PRELIMINARY ENGINEERING PHASE

- Final Report – May 26, 2026

Village of Homewood – HVAC Renovations

SUBMITTED TO:

Village of Homewood

2020 Chestnut Road

Homewood, Illinois 60430

Project number: 26-347-1670

Kluber Architects + Engineers

May 26, 2026

Mr. Joshua Burman
Director of Public Works
Village of Homewood
17755 Ashland Ave.
Homewood, IL 60430

Re: Public Safety Campus HVAC Replacement
Kluber Project No. 26-347-1670

The Kluber team has enjoyed the opportunity to work with the representatives from the Village of Homewood on the Heating, Ventilation, and Air Conditioning (HVAC) Replacement for the Public Safety Campus.

The following document has been grouped into several sections as described below:

Project Scope
The work defined by Kluber's Proposal and as clarified or modified through discussions with Village representatives during the current phase of Kluber's work.

The Village of Homewood would like to replace the current HVAC system at the Public Safety Campus and is looking for recommendations, budgets, and options to phase future HVAC projects.

Preliminary Evaluation
An analysis of the exiting conditions including Kluber's review of available existing drawings and site visits to review existing conditions.

Recommendations
Recommendations for improvements to and replacement of the current HVAC system including design options and phasing.

Preliminary Cost Estimate
An opinion of probable cost for the recommendation discussed. It includes costs for materials, selective demolition, allowances, contingencies and soft costs.

Next Steps
The Village of Homewood has reviewed the plan and desires to implement Option 2. Upon acceptance of the Study the next steps would be to proceed with the Construction Documents phase of the project.

This phase will include detailed Drawings and Technical Specifications, as well as front-end bidding requirements for the Village.

As always, if you have any questions regarding the attached information, please contact our office.

It has been a pleasure working with you and your team, and we look forward to proceeding with the next phase of this project.

Sincerely,

Charli Johnsos
Senior Project Manager
cjohnsos@kluberinc.com

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Project Scope

This section describes the scope of work that has led to this report.

THE PROJECT SCOPE IS FURTHER DEFINED AS FOLLOWS:

Homewood Public Safety Campus – HVAC Improvements

The project consists of developing options and cost estimates for a new HVAC system for the Public Safety Campus. The existing facility is comprised of three levels (partial basement, first and second) totaling approximately 25,000 square feet. This includes reviewing the existing conditions, evaluating modern system alternatives and recommending solutions that ensure reliable performance, energy efficiency and long-term maintainability for this mission-critical, 24/7 facility.

Preliminary Evaluation

Review of available existing drawings or as-builts and site visit to review existing conditions.

Existing Systems Descriptions

MECHANICAL SYSTEMS

The building is heated and cooled with a ground source heat pump (GSHP) system. The system consists of a water loop (ground loop) that is pumped between a set of geothermal wells and indoor ground-sourced heat pumps. There are twenty-four, 400-foot-deep geothermal wells at the Public Safety Center, located in the adjacent parking lot on the west side of the building. These wells use the earth's relatively constant ground temperature to maintain the ground loop water temperature within a specific range. The water loop absorbs heat from the ground in the winter and rejects heat in the summer. The indoor ground source heat pumps are refrigerant based systems which provide the heating or cooling to the building. Heat pumps contain a reversing valve in the refrigerant system which allows the system to operate in heating or cooling. When the heat pump is in cooling mode, heat from the building is rejected to the ground loop. In heating mode, heat is absorbed from the ground loop.

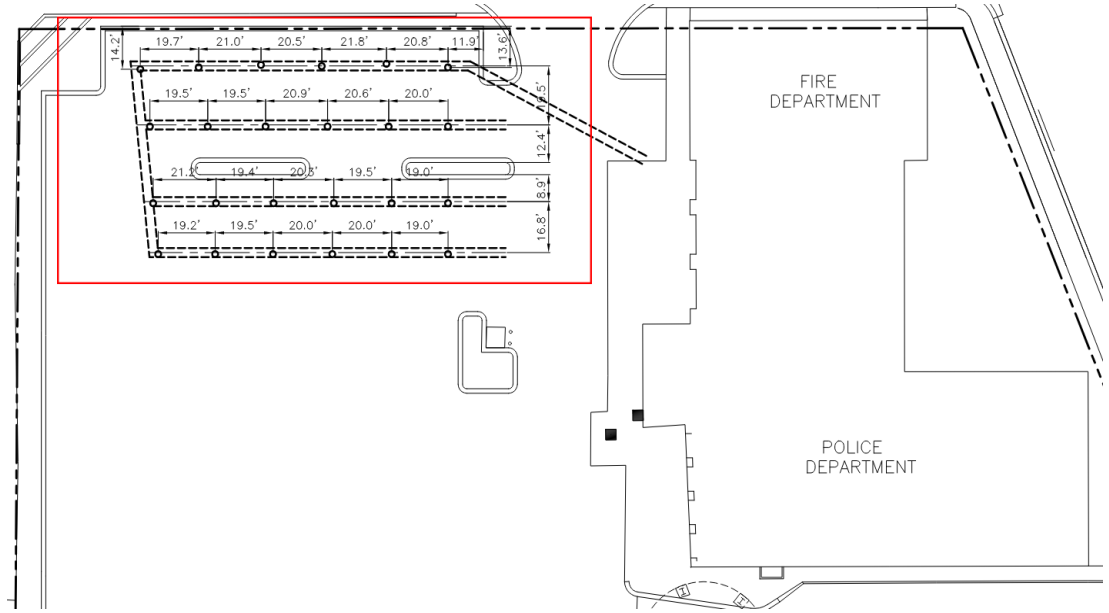
The fire station and the police station have separate piping connections to the geothermal field. One building's part of the ground loop could potentially be shut down without impacting the other building's heating and cooling capabilities. The ground water supply and return piping mains enter and leave the buildings in the first-floor mechanical room behind the sallyport of the police station and the first-floor maintenance room of the fire station. Inline pumps direct the ground water flow from the geothermal field into the buildings. Propylene glycol is utilized to prevent the water from freezing.

Police Station: First floor

The first floor of the police station is heated and cooled by ten floor-mounted ground-sourced heat pumps (GSHP) and eight ducted GSHP's located above the ceiling. Code required ventilation air is supplied by a ducted, vertical GSHP. This unit pulls ventilation air from the wall louver on the west side of the building and pre-conditions the outside air. An electric duct heater provides additional heating capacity for the unit. This air is then supplied directly into the first-floor plenum space which mixes with the return air of the ducted GSHP's. GSHP's located above the first-floor ceiling distribute ventilation to the space by returning this mixed air from the plenum space. This includes the interview rooms, high-security holding area, and the interior rooms. First floor offices along the perimeter of the building are heated and cooled by floor-mounted GSHP's. The windows in these offices are operable, which meet the requirements for natural ventilation. Piping is routed in the ceiling space and down to the floor mounted units through piping chases and enclosures. Hydronic piping and ductwork from the previous HVAC system is abandoned throughout the first-floor ceiling space.

Police Station: Lower Level

The lower level of the police station is heated and cooled by six ducted GSHP's located above the ceilings and inside the mechanical room. A roof-mounted energy recovery ventilator (ERV) distributes ventilation to the lower level. An ERV is an energy recovery device which transfers energy from an exhaust airstream to the outdoor airstream without mixing of air. Similar to the first floor, the ventilation is supplied directly into the plenum space which mixes with the return air of the ducted GSHP's. These ducted GSHP's distribute the mixed air to the space. The bathrooms and locker rooms are exhausted through the same energy recovery ventilator that supplies outside air to the lower-level.



Geothermal Field Location

Existing Systems Descriptions - CONTINUED

MECHANICAL SYSTEMS - CONTINUED

Police Station: Sallyport

The sallyport is heated by two gas-fired unit heaters. Exhaust is provided by a roof mounted exhaust fan interlocked with a gravity ventilator for makeup air. The ventilation system is controlled by a wall switch.

Police Station: Lower-Level Shooting Range

The shooting range on the lower level is heated and ventilated by a gas-fired makeup-air unit. The shooting range equipment is only operated when the shooting range is in use. Heated outside air is ducted to a supply plenum located on the entry side of the range. The supply plenum contains a perforated wall which evenly distributes air across the face of the wall and into the range. Air is pulled across the range with an exhaust intake located downrange. The exhaust air is filtered by HEPA filters before discharging above the roof of the building. The shooting range does not have any air conditioning making the space very uncomfortable during the warmer months. In addition, based on feedback from the using agency, when the range is not in use, the space can become very cold in the winter and warm during the summer.

Fire Station: First Floor

The first floor of the fire station is heated and cooled by eight floor-mounted ground-sourced heat pumps (GSHP) and two ducted GSHP's located above the ceiling. The windows in the fire station are operable, which meet the requirements for natural ventilation. Piping is routed in the ceiling space and down to the floor mounted units through piping chases and enclosures. Hydronic piping and ductwork from the previous HVAC system is abandoned throughout the first-floor ceiling space.

Fire Station: Second Floor

The second floor of the fire station is heated and cooled by six floor mounted GSHP's and a packaged constant-volume rooftop unit. The GSHP's provide heating and cooling to the day room, kitchen, and locker room. Piping to these GSHP's is routed from the first-floor ceiling space below. Code required ventilation air is provided by a roof-mounted energy recovery ventilator with an electric duct heater for supplemental heat. The outside air is ducted directly to the day room, kitchen, and dormitory corridor. The men's locker room is exhausted through the energy recovery ventilator. The rooftop unit provides heating, cooling and ventilation to the dormitory and the chief's room. These spaces operate as a single zone with one thermostat controlling the entire dormitory.

Fire Station: Apparatus Bay

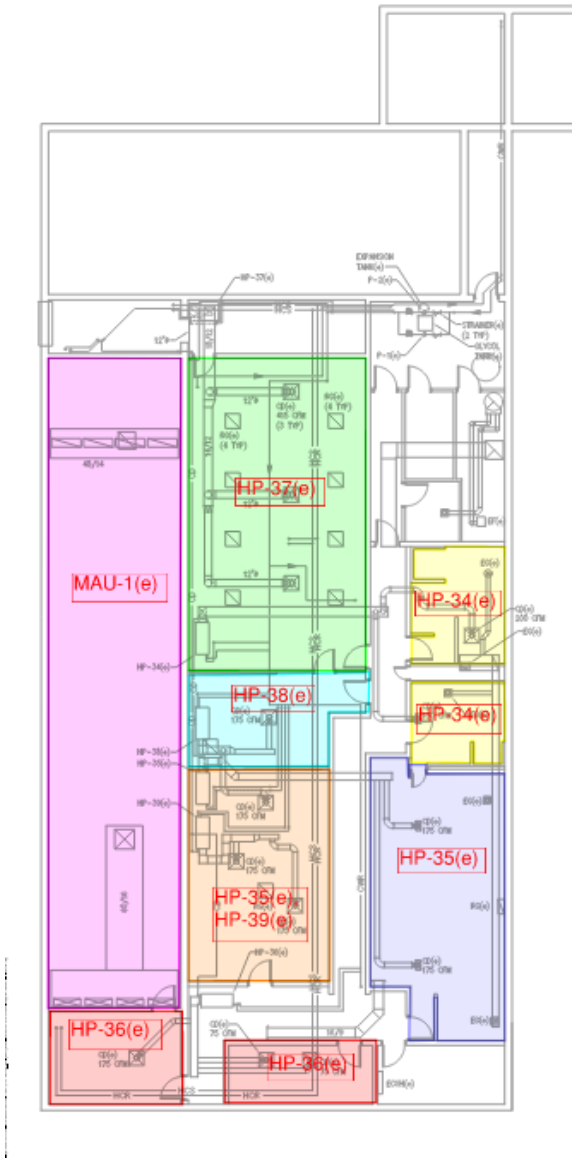
The apparatus bay is heated by four gas-fired unit heaters. Exhaust is provided by two roof mounted exhaust fans interlocked with gravity ventilators for makeup air. The ventilation system is controlled by a wall switch A source-capture exhaust system is installed to connect the tailpipe of emergency vehicles directly to exhaust. Piping from the previous HVAC system is abandoned throughout the Apparatus Bay.

Existing HVAC Drawing (Police Station)

Floor-mounted ground-source Heat pump

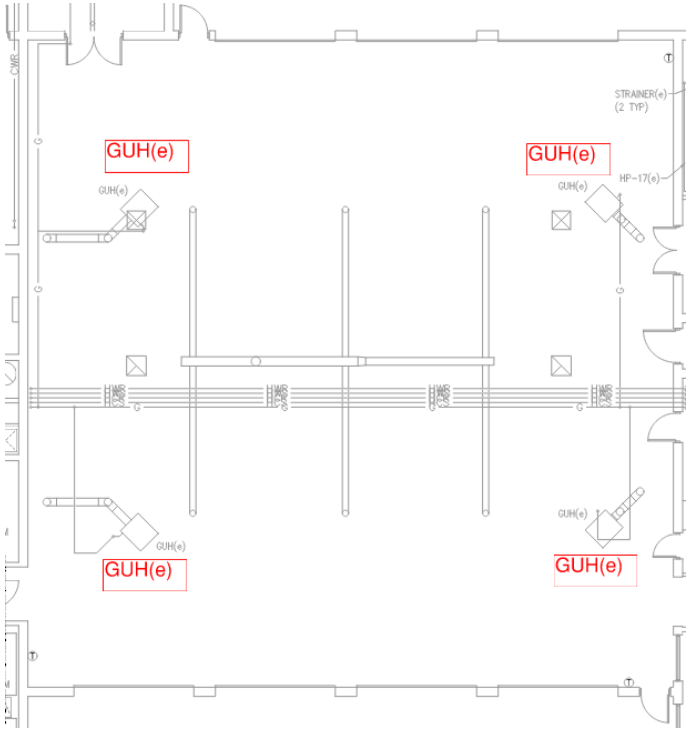
Abbreviations:
GUH – gas-fired unit heater
HP – ground-source heat pump
EUH – electric unit heater
ECUH – electric cabinet unit heater
CD – ceiling diffuser
RG – return grille
EG – exhaust grille

Police Station First Floor



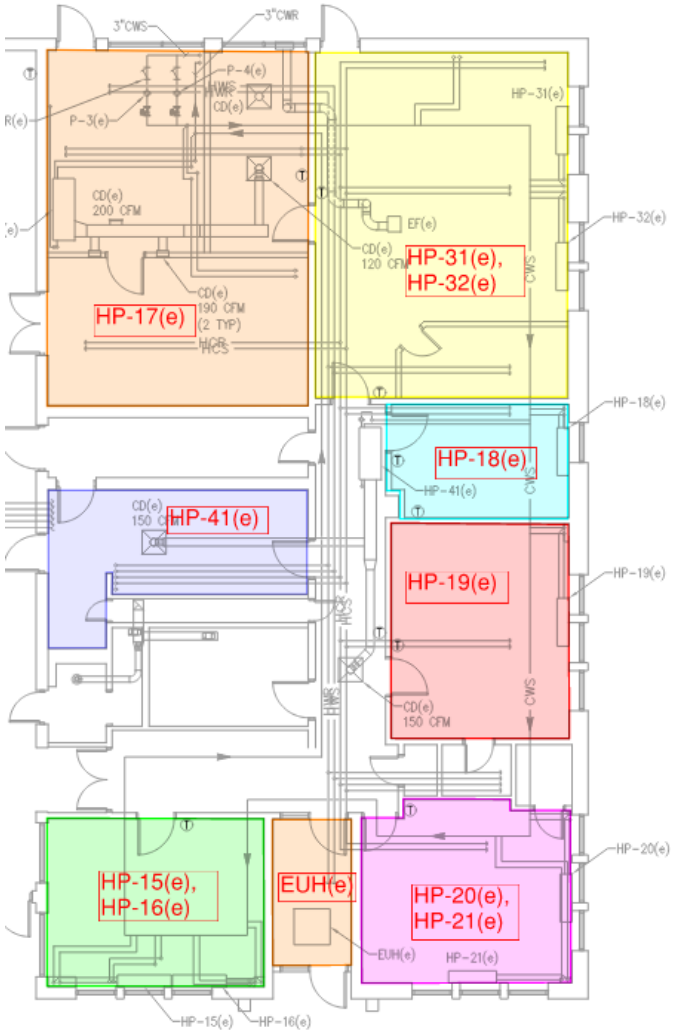
Police Station Lower Level

Existing HVAC Drawing (Lower Level, Second Floor)

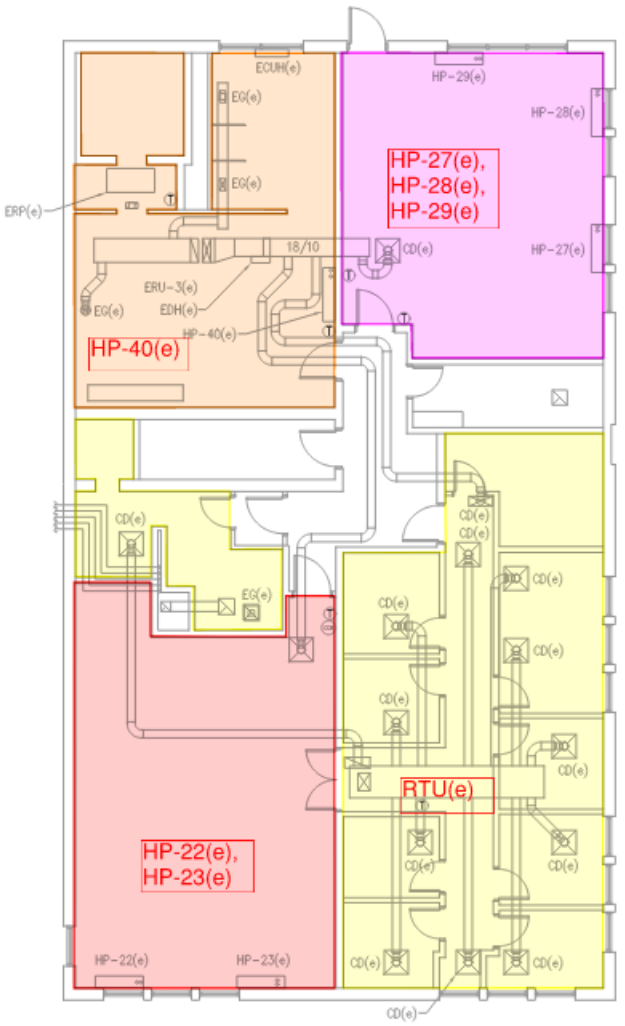


Apparatus Bay

Abbreviations:
RTU – rooftop unit
HP – ground-source heat pump
ERP – electric radiant panel
ECUH – electric cabinet unit heater
CD – ceiling diffuser
RG – return grille
EG – exhaust grille

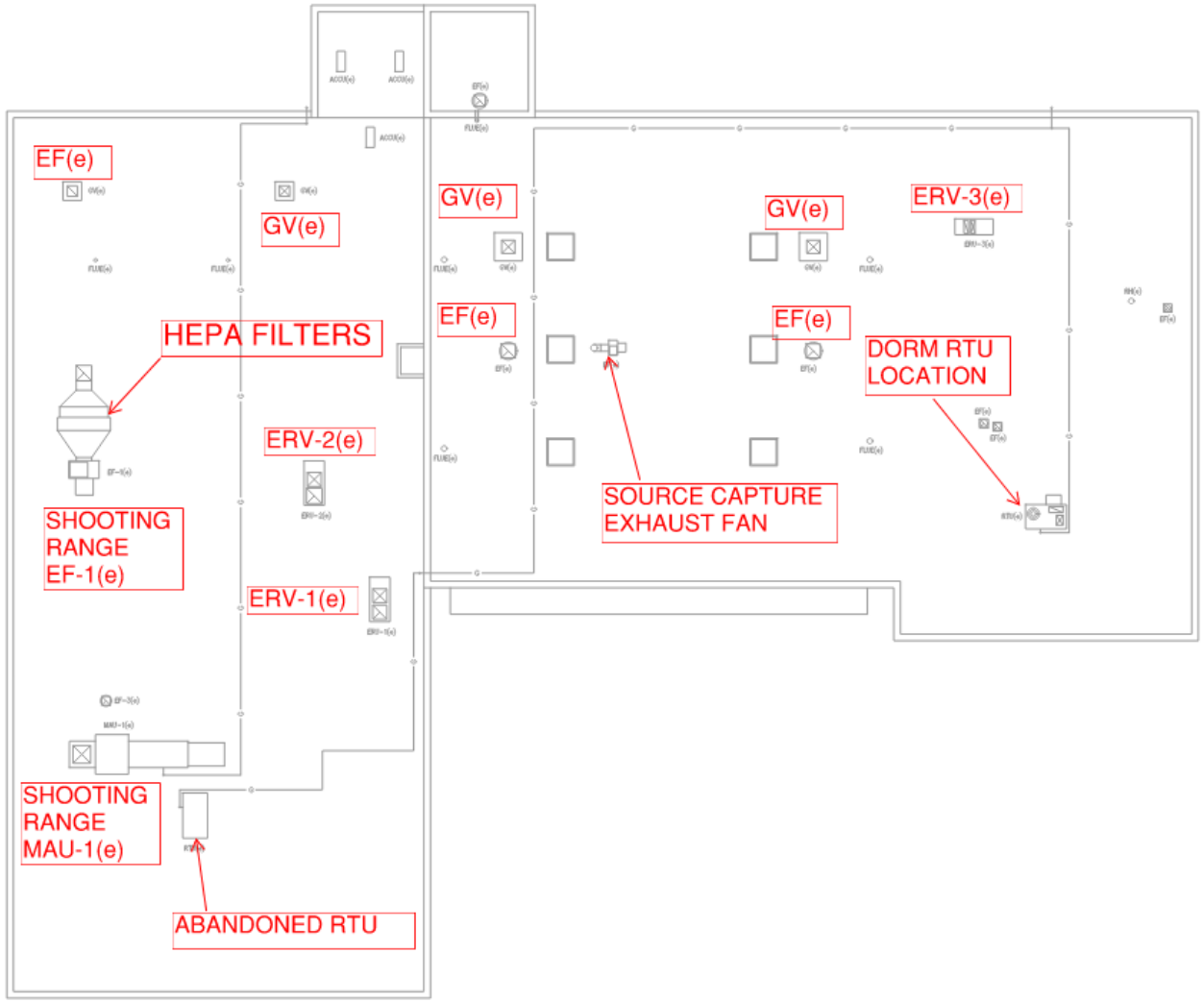


Fire Station First Floor



Fire Station Second Floor

Existing HVAC Drawing (Roof)

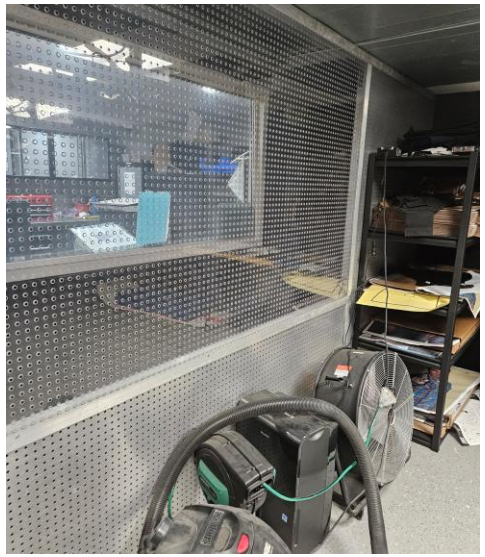


Roof

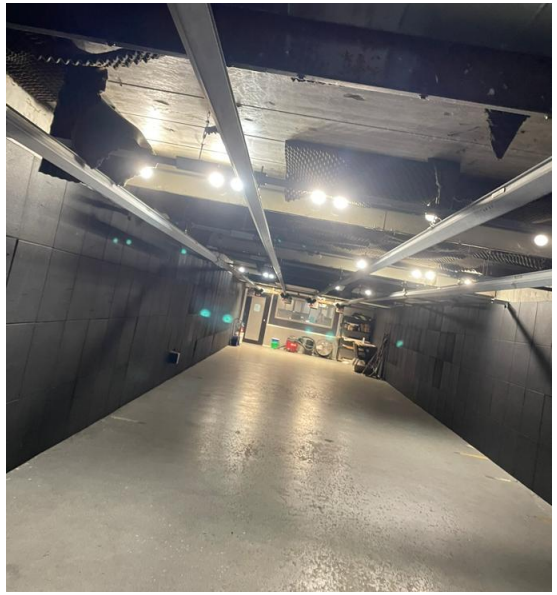
Abbreviations:
RTU – rooftop unit
EF – exhaust fan
ERV – energy recovery unit
MAU – makeup air unit
GV – gravity ventilator

HVAC Systems Photos

Typical ducted ground source heat pump

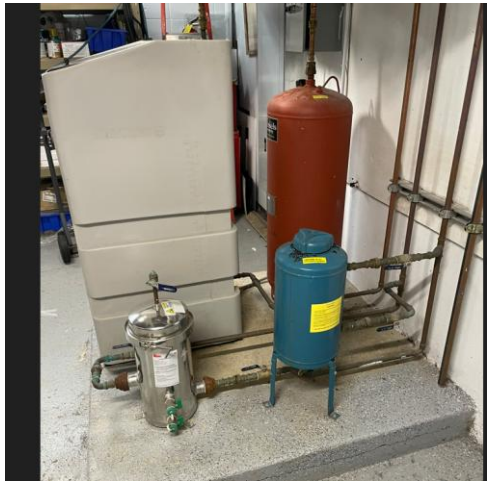


Shooting Range perforated supply air wall



Shooting Range

Police Department ground loop pumps

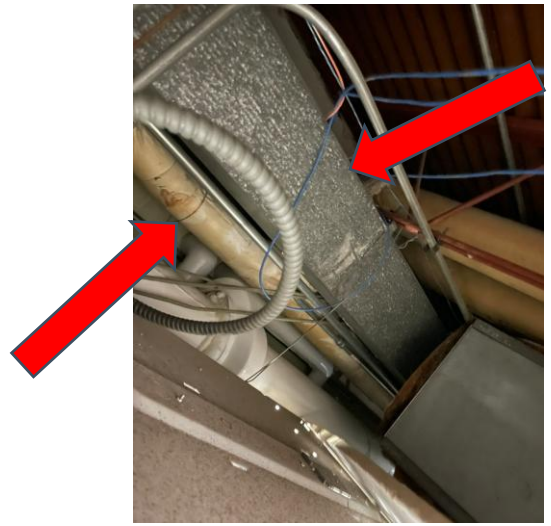


Police Station ground loop equipment (glycol feeder, expansion tank, pot feeder & side-stream filter)

HVAC Systems Photos - Continued

Typical floor-mounted HP

Piping to / from geothermal field (Police Department)



Abandoned HVAC infrastructure above ground water piping

Fire Station ground pump

Piping to / from geothermal field (Fire Station)

Typical gas-fired unit heater

HVAC Systems Photos - Continued

Shooting Range makeup air unit

Shooting Range exhaust fan and HEPA filter housing

Apparatus Bay source-capture exhaust fan

Police Department energy recovery ventilators

Fire Station dormitory rooftop unit

Typical roof mounted exhaust fan

Recommendations

The Recommendations are a series of written descriptions that reference the building codes; descriptions of HVAC systems; system modifications and possible equipment selections.

Applicable Building Codes

Code Information:

This project site falls within the Village of Homewood and will be designed to me the requirements of the adopted building codes below:

2018 International Building Code

2018 International Existing Building Code

2018 International Mechanical Code

2014 State of Illinois Plumbing Code

2018 International Fuel Gas Code

2017 National Electrical Code

2024 Illinois Energy Conservation Code

2018 Illinois Accessibility Code

Local amendments to the above code

Recommendations - Summary

MECHANICAL SYSTEMS

Option 1 Summary:

Variable Refrigerant Flow System:

Remove the geothermal system, abandon the geothermal field, and install a variable refrigerant flow (VRF) system for heating and cooling. Install a combination of floor-mounted, wall-mounted, recessed ceiling cassette, and above-ceiling ducted indoor units. Install dedicated outdoor air systems (DOAS) with energy recovery for ventilation.

Option 2 Summary:

Hot Water / Chilled Water System

Remove the geothermal system, abandon the geothermal field, and install a 4-pipe hot water / chilled water system. Create separate mechanical rooms for a chiller and boilers. Install a split air-cooled chiller with the condenser on the roof for cooling. Install multiple natural gas-fired high efficiency condensing boilers for heating. Hot and chilled water would be distributed throughout the building to various fan coil units to heat and cool the building. Install dedicated outdoor air systems for the fire station and police department to provide ventilation.

Misc. Infrastructure Summary:

Replace the shooting range MAU with a packaged dedicated outdoor air system to provide heating and cooling. Replace the shooting range exhaust and air filtration system with a similar system. Install a hazardous gas detection system for the Sallyport and Apparatus Bay. Re-use the existing roof top unit and install VAV diffusers for the dormitory rooms.

Recommendations

MECHANICAL SYSTEMS

Option 1: Variable Refrigerant Flow System (VRF):

A VRF system is a refrigerant based split system heat pump utilized to heat and cool a building. The outdoor heat pumps operate in heating or cooling year-round based on the building's requirements. VRF systems provide superior zone control as each office can have its own indoor unit with thermostat. Branch selectors control the amount of refrigerant flowing to each indoor unit.

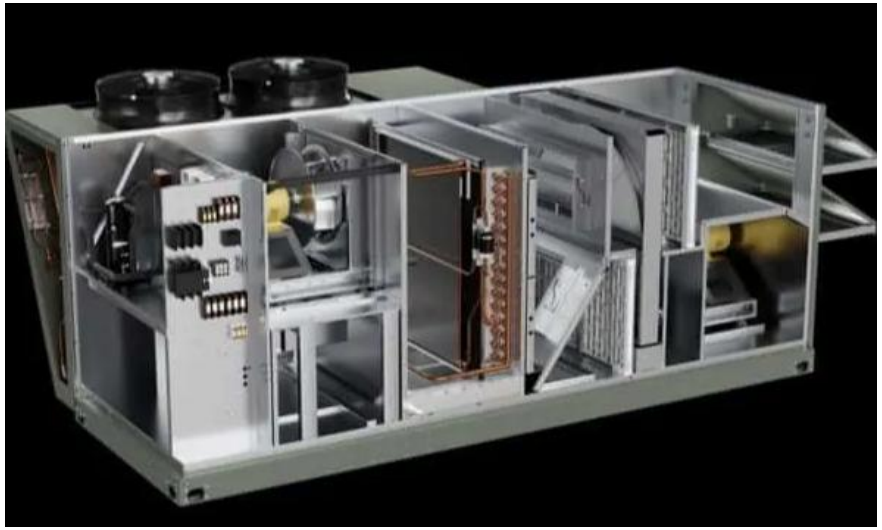
Indoor VRF units are decoupled systems. This means that the ventilation systems and heating/cooling systems are separated. A dedicated outdoor air system with energy recovery (DOAS) would be necessary with the installation of a VRF system. A DOAS is a refrigerant-based packaged roof top unit used to condition the ventilation air. A DOAS would be sized to condition the code required outdoor air amount. The required outdoor air amount would be a much smaller airflow than is required for space conditioning purposes. Treated outdoor air would be supplied to each room at a room neutral condition.

The outdoor equipment for the VRF system will be located on the roof. One VRF outdoor unit would be located on the roof of the fire station and would serve the VRF indoor units in the fire station. One VRF outdoor unit would be located on the roof of the police station and would serve the VRF indoor units in the police station. Refrigerant would be piped inside the building to the indoor equipment.

Police Station: Lower Level

The lower level of the police station has a very low structure. Remove above ceiling heat pumps and replace with wall-mounted or ceiling cassette style VRF indoor units to provide heating and cooling to the lower level. Remove existing roof-mounted ERV and replace with a roof-mounted DOAS to provide ventilation to the lower level. Existing outdoor air and exhaust air duct chases will be utilized. Outdoor air ductwork would be routed through the corridor ceiling space and supplied into the lower-level rooms with sidewall diffusers. This solution would maximize ceiling heights in the lower-level rooms.

VRF outdoor unit



DOAS

Recommendations - Continued

MECHANICAL SYSTEMS - CONTINUED

Option 1: VRF Recommendations

Police Station: First Floor

Replace floor-mounted heat pumps with floor-mounted VRF indoor units. Refrigerant piping would be routed in the joist space, pipe chases, and pipe enclosures. Replace the existing ducted heat pumps with ducted VRF indoor units. Existing building zoning will be reviewed during the design phase to determine where additional zoning may be required for optimal occupant comfort. Supply ductwork would be routed through the ceiling space to the ceiling diffusers. A DOAS would be used for the first floor of the police station. This DOAS would be a packaged unit mounted on the roof. The outdoor air ductwork would be routed in the first-floor ceiling space and connected to the return ductwork of each ducted VRF indoor unit. The outdoor air can be supplied directly into the space for each space containing ductless VRF units. The first-floor ceiling space can remain a plenum return.

Fire Station:

Replace the floor-mounted heat pumps with floor-mounted VRF indoor units for the fire station. Refrigerant piping would be routed down from the roof to the first-floor ceiling space through a pipe chase. Refrigerant piping to the first-floor VRF indoor units would be routed in the joist space, new pipe chases, and new pipe enclosures. Replace the existing ducted heat pumps on the first floor with ducted VRF indoor units. Existing building zoning will be reviewed during the design phase to determine where additional zoning may be required for optimal occupant comfort. Refrigerant piping to the second-floor VRF indoor units would be routed from the ceiling space on the floor below. A DOAS would be used for the fire station. This DOAS would be a packaged unit mounted on the roof of the fire station. The outdoor air ductwork would be routed down to the first-floor ceiling space through a new duct chase. The outdoor air can be supplied directly into the space for each space containing a floor-mounted VRF unit.

Wall-mounted VRF indoor unit

Floor-mounted VRF indoor unit

Recommendations - Continued

MECHANICAL SYSTEMS - CONTINUED

Option 2: Hot Water / Chilled Water Recommendations

Install a four-pipe hot water / chilled water system. Two high-efficiency, natural gas-fired, condensing boilers would be installed in the lower-level mechanical room for heating. Based on the preliminary assessment, a new chase would be installed to vent the boilers to the roof. Final locations for venting will be determined during the design phase. Based on feedback from the Village, the indoor generator may be relocated to the exterior. If the generator is relocated, the generator room will be utilized as a mechanical room. Install a split air-cooled chiller with a remote condenser for cooling. The chiller would be installed in the lower-level with the remote condenser on the roof. The compressors for a split air-cooled chiller are contained within the indoor unit. This reduces the radiated noise generated from the outdoor equipment. The entire building can be served by one central hot water / chilled water system. In a four-pipe hydronic system, the hot water and chilled water have separate piping systems which allows simultaneous cooling and heating operation throughout the year.

Police Station: Lower-Level

The lower level has a very low structure. Remove above ceiling heat pumps and replace with wall-mounted fan-coil units to provide heating and cooling to the lower level. Remove existing roof-mounted ERV and replace with a roof-mounted DOAS to provide ventilation to the lower level. Existing outdoor air and exhaust air duct chases will be utilized. Outdoor air ductwork would be routed through the corridor ceiling space and supplied into the lower-level rooms with sidewall diffusers. This solution would maximize ceiling heights in the lower-level rooms.

Police Station: First Floor

Replace the floor-mounted heat pumps with floor-mounted fan-coil units. Hot water and chilled water piping would be routed in the joist space, new pipe chases, and new pipe enclosures. Replace the existing ducted heat pumps with ducted fan coil units. Supply ductwork would be routed through the ceiling space to the ceiling diffusers. Existing building zoning will be reviewed during the design phase to determine where additional zoning may be required for optimal occupant comfort. A DOAS would be used for the first floor of the police station. The DOAS would be a packaged unit mounted on the roof. The outdoor air ductwork would be routed in the first-floor ceiling space and connected to the return ductwork of each ducted fan coil unit. It is recommended that the outdoor air be supplied directly into the space for each space containing a floor-mounted fan-coil unit. The first-floor ceiling space can remain a plenum return.

Floor-mounted fan-coil unit

High-efficiency boilers

Recommendations - Continued

MECHANICAL SYSTEMS - CONTINUED

Fire Station:
Replace the floor-mounted heat pumps with floor-mounted fan-coil units. Hot water and chilled water piping would be routed from the police station through the apparatus bay. Hot water and chilled water piping to the second-floor fan-coil units would be routed up from the first-floor ceiling space. Hot water and chilled water piping to the first-floor fan-coil units would be routed in the joist space, new pipe chases, and new pipe enclosures. It is recommended that the existing ducted heat pumps on the first floor be replaced with ducted fan-coil units. Existing building zoning will be reviewed during the design phase to determine where additional zoning may be required for optimal occupant comfort. A DOAS is recommended for the fire station. This DOAS would be a packaged unit mounted on the roof of the fire station. The outdoor air ductwork will be routed down to the first-floor ceiling space through a new duct chase. The outdoor air will be supplied directly into the space for each space containing a floor-mounted fan-coil unit.

Sallyport:
The sallyport heating and ventilation system will be replaced with similar equipment. Due to the elevation of the existing structure, infrared radiant heaters would not be feasible for this space. New gas-fired unit heaters will be installed. If option 2 is selected, these unit's can be converted to hot water unit heater in lieu of gas-fired unit heaters. The existing exhaust fan will be replaced with similar equipment, and a hazardous gas detection system will be installed to monitor the Sallyport carbon monoxide and nitrous dioxide levels. The hazardous gas detection system will be interlocked with the exhaust fan. The manual override switch would remain for summer ventilation.

Apparatus Bay:
The gas-fired unit heaters appear to be in good condition and will remain. If option 2 is selected, these units can be converted to hot water unit heaters if desired. Although the structure of the apparatus bay is taller than the sallyport, installing infrared radiant heaters would not be feasible for this space. Infrared heaters require a large clearance below them due to the amount of heat they produce. With the vehicles parked in the apparatus bay, the required clearances would not be met. If the infrared heaters were installed between the vehicle lanes, any combustible materials would have to be relocated to meet the required clearances. The exhaust fans serving the Apparatus Bay will be replaced with similar equipment and a hazardous gas detection system will be installed to monitor the Apparatus Bay carbon monoxide and nitrogen dioxide levels. The hazardous gas detection system will be interlocked with the exhaust fans. The manual override switch would remain for summer ventilation.

Fire Station Second Floor Dormitory:
The existing roof top unit will remain. VAV diffusers will be installed for each bunk room to provide additional space temperature control. VAV diffusers utilize a temperature-sensitive wax to adjust the airflow through the diffuser in response to space temperature.

Recommendations - Continued

MECHANICAL SYSTEMS - CONTINUED

Shooting Range:

The shooting range heating-only makeup air and exhaust fan will be replaced. The unit was manufactured in 2007 and is near the end of its median service life of 15-20 years. Shooting ranges have very specific safety requirements for ventilation to minimize any exposure associated with lead ammunition and other health hazards associated with a shooting range. The shooting range ventilation system should be tested and balanced at the early stages of design. A specialized testing and balancing company familiar with shooting ranges should perform functional testing of the shooting range controls and ventilation system. This step is key to ensuring the existing supply and exhaust infrastructure inside the range is adequate for the range prior to replacing any equipment. The existing supply air perforated wall may need to be replaced with radial diffusers based on the results of preliminary testing.

The shooting range ventilation system will be replaced with a packaged roof top unit (RTU). Since the shooting range requires 100% outdoor air, energy recovery will be incorporated into the design of the new unit. The RTU will pre-treat the outside air and reduce the amount of mechanical heating / cooling required. New HEPA filters will be installed on the roof similar to the current system, however, the exhaust fan will be incorporated into the roof top unit. The shooting range controls will be replaced with new direct digital controls. The new controls will incorporate space temperature control for both occupied and unoccupied modes. The new unit will be a variable air volume unit to allow for reduced airflow when the range is not in use.

The shooting range ventilation system is independent of the rest of the building's HVAC system. Kluber listed the preliminary opinion of cost for this work as an alternate. The Village may wish to bid this out as a separate project.

Building Automation System:

A central direct-digital control (DDC) building automation system will be installed. A building automation system will be utilized to control and monitor the HVAC systems. The system will be a non-proprietary, web-based central control system such as a Johnson Controls Facility Explorer Tridium system

Recommendations - Continued

MECHANICAL SYSTEMS - CONTINUED

Miscellaneous Notes:

A few additional HVAC options were explored. Further discussions on these options would be required with the client agency on viability:

- Replace equipment in kind. This option would replace heat pumps in kind. This option is not recommended as the existing geothermal field is leaking water and the location of the existing geothermal field may be up for redevelopment. In addition, the current system has experienced multiple compressor failures and difficulty in procuring replacement parts.
- Packaged air-cooled chiller in lieu of split air-cooled chiller: The split-system air-cooled chiller may be substituted with a packaged air-cooled chiller. All components of a packaged air-cooled chiller are contained within the outdoor unit. This option is not recommended as the compressors may become a nuisance for the neighbors. With this option, glycol would have to be introduced into the chilled water system to prevent freezing of the outdoor chiller.
- Two-pipe hydronic system in lieu of 4-pipe system: Chilled water and hot water piping can share the same distribution mains, thus requiring a manual change over in the spring and fall. This is similar to the HVAC system the Police Department and Fire Station had prior to the geothermal system. This system is not recommended as the entire building would have to be in cooling mode or heating mode. Space comfort during the shoulder seasons would be difficult to maintain.
- Air conditioning of the apparatus bay and / or the sallyport: Air conditioning the vehicle storage spaces is not recommended due to the high energy cost of conditioning a garage space. These spaces have large overhead doors which frequently open and close. When these doors open, IECC requires that equipment be turned off / reset temperature.
- Packaged roof top units for fire station. Kluber investigated the viability of adding packaged roof top units to condition the second floor of the fire station. Kluber noted the elevation of the bottom of the joists to be 8’-6” and ceiling heights of 8’-0”. Due to the low elevation of the structure and limited space for ductwork, this option would not feasible.

Project Phasing:

The public safety center is a critical facility which operates 24/7. Due to this, the project must be installed in phases. Close coordination with the client agency will be required and exact sequencing of phases will be determined during the design phase of the project. Project phasing may be different depending on which option is chosen. Areas of the building will be required to be temporarily vacated during construction. Temporary heating and cooling of occupied spaces will be required during construction when the central heating and cooling system is shut down.

Recommendations - Continued

Structural
Existing Documentation Review

Our office is in receipt of existing building construction documents prepared by Pereira & Associates dated May 20, 1966. In review of the structural information, we note the following:

Existing structure is comprised of three main buildings. The plan West building, currently the police station, has a footprint of approximately 8,500 square feet. This portion of the building is a single story structure with partial basement. The foundations are conventional cast-in-place (C.I.P.) concrete stem walls and spread footings. The grade level first floor is constructed with a mix of 6”-8” precast hollow core slabs and reinforced concrete beams. Reinforcement masonry construction has been utilized from the first level up to the roof structure which was to be constructed using 8” precast hollow core planks. In review of the existing documents and the listed design superimposed loadings for the roof structure for this portion of the building, it appears the roof framing was likely designed for a second floor addition. The plan south stairwell on the plans indicates a “future” stairwell which would reinforce this assumption.

The centrally located building on the plan is a single story masonry construction volume space approximately 5,200 square feet. This portion of building does not have a basement and currently acts as the garage space for the fire station. The foundations and bearing walls for this area are the same as what was described previously for the eastern police station apart from the long-span roof construction which was to utilize reinforced precast single “T” roof framing. The superimposed loading listed for this roof area indicates it was strictly designed for roof loading applications with no added capacity for use/occupancy change. One area location, plan west of this roof, shows a CIP housekeeping pad for support of large rooftop equipment.

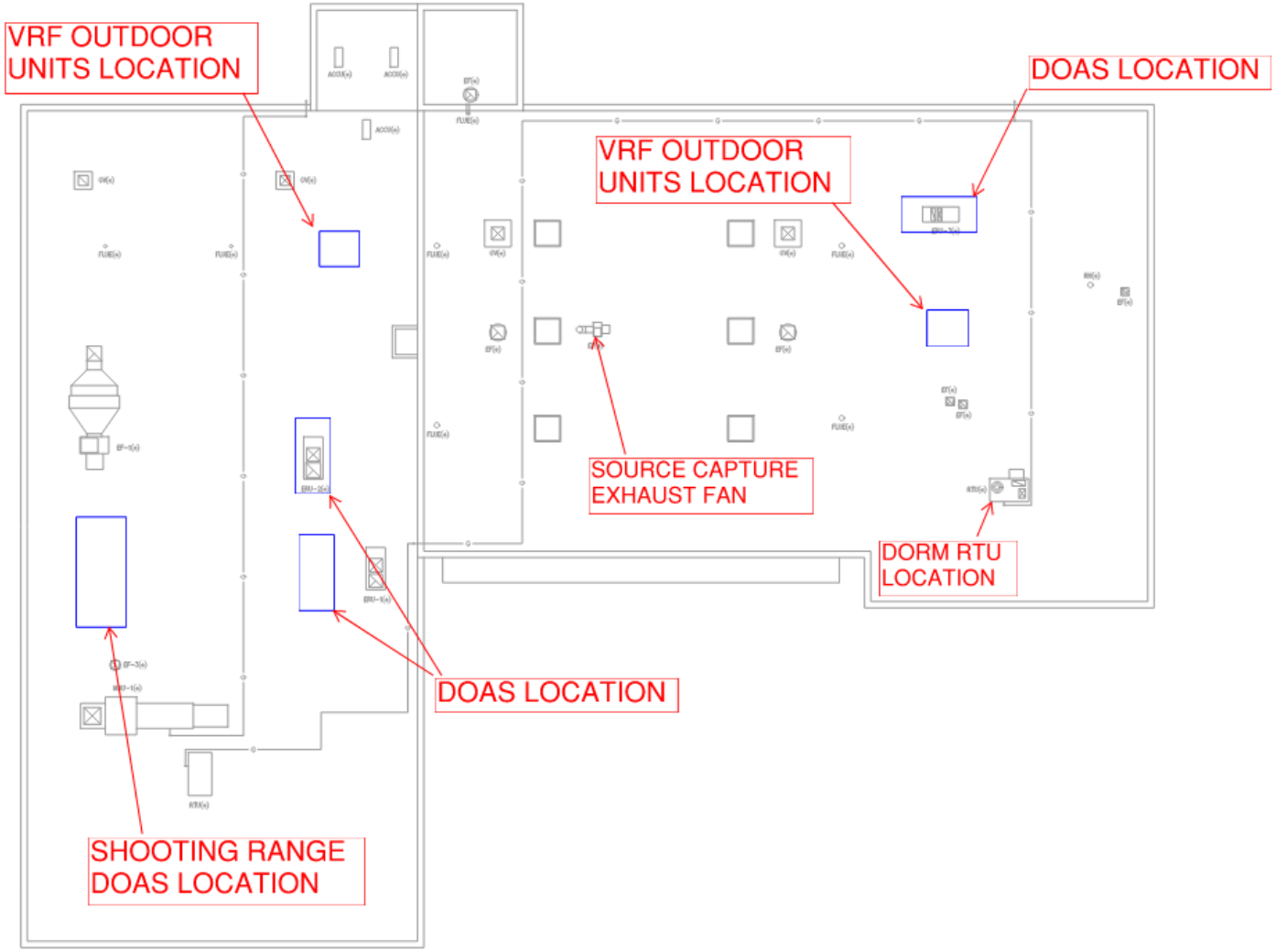
The third building just east of the garage has an approximate footprint of 3,600 square feet and is constructed similar to the police station. This building has a full basement, first level and second floor. All levels were to be framed with precast planking.

Structural
As-built Review

After completion of the site walkthrough, evidence of some value engineering is believed to have occurred during construction. The grade level floor framing for each building noted previously were confirmed in utilizing precast hollow core planks and slab-on-grade construction. However, conventional steel open web bar joist framing has been implemented for all roof framed areas and elevated floors. It is unclear whether this was completed to reduce either weight, costs or both.

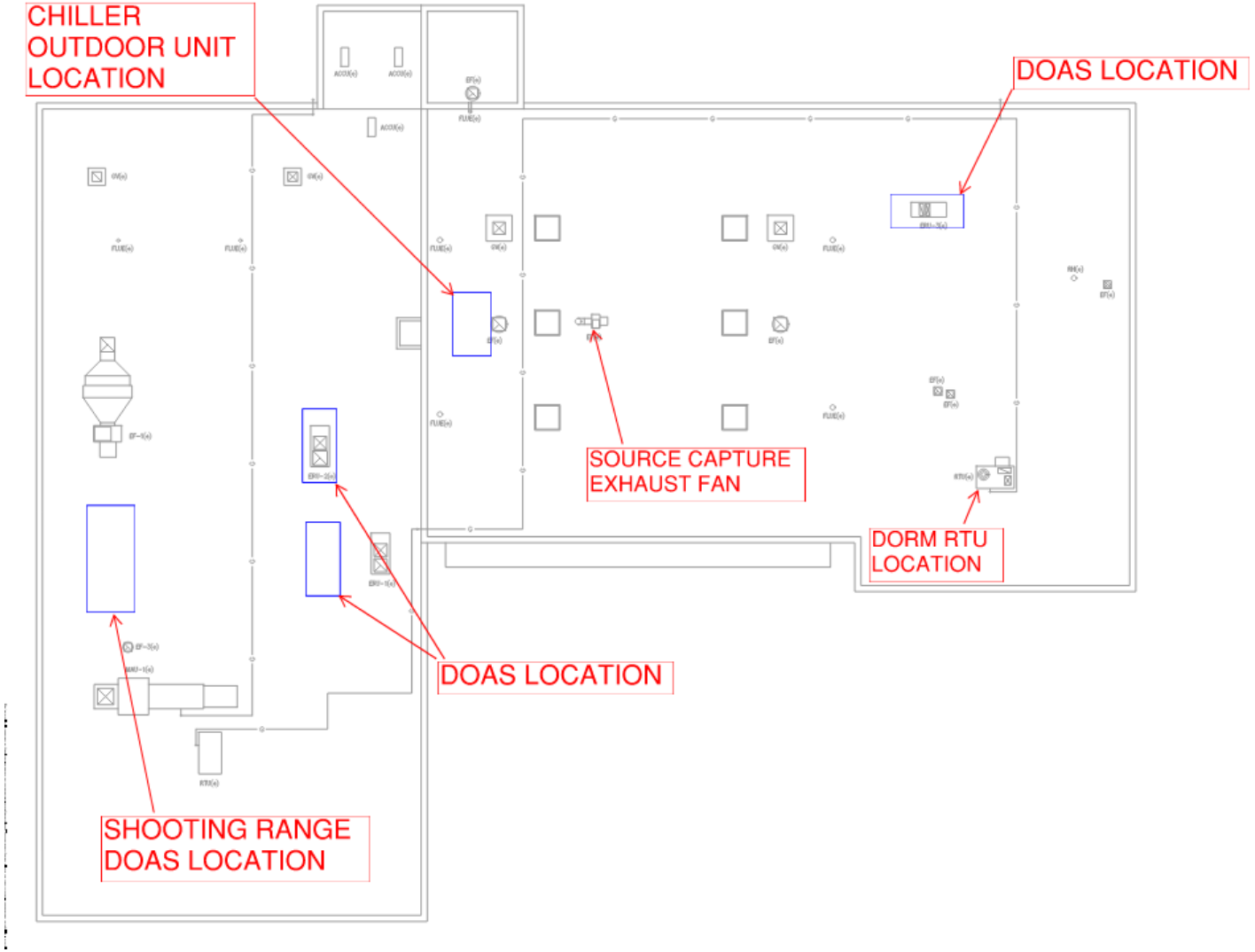
Structural - Recommendations
Based on the framing differences between the existing documents and field observations, we recommend care be taken when locating any new rooftop equipment. Due to unknown joist faming depths and spacings, the most economical solution for any roof supported equipment should take an effort to removal and replace equipment one-for-one. With an effort to keep new/replacement equipment in the same location, footprint and weight as existing equipment will ultimately reduce the structural cost impact to the existing framing. Should new equipment be located at a new roof location where no prior equipment is present, we anticipate that reinforcements would be required to the existing bar joists to add total load carrying capacity. This typically requires site welding additional steel to the existing joist bearing seats to provide added shear capacity and miscellaneous bars and plates along the chord and web members to increase bending capacities and to control deflection. Joist reinforcements also carry costs for temporary shoring of the modified bar joist since typically we would not recommend completing these types of reinforcement repairs on a “loaded” member. Shoring would need to remain in place until all reinforcements are completed.

Recommendations - Continued



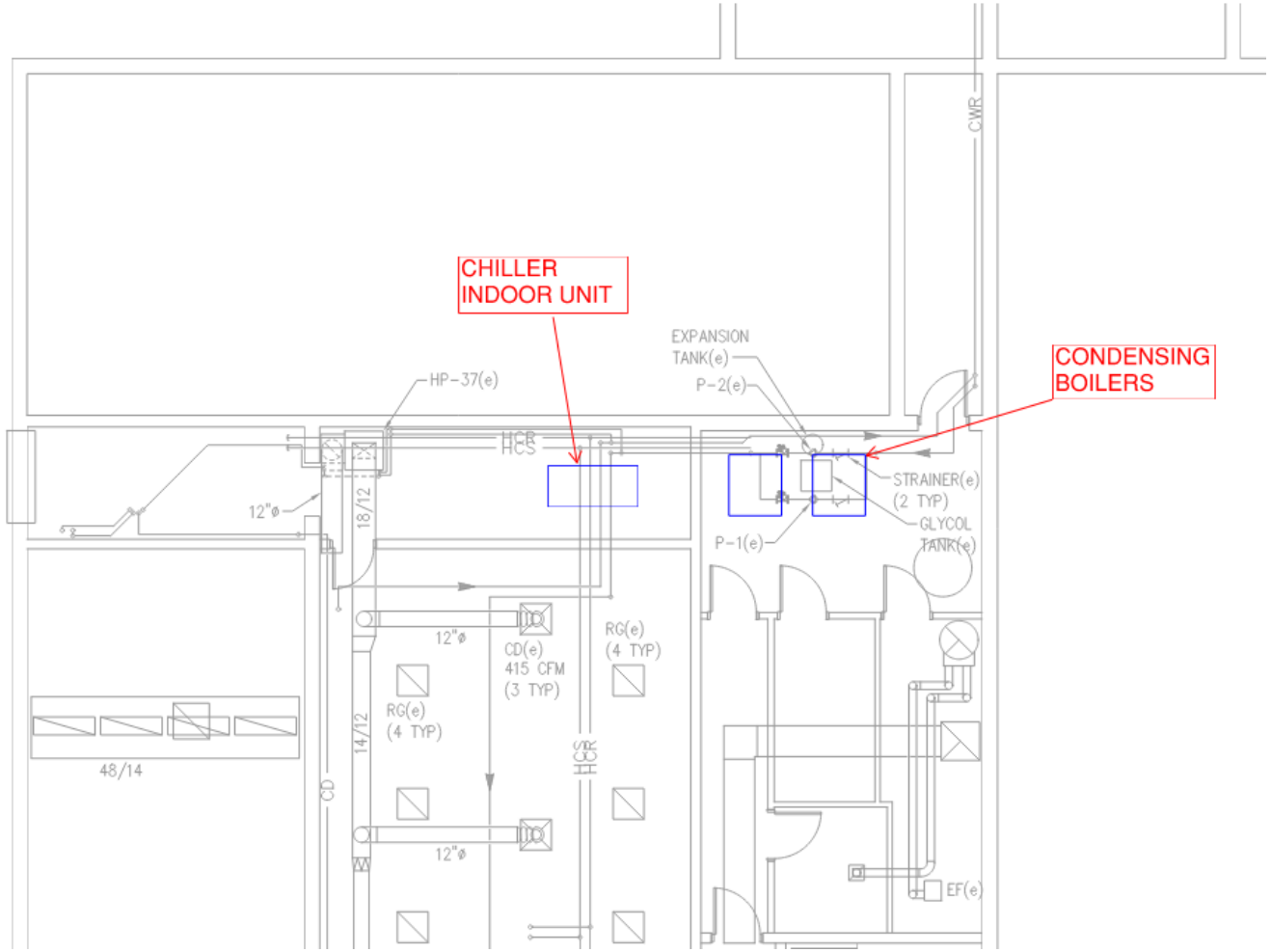
Roof Equipment – Option 1

Recommendations - Continued

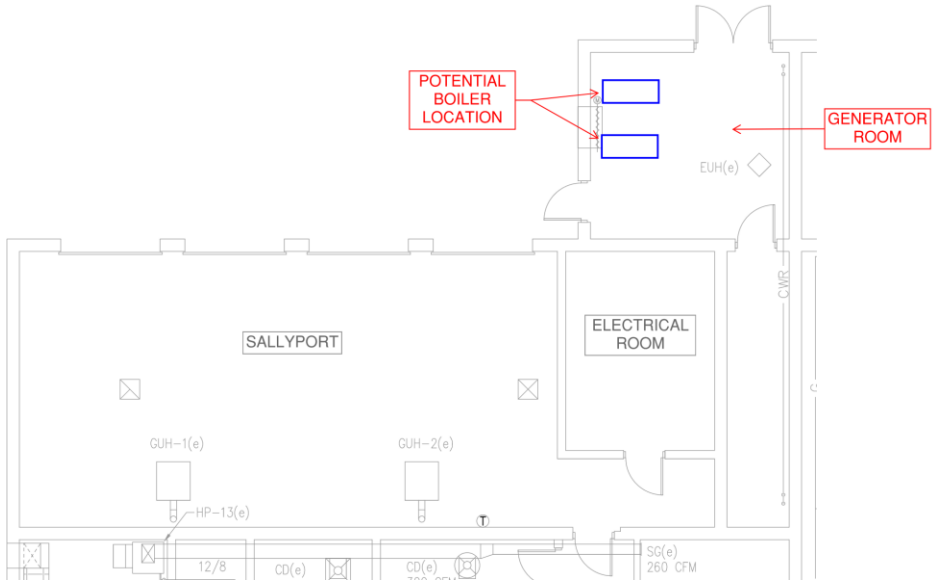


Roof Equipment – Option 2

Recommendations - Continued



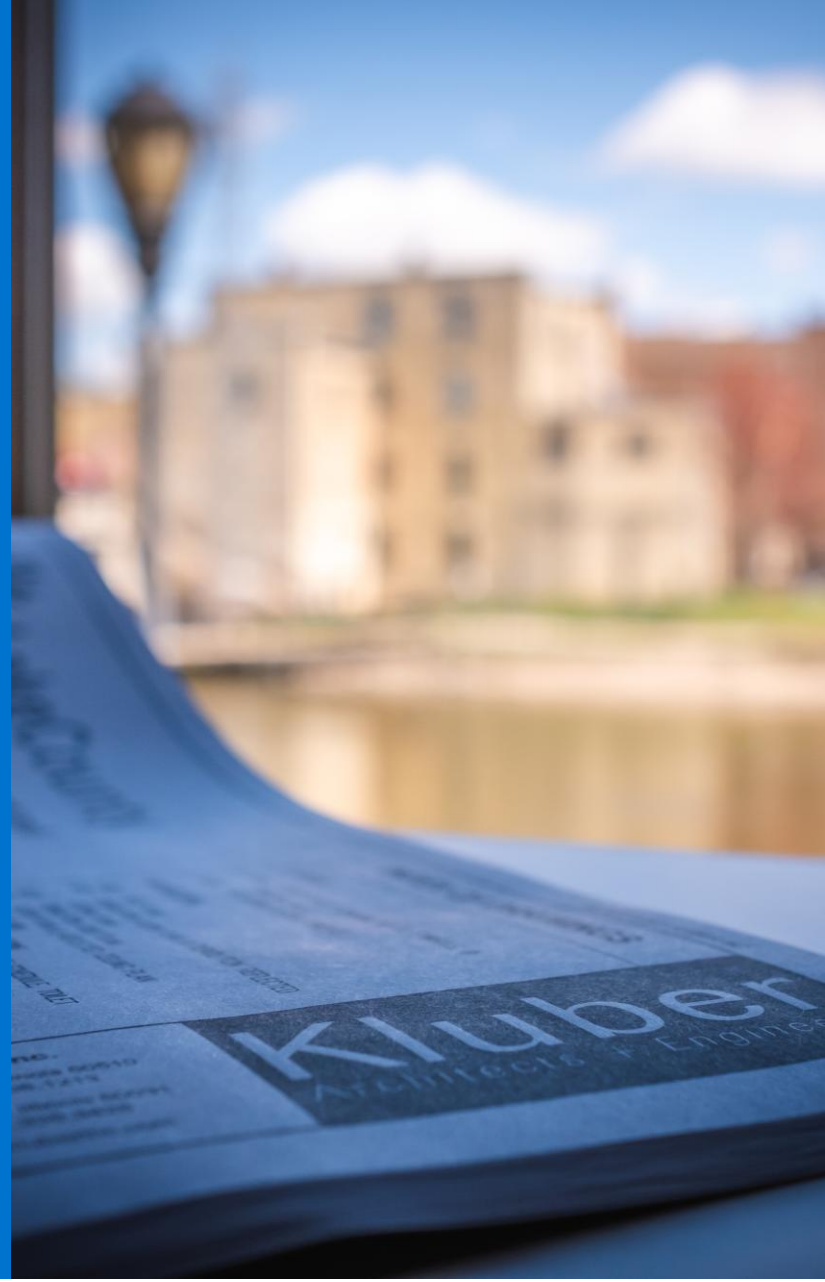
Lower-level Equipment Option 2



First Floor Equipment Option 2

Preliminary Cost Estimate

Preliminary Estimate of Probable Construction Costs.



Preliminary Estimate: Public Safety Campus - Option 1

LINE	COST ITEM		COST
01	Building Remodel Construction Raw Cost		$1,063,943
02	Building Design Contingency	(10.00%)	$106,394
03	SUBTOTAL BUILDING CONSTRUCTION COST		$1,170,337
04	General Contractor OH & P	(15.00%)	$175,551
05	General Contractor Bond & Insurance	(2.00%)	$26,918
06	TOTAL BUILDING CONSTRUCTION COSTS		$1,372,806
07	Building Construction Contingency		$100,000
08	Commissioning (Allowance)		$37,500
09	Estimated Permit Fees		$0
10	Abatement (Not Included)		N/A
11	A/E Fees	(TBD)	TBD
12	TOTAL SOFT COSTS		$137,500
13	TOTAL PROJECT COST		$1,510,306
	Alternates: (including OH&P, Bond & Insurance)		
14	Bldg Alternate No. 1 - Apparatus Bay / Sallyport		$45,161
15	Bldg Alternate No. 2 - Shooting Range		$630,356
16	TOTAL PROJECT COST WITH ALTERNATES		$2,185,823

Notes:

1) Cost does not include hazardous material abatement.

Preliminary Estimate: Public Safety Campus - Option 2

LINE	COST ITEM		COST
01	Building Remodel Construction Raw Cost		$1,642,667
02	Building Design Contingency	(10.00%)	$164,267
03	SUBTOTAL BUILDING CONSTRUCTION COST		$1,806,934
04	General Contractor OH & P	(15.00%)	$271,040
05	General Contractor Bond & Insurance	(2.00%)	$41,559
06	TOTAL BUILDING CONSTRUCTION COSTS		$2,119,533
07	Building Construction Contingency		$100,000
08	Commissioning (Allowance)		$37,500
09	Estimated Permit Fees		$0
10	Abatement (Not Included)		N/A
11	A/E Fees	(TBD)	TBD
12	TOTAL SOFT COSTS		$137,500
13	TOTAL PROJECT COST		$2,257,033
	Alternates: (including OH&P, Bond & Insurance)		
14	Bldg Alternate No. 1 - Apparatus Bay / Sally Port		$45,161
15	Bldg Alternate No. 2 - Shooting Range		$630,356
16	TOTAL PROJECT COST WITH ALTERNATES		$2,932,550

Notes:

1) Cost does not include hazardous material abatement.