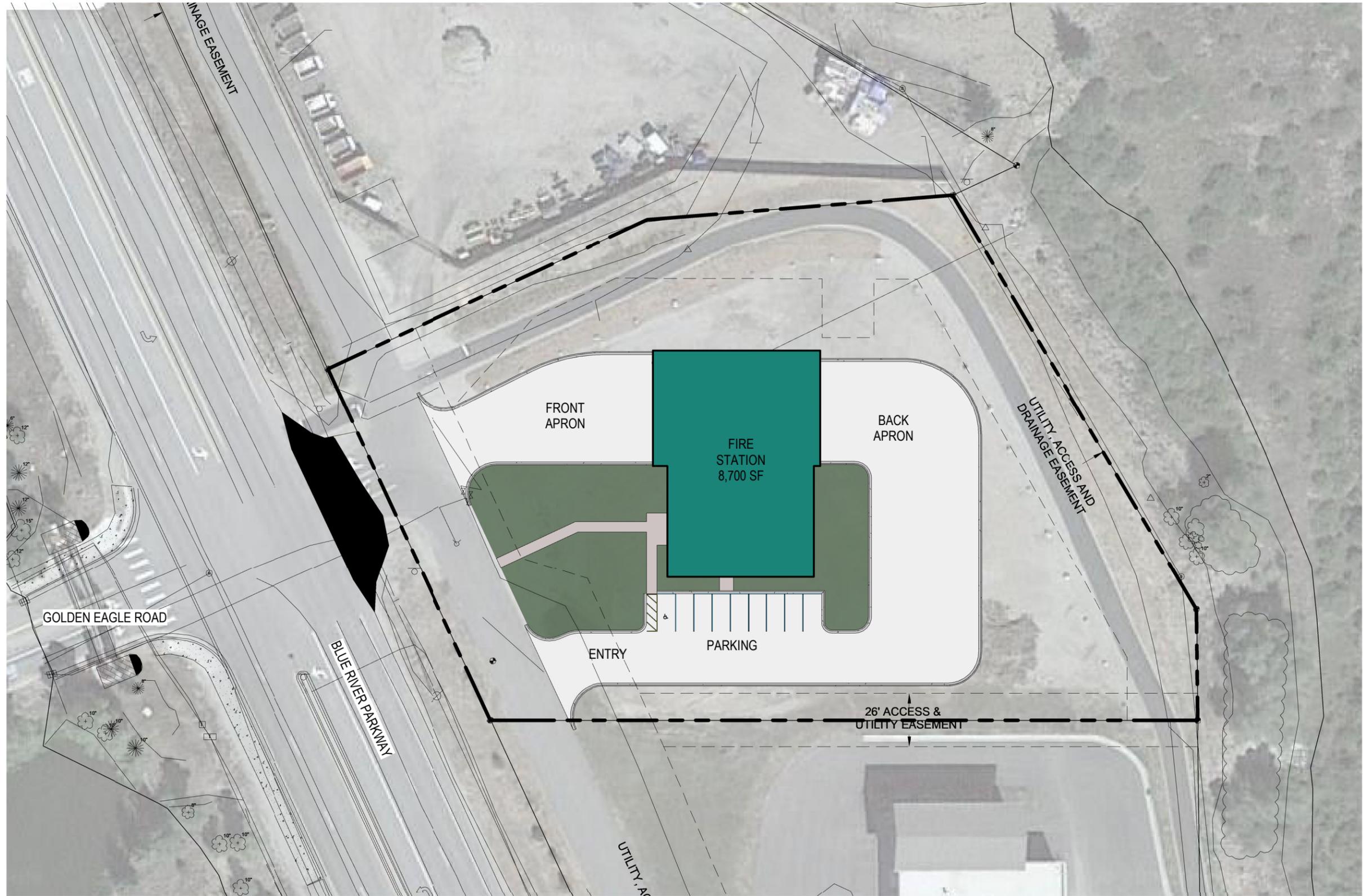
SECURITY, VIDEO SURVEILLANCE AND ACCESS CONTROL SYSTEMS

Devices for these systems shall have rough ins consisting of a 4" square box with a single gang mud ring. A 3/4" conduit shall be routed from the back box of each device to the nearest cable tray. It is expected that there will be video surveillance cameras located at each exterior door. The access control system shall consist of trilogy security lock devices. Building entry/exits are anticipated to have access controls.

The security door access system design and programing shall be provided by the owner's preferred vendor. All outside doors shall be equipped with an electronic release strike & card reader. The system shall be Honeywell PRO32 compatible with

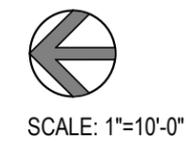
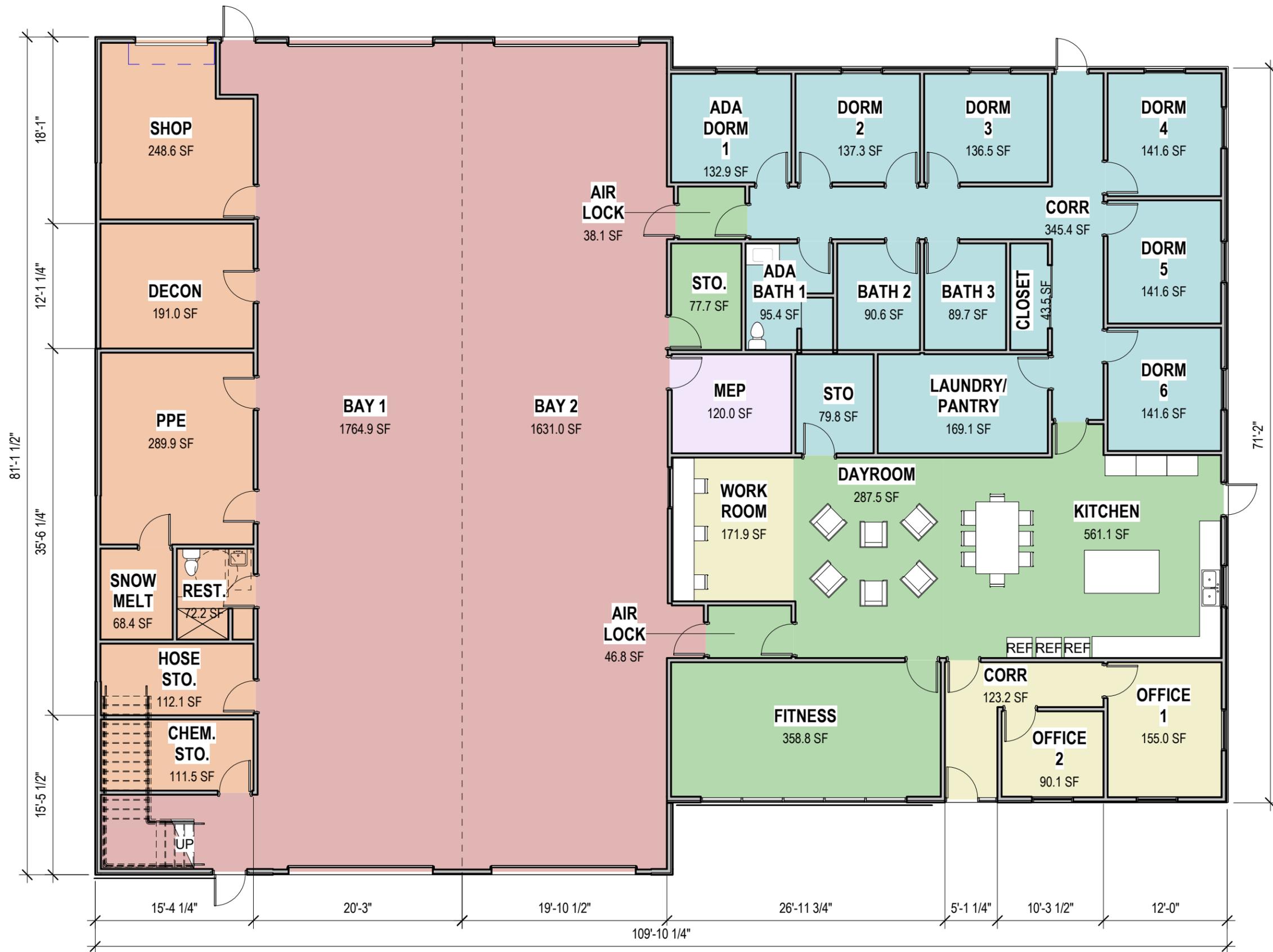
HID Multiclass card readers and may be connected to existing Silverthorne servers if required.

Video System by GC will be Multi Sensor Internet Protocol (Axis P3717 PLE). Panoramic Cameras shall be installed around the exterior to monitor all entry points (man doors, garage doors and windows), parking lots, and outside equipment. The system may be connected to existing Silverthorne servers.



TRUE NORTH

SCALE: 1"=50'-0"



SQUARE FOOTAGE: 8,700 SF

FLOOR PLAN



EXTERIOR ELEVATION - WEST

1" = 20'-0"



EXTERIOR ELEVATION - SOUTH

1" = 20'-0"



EXTERIOR ELEVATION - NORTH

1" = 20'-0"



EXTERIOR ELEVATION - EAST

1" = 20'-0"

