SOUTHCENTRAL FOUNDATION

Anchorage Native Primary Care Center
Facility Conditions Assessment

ROOFS AND MECHANICAL EQUIPMENT

August 28, 2025

Southcentral Foundation

NEESER CONSTRUCTION, INC.

NORTHFORM ARCHITECTURE

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Executive Summary

This report summarizes existing conditions, known deficiencies, and recommended improvements to the roofs and major mechanical equipment at the Anchorage Native Primary Care Center (ANPCC). The report and the effort behind it are initial steps in a repair and upgrade project being planned by Southcentral Foundation (SCF). The intent of this report and underlying effort is to assist SCF in determining the scope of improvements that will comprise the project that will ultimately be designed and built.

Key deficiencies observed an ANPCC include the following:

- Except for more recent building additions and the central Atrium, roof assemblies are generally approaching end of useful life, most especially at PCC1 and PCC2.
- Most major rooftop mechanical equipment is approaching end of useful life.
- Boilers for PCC1 are aging and inefficient, and maintenance is challenging given their rooftop location.
- Roof slopes at PCC1 are too shallow to provide sufficient slope to drain to prevent ponding water.
- Billowing of roof membranes and thermographic imaging indicates air leakage at parapet walls.
- The Atrium roof sheds significant amounts of snow onto the adjacent roofs of PCC1 and PCC2, requiring manual removal of the snow from the adjacent roofs using methods that damage the underlying membrane and cause leaking.
- There is no fall protection system for maintenance personnel on any of the roofs, and access to PCC3 for equipment maintenance is limited to a small (36x36) access hatch and vertical ladder.

To solve key deficiencies at ANPCC, the consultant team that prepared this report has identified recommended conceptual solutions that are practical within the context of its current scope of services and SCF's desired timeframe for project completion. These include, but are not limited to, the following:

- **New roof assemblies at PCC1, PCC2 and PCC3 to meet SCF's facility design standards.**
- **New major mechanical equipment including three condensing units, four rooftop air handlers, and new boiler system that will serve both PCC1 and PCC3.**
- **SPF insulation inside parapet stud cavities in line with roof insulation to mitigate air leakage.**
- **Improved access to PCC3 roof via man door onto PCC1 roof and exterior utility stair up to PCC3.**
- **Travel restraint (fall prevention) systems across all roofs.**
- **Rooftop membrane protection pavers at snow drift and snow dump problem areas.**

The full, detailed list of recommended improvements to ANPCC's roofs and major mechanical equipment is included in Part 3 of this report; their associated rough costs are summarized in the Part 4 of this report. Alternative solutions that have been considered and deemed impractical within the current scope and/or less preferred than the recommended solutions are included in Appendix F.

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Part 1

Overview

1.01 Scope & Purpose

Southcentral Foundation (SCF) is planning a repair and upgrade project at the Anchorage Native Primary Care Center (ANPCC). The general scope of the project includes mechanical equipment replacement, roof replacement, and improved rooftop access.

The purpose of this report is to briefly summarize existing conditions at ANPCC, identify problems and deficiencies within the scope areas, and recommend improvements to repair or replace deficient components and systems. Rough-order-of-magnitude (ROM) cost estimates will be developed to assist Southcentral Foundation in determining which combination of repairs and replacements to the facility will be included in the final project scope.

Preparation of this report included the following tasks:

- Reviewing background information and available record documents.
- Performing walk-throughs of the facility to assess existing roof assembly and mechanical equipment conditions and to identify potential new rooftop access points.
- Performing digital thermographic imaging of the existing roofs and upper walls to identify deficiencies in the thermal envelope.
- Performing an HVAC pressurization and controls field study to determine system operability and to assist in creating optimal conditions for the thermographic imaging to be performed.
- Performing minor destructive investigation to determine components comprising roof assemblies and parapet wall assemblies.
- Performing an energy audit to establish basement energy use for the facility.
- Identifying potential solutions to existing roof snow shed paths in order to mitigate rooftop concentrated snow loads and the damage caused by snow removal.
- Quantifying rough-order-of-magnitude costs associated with the recommended improvements.

While this report begins to identify the scope of potential renovations and repairs and the anticipated approximate costs, additional work including schematic level planning, design, and detailed estimating performed in the next phase will enable SCF to make properly considered decisions. The effort behind this report should be considered the first of several steps to fully assess and thoroughly evaluate, plan, and design the project.

1.02 Facility

ANPCC is located at 4320 Diplomacy Drive on the main campus of Southcentral Foundation and the Alaska Native Medical Center. The legal address is Block 2, Lot 3B, Tudor Centre subdivision. The first phase of the facility, now known as PCC 1, is a two-story structure of approximately 41,000 square feet of space, originally built in 1996. The second phase of construction includes PCC 2 and the central Atrium – approximately 52,000 square feet combined – completed in 2002. PCC 2 was expanded upon in 2022 with a two-story 6,000 square foot addition. The three-story, 73,000 square foot PCC 3 and the adjacent five-story parking garage were constructed in 2008-2009. The parking garage is connected to the second story of PCC3 by a pedestrian bridge.

The construction of the ANPCC facility generally is the equivalent of Type II-B in current building codes, except for the Atrium which is equivalent to Type V-A. All portions of the facility are fully protected by automatic sprinkler systems. PCC1 and PCC2 are separated from the Atrium by existing 2-hour fire-rated area separation walls. PCC1 and PCC3 are considered part of the same building for code purposes – and therefore are not separated by fire rated construction – according to the code analysis performed during the design of PCC3 in 2008.

The ANPCC facility is generally a Group B occupancy throughout, except for the Atrium which is considered Group A.

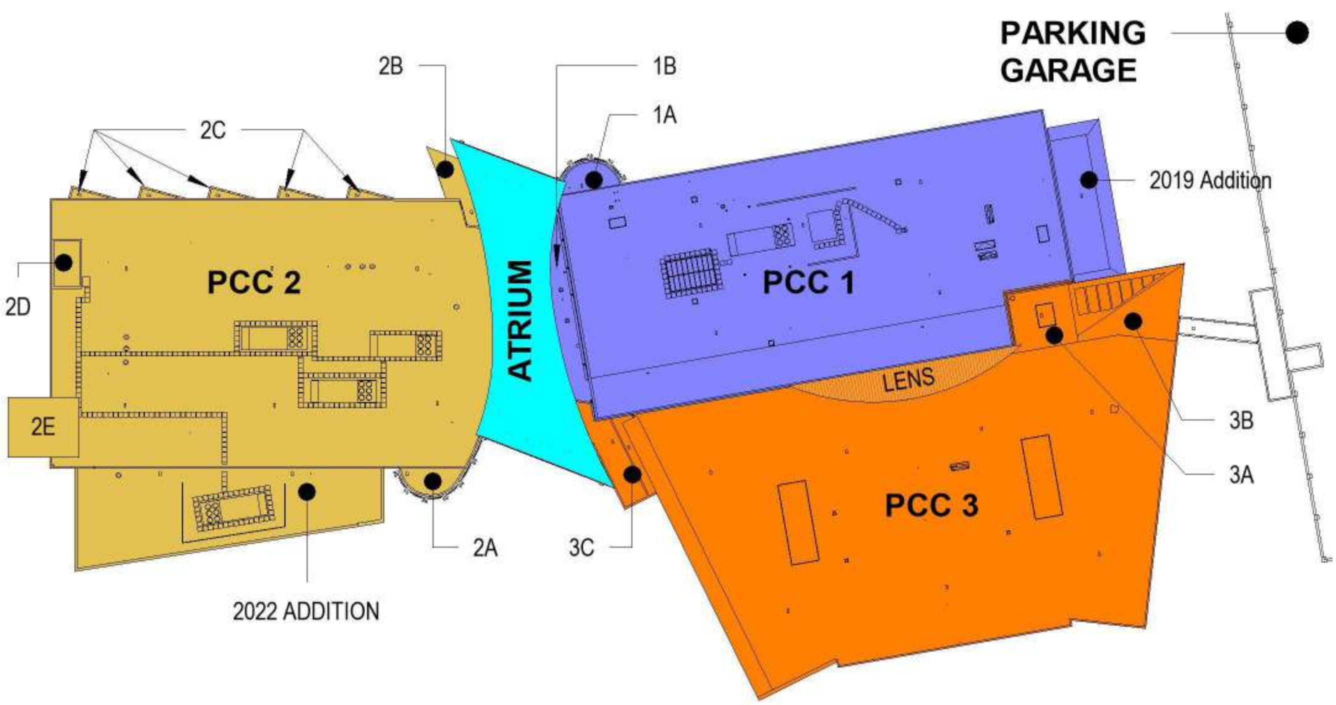

Fig. 1 - Anchorage Native Primary Care Center – 4320 Diplomacy Drive – Roof Plan

PART 2
Existing Conditions

Primary Care Center 1

2.01 Architectural

The roof of PCC 1 is approximately 23,000 square feet and consists of a PVC membrane, recovery board, rigid insulation, vapor retarder, and metal deck surrounded by parapet walls 39” high from top-of-deck to top-of-parapet framing (source: Sheet A5-1, Anchorage Native Medical Office Building drawings, April 30, 1996). Record drawings indicate the roof structure is flat, with the top of metal deck at +27’-9”. Roof drainage is accommodated by four sets of roof drains as well as a single, fifth primary drain (with no overflow) located between rooftop air handler (RTU-1.1) and a custom Haakon boiler container. Two smaller roof areas – identified as subsections 1A and 1B in Figure 1 – are located at the west end of the building, adjacent to the Atrium and separated from the main roof by parapet walls. Subsections 1A and 1B are each served by individual roof drains. An addition to the east end of PCC 1 was built in 2019 and is separated from the main roof by a seismic joint and that is served by a separate set of roof drains. The 2019 addition contains an additional rooftop air handler (RTU-1.3). The roof of the 2019 addition is a white EPDM membrane that is in good condition, although dust and debris have accumulated in corners and edges that should be removed to prevent organic growth. Thermal imaging of this roof indicates minor heat loss where the exterior wall meets the roof overhang.

PCC1’s boilers and heating equipment are housed in a rooftop mechanical enclosure, approximately 10’ x 12’ in size, located centrally on the roof. A large air handler (AHU-1.1) is located adjacent to the mechanical enclosure, and another smaller unit (RTU-1.1) is located near the northwest corner of the roof. Two large steel-framed cosmetic screens are mounted on the roof and intended to shield AHU-1.1 and the mechanical enclosure from view. A large sloped-glass skylight, approximately 20’x13’, is located west of AHU-1.1; user groups report condensation occasionally forming on the underside of the skylight and dripping/flowing down the interior walls of the skylight well. Several smaller condensing units and rooftop exhaust fans are present on the roof. Access to the PCC 1 roof is via ship ladder and access hatch approximately 3’ wide by 8.5’ long at the east side of the roof. Seismic joints separate PCC1’s roof from the adjacent exterior walls of PCC 3. A seismic joint also separates the main PCC 1 roof from the smaller separate section of roof adjacent to the Atrium. Based on record drawings, a continuous portion of PCC 1 roof adjacent to PCC 3, approximately 18 feet wide, was reinforced structurally with an additional layer of 3” metal deck to accommodate additional snow drift load during the construction of PCC 3.

In addition to the roof, the existing Boiler Room 1890 and Facilities Office 1877 were observed during the site visit. Boiler Room 1890 houses the central heating plant for PCC 3. Based on record drawings for PCC 3, Boiler Room 1890 is separated from the remainder of both PCC 1 and PCC 3 by non-rated wall assemblies capable of resisting the passage of smoke. Based on record drawings, Facilities Office 1877 is surrounded by non-rated walls, although fire-stopping sealant was observed at pipe and duct penetrations inside the room.

PCC 1 Roof – facing northeast

Problems and Deficiencies

- Roof membrane shows a history of patches and repairs and is approaching the end of its useful life. Thermal imaging study indicates damp insulation and puddling moisture trapped within the roof assembly at several locations near the west side of the roof, adjacent to the Atrium.
- There are numerous abandoned equipment curbs, openings, and equipment screen structural posts that have been capped with sheet metal.
- Roof slopes are not adequately directing rainwater to the internal roof drains. Slopes are insufficient to prevent ponding water (observed during the walk-through).

- During average to high snowfall years, the Atrium roof sheds significant quantities of snow onto the northwest corner of PCC 1. The same situation occurs along the south edge of the PCC 1 roof underneath the PCC 3 “lens” (see 2.09 for lens description). The weight of accumulated snow can exceed the load bearing capacity of the roof in these areas, requiring maintenance personnel to manually remove the snow using shovels and other tools, which causes damage to the roof membrane. Snow accumulation is causing damage to the exposed plywood finish and joint sealants at the Atrium sidewalls.
- Parapet cap flashing splice joint sealant is failing.
- Steel structural members at the rooftop equipment screens is beginning to rust.
- There is no permanently attached fall protection system on the roof, although equipment screen structures provide an opportunity for tie-off.
- The glazing at the slope-glass skylight does not have adequate R-value to prevent condensation at the inside surface and the unit may be approaching end of useful life.
- Given that both heating and ventilation equipment is located on the roof, access to the equipment for maintenance personnel carrying parts and tools is suboptimal.

PCC 1 Roof – northwest corner – Atrium roof snow shed zone

2.02 Structural

PCC 1 was originally designed in 1996 under the 1994 UBC.

- Snow Load = 40 psf
- Live Load = 50 psf
- Wind Load = 100 mph, Exp C
- Seismic = Zone 4, Z=0.4, Rw=6.0, Ie=1.0

The building is two stories tall. The gravity and lateral framing system consists of wide-flange steel beams and tube-steel columns. All of the primary girders, in both directions, at both floors, are moment-connected to all of the tube steel columns using a cover plate design that extends out 1'-10" from the face of the column. The area from the face of the column to 2'-9" away from the face of the column is a protected zone and cannot be welded to or modified (which can limit renovation opportunities).

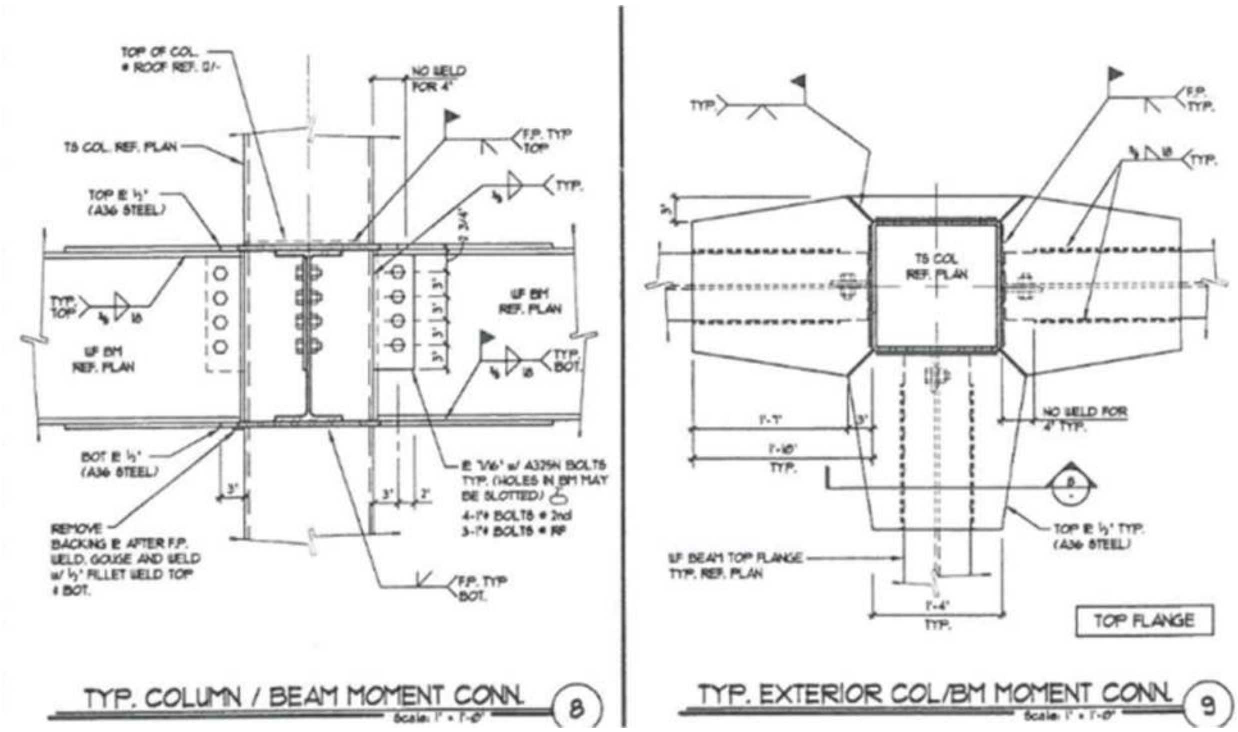

Fig. 2 - Existing PCC1 Moment Frame Connections and Protected Zone

The roof framing is 3" x 20ga metal deck over wide flange steel beams. Adjacent to the skylight, an 18 ga deck is used. At the two pieces of mechanical equipment, RTU-1.1 and the Rooftop Boiler Container, a concrete pad is poured on top of the roof deck. The permit set of drawings indicates that the roof structure is flat.

At the second floor, a composite concrete deck (2.5" concrete over 3" metal deck) is supported by steel wide-flange beams.

The first floor is a concrete slab on grade with the columns founded on pilasters and isolated spread footings.

- The PCC 2 (2002) addition framed in a portion of roof between PCC 1 and the Atrium – identified as 1B in Figure 1 – to the west of the PCC 1 building, separated by a seismic joint.
- The PCC 3 (2008) addition framed in the taller PCC 3 to the south of PCC 1. The PCC 3 addition also upgraded the PCC 1 roof deck adjacent to the new taller building to deal with the added snow drift/dump.
- PCC 1 underwent significant renovation in 2017 that extended the bridge in the Atrium, infilled a portion of the second-floor openings, replaced RTU 1.1, added the ships ladder to the roof, and restructured the windows in the second-floor directors office.
- PCC 1 underwent an addition in 2019 that framed in a new roof to the east of the building, level with the PCC1 roof.

2.03 Mechanical

Both floors of PCC1 are served primarily by one large VAV RTU (RTU-1.1). RTU-1.1 is a 100-ton Daikin roof top unit with packaged DX cooling utilizing R-410A refrigerant and was installed as part of the 2North 2nd floor remodel project that took place in 2017/18. A single 49.0” direct drive fan with a VFD provides supply air to the building. A single 36.0” fan with a VFD returns and relieves air from the building. MERV 8 filters are installed downstream of the unit's internal mixing box. No gas heat or heating coil is present in this unit, likely due to the low outside air percentage that this unit was design for. The unit is installed on an insulated wood framed curb. Packaged controls operate the unit and the controls contractor has full control over all pre-packaged control points. Overall, the unit appears to be in excellent condition and has been well maintained thus far.

A second smaller RTU (RTU-1.2) is a 5-ton, constant volume, packaged Trane unit with gas heat and DX cooling utilizing R-410A. The unit is dedicated to serving the lab in the northwest corner of the 1st floor and was installed in 2017/8. The unit is installed on an insulated wood framed curb. Packaged controls operate the unit and the controls contractor has limited control of this unit. The unit appears to be in excellent condition and has been well maintained thus far.

A third RTU (RTU-1.3) is a custom 8-ton AAON unit with a glycol heating coil and packaged DX cooling utilizing R-410A primarily serving and installed for the 2019/2020 1st and 2nd floor addition utilizing VAV’s. The unit is installed on an insulated wood framed curb. Excessive rattling was observed from the unit. Upon further investigation it was discovered that the belt on the relief fan motor was missing, and the motor was spinning freely with no connected fan load. Packaged controls on the unit control the unit's operation; the controls contractor has limited control of the unit. Otherwise, the unit appears to be in acceptable condition.

There are four downblast exhaust fans installed on insulated wood framed curbs located on the main roof of PCC1. One of the downblast fans was installed during the 2North remodel in 2017/18. The other 3 exhaust fans appear to be equipment installed as part of the original building construction. Each exhaust fan serves various restrooms, janitor closets, and other medical spaces requiring exhaust throughout the 1st and 2nd floors. All exhaust fans appear to be in acceptable condition with no visible or audible issues.

There are two downblast exhaust fans located in the adjacent smaller parapet roof to the west of the main roof. Both are installed on insulated wood framed curbs. The exhaust fans appear to be in acceptable condition with no visible or audible issues.

There are two 3-ton Trane condensing units, utilizing R-410A refrigerant, installed on insulated wood framed curbs. These two condensing units are paired with separate evaporators that serve the comm room (2nd floor) and the electrical room (1st floor). They provide adequate cooling, however, they are at the end of their typical life span and should be replaced in the near future. It is also worth noting that parts for these units are becoming more expensive as time goes on since these units have been discontinued.

Several plumbing vents (VTR's) are present throughout the different roofs of PCC1. They are comprised of cast iron and are in acceptable condition.

A custom Haakon boiler container, located on the roof of PCC1, houses the boiler plant for PCC1. There are two Burnham cast iron V907A 1198 MBH boilers along with associated boiler pumps, building pumps, and other building heating appurtenances. The system currently utilizes water as the heating medium with no heat exchangers present for propylene glycol freeze protection of outside air coils as there are none served by the PCC1 boiler system. The current boilers were installed around 2007/2008 and replaced the cast iron boilers that were installed in 1996 as part of the original construction of PCC1. The boilers themselves would be considered approximately slightly past mid-life for service. The pumps, various fittings, and valves appear to have had leaks throughout their life. The system uses water as the heating fluid.

The Haakon container also contains a 119-gallon natural gas fired water heater that provides domestic hot water for PCC1. It appears to be 5-7 years old, if not older, and is in mid to late life of service.

The roof drains for PCC1 are a combined primary and overflow piping arrangement per the MOA handout modification to the UPC. The drains themselves are all 3" outlets. The drains and downstream rain leader piping, according to as-built documents, are sized adequately per the UPC and SCF's design standards. An overflow outlet exists for PCC1, but it is not electrically heat traced.

There is a single roof drain located between RTU-1.1 and the Haakon boiler container. This appears to be a drain that was added to remedy ponding that may have been happening in the area. The primary drains around the roof are sized to accommodate the extent of the roof as is.

Problems and Deficiencies

- Per SCF standards, the filtration efficiency of the filters in RTU-1.1 is not in compliance.
- The relief fan for RTU-1.3 is not connected to its motor; no belt was observed to be connected. In addition, JCI has indicated that they have limited control of this unit and its packaged controls.
- The two Trane condensing units (and their associated indoor evaporators) are past the typical service life for split systems and should be fully replaced with new 3-ton units.
- Per SCF standards, VTR's are to be extended to a minimum of 18" above the adjacent roof surface. Not all VTR's presently meet this requirement.
- The Haakon boiler module is not maintenance friendly and utilizes low efficiency gas boilers. It is not at the end of its service life but accessibility in the future will continue to remain a problem with a boiler plant located on the roof.
- The existing PCC1 boilers are not adequately sized to accommodate the new snowmelt load for the ADA parking to the North of PCC1. There is also no propylene glycol in the PCC1 boiler system which would be necessary for the snowmelt system. The PCC1 boilers are also not designed for low temperature operation which would be necessary for a snowmelt system.
- Per SCF standards, primary and overflow roof drainage systems are to be piped separate. The primary and overflow roof drainage systems are combined for PCC1.

2.04 Electrical

RTU-1.1 is fed from PCC1's Main Distribution Panel (MDP) located in the first floor electrical room 1864. The MDP is a 1200A, Cutler-Hammer, Pow-R-Line, 480/277V, 3Φ, 4W, switchboard manufactured in 1996 and is in good condition for its age. The MDP has many spaces available for additional breakers and it is assumed the electrical service is sized adequately for any scope of work that may pertain to this project. RTU-1.1 is a 480/277V, 3Φ, 3W unit with a minimum circuit ampacity (MCA) of 229.5A and a maximum overcurrent protection (MOP) of 250A. The feeder for RTU-1.1 is protected at the MDP with 400A fuses and the feeder (3)500 kcmil,(1)#3 AWG EGC rated for 380A. The feeder is routed from the MDP to the roof where it terminates on the RTU-1.1's local 250A fused disconnect.

The smaller RTU, RTU-1.2, is fed from panel ‘1LA’ via 1” conduit (C), (4)#6 AWG, (1)#10 AWG equipment grounding conductor (EGC). RTU-1.2 is a 208/120V, 3Φ, 4W, unit with a MCA of 36.1A and a MOP of 50A. RTU-1.2 has an integral local disconnecting means and is protected by a 50A, 3-pole breaker in panel ‘1LA’ in electrical room 1864.

The third RTU, RTU-1.3, is fed from panel ‘1H’ via (4)#10 AWG, (1)#10 AWG EGC. RTU-1.3 is a 480/277V, 3Φ, 4W, unit with a MCA of 25A and a MOP of 30A. RTU-1.3 has an integral local disconnecting means and is protected by a 30A, 3-pole breaker in panel ‘1H’ electrical room 1864.

There are (6) downblast exhaust fans on the roof that are directly fed from the building’s electrical system. They are all 120V, 1Φ. The (2) fans on the west side of the roof, that are at a lower elevation than the rest of the roof, are equipped with local disconnecting means and comply with current NEC requirements. The other (4) fans do not have local disconnecting means and are in violation of the requirements of NEC 430.102 (B). If these fans are to be touched as part of this scope of work, local thermal toggle switch, disconnects will need to be provided to bring them into compliance.

There are (2) condensing units on the roof. These are identical units, both fed from panel ‘2LD’ via (2)#10 AWG, (1)#10 AWG EGC. The units are 208, 1Φ, 2W, units with a MCA of 24A and a maximum fuse size of 40A. Both units have local disconnecting means and are protected by 40A, 2-pole breakers in panel ‘2LD’.

The boiler plant located on the roof has a dedicated panel for all loads in the space. The panel is located adjacent to the door and is a 2-section QO load center rated 100A, 240/120, 1Φ that is fed from a step-down transformer adjacent to the panel. The panel in the boiler plant has (10) breaker spaces and a main breaker. All branch circuit breakers in the panel appear to be in use. The transformer feeding the panel is a 10kVA, 480V:240V, 1Φ, transformer.

All items with electrical connections needing to be removed to accommodate the new roof shall be disconnected at the equipment’s disconnect and coiled back to a spot that will be unaffected from the roof work. Once the new roof is installed, the equipment will be reconnected to the existing feeder. For equipment that will be demolished, the electrical connection will be disconnected and conductors and conduit will be demolished back to its source.

Problems and Deficiencies

- (4) out of the (6) downdraft exhaust fans do not have local disconnects and do not comply with NEC 430.102 (B).

Primary Care Center 2

2.05 Architectural

The roof of PCC 2 is approximately 23,300 square feet and consists of a PVC membrane, recovery board, rigid insulation, vapor barrier, and metal deck surrounded by parapet walls approximately 42" from top-of-steel to top-of-parapet framing (source: sheets A3.20 and A8-1.3, PCC II Shell and Core Package Volume II, October 9, 2000). The most current record drawings indicate a flat structure with top of metal deck at +27'-9" (source: sheet S102, PCC II West Expansion & Renovation (SCF22-1068), May 20, 2022). The main area of roof over PCC 2 accommodates three large air handlers and seven exhaust fans and is served by six sets of roof drains. The three air handlers are mounted on a raised "platform," approximately 8" higher than the rest of the roof. Based on available record drawings, the platform consists of a concrete-on-metal deck pad with fire-treated 2x4 wood joists @24" on center on top of the concrete, finished with 5/8" fire treated plywood. The membrane roof system continues over the top of the platform.

A smaller roof area – identified as subsection 2A on Figure 1 – is located on the south side of PCC 2 adjacent to the Atrium and is separated from the main PCC 2 roof by a parapet wall. To the north, over the ground floor main entrance to the Atrium, is a small roof area – identified as subsection 2B on Figure 1. Also on the north side of PCC 2, a series of five triangular projecting elements – identified as subsections 2C on Figure 1 – have slightly lower roofs and are separated from the main roof by a parapet wall finished with thin brick veneer on the outer/exposed wall surface. The 2C subsections have insulated membrane roofs with individual roof drains serving each one.

The 2022 addition to PCC 2 contains an additional rooftop air handler and cosmetic equipment screen surrounding it and two sets of roof drains. This 4,500 square foot EPDM membrane roof is separated by a parapet wall but accessible from the main roof by a fixed steel ship ladder. The roof and the screen of the 2022 addition appear to be in good condition. SCF indicates that there have been complaints from the user group of PCC 2 about the noise generated by the rooftop air handler at this addition.

Access to the PCC 2 roof occurs through Stair S1 on the west side of the building. This is the only stair at the ANPCC complex that extends up to the roof and enables access to the rooftop without having to climb a ladder. The rooftop of Stair S1 – identified as subsection 2D on Figure 1 – is finished with a membrane system and drains onto the main roof through a parapet wall scupper.

A rooftop boiler room containing two large boilers is located at the southwest corner of the main PCC 2 roof. The roof of the boiler room – identified as subsection 2E on Figure 1 – is finished with a standing seam metal roof system that shed drains onto the main roof.

PCC 2 Roof – facing east

Problems and Deficiencies

- Roof membrane shows a history of patches and repairs and is approaching the end of its useful life. Thermal imaging study indicates damp insulation and puddling moisture trapped within the roof assembly at several locations near the east side of the roof, adjacent to the Atrium.
- Thermal imaging of the parapet wall between the main roof and the 2022 south addition roof shows clear signs of heat loss. The stud framing in the original exterior wall of PCC2 is acting as a "thermal chimney" through the roof.
- Area of main roof membrane where boiler room roof sheds snow onto is not adequately protected or reinforced. Thermal imaging shows damp insulation in this area.
- Existing roof is dirty, and airborne dust and debris is accumulating in corners, causing small amounts of organic growth. Roof drains have not been recently cleaned and accumulated dust/debris is causing moss to form and water to pond around them instead of freely draining into them.
- During average to high snowfall years, the Atrium roof sheds significant quantities of snow onto the northwest corner of PCC 1. The weight of accumulated snow can exceed the load bearing

capacity of the roof in this area, requiring maintenance personnel to manually remove the snow using shovels and other tools, which causes damage to the roof membrane.

- Access into rooftop boiler room requires stepping over an 18” high door sill.
- There is no permanently attached fall protection system on the roof.

2.06 Structural

PCC 2 was originally designed in 2000 under the 1997 UBC.

- Snow Load = 40 psf plus drift around the Atrium, Penthouse and RTUs
- Live Load = 60 psf office, 100 psf corridor
- Wind Load = 90 mph, Exp B
- Seismic = Zone 4, Z=0.4, Rw=6.4, Omega=2.2, Ie=1.0

The building is two stories tall with a Penthouse at the west wall and an Atrium between PCC 1 and 2 that are both an additional story tall. The lateral framing system consists of wide-flange steel beams and columns with tube steel braced frames at select locations.

The roof framing is 3” x 18 gage metal deck over wide flange steel beams. At the three pieces of mechanical equipment, and in the rooftop boiler room, a concrete pad is poured on top of the roof deck, and this area is designed for 125 psf live load. The permit set of drawings indicates that the roof structure is flat. The Atrium roof is a twisted-plate shape (opposite corners of the roof are high/low and the slope changes gradually from one end to the other) constructed from glue-laminated beams and columns.

At the second floor, a composite concrete deck (2.5” concrete over 3” metal deck) is supported by steel wide-flange beams.

The first floor is a concrete slab on grade with the columns founded on pilasters and isolated spread footings.

- PCC 2 underwent significant addition in 2022 that added square footage to the building to the south. This renovation extended both the first and second floors. The addition is seismically connected to the original PCC 2 (no seismic joint) and continued the use of the tube steel braced frames. This addition also extended the western stairwell to the roof level.

2.07 Mechanical

Both floors of PCC2 are served by separate roof top units. The first floor is served by RTU-2.1. The second floor is served by RTU-2.2. Both floors of the 2022 addition are served by a single RTU, RTU-2.4. The atrium is served by an RTU (RTU-2.3) which is also located on the main roof of PCC2.

RTU-2.1 is a 60-ton packaged VAV unit utilizing a 50% propylene glycol heating coil and DX cooling utilizing R-410A refrigerant and was installed as part of the 2022 addition. A direct drive supply fan array with a VFD provides supply air to the 1st floor of the building. There are relief dampers integral to the unit. MERV 14 filters are installed downstream of the unit's internal mixing box as well as UV light filtering. The unit is installed on an insulated wood framed curb. Packaged controls on the unit control the unit's operation; the controls contractor has limited control of the unit. Overall, the unit appears to be in excellent condition and has been well maintained thus far.

RTU-2.2 is a 60-ton packaged VAV unit utilizing a 50% propylene glycol heating coil and DX cooling utilizing R-22 refrigerant and was installed as part of the original construction of the building in 2000. A belt driven supply fan with a VFD provides supply air to the 2nd floor of the building. There are relief dampers integral to the unit. MERV 8 filters are installed downstream of the unit's internal mixing box. The unit is installed on an insulated wood framed curb. Packaged controls on the unit control the unit's operation; the controls contractor has limited control of the unit. Overall, the unit is at the end of its service life.

RTU-2.3 is a 30-ton packaged constant volume unit utilizing a 50% propylene glycol heating coil and DX cooling utilizing R-22 refrigerant and was installed as part of the original construction of the building in 2000. A belt driven supply fan with a VFD provides supply air to the atrium. There is a separate relief fan unit installed adjacent to the RTU. MERV 8 filters are installed downstream of the unit's internal mixing box. The unit is installed on an insulated wood framed curb. Packaged controls on the unit control the unit's operation; the controls contractor has limited control of the unit. Overall, the unit is at the end of its service life.

RTU-2.4 is a 60-ton packaged VAV unit utilizing indirect combustion natural gas for heat and DX cooling utilizing R-410A refrigerant and was installed as part of the 2022 addition. A direct drive supply fan array with a VFD provides supply air to the 1st and 2nd floor of the addition. There are relief dampers integral to the unit. MERV 14 filters are installed downstream of the unit's internal mixing box as well as UV light filtering. The unit is installed on an insulated wood framed curb. Packaged controls on the unit control the unit's operation; the controls contractor has limited control of the unit. It was observed that part of the unit's fan wall had been bent, likely due to over-pressurization of the unit; this is likely due to the unit controls not being set up properly or the controls contractor not being able to give the unit proper input since they are locked out of controlling the unit by the manufacturer. Upon walking through the interior spaces, excessive noise was observed from the unit to the working areas. Overall, the unit appears to be in excellent condition and has been well maintained thus far.

There are six downblast exhaust fans installed on insulated wood framed curbs located on the main roof of PCC2. Two of the downblast fans were installed during the remodel in 2022. The other 4 exhaust fans appear to be equipment installed as part of the original building construction. Each exhaust fan serves various restrooms, janitor closets, and other medical spaces requiring exhaust throughout the 1st and 2nd floors. All exhaust fans appear to be in acceptable condition with no visible or audible issues.

PCC 2 Roof – 2022 addition and RTU-2.4 surrounded by equipment screen

There is one downblast exhaust fan located on the adjacent addition roof to the south of the main roof. It is installed on an insulated wood framed curb. The exhaust fan serves a restrooms and other medical spaces requiring exhaust on the 1st floor. The exhaust fan appears to be in acceptable condition with no visible or audible issues.

Several plumbing vents are present throughout the different roofs of PCC2. They are comprised of cast iron and are in acceptable condition and all appear to be extended a minimum of 18” above the roof surface.

The roof drains for PCC2 are a combined primary and overflow piping arrangement per the MOA handout modification to the UPC. The drains themselves are all 3” outlets. The drains and downstream rain leader piping, according to as-built documents, are sized adequately per the UPC and SCF’s design standards.

Overflow relief outlets exist for all rainleader piping serving PCC2 and appear to all be equipped with electric heat trace.

Natural gas piping is routed on the roof serving the newly installed RTU-2.4. It is in good condition and appears to be supported properly.

Problems and Deficiencies

- RTU-2.2 is nearly at the end of its service life, utilizes a refrigerant that is no longer in production, and should be replaced with a similarly sized unit.
- RTU-2.3 is nearly at the end of its service life, utilizes a refrigerant that is no longer in production, and should be replaced with an appropriately sized unit that can provide adequate airflow and correct pressurization of the atrium.
- The controls contractor has indicated that they are not able to control RTU-2.1 and RTU-2.4 effectively. Owner should request that a manufacturers service representative coordinate and assist the controls contractor with properly controlling the RTU's.
- Excessive noise is being transmitted from RTU-2.4 to the open office space directly below. Additional noise treatments and mitigation are necessary.
- Per SCF standards, primary and overflow roof drainage systems are to be piped separate. The primary and overflow roof drainage systems are combined for PCC1.

2.08 Electrical

RTU-2.1 is fed from panel 'DL1M' via 2.5"C, (4)#250kcmil, (1)#4 AWG EGC. RTU-2.1 is a 480/277V, 3Φ, 4W unit with a MCA of 184A and a MOP of 225A. RTU-2.1 has an integral local fused disconnecting means and is fed via a 225A, 3-pole breaker in panel 'DL1M'.

RTU-2.2 is fed from panel 'MSB1' via 2.5"C, (4)#250kcmil, (1)#4 AWG EGC. RTU-2.3 is a 480/277V, 3Φ, 4W unit with a MCA of 201A and a MOP of 100A. RTU-2.3 has an integral local fused disconnect and is fed via a 225A, 3-pole breaker in panel 'MSB1'.

RTU-2.3 is fed from panel 'MSB1' via 1.5"C, (4)#1AWG, (1)#6 AWG EGC. RTU-2.3 is a 480/277V, 3Φ, 4W unit with a MCA of 87A and a MOP of 100A. RTU-2.3 has an integral local fused disconnect fused at 100A and is fed via a 125A, 3-pole breaker in panel 'MSB1'.

RTU-2.4 is fed from panel 'MSB1' via 2.5"C, (4)#250kcmil, (1)#4 AWG EGC. RTU-2.1 is a 480/277V, 3Φ, 4W, unit with a MCA of 199A and a MOP of 225A. RTU-2.4 has an integral local fused disconnect and is fed via a 225A, 3-pole breaker in panel 'MSB1'

There are (7) downblast exhaust fans on the roof that are fed from the building's electrical system. These fans are all 120V, 1Φ. (3) of the fans are equipped with local disconnects and are in compliance with the current NEC requirements. The other (4) fans do not have local disconnects and are therefore in violation of the requirements of NEC 430.102 (B). If these fans are to be touched as part of this scope of work, local thermal toggle disconnects will need to be provided to bring them into compliance.

All items with electrical connections needing to be removed to accommodate the new roof shall be disconnected at the equipment's disconnect and coiled back to a spot that will be unaffected from the roof work. Once the new roof is installed, the equipment will be reconnected to the existing feeder. For equipment that will be demolished, the electrical connection will be disconnected and conductors and conduit will be demolished back to its source

Problems and Deficiencies

- (4) out of the (7) downdraft exhaust fans do not have local disconnects and therefore do not comply with NEC 430.102 (B).

Primary Care Center 3

2.09 Architectural

The roof of PCC 3 is approximately 28,500 square feet and consists of a mechanically-fastened TPO membrane, cover board, tapered rigid insulation, GWB sheathing, vapor retarder, and metal deck surrounded by parapet walls that average in height of 36" from top-of-metal deck to top-of-parapet framing (source: sheets G1.12, A3.21, and A3.31, Southcentral Foundation PCC III Clinic CA Conformed Set, November 21, 2008) . Record drawings indicate a flat roof structure, with top of metal deck at +42'-0". Billowing was observed in certain parts of the roof membrane, which is typically caused by building ventilation pressure exceeding atmospheric pressure. The main area of roof over PCC 3 accommodates two large air handlers and three exhaust fans and is served by seven sets of roof drains. A separate area of roof at the northeast corner – identified as subsection 3A on Figure 1 – accommodates a large DX condensing unit; this sub-section is separated from the main room by a short parapet wall and is served by a single roof drain set. Adjacent to the condensing unit – on subsection 3B on Figure 1 – is a series of roof openings to allow daylight through to the pedestrian walkway below.

A long, narrow daylight monitor with south facing glazing – identified as the "lens" in available record drawings as well as on Figure 1 – is located along the north side of the PCC 3 roof. The top of the lens is sloped to drain to the north, onto the roof of PCC 1. The lens roof is finished with standing seam metal roofing that appears to be in good condition.

Another small portion of roof – identified as subsection 3C – is located two stories below the main roof over the ground floor West Vestibule 1115. This portion of roof has a raised seismic joint running through it to isolate the PCC3 structure from structure attached to the Atrium. Two sets of roof drains serve this portion of roof – one on either side of the seismic joint.

Access to the main PCC 3 roof occurs via a fixed vertical ladder and small access hatch inside Stair 2. This is the only means of maintenance access to the rooftop equipment on PCC 3. The hatch has a telescoping extendable safety post, but no perimeter guardrail.

PCC 3 Roof – facing west

Problems and Deficiencies

- Existing roof is dirty and airborne dust and debris is accumulating in corners, causing small amounts of organic growth. Roof drains have not been recently cleaned and accumulated dust/debris is causing moss to form and water to pond around them instead of freely draining into them.
- Thermal imaging indicates areas of damp insulation, as well as areas of heat loss at parapet walls along the north and east sides of the roof as well as at corners. Roof underwent billowing and

ballooning when building was positively pressurized, indicating leaks in the vapor barrier and other components of the roof assembly.

- The sloped roof of the "lens" sheds significant quantities of snow onto the roof of PCC 1. The weight of accumulated snow can exceed the load bearing capacity of the PCC 1 roof in this area.
- Access to this roof is very challenging and is limited by the relatively small size of the access hatch and the vertical ladder coming out of Stair 2. There is no safety railing around the perimeter of the access hatch. Extending an existing stairwell to the roof may be a viable option; extending an existing elevator to the roof is likely not a viable option due to cost.
- There is no permanently attached fall protection system on the roof. Additionally, the daylight openings adjacent to the chiller unit at the northeast corner are not marked or protected in any way and pose a significant safety hazard to anyone accessing the roof.
- A power receptacle in the parapet wall at the southeast corner of the roof is missing a weather protective cover.
- Non-galvanized steel channel supports at the dry cooler are rusted, although it appears they have been field primed in an effort to contain the rust.

2.10 Structural

PCC 3 was originally designed in 2008 under the 2006 IBC.

- Snow Load = 40 psf plus drifting snow load at parapet, skylight and RTUs
- Live Load = 60 psf office, 100 psf corridor
- Wind Load = 120 mph, Exp B, Enclosed
- Seismic = Sds=1.01, Sd1=0.49, Site Class C, SDC D, Ie=1.0, R=6.0

The building is three stories tall. The lateral framing system consists of wide-flange steel beams and columns (wide-flange and tube-steel) with tube steel braced frames at select locations.

The roof framing is 3" metal deck over wide flange steel beams. At the two pieces of mechanical equipment, RTU-3.1 and 3.2, and the mechanical room, a concrete pad is poured on top of the roof deck. The drawings indicates that the roof structure is flat.

At the third and second floor, a composite concrete deck (2.5" concrete over 3" metal deck) is supported by steel wide-flange beams.

The first floor is a concrete slab on grade with the columns founded on pilasters and isolated spread footings.

PCC 3 includes a skybridge at the second floor connecting to a Parking Garage. The skybridge is laterally connected to PCC 3 in the longitudinal bridge direction and uses field-welded wide-flange beam to tube-steel column moment frames in the transverse direction. The skybridge is laterally separated from the Parking Garage with a seismic joint.

2.11 Mechanical

All three floors of PCC3 are served by two separate RTU's and an indoor AHU. The first floor and west side of the second floor are served by RTU-3.1. The third floor and the east side of the second floor are served by RTU-3.2. The commons area of all three floors is served by an indoor air handler, AHU-3.1 which has a remote DX condensing unit located on the roof of PCC3.

RTU-3.1 is a 60-ton packaged VAV unit utilizing a 50% propylene glycol heating coil and DX cooling utilizing R-22 refrigerant and was installed as part of the original construction of the building in 2008. A belt drive supply fan with a VFD provides supply air to the 1st and 2nd floors. There is a belt-driven relief fan with a VFD that is packaged with the unit. MERV 8 filters are installed downstream of the unit's internal mixing box. The unit is installed on an insulated wood framed curb. Packaged controls on the unit control the unit's operation; the controls contractor has limited control of the unit. Overall, the unit is nearing the end of its service life and should be replaced sometime in the next 5 years.

RTU-3.2 is a 60-ton packaged VAV unit utilizing a 50% propylene glycol heating coil and DX cooling utilizing R-22 refrigerant and was installed as part of the original construction of the building in 2008. A belt drive supply fan with a VFD provides supply air to the second and third floors. There is a belt-driven relief fan with a VFD that is packaged with the unit. MERV 8 filters are installed downstream of the unit's internal mixing box. The unit is installed on an insulated wood framed curb. Packaged controls on the unit control the unit's operation; the controls contractor has limited control of the unit. Overall, the unit is nearing the end of its service life and should be replaced sometime in the next 5 years.

AHU-3.1 is served by a DX condensing unit located on the roof. It was installed as part of the original construction of the building in 2008 and utilized R-22 refrigerant. It is currently installed on a steel housekeeping pad. Spring vibration isolators look to have been added at some point, but do not look to have been part of the original construction. Internal packaged controls on the unit control the unit's operation. Overall, the unit is at the end of its service life and should be replaced.

There are three downblast exhaust fans installed on insulated wood framed curbs located on the main roof of PCC3 and appear to have been installed as part of the original building construction. Each exhaust fan serves various restrooms, janitor closets, and other medical spaces requiring exhaust throughout the 1st, 2nd, and 3rd floors. All exhaust fans appear to be in acceptable condition with no visible or audible issues.

A dry cooler and pump package is located between RTU-3.1 and RTU-3.2. It is currently abandoned but it previously served and provided cooling for the elevator room and comm room in PCC3.

Several plumbing vents are present throughout the PCC3 roof. They are comprised of cast iron, are in acceptable condition, and appear to be extended a minimum of 18” above the roof surface.

The roof drains for PCC3 are a combined primary and overflow piping arrangement per the MOA handout modification to the UPC. The drains themselves are all 3” outlets. The drains and downstream rain leader piping, according to as-built documents, are sized adequately per the UPC and SCF’s design standards. An overflow relief outlet exists for the rainleader piping serving PCC3 and appears to be equipment with electric heat trace.

Problems and Deficiencies

- RTU-3.1 and RTU-3.2 are nearly at the end of their service lives, utilizing a refrigerant that is no longer in production, and should be replaced with similarly sized units.
- The DX condensing unit serving AHU-3.1 is nearing the end of its service life, utilizing a refrigerant that is no longer in production, and should be replaced. There is also significant vibration transmission through the roof to the spaces below.

2.12 Electrical

RTU-3.1 is fed from the Main Distribution Panel (MDP) via (2)2.5”C, (3)#3/0 AWG, (1)#1 AWG EGC. RTU-3.1 is a 480/277V, 3Φ, 4W, unit with a MCA of 261A and a MOP of 300A. RTU-3.1 has an integral local fused disconnect and is fed via a 350A, 3-pole breaker the MDP.

RTU-3.2 is fed from the Main Distribution Panel (MDP) via (2)2.5”C, (3)#3/0 AWG, (1)#1 AWG EGC. RTU-3.2 is a 480/277V, 3Φ, 4W, unit with a MCA of 261A and a MOP of 300A. RTU-3.2 has an integral local fused disconnect and is fed via a 350A, 3-pole breaker the MDP.

AHU-3.1 has a chiller located on the roof on the north side of the building and is fed from the Main Distribution Panel (MDP) via 2”C, (3)#2/0 AWG, (1)#4 AWG EGC. AHU-3.1’s chiller is a 480/277V, 3Φ, 4W, unit with a MCA of 106A and a MOP of 125A. AHU-3.1 has an integral local fused disconnect and is fed via a 125A, 3-pole breaker the MDP.

There is a dry cooler pump package located between RTU-3.1 and RTU-3.2. It appears to be abandoned in place but was previously used to provide cooling for the elevator room and comm room in PCC3. There currently are (3) electrical roof penetrations to this unit.

There are (3) downblast exhaust fans on the roof that are fed from the building’s electrical system. These fans are all 120V, 1Φ. All (3) fans do not have local disconnects and therefore are in violation of the requirements of NEC 430.102 (B). If these fans are to be touched as part of this scope of work, local toggle disconnects will need to be provided at each unit, to bring them into compliance.

Problems and Deficiencies

- A weatherproof receptacle cover is missing for the east receptacle in the parapet wall.
- Three (3) downdraft exhaust fans do not have local disconnects and do not comply with NEC 430.102

Atrium

2.13 Architectural

The “twisted saddle” roof of the Atrium measures approximately 4,545 square feet is finished with a PVC roof membrane with adhered PVC cosmetic ribs that resemble standing seams. The roof membrane appears to be in good condition given its age, and no leaks have been reported.

Problems and Deficiencies

- While the roof itself is in good condition and appears to have some amount of useful life remaining, the key problems of the Atrium roof are the form and the composition of the assembly.
    - The high degree of slope at the north and south ends of the roof causes snow to shed onto the lower roofs of PCC 1 and PCC 2. The accumulated snow can occasionally exceed the structural capacity of the lower roofs and must be removed manually, which causes damage to those lower roofs.
    - Snow accumulation below the Atrium eaves is causing damage to the exposed rough-sawn plywood finish and joint sealants at the Atrium sidewalls, particularly at PCC 1.
- There is no permanent access point (ladder or otherwise) and no fall protection system on the Atrium or adjacent roofs that enable safe access onto the Atrium roof. Note: There is no major mechanical equipment on the Atrium roof to be serviced.

Atrium – from PCC1, looking southwest

PART 3
Recommended Improvements

General

Improvements shall comply with the following:

- 2018 International Building Code
- 2018 International Existing Building Code
- 2018 International Fire Code
- 2018 International Mechanical Code
- 2018 Uniform Plumbing Code
- 2017 National Electrical Code
- Municipality of Anchorage local amendments to the codes listed herein

Improvements shall consider, and where practical conform to, the following:

- Southcentral Foundation Design and Construction Standards Version 1.0 (Working Draft)

Primary Care Center 1

3.01 Architectural

A1-1 Replace roof system in its entirety including **main roof and subsections 1A and 1B**. [do not replace 2019 addition]. Demolish existing roof system down to the metal deck. Replace with SCF's standard low slope roof system including glass-mat sheathing, self-adhered vapor retarder, expanded polystyrene insulation (R-40 average), polyisocyanurate cover board, and fully adhered white EPDM membrane (60 mils thick). Improve roof slopes to drain with tapered insulation, sloped 1/4" per foot minimum. Insulation thickness at roof drains shall be 3.5 inches minimum. Use SPF insulation at roof-to-parapet wall intersections to reduce heat loss. Install new parapet cap flashings and sealant. Replace all roof drain bodies and covers, and relocate overflow drain 2" in elevation upslope from primary drain, and without an overflow dam.

A1-2 Remove and infill existing abandoned mechanical openings, roof access hatches, and mechanical screen support posts.

A1-3 Create "snow shed protection zone" where the accumulation of snow shedding from the Atrium roof occurs. Install modular concrete paver system (approximately 890 square feet) on top of an EPDM slip sheet on top of the new roof assembly per item A1-1.

A1-4 Replace all seismic joint covers.

A1-5 Install travel restraint system per SCF standards Section 07 72 00, paragraph 1.g full length of roof along exposed north and east edges. [Basis of design: Guardian CB-18 anchor post, and 2,000 lb stainless steel wire rope, and orange PVC safety flags] Attach anchor posts at 15 feet on center, 15 feet from parapet walls using simple screw connections to wood thermal break pads. No structural upgrades are required.

A1-6 Consider demolishing existing skylight and reconfiguring into daylight monitor with vertical glass and sloped roof. Replace with new metal stud or structural steel walls and roof framed around the windows. Consider adding air movement at upper portion of skylight well to reduce condensation buildup.

A1-7 Consider adding rooftop access door from third floor of PCC 3 (Waiting Area 3105 or West Lobby 3102) directly onto roof of PCC 1.

A1-8 Consider adding exterior galvanized steel ship stair from PCC1 roof to PCC3 roof.

A1-9 Create "melt zone" to mitigate accumulation of snow shedding from the PCC 3 lens roof and to provide protective layer over the new roof membrane. Install 3-inch cast-in-place concrete with integrated radiant glycol snow melt system (approximately 1,715 square feet) on top of 2-inch rigid insulation and EPDM slip sheet on top of new roof assembly per item A1-1. Construct new roof drain in the vicinity of the melt zone and install electrical heat trace.

3.02 Mechanical

M1-1 The efficiency of the filters currently installed in RTU-1.1 are MERV 8. Per SCF standards, the filter sequence should be MERV 8 pre-filters followed by MERV 14 final filters. It is unlikely that the existing unit could accommodate an additional filter bank due to physical limitations (no room). Replacing the existing MERV 8 filters with MERV 14 filters would be possible with a modification to the filter rack to allow for the thicker MERV 14 filters (4") since the original rack was designed for MERV 8 filters (2"). No new fans or motors would be necessary as the existing fan motor appears to be sufficiently large enough to accommodate the additional pressure drop associated with MERV 14 filters.

M1-2 RTU-1.3 should have a new belt for its relief fan installed. The limited control functionality, as indicated by JCI, should be further investigated with the RTU manufacturer's (AAON) so that adequate control of the RTU is maintained by the BAS. Ideally the building controls contractor should be able to edit and control points for this unit, but currently they can only view points.

M1-3 Both Trane condensing units and indoor evaporators serving the Electrical and Comm rooms should be replaced with new 3-ton units. These would likely be direct 1-for-1 replacements and most of the refrigerant piping should be able to be re-used. New refrigerators, R-32 or R-454B should be used in place of R-410A as R-410A is no longer being produced commercially and is beginning to be phased out of use.

M1-4 Three of the VTR's present are not extended 18" beyond the surface of the roof per SCF standards. As part of any roof replacement effort, all VTR's would be their risers replaced so that they extend a minimum of 18" beyond the surface of the new roof, due to differences in insulation thickness for the new roof.

M1-5A Replace the Haakon boiler container with a built-up architectural penthouse on roof, similar to PCC2. Even though the container and equipment inside of it has not reached the end of its service life, it is not very maintenance friendly and the boilers are only 80% efficient when running at optimal conditions. A new boiler room penthouse, similar to the boiler room for PCC2, should be constructed, so that ease of maintenance and accessibility are increased. However, to fully realize the better accessibility to the boiler penthouse, roof accessibility would also need to be improved. It is worth noting that SCF standards indicate that for new installations, boilers and equipment rooms should be designed on the ground floor.

M1-5B In lieu of item M1-4A, the Haakon boiler container would be demolished as well as the PCC3 cast iron boilers. Provide new and larger high-efficiency condensing gas boiler system to service both PCC1 and PCC3 heating systems from the PCC3 boiler room. New heating lines would need to be installed and routed from the PCC3 boiler room to connect to the PCC1 heating mains. However, a combined boiler system for both buildings would reduce the amount of equipment needing routine maintenance. The existing building heat exchanger could potentially be repurposed to serve as a glycol heat exchanger for serving all the RTU heating coils, in accordance with SCF standards that the building heating fluid be water with the exception of coils exposed to outside air, as well as the existing snowmelt loads. We would recommend that each boiler has a minimum of at least 4,300 MBH of output (minimum of 2 boilers, sized at 66% of total load, with a 3rd boiler as a redundant backup). To serve three 4,300 MBH boilers, the gas piping to the PCC3 boiler room would have to be upsized to accommodate the increased load.

M1-6A If item M1-5A is pursued, the new snowmelt for the ADA parking lot north of PCC1 could be connected to the new condensing boilers on the PCC1 roof. If a snowmelt heat exchanger (approximately 970 MBH) is provided with new circulation pumps; low temperature 50% propylene glycol could be provided to heat the ADA snowmelt area. We would recommend that each boiler has a minimum of at least 1,500 MBH of output (minimum of 2 boilers, sized at 66% of total load, with a 3rd boiler as a redundant backup). To serve three 1,500 MBH boilers, the gas piping to the new PCC1 boiler room would have to be upsized to accommodate the increased load.

M1-6B If item M1-5B is pursued, the new snowmelt for the ADA parking lot north of PCC1 could be connected to the new condensing boiler system located in the PCC3 boiler room. New heating lines need to be installed and routed from the PCC3 boiler room to connect to the PCC1 ADA parking snowmelt manifolds as well as the existing snowmelt for PCC1. The existing glycol heat exchanger could be repurposed to accommodate the total snowmelt load in addition to the outside air heating coils for all the air handling units. We would recommend that each boiler has a minimum of at least 4,700 MBH of output (minimum of 2 boilers, sized at 66% of total load, with a 3rd boiler as a redundant backup). To serve three 4,700 MBH boilers, the gas piping to the new PCC1 boiler room would have to be upsized to accommodate the increased load. Other boiler configurations could be explored during the design phase to consider building diversity as well as modulating turndown.

M1-8 SCF standards do not clearly indicate that electric heat trace is necessary for the rain leader overflow outlets at the exterior of the building. However, we would recommend that it be installed to prevent any backing up of the storm drain system due to potential freeze-ups in the future.

M1-9 In association with recommendation A1-9 to melt the drifting/shedding snow between PCC1 and PCC3 using a radiant glycol system, connect the new heated slab piping to the heat exchanger, pumps, and replacement boilers at PCC3. The replacement condensing boilers in PCC3 (provided under recommendation M1-5B) would need to be sized at a minimum of 5,500 MBH each of output (minimum of 2 boilers, sized at 66% of total load, with a 3rd boiler as a redundant backup). To serve three 5,500 MBH boilers, the gas piping to the new PCC1 boiler room would have to be upsized to accommodate the increased load. Other boiler configurations could be explored during the design phase to consider building diversity as well as modulating turndown.

Boiler Sizing Matrix

Boiler Sizing w/ 10% S.F.	**Size (MBH, Min. 2 Boilers Each)**
Option M1-5A, PCC1 Boiler Replacement	1,055
Option M1-6A, PCC1 Boiler Replacement	1,452
Option M1-5B, PCC3 Boiler Replacement	4,257
Option M1-6B, PCC3 Boiler Replacement	4,665
Option M1-9, PCC3 Boiler Replacement	5,454

For additional sizing information, see Appendix G

3.03 Electrical

E1-1 If the roof mounted exhaust fans are to be touched as part of this project, a local disconnecting means will be provided at each unit. This would be required for the following: EF adjacent to the sky light, the EF fan further south of the sky light, EF-1, and the EF to the northeast of the boiler plant.

E1-2 The mechanical section is recommending that the two condensing units, and their associated evaporator units, be replaced as a (1) for (1) swap. If electrical draw on the new units is similar to the existing units, it is assumed that existing electrical infrastructure feeding these existing units would be able to be reused to the feed the new units

The mechanical section is recommending that the (2) boilers be replaced with modern equipment. Since these are gas units, they have minimal power draw, and the existing electrical connections would be able to be reused to feed new units. Mechanical proposes two options for addressing the penthouse and the electrical scope for each option is described below:

E1-3A Construct a new boiler penthouse room, similar to the boiler room for PCC2. All of the electrical equipment in the existing boiler room including the existing panel and transformer located in the penthouse would be demolished. This would leave a single 480V, 1Φ feeder that might be sized adequately for the new penthouse, depending on the new equipment proposed. If it is determined that the existing feeder is not adequately sized for the new penthouse, a new, larger feeder will be provided and the breaker protecting the feeder will be upsized. The new penthouse would receive a new transformer of similar size and a new 240/120V, 1Φ panel with a 50A main breaker. This panel would feed all new mechanical equipment, lighting, and receptacles in the penthouse.

E1-3B In lieu of a new boiler penthouse on PCC1, the boilers for PCC3 would be replaced with larger, high-efficiency condensing gas boilers and new heating lines routed from the PCC3 boiler room to connect to the existing heating mains for PCC1 on the 2nd floor. All electrical connections to the existing boilers would be demolished and replaced with larger conduit, conductors and circuit breakers rated to supply the new, larger condensing boilers in PCC3. The upsized electrical equipment would be fed from the closest available existing electrical panel in PCC3, as required to accommodate the new boilers' electrical needs. Since the boilers will be gas-fired, only a minimal increase in electrical load is anticipated. As such, it is assumed that the existing electrical infrastructure has sufficient capacity to support the proposed scope of work.

Primary Care Center 2

3.04 Architectural

A2-1 Demolish existing roof system in its entirety including **main roof and subsections 2A, 2B, and 2C**. Replace with SCF's standard low slope roof system including glass-mat sheathing, self-adhered vapor retarder, expanded polystyrene insulation (R-40 average), polyisocyanurate cover board, and fully adhered white EPDM membrane (60 mils thick). Improve roof slopes to drain with tapered insulation, sloped 1/4" per foot minimum. Insulation thickness at roof drains shall be 3.5 inches minimum. Use SPF insulation at roof-to-parapet wall intersections to reduce heat loss. Install new parapet cap flashings and sealant. Install SPF insulation in line with the roof insulation at the parapet wall that separates the 2022 addition from the main roof. Replace all roof drain bodies and covers, and relocate overflow drain 2" in elevation upslope from primary drain, and without an overflow dam.

A2-2 Reinforce area of main roof within the Boiler Room roof shed zone with EPDM slip sheet ballasted with concrete pavers, approximately 30' x 12' in area.

A2-3 Create "snow shed protection zone" where the accumulation of snow shedding from the Atrium roof occurs. Install modular concrete paver system (approximately 1194 square feet) on top of an EPDM slip sheet on top of the new roof assembly per item A2-1.

A2-4 Install galvanized steel steps both sides of Boiler Room doors (interior and exterior).

A2-5 Install travel restraint system per SCF standards Section 07 72 00, paragraph 1.g full length of roof along exposed north and east edges. [Basis of design: Guardian CB-18 anchor post, and 2,000 lb stainless steel wire rope, and orange PVC safety flags] Attach anchor posts at 15 feet on center, 15 feet from parapet walls using simple screw connections to wood thermal break pads. No structural upgrades are required.

A2-6 Consider replacing standing steam metal roof at **subsection 2E (Boiler Room roof)**. Replace with SCF's standard metal roofing assembly including self-adhering, high-temperature underlayment and factory finished standing seam roofing with 20-year finish warranty and 5-year weather-tightness warranty. Install non-penetrating snowguards at 36" on center, eave to ridge.

3.05 Mechanical

M2-1 Replace RTU-2.2 with a similarly sized unit utilizing modern refrigerants. The existing RTU utilized a refrigerant (R-22) that is no longer in production and will continue to cause an escalation in maintenance costs year over year. The new unit should be specified by a manufacturer that has an open control and communication scheme so that the building controls system is able to control all points on the unit. Any manufacturer that requires “unlocking” of its control points should not be considered for use. Alternatively, the new unit could be specified without controls entirely and all its controls could instead be installed by the building controls contractor. This would result in the greatest amount of control and trend data for future diagnostics and energy usage for the owner.

M2-2 Replace RTU-2.3 with an appropriately sized unit that will provide adequate airflow and correct pressurization of the atrium. The existing RTU utilized a refrigerant (R-22) that is no longer in production and will continue to cause an escalation in maintenance costs year over year. The new unit should be specified by a manufacturer that has an open control and communication scheme so that the building controls system is able to control all points on the unit. Any manufacturer that requires “unlocking” of its control points should not be considered for use. Alternatively, the new unit could be specified without controls entirely and all its controls could instead be installed by the building controls contractor. This would result in the greatest amount of control and trend data for future diagnostics and energy usage for the owner.

M2-3 The building controls contractor has indicated that they are not able to effectively control RTU-2.1 and RTU-2.4 due to a lack of editable control points within the programming of the RTU’s. The building controls contractor has indicated that they are only able to monitor points from both units; beyond remotely turning either unit on or off, they are not able to change any set points. It is recommended that the owner submit a request to the manufacturer’s service representative in the area to come and assist the building controls contractor in properly controlling the units and provide additional access as necessary for control of the units.

M2-4A To reduce noise transmission from RTU-2.4, the supply air riser should have a sound wrap insulation installed on the outside of the vertical supply duct.

M2-4B In lieu of, or in addition to, option M2-4A, to reduce noise transmission from RTU-2.4 it could have its curb raised a minimum of 24” to accommodate a sound attenuator installed in the existing supply air riser.

M2-5 Attenuation options M2-4A and M2-4B could be considered for RTU-2.1 if noise transmission is a concern; however, SCF maintenance has not reported it as an issue at the moment. Any new replacement units that are installed (RTU-2.2 and RTU-2.3) will have noise mitigation options similar to M2-4A and M2-4B considered for their designs and installation.

3.06 Electrical

E2-1 The mechanical section is recommending that RTU-2.2 be replaced as a (1) for (1) swap. If the electrical draw on the new units is similar to the existing unit it would be assumed that exiting electrical infrastructure feeding these existing units would be able to be reused to feed the new units. If the new units have a greater electrical demand, overcurrent protective devices and electrical feeders will need to be upsized in accordance with the NEC to accommodate the increased load. It is assumed that the existing electrical infrastructure has adequate capacity for the increase in load. Any decrease in load will, at most, require the electrical feeder to be fused down to a lower amperage at the equipment to meet the equipment's MOP.

E2-2 The mechanical section is recommending that RTU-2.3 be replaced and that the new replacement unit's size be evaluated. If electrical draw on the new units is similar to the existing unit it would be assumed that exiting electrical feeders for these units would be reused to feed the new units. If the new units have a greater electrical demand, overcurrent protective devices and the electrical feeders will need to be upsized in accordance with the NEC to accommodate the increased load. It is assumed that the existing electrical infrastructure has adequate capacity for the increase in load. Any decrease in load will, at most, require the electrical feeder to be fused down to a lower amperage at the equipment to meet the equipment's MOP.

E2-3 The mechanical section recommends raising RTU-2.4 approximately 24". This will require the units existing electrical feeder to be extended to the new height of the disconnect. This can be achieved with a roof mounted, NEMA 3R junction box where the conductors spliced and extended to the new location of the units disconnect.

E2-4 Provide disconnects for all motors (exhaust fans) on roof that do not have a local disconnecting means. This would be required for the following: Eastern most EF, EF-1, EF-2, and EF-3

Primary Care Center 3

3.07 Architectural

A3-1 Demolish existing roof system in its entirety including **main roof and subsections 3A, 3B, and 3C** [do not replace Lens roof]. Replace with SCF's standard low slope roof system including glass-mat sheathing, self-adhered vapor retarder, expanded polystyrene insulation (R-40 average), polyisocyanurate cover board, and fully adhered white EPDM membrane (60 mils thick). Improve roof slopes to drain with tapered insulation, sloped 1/4" per foot minimum. Insulation thickness at roof drains shall be 3.5 inches minimum. Use SPF insulation at roof-to-parapet wall intersections to reduce heat loss. Install new parapet cap flashings and sealant. Replace all roof drain bodies and covers, and relocate overflow drain 2” in elevation upslope from primary drain, and without an overflow dam.

A3-2 As an alternative to item A1-8, construct new fully enclosed rooftop access bridge from Level 5 of the adjacent parking garage. Design and construct bridge structurally and aesthetically similar to existing Level 2 bridge.

- New bridge will be supported on new 12” diameter pipe piles outboard of the existing skybridge columns. Piles will extend 40 feet below grade and 42 feet above grade.
- New bridge will be seismically supported by PCC 3 and seismically jointed at the parking garage.
- New bridge will utilize steel trusses along both sides made with W12x35 top and bottom chords and HSS4x4x1/4 web members. The floor and roof beams would be W10x12. Total steel tonnage of the bridge would be approximately 20,000 lbs.

A3-3 As an alternative to item A1-8 and A3-2, extend Stair 2 to the roof. Finish exterior walls to match the stair tower walls at PCC 2.

- Design similar to PCC 2 2021 stairwell extension including low slope membrane roof, low parapet walls, and sidewall roof scupper.
- HSS4x41/4 columns can be added to the top of the PCC 3 roof structure to extend the stair enclosure upward. The exterior walls of the new enclosure can be wood sheathed metal studs and act as the lateral system in both directions (wood shear walls).
- The intermediate landing can be framed from new steel beams connecting to the existing steel columns.
- The new stair stringers will be C12x20.7 extending from the 3rd floor to the new landing and from that landing to the roof level.
- The portion of the roof deck that will serve as the new stair landing at the roof level will be covered with concrete.

A3-4 Install travel restraint system per SCF standards Section 07 72 00, paragraph 1.g full length of roof along exposed north and east edges. [Basis of design: Guardian CB-18 anchor post, and 2,000 lb stainless steel wire rope, and orange PVC safety flags] Attach anchor posts at 15 feet on center, 15 feet from parapet walls using simple screw connections to wood thermal break pads. No structural upgrades are required.

A3-5 Install striped warning tape at perimeter of daylight openings at northeast corner of roof.

A3-6 Replace seismic joint cover at subsection 3C.

A3 -7 Consider replacement of non-galvanized steel channel supports at the dry cooler with galvanized steel channels.

3.08 Mechanical

M3-1 Replace RTU-3.1 and RTU-3.2 with similarly sized units utilizing modern refrigerants. The existing RTU utilized a refrigerant (R-22) that is no longer in production and will continue to cause an escalation in maintenance costs year over year. The new unit should be specified by a manufacturer that has an open control and communication scheme so that the building controls system is able to control all points on the unit. Any manufacturer that requires "unlocking" of its control points should not be considered for use. Alternatively, the new unit could be specified without controls entirely and all its controls could instead be installed by the building controls contractor. This would result in the greatest amount of control and trend data for future diagnostics and energy usage for the owner.

M3-2 Replace the DX condensing unit serving AHU-3.1. Due to recent revisions to ASHRAE Standard 15 and EPA regulations, refrigerant coils within air handlers can no longer be replaced 1-for-1 without replacing the entire air handling unit. The alternative to replacing the entire air handling unit, along with the DX condenser, is to replace the DX condenser with an air-to-water rooftop packaged chiller and change the air handling unit coil accordingly. Due to the cost of maintenance associated with refrigeration units and the constant changes within the industry pertaining to refrigerant use, utilizing chilled water for cooling will allow SCF to avoid future replacement issues. Chilled water units also typically will last longer (20-30 years) vs DX refrigerant condensing units (15-20 years) with proper maintenance. We would recommend that SCF replace the DX condensing unit with an air-to-water rooftop packaged chiller and a chilled water coil. Any new unit installed on the roof would need to be specified with appropriately sized spring vibration isolators to mitigate vibration transmission through the roof and structure to the spaces directly below.

3.09 Electrical

E3-1 The mechanical section is recommending that RTU-3.1 and RTU-3.2 be replaced with similarly sized units. If electrical draw on the new units is similar to the existing unit it would be assumed that exiting electrical infrastructure feeding these existing units would be reused to feed the new units. If there is an increase in electrical draw of the unit, overcurrent protection and the feeder will need to be upsized to accommodate the increase in load. It is assumed that the existing electrical infrastructure has adequate capacity for the increase in load. Any decrease in load will at most require the power feed to be fused down at the equipment to meet the equipment's maximum over current protection.

E3-2 The mechanical section is recommending that AHU-3.1's condensing unit should be replaced as a (1) for (1) swap. If electrical draw on the new units is similar to the existing unit it would be assumed that exiting electrical infrastructure feeding these existing units would be reused to feed the new units. If there is an increase in electrical draw of the unit, overcurrent protection and the feeder will need to be upsized to accommodate the increase in load. It is assumed that the existing electrical infrastructure has adequate capacity for the increase in load. Any decrease in load will at most require the power feed to be fused down at the equipment to meet the equipment's maximum over current protection.

E3-3 If the dry cooler pump package is abandoned in place and not intended for future use, it is recommended to demolish the unit and all associated conduit, junction boxes, and conductors back to their source.

E3-4 A weatherproof receptacle cover should be provided for the east receptacle in the parapet wall that has a missing cover.

E3-5 Provide disconnects for all exhaust fans on roof that do not have a local disconnecting means. This would be for all of the exhaust fans on the roof.

Atrium

3.10 Architectural

AA-1 Consider installing travel restraint system such that travel across Atrium roof is possible. Travel cable could be attached to fixed ladders referenced in item AA-2, if both improvements are selected.

AA-2 Consider installing fixed access ladders at east and west sides of central portion of Atrium roof as well as fully adhered walkway pads between ladders. Install ladders at center of Atrium roof (flat section) on both sides (to PCC 1 and PCC 2). Provide landing on both sides at new ladders to allow for safe transition onto travel restraint system.

AA-3 Consider roof system replacement including new 3.5 inch overframing over existing roof to include additional insulation to achieve R-40 minimum in compliance with SCF standards, glass-mat sheathing, 1 inch vent layer created with wood or metal sleepers, glass-mat sheathing, and new fully adhered EPDM membrane. Include new perimeter edge flashings.

AA-4 Remove all rough-sawn plywood sheathing from Atrium sidewalls. Install SPF insulation at joint where Atrium sidewalls meet underside of Atrium roof. Install new 0.125” solid aluminum panels (to better resist snow/ice damage) over new plywood sheathing at Atrium sidewalls.

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Part 4

Rough-Order-of-Magnitude Costs

4.01 Primary Care Center 1 Cost Summary

	Recommended Improvement Item	All Items	DB proposed Items	SCF Selected Items*
A1-1	*New roof system fully adhered white 60mil EPDM R40 EPS ave S.A.M. VB*	$1,482,070	1,482,070.10	$1,482,070
A1-2	*infill abandoned openings*	$106,682	106,682.00	$106,682
A1-3	*Create paver snow removal / protection zone at East Side of Atrium*	$51,303	$51,303	$51,303
A1-4	*replace seismic joints*	$89,262	$89,262	$89,262
A1-5	*Install travel restraint system*	$35,763	$35,763	$35,763
A1-6	*Redesign skylight*	$180,192	$180,192	$180,192
A1-7	*Add access door from PCC3*	$38,067	$38,067	
A1-8	*Add exterior utility stair*	$85,400	$85,400	
A1-9	*Create paver snow removal/protection zone at North Side of Stair "Lens"*	$85,493	$85,493	$85,493
M1-1	*Replace filters at RTU1.1*	$30,000	$30,000	$30,000
M1-2	*Service & repair controls at RTU1.3 (by SCF maintenance, plug $0)*	$0		
M1-3	*Replace condensing units*	$78,000	$78,000	$78,000
M1-4	*Extend VTR's 18" above roof (per SCF, connect below roof deck)*	$40,500	$40,500	$40,500
M1-5A	*Replace boiler container with a new penthouse*	$760,600		
M1-5B	*Demolish boiler container, new boilers in boiler room*	$1,513,503	$1,513,503	$1,513,503
M1-6A	*With M1-5A, Connect snow melt to boilers on roof*	$259,000		
M1-6B	*With M1-5B, Connect snow melt to boilers in boiler room*	$259,000	$259,000	$259,000
M1-8	*Replace heat trace at roof drain overflow outlet at grade P1*	$10,500	$10,500	$10,500
M1-9	*HX, pumps, manifolds etc for snow melt zones (at 35% will not be $0.00)*	$0	$0	
E1-1	*Motor disconnects at EF's*	$14,000	$14,000	$14,000
E1-2	*Elec support for condensing units and evaporators*	$10,000	$10,000	$10,000
E1-3A	*Electrical support for M1-5A*	$115,000		
E1-3B	*Electrical support for M1-5B*	$109,000	$109,000	$109,000
	PCC1 TOTAL	**$5,353,335**	**$4,218,735**	**$4,095,268**

*deductive alternates identified in red text.

4.02 Primary Care Center 2 Cost Summary

	Recommended Improvement Item	All Items	DB proposed Items	SCF Selected Items*
A2-1	*New roof system fully adhered white 60mil EPDM R40 EPS ave S.A.M. VB*	$1,533,761	$1,533,761	$1,533,761
A2-2	*Create paver snow removal/protection zone at E Side of Boiler Rm*	$22,099		$22,099
A2-3	*Create paver snow removal/protection zone at West Side of Atrium*	$42,300	$42,300	$42,300
A2-4	*Add steps boths sides of boiler room door*	$15,000	$15,000	$15,000
A2-5	*Install travel restraint system*	$30,932	$30,932	$30,932
A2-6	*Replace boiler room roof*	$65,000	$65,000	$65,000
M2-1	*Replace RTU2.2*	$272,000	$272,000	$272,000
M2-2	*Replace RTU2.3*	$195,000	$195,000	$195,000
M2-3	*Controls for RTU's 2.1 and 2.4*	$10,000	$10,000	$10,000
M2-4A	*Install sound liner under RTU2.4*	$21,335	$21,335	$21,335
M2-4B	*Raise RTU2.4 for 24" curb and sound attenuator*	$41,504	$41,504	$41,504
M2-5	*Add sound attenuation at RTU2.1 (same treatment M2-4A & M2-4B)*	$72,838		$72,838
E2-1	*Electrical support for M2-1*	$53,000	$53,000	$53,000
E2-2	*Electrical support for M2-2*	$53,000	$53,000	$53,000
E2-3	*Electrical support for M2-4B*	$21,000	$21,000	$21,000
E2-4	*Motor disconnects at EF's 1, 2 and 3*	$9,000	$9,000	$9,000
	PCC2 TOTAL	**$2,457,769**	**$2,362,832**	**$2,457,769**

*deductive alternates identified in red text.

4.03 Primary Care Center 3 Cost Summary

	Recommended Improvement Item	All Items	DB proposed Items	SCF Selected Items*
A3-1	*New roof system fully adhered white 60mil EPDM R40 EPS ave S.A.M. VB*	$1,763,885	$1,763,885	$1,763,885
A3-2	*Construct Bridge from Parking Garage to P3 roof*	$505,717		
A3-3	*Extend Stair 2 to roof level*	$329,233		$329,233
A3-4	*Install travel restraint system*	$46,375	$46,375	$46,375
A3-5	*Install warning tape at roof openings*	$1,536	$1,536	$1,536
A3-6	*replace seismic joint lower NE entry 40 lf*	$34,500	$34,500	$34,500
A3-7	*Replace channel supports for dry cooler*	$23,000	$23,000	
M3-1	*Replace RTU3.1 and RTU3.2*	$618,000	$618,000	$618,000
M3-2	*Replace DX condensing unit*	$164,000	$164,000	$164,000
E3-1	*Electrical support for M3-1*	$30,000	$30,000	$30,000
E3-2	*Electrical support for M3-2*	$30,000	$30,000	$30,000
E3-3	*Demolish dry cooler*	$12,000	$12,000	$12,000
E3-4	*Install weather cover at parapet outlet*	$1,000	$1,000	$1,000
E3-5	*Motor disconnects at EF's*	$9,000	$9,000	$9,000
	PCC3 TOTAL	**$3,568,247**	**$2,733,297**	**$3,039,530**

*deductive alternates identified in red text.

4.04 Atrium Cost Summary

	Recommended Improvement Item	All Items	DB proposed Items	SCF Selected Items*
AA-1	*Install travel restraint across Atrium*	$56,000		
AA-2	*Install fixed ladders either side of Atrium*	$15,000		
AA-3	*New roof system fully adhered white 60mil EPDM R40 EPS ave wVENT*	$482,002		
AA-4	*Replace water damaged rough-sawn plywood (scope to be confirmed)*	$34,204	$34,204	$34,204
	ATRIUM TOTAL	**$587,206**	**$34,204**	**$34,204**

4.05 Total Project Cost Summary

Other	*Connect P1 Handicap parking snowmelt to P1 boilers*	$20,000	$0	$20,000
	TOTAL ESTIMATED ROM COSTRUCTION COST	**$11,986,557**	**$9,349,068**	**$9,626,771**
	General Conditions	$2,397,311	$2,056,795	$2,166,023
	Contingency	$2,876,774	$2,281,173	$2,358,559
	Designer CA Fees	$258,910	$205,306	$212,270
	Builders Risk Insurance -$57850.00 IN PCS	$57,702	$34,723	$57,702
	(P & P BOND -$ 62300)IN PCS	$52,970	$31,620	$52,970
	NCI OH&P -$ 445,000.00 IN PCS	$449,395	$270,417	$445,000
	Preconstruction Phase Services CONTRACT	$1,399,179	$1,399,179	$1,399,179
	TOTAL ESTIMATED ROM PROJECT COST	**$19,478,798**	**$15,628,280**	**$16,318,475**

Appendix A

Drawings and Diagrams

ANPCC Roof Plan – Recommended Improvements

Roof & Parapet Assemblies per destructive investigation performed on 7/15/25

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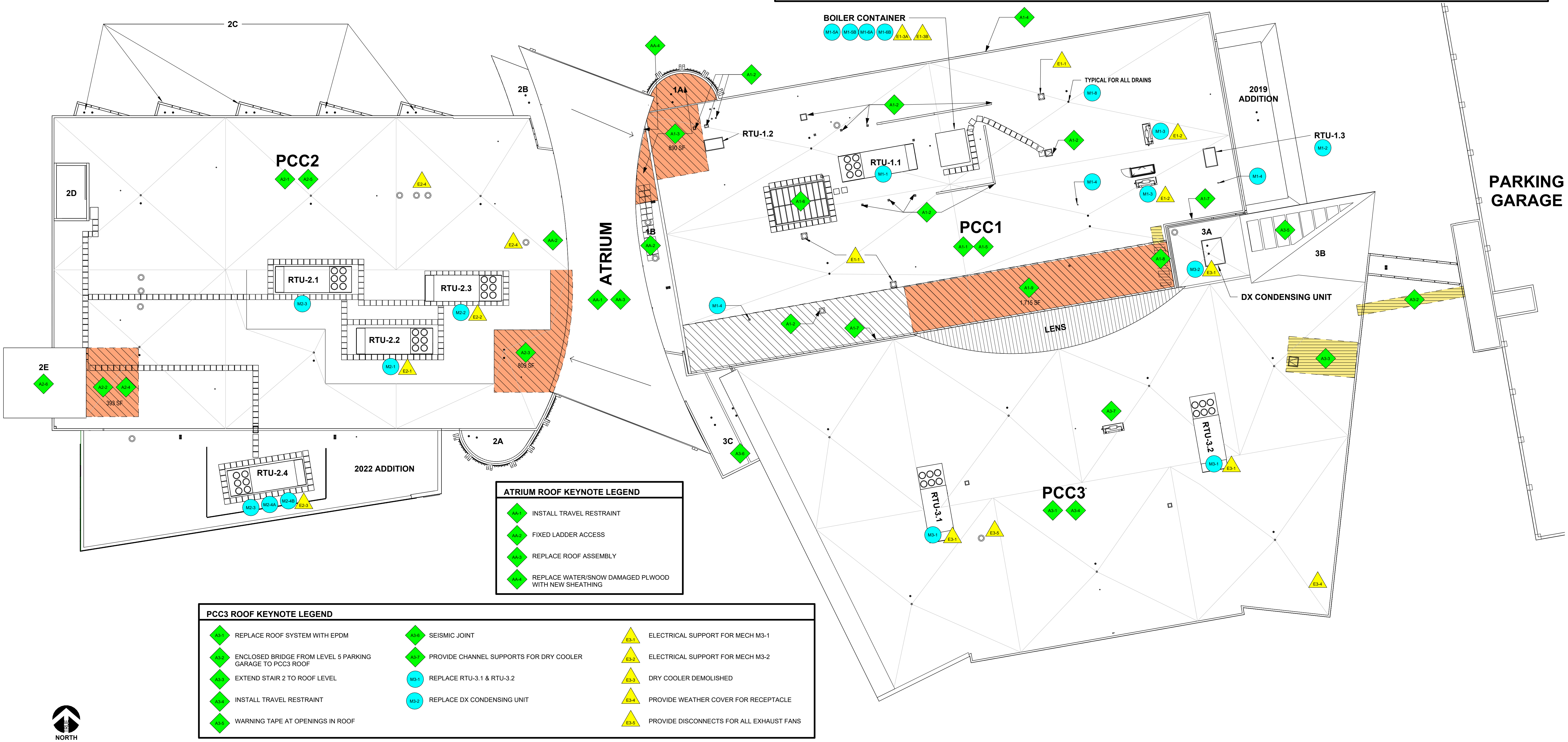
PCC2 ROOF KEYNOTE LEGEND

A2-1	REPLACE ROOF SYSTEM WITH EPDM
A2-2	REINFORCE WHERE BOILER ROOF SHEDS WITH BALLASTED CONCRETE PAVERS
A2-3	CREATE PAVER PROTECTION FOR ATRIUM SNOW DUMP
A2-4	INSTALL GALVANIZED STEEL STEPS
A2-5	INSTALL TRAVEL RESTRAINT
A2-6	REPLACEMENT OF STANDING SEAM BOILER ROOF
M2-1	REPLACE RTU-2.2
M2-2	REPLACE RTU-2.3
M2-3	CONTROLS FOR RTU-2.1 & RTU2.4 UNLOCKED BY MFR
M2-4A	INSTALL SOUND LINER ON RTU-2.4
M2-4B	RAISE RTU-2.4 TO ACCOMMODATE 24" CURB FOR SOUND ATTENUATOR.
M2-5	NEW RTU SHALL INCLUDE NOISE MITIGATION IN THEIR DESIGN
E2-1	ELECTRICAL SUPPORT FOR MECH M2-1
E2-2	ELECTRICAL SUPPORT FOR MECH M2-2
E2-3	ELECTRICAL SUPPORT FOR MECH M2-4B
E2-4	PROVIDE DISCONNECTS FOR EXHAUST FANS EF-1, EF-2, EF-3

PCC1 ROOF KEYNOTE LEGEND

A1-1	REPLACE ROOF SYSTEM WITH EPDM
A1-2	REMOVE & INFILL ABANDONED MECH ITEMS
A1-3	CREATE PAVER PROECTION FOR ATRIUM SNOW DUMP
A1-4	REPLACE ALL PARAPET CAPS & SEISMIC JOINTS
A1-5	INSTALL TRAVEL RESTRAINT
A1-6	SKYLIGHT UPGRADES
A1-7	ACCESS DOOR FROM PCC3
A1-8	ADDING EXTERIOR GALVANIZED STAIR TO PCC 3
A1-9	MELT ZONE FOR SNOW DUMP
M1-1	RTU-1.1 INSTALL FILTERS MERV 14 FILTERS
M1-2	SERVICE, REPAIR & COMPLETE CONTROLS FOR RTU-1.3
M1-3	REPLACE BOTH 3 TON CONDENSING UNITS & EVAPORATORS
M1-4	EXTEND VTR TO MIN. 18" ABOVE ROOF SURFACE
M1-5A	REPLACE HAAKON CONTAINER WITH NEW BUILT UP PENTHOUSE ON ROOF (SIMILAR SIZE AS PCC2 BOILER ROOM
M1-5B	DEMOLISH HAAKON CONTAINER AND PROVIDE NEW HIGH EFFICIENCY CONDENSING GAS BOILERS SYSTEM TO SERVE BOTH PCC 1 & PCC3 HEATING SYSTEMS FROM THE PCC3 CURRENT BOILER ROOM.
M1-6A	IF M1-5A IS PURSUED, NEW SNOW MELT ADA SYSTEM CAN BE CONNECTED TO THE NEW BOILER IN THE PCC1 PENTHOUSE.
M1-6B	IF M1-5B IS PURSUED, NEW SNOW MELT ADA SYSTEM CAN BE CONNECTED TO NEW BOILER IN PCC3 BOILER ROOM & REPURPOSE THE EXISTING PCC1 GLYCOL HEAT EXCHANGER FOR NEW SNOW MELT LOAD .
M1-7	NOT USED
M1-8	RECOMMEND INSTALL OF HEAT TRACE IN OVERFLOW OUTLETS
M1-9	CONNECT SNOWMELT OPTION A1-9 TO NEW HEATING EQUIPMENT M1-5B
E1-1	PROVIDE DISCONNECTS FOR ALL MOTORS (EXHAUST FANS)
E1-2	ELECTRICAL SUPPORT FOR MECH CONDENSING UNITS & EVAPORATORS
E1-3A	ELECTRICAL SUPPORT FOR M1-5A
E1-3B	ELECTRICAL SUPPORT FOR M1-5B



ATRIUM ROOF KEYNOTE LEGEND

AA-1	INSTALL TRAVEL RESTRAINT
AA-2	FIXED LADDER ACCESS
AA-3	REPLACE ROOF ASSEMBLY
AA-4	REPLACE WATER/SNOW DAMAGED PLWOOD WITH NEW SHEATHING

PCC3 ROOF KEYNOTE LEGEND

A3-1	REPLACE ROOF SYSTEM WITH EPDM
A3-2	ENCLOSED BRIDGE FROM LEVEL 5 PARKING GARAGE TO PCC3 ROOF
A3-3	EXTEND STAIR 2 TO ROOF LEVEL
A3-4	INSTALL TRAVEL RESTRAINT
A3-5	WARNING TAPE AT OPENINGS IN ROOF
A3-6	SEISMIC JOINT
A3-7	PROVIDE CHANNEL SUPPORTS FOR DRY COOLER
M3-1	REPLACE RTU-3.1 & RTU-3.2
M3-2	REPLACE DX CONDENSING UNIT
E3-1	ELECTRICAL SUPPORT FOR MECH M3-1
E3-2	ELECTRICAL SUPPORT FOR MECH M3-2
E3-3	DRY COOLER DEMOLISHED
E3-4	PROVIDE WEATHER COVER FOR RECEPTACLE
E3-5	PROVIDE DISCONNECTS FOR ALL EXHAUST FANS

ANPCC Roof Plan - Recommended Improvements

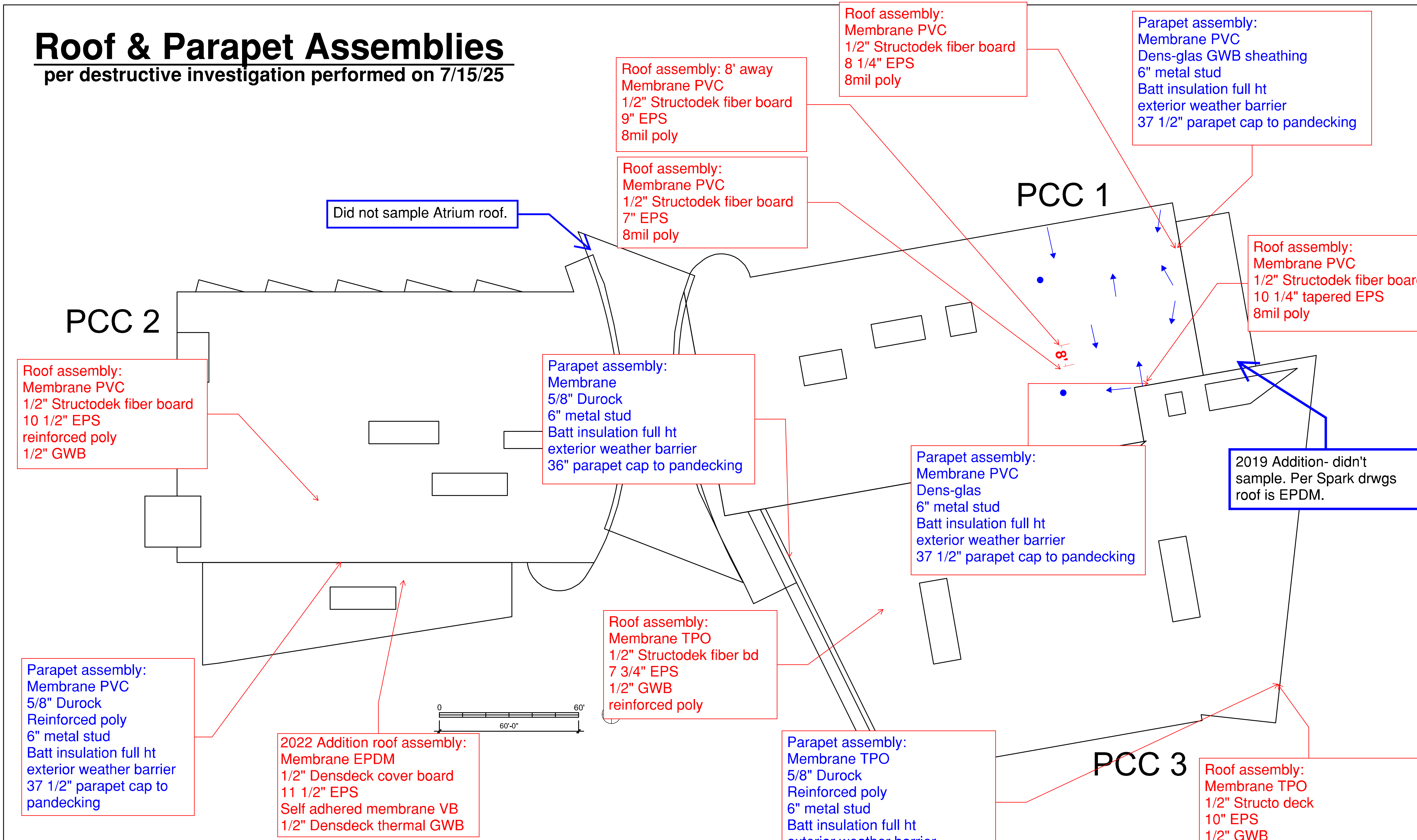
Southcentral Foundation

NEESER CONSTRUCTION, INC.

NORTHFORM ARCHITECTURE

Roof & Parapet Assemblies

per destructive investigation performed on 7/15/25



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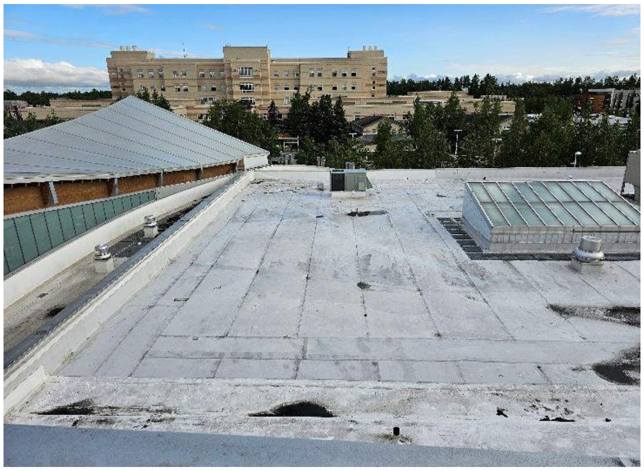
7/18/25 3pm

Overall Roof Plan

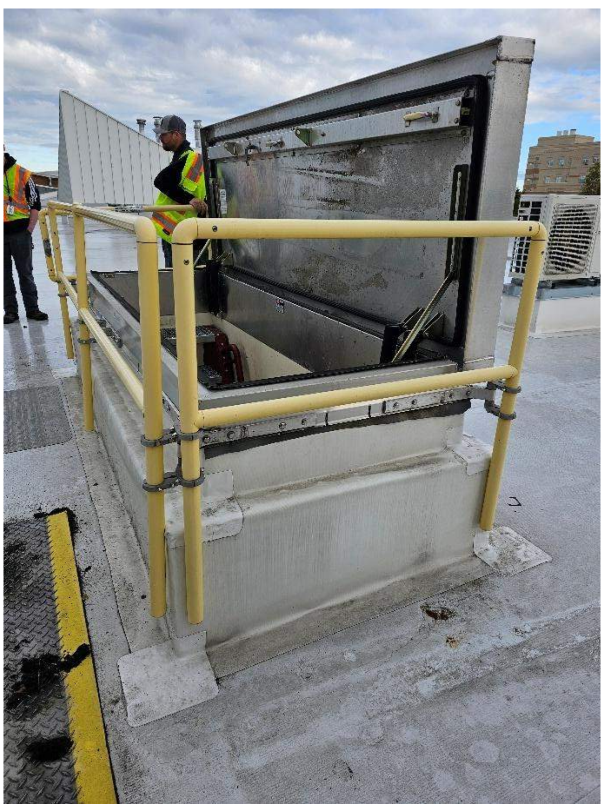
Appendix B
Site Photographs

Primary Care Center 1




PCC 1 Roof – west side

PCC 1 Roof – looking northeast




PCC 1 Roof – Access hatch

PCC 1 Roof – CU-2

PCC 1 Roof – at southeast corner, looking west

PCC 1 Roof – southwest corner

PCC 1 Roof – west side, looking north

PCC 1 Roof – northwest corner

PCC 1 Roof – at northeast corner, looking west

PCC 1 Roof – southeast corner

PCC 1 Roof – equipment screen

PCC 1 Roof – Boiler room module

PCC 1 Roof – billowing at south sidewall

PCC 1 Roof – north (peak) side of skylight

PCC 1 Roof – seismic joint at east addition

PCC 1 Roof – seismic joint at east addition

PCC 1 Roof - east addition

PCC 1 Roof – seismic joint at Atrium

Primary Care Center 2

PCC 2 Roof – southwest corner, boiler room

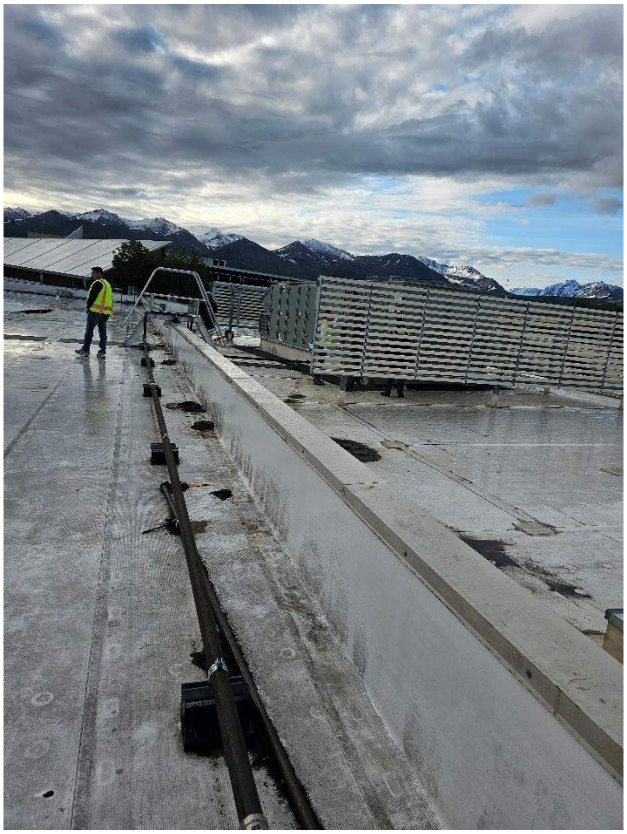
PCC2 Roof – northwest corner, stair access

PCC 2 Roof – south side, looking north at air handlers

PCC 2 Roof – south side, looking east

PCC 2 Roof – EF-1, EF-2, and EF-3

PCC 2 Roof – Boiler room entrance door



PCC 2 Roof – parapet wall at new addition

PCC 2 Roof – typical roof drain

PCC 2 Roof – northeast roof curved subsection

PCC 2 Roof – southeast corner of main roof

Primary Care Center 3

PCC 3 Roof – northeast subsection, chiller unit

PCC 3 Roof – openings at northeast corner

PCC 3 Roof – view looking north from parking garage

PCC 3 Roof – view from northeast subsection

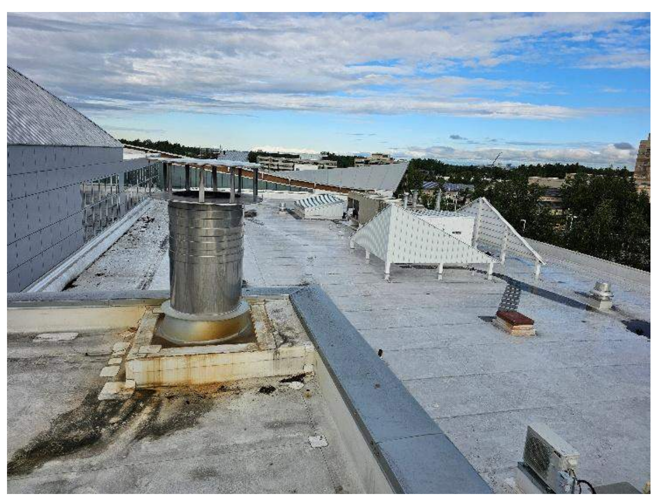
PCC 3 Roof – typical roof drains

PCC 3 Roof – dry cooler

PCC 3 Roof – access hatch

PCC 3 Roof – air handler pipe chase

PCC 3 Roof – southwest corner



PCC 3 Roof – northeast subsection, exhaust stack

Atrium

Atrium – view from PCC1, looking southwest

Atrium – northeast corner edge condition

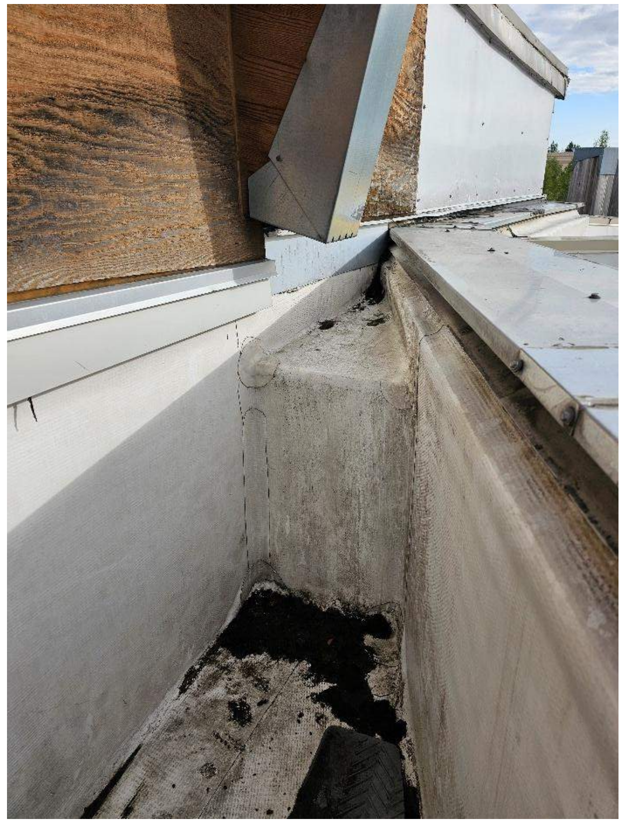
Atrium – southwest corner, view from PCC2

Atrium – southwest corner eave condition

Atrium – glulam beam and PCC 2 parapet condition

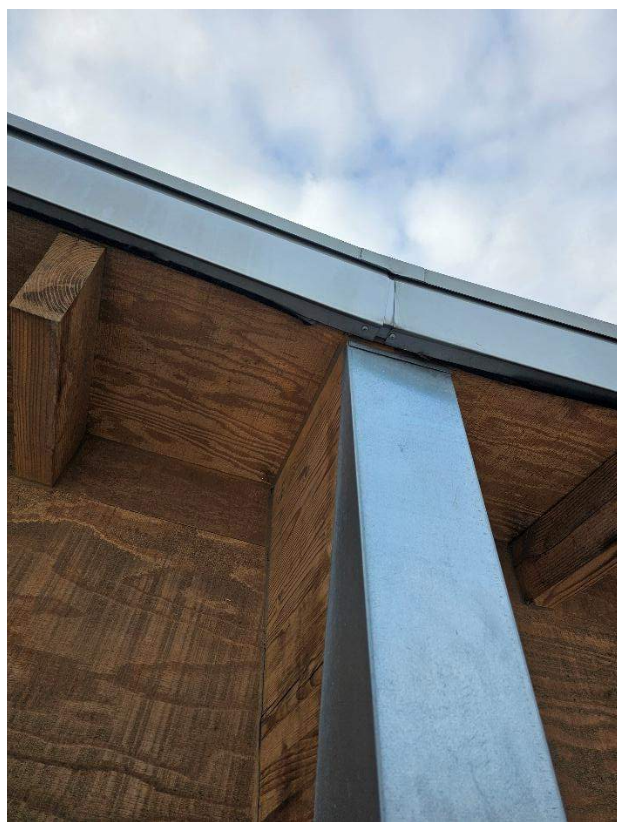
Atrium – PCC 2 sidewall condition

Atrium – northeast corner at PCC1 seismic joint



Atrium – northeast corner at PCC1 seismic joint

Atrium – PVC rib



Atrium – eave flashing splice joint

Appendix D

Building Pressure Study Report

Milaud R. Baumgartner, P.E., CxA | RSA Engineering, Inc.

On June 19, 2025, I met with Darren Toms (Neeser Construction), Robert Norton (Johnson Controls, Inc., JCI, controls technician), and Steven Ford (Alaska Air Balancing, AAB, NEBB certified balancer) at approximately 8 AM.

Upon entering the ANPCC building, JCI began setting all VAV (variable air volume) boxes throughout all buildings to “Max Cooling Flow”, to simulate a call for cooling by the entire building. Previously, it had been discussed that all the units were to be set to 100% Economizer, thereby bringing in 100% O/A (outside air) into the buildings, but JCI indicated that they were only able to manually control one Rooftop Unit (RTU) (RTU-1.1, Daikin) due to manufacturer control lockouts. All of the Trane RTU’s and the AAON RTU they were not able to command. They would only be able to put one of the RTUs (RTU-1.1, Daikin) into economizer mode manually, so that approach was taken out of consideration for use.

At approximately 9 AM, AAB began by measuring the airflow in RTU-1.1 on PCC1, which serves both floors of PCC1; measuring approximately 43,400 CFM (cubic feet per minute) in the return air plenum, noting that the O/A dampers for the unit appeared to be fully closed. This was done to establish a baseline for airflow for comparison to the original design documents. The airflow for RTU-1.2 was measured at the diffusers inside the laboratory of PCC-1. Approximately 2,450 CFM was measured. No further investigation of this unit was conducted as the air it supplies to the laboratory is isolated from the rest of the building. RTU-1.3, which serves the 2019 addition, measured approximately 5,230 CFM in the return air box, also noting that there was no relief air being drawn out of the unit on account of the relief fan belt having been broken. This also indicates that RTU-1.3 was not providing any O/A.

At approximately 10 AM, it was discovered that the RTUs on PCC-3 were never turned back on from their shutdown the previous night although through Metasys (the building automation system), JCI was noting that all the units were operating. We went to the PCC-3 roof and manually turned on RTU-3.1 and RTU-3.2 and both began to operate automatically. We also went to the PCC-2 roof to check that all RTU’s were operating as intended and discovered that RTU-2.2 and RTU-2.3 were off and in alarm states. RTU-2.2 and RTU-2.3 were both manually reset and began to operate automatically. It should be noted that SCF maintenance personnel had previously mentioned that RTU-2.3, which is the unit that served the Atrium, hardly ever runs and that it, along with RTU-2.2 needs to be replaced, due to age and lack of control by JCI.

Once all RTUs were verified to be operating and all VAVs were verified, via Metasys by JCI, to be set to Max Cooling CFM, airflow measurement of the remaining RTU's continued. It is worth noting that all of the RTU's were operating based off their packaged controls and factory manufacturer sequences based on ambient outdoor conditions as well as internal building conditions. There are generally no specific manual adjustments that are able to be made to these units in terms of their sequence of operations.

AAB measured each of the RTU's at PCC-2 as follows: RTU-2.1, serving the 1st floor, approximately 18,730 CFM; RTU-2.2, serving the 2nd floor, approximately 14,200 CFM; RTU-2.3, serving the Atrium, approximately 9,620 CFM. For RTU-2.4, which serves the 2022 addition, due to the small size of the mixing box, the instrument used for airflow measurement was not able to fit inside; AAB was not able to measure the return airflow. Instead, AAB verified the accuracy of flow through several VAV's and then Metasys was used to total airflow from the VAV's served by RTU-2.4, which was approximately 21,650 CFM. For RTU-2.1, 2.2, and 2.3, it was observed that all O/A dampers were closed. For RTU-2.4, approximately 10% O/A was being brought in by RTU-2.4.

AAB measured both RTUs at PCC-3 as follows: RTU-3.1, serving the 1st and 2nd floors, approximately 20,990 CFM, RTU-3.2, serving the 2nd and 3rd floors, approximately 17,710 CFM. Both were observed to have had their O/A dampers closed even though the minimum O/A damper position set by the packaged controller indicated that they were to be at 15% open. AHU-3 (air handling unit), located inside PCC-3, serving the circulation space, was also checked and measured. Approximately 17,430 CFM was measured at the return air opening in the unit's mixing box with the O/A damper noted to be fully closed. When checked, Metasys had a setpoint of 10% for the O/A damper minimum position. It was verified that the O/A damper actuator did work, when the damper position was commanded to open further than 10%.

At approximately 3 PM, once measurements of all RTUs and AHUs had been completed, airflow to/from the Atrium was measured again since all units were verified to be operational. AAB once again took airflow readings at the doorways from each building in the atrium. At the 1st floor of PCC-1, airflow movement was negligible. At the 2nd floor of PCC-1, approximately 600 CFM was moving into PCC-1 from the Atrium. At the 1st floor of PCC-2, approximately 4,160 CFM was moving into the Atrium from PCC-2. At the 2nd floor of PCC-2, approximately 1,400 CFM was moving into the Atrium from PCC-2. At the 1st floor of PCC-3, approximately 2,610 CFM was moving into the Atrium from PCC-3. At the 2nd floor of PCC-3, approximately 2,880 CFM was moving into the Atrium from PCC-3.

Conclusions & Observations:

1. It was discovered that each RTU, across all roofs, was operating with its own building pressure reference setpoint. What this means is that concurrent RTU's on the same roof of a building could have different building pressure references that they are attempting to control to.

    - Typically, one pressure reference should be used for all units serving the same building. That same building pressure reference can also be used to control the relief for the building. Currently, the majority of the RTUs have integral return/relief fans that are operating to maintain separate building static pressure references. While this can work, this does not take into consideration the building as a whole but instead each respective RTU is only concerned with the areas that it serves.

        i. A more effective control strategy for a building that has multiple RTU's and AHU's serving it would be to have an independent relief fan installed that will automatically operate and vary its speed via a variable speed drive to maintain the building pressure setpoint. Continual monitoring of outside air airflow, return airflow, and relief airflow would be necessary for verifying control of the building static pressure.

        ii. Another option would be to specify new RTUs without packaged controls so that the controls contractor can install their own controls that will better enable them to control, monitor, and diagnose problems with the units. Existing RTUs could have their packaged controls removed in favor of controls by the control's contractor.

2. O/A dampers and actuators for all units should be checked, with JCI and a unit manufacturer's representative or technician present to ensure that actual O/A damper position and O/A damper position as monitored by Metasys or indicated by the packaged controls are aligned.

3. The roof of PCC-3 is being blown up significantly by RTU-3.1 and RTU-3.2. When we walked on the roof of PCC-3 when both RTUs were off, there was no billowing of the roof assembly at that time. Compared to several hours later, when the units were on and there were essentially "bubbles" that we were walking on. While it is not possible to measure air escaping the envelope via the roof, parapets, or connecting walls between buildings, it is visually evident that air is being pushed out past the roof deck into the roof assembly.

4. Previous observations by SCF personnel that were relayed to the investigation team were that there was a significant wind tunnel effect among all the buildings and the Atrium. This was with the understanding that this was, in-part, due to the lack of operation of RTU-2.3. Airflow readings at all the connected doorways into the Atrium would indicate that when RTU-2.3 is operating, air is possibly being drawn into the Atrium from the other buildings as well as being pushed in by the other buildings.

    - While a "wind tunnel" may be noticeable or prominent at the doorways connecting the Atrium and each building, we would not recommend drastically changing this condition. As previously recommended as part of #1, separate and independent relief fans for each building would help to ensure a more stable and consistent positive building pressure. However, we would want each building to be positive to the Atrium, i.e. airflow would move from each building into the Atrium. Since this is a healthcare application, air should move from the cleanest space to the dirtiest space. Evaluating each building as a whole, each PCC building should be considered a "clean" part of the building, while the Atrium, a public circulation area should not be considered a "clean" space.

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Appendix E

Level 1 Energy Audit

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Level 1 Energy Audit for Southcentral Foundation's Anchorage Native Primary Care Center

Prepared under contract with:
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For the building owner:
Southcentral Foundation
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Site Survey Dates:
June 10th and July 2nd and 3rd, 2025

Prepared By:
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Energy Audits of Alaska

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Revision Tracking

New Release – July 24, 2025

Disclaimers

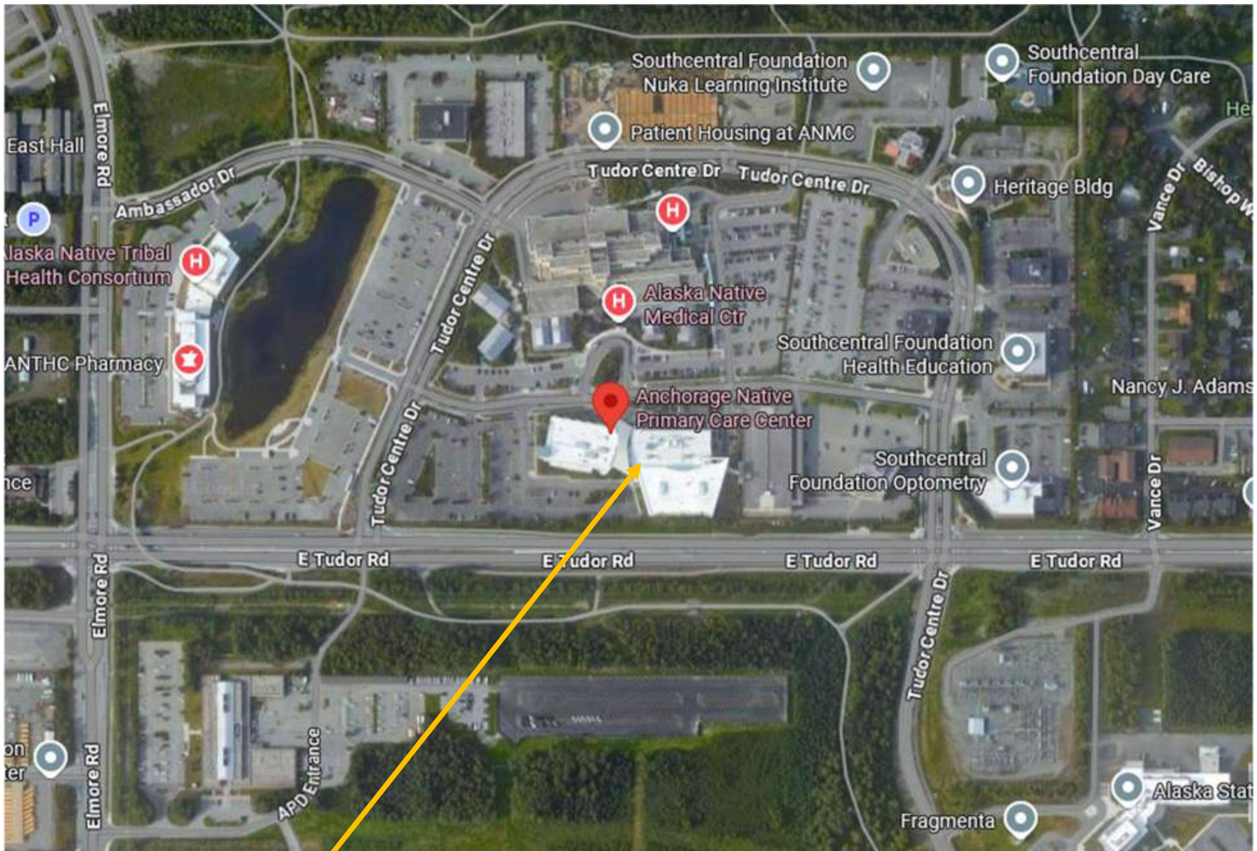
This energy audit is intended to identify and recommend potential areas of energy savings, estimate the value of the savings and approximate the costs to implement the recommendations. This audit report is not a design document and no design work is included in the scope of this audit. Any modifications or changes made to a building to realize the savings must be designed and implemented by licensed, experienced professionals in their fields. Lighting recommendations should all be first analyzed through a thorough lighting analysis to assure that the recommended lighting upgrades will comply with any State of Alaska Statutes as well as Illuminating Engineering Society (IES) recommendations. Lighting retrofit upgrades should be made by a qualified electrician in order to maintain regulatory certifications on light fixtures. Ventilation recommendations should be first analyzed by a qualified and licensed engineer experienced in the design and analysis of heating, ventilation and air-conditioning (HVAC) systems.

Neither the auditor nor Energy Audits of Alaska bears any responsibility for work performed as a result of this report.

Payback periods may vary from those forecasted due to the uncertainty of the final installed design, configuration, equipment selected, and installation costs of recommended energy efficiency measures (EEMs), or the operating schedules and maintenance provided by the owner. Furthermore, EEMs are typically interactive, so implementation of one EEM may impact the cost savings from another EEM. The auditor accepts no liability for financial loss due to EEMs that fail to meet the forecasted savings or payback periods.

This audit meets the criteria of a Level 1 Energy Audit per the Association of Energy Engineers and per the ASHRAE definitions, and is valid for one year. The life of an audit may be extended on a case-by-case basis. This audit is the property of the client and the building owner although the data in this report may be used by the auditor for comparison purposes to other similar use buildings.

Project Location



NORTH

Subject Building

Building contact:
Kristin Huesser
Project Manager
(907) 229-4549 mobile
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1. SUMMARY

Southcentral Foundation's Alaska Native Primary Care Center (PCC) is located in Anchorage, Alaska. Chugach Electric Association is the electric utility provider and approximately 15% of their power is generated by renewables. Enstar Natural Gas Company provides natural gas to the facility.

This report was prepared under contract to Neeser Construction, Inc, for Southcentral Foundation (SCF), owner of the subject building. The scope of the report is a Level 1 energy audit as defined by ASHRAE, also called a "walk through" audit. A Level 1 audit includes a Preliminary End Use Analysis (PEA) which is a benchmark analysis of the buildings energy consumption and compares its energy profile to other similar use buildings. A Level 1 audit also identifies no-cost and low-cost energy conservation measures (ECMs) and a listing of potential areas and magnitudes of energy savings for energy efficiency measures (EEMs) requiring capital expenditures. Because calculations at this level of energy audit are minimal, savings and costs are approximate and typically based on the auditor's previous experience. The EEMs are intended to inform the owner's decisions regarding facility planning and whether to undertake more comprehensive Level 2 or Level 3 energy audit of specific areas in the facility.

The site surveys took place on June 10th and July 2nd and 3rd, 2025. The outside temperatures during the day varied between 56F and 63F.

1.1 Guidance to the Reader

The 7 page Summary is designed to contain all the information the building owner/operator should need to determine which energy improvements should be pursued, approximately how much they will cost and their estimated annual savings and simple payback. The Summary discusses the subject building and provides summary tables (Figure 1.7) with overall savings, costs and paybacks for the EEMs evaluated for the facility covered in this audit.

Section 2 describes the methodology used in this analysis and Section 3 describes the existing conditions. Appendix A lists the major HVAC equipment, Appendix B contains the source electric and natural gas data as well as a benchmark analysis of the facility, Appendix C contains rooftop schematics for each of the 3 buildings, Appendix E contains photographs of major equipment and Appendix F contains the abbreviations and acronyms used in this document.

A Key Plan is shown in Figure 3.1.

<u>Issues that the auditor feels are of particular importance to the reader are underlined.</u>

1.2 Noteworthy Points

a. This facility consists of 3 interconnected buildings constructed at various times over the last 28 years, they are identified as PCC1, PCC2 and PCC3 in this document (see Key Plan in Figure 3.1).

b. SCF Accounting allocates 85% of the T336 423 019 electric meter's use to PCC3 and 15% of its use to the parking garage. This meter accounts for 70% of the total electric consumption and 73% of the total demand, but the PCC3 building only accounts for 50% of the square footage and the primary electrical use in the parking garage is lighting. These discrepancies raise questions about the accuracy of the SCF allocation.

c. The air handling units (AHUs) and rooftop units (RTUs) are not fully incorporated into the building's automation system (BAS). Each has a stand-alone controller (aka rooftop module, or RTM) and only allows the BAS system to manage occupied/unoccupied schedules, heating and cooling setpoints and static pressure set points and to over-ride supply air and mixed air temperatures. Consequently, it was observed that there is little to no consistency in the remaining settings across the AHUs and RTUs. More detail is provided in Section 3.2. add into Appendix F

d. Therms and CCF are used interchangeably in this analysis.

e. ECMs are no cost or low-cost energy conservation measures typically implemented by the building owner or the owner's staff. The following ECMs are considered most important and additional, more general ECMs are listed in Section 1.7.
   - Where it has not already been implemented, add switch mounted, dual technology occupancy sensors in the bathrooms and switch or ceiling mounted motion sensors in other intermittently occupied spaces to control lighting
   - As refrigeration and other appliances reach their end of life, replace with Energy Star versions
   - Most of the lighting in the parking garage was on during daylight hours, even though each fixture appears to have a motion and/or photocell sensor (photo at right). The sensors may not be functional; this should be investigated and rectified.

   - It is recommended to submeter the parking garage electric use to eliminate any inaccuracy in the estimated 15% allocation mentioned in paragraph "b" above
   - CP-6 in PCC3 was running at 100% speed continually, with its VFD in bypass mode; this should be changed to auto mode to allow the VFD to adjust the pump speed

f. If all the EEMs that were evaluated for this building are implemented, there will be a 33% reduction in energy costs, totaling $161,305/year, with a simple payback of 10.4 years on the $1,680,876 implementation cost.

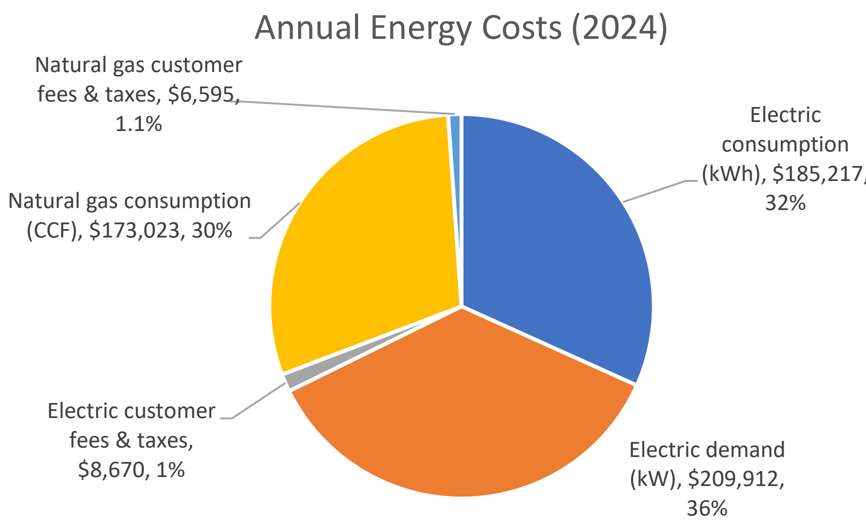
1.3 Current Cost and Breakdown of Energy

Based on electricity and natural gas prices in effect at the time of the audit, the total annual energy costs are $583,418 per year. The breakdown of the annual energy costs is shown in Figures 1.1 and 1.2.

Figure 1.1 – Annual Energy costs

2024 costs	
Electric consumption (kWh)	$185,217
Electric demand (kW)	$209,912
Electric customer fees & taxes	$8,670
Natural gas consumption (CCF)	$173,023
Natural gas customer fees & taxes	$6,595
TOTAL	**$583,418**

Figure 1.2



The tables below show the current electric and natural gas rates and the relative costs per MMBTU for each fuel used in this facility. For comparison purposes, Figure 1.4 shows the cost per MMBTU for heat generated by heat pumps[1] using a seasonal Coefficient of performance (COP) of 1.75 and by standard and condensing boilers using natural gas. The relative cost per MMBTU for heat pump heating does not include electric demand costs, which will drive that cost higher.

Figure 1.3 – Fuel Costs

	Unit	Unit cost
Electricity	kWh	$0.06753
	kW	$37.40
Natural Gas	CCF	$0.97507

[1] Heat pumps are generally not economically viable in Anchorage except for shoulder season heating; they are shown here for comparative purposes only

Figure 1.4 – Relative Heating Costs for Various Fuels

	Unit cost	Cost/MMBTU	Heating type	Heating efficiency	Cost/MMBTU for heating
Electricity (kWh)	$0.0675	$19.79	heat pump	175%	$11.31
Natural Gas (CCF)	$0.9751	$9.75	condensing boiler	92%	$10.60
			new 3-pass cast iron boiler	87%	$11.21
			20 yr old 3-pass cast iron boiler	82%	$11.89

1.4 Benchmark Summary and Energy Utilization Comparison (EUI)

Benchmark figures, EUIs and energy cost indexes (ECIs) facilitate the comparison of energy use between different buildings with similar use and occupancy and for the same building over time. Figure 1.5 lists several benchmarks for the audited building and Figure 1.6 compares the EUIs of a number of similar use buildings previously audited by the auditor. Heating Degree Days (HDDs) are a measure of the severity of cold weather and are used to normalize heating energy to the differences in climate in each region. More details can be found in Appendix B.

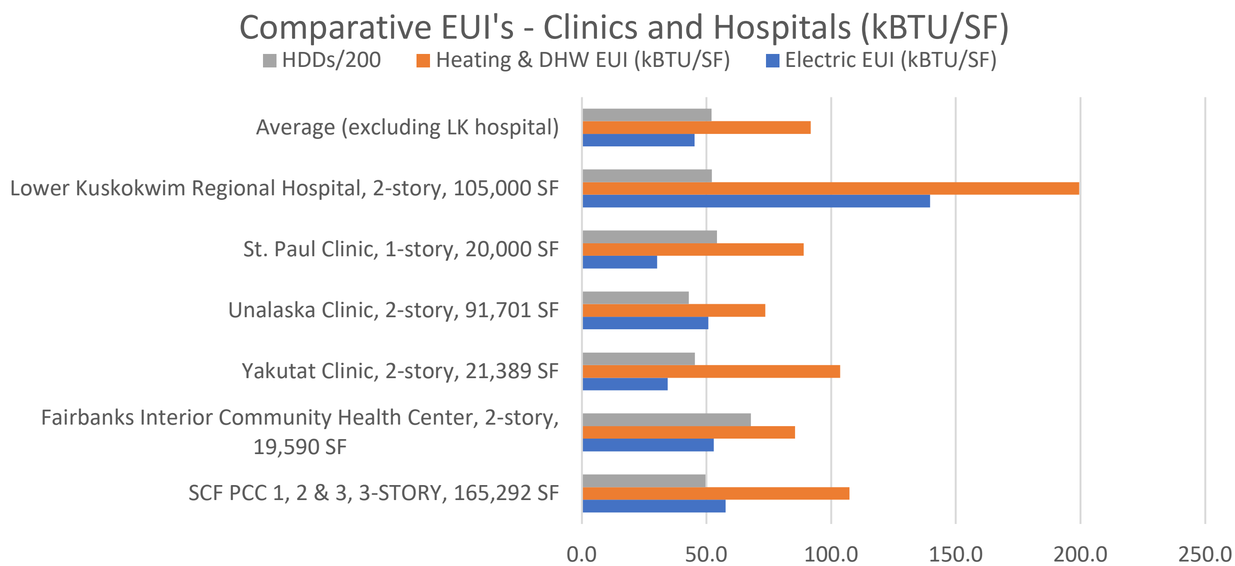
Figure 1.5

Building Benchmarks			
Description	**EUI (kBTU/SF)**	**EUI/HDD (BTU/SF/HDD)**	**ECI ($/SF)**
Existing Building	165.1	16.6	$3.53
With Proposed Retrofits			$2.37
EUI: Energy Use Intensity - The annual site energy consumption divided by the structure’s conditioned area.			
EUI/HDD: Energy Use Intensity per Heating Degree Day.			
ECI: Energy Cost Index - The total annual cost of energy divided by the square footage of the conditioned space in the building.			

The subject building’s heating[2] and electric EUI’s are compared to similar use buildings in the bar chart below. The subject building’s electric EUI is 28% higher than the average of all the buildings (excluding the Lower Kuskokwim Hospital) and its heating EUI is 17% above the average, despite the fact that the number of HDDs in Anchorage is 5% less than the average of the other regions. Additional discussion is provided in Appendix B. ECI’s are not compared across these facilities due to dramatically differing costs of energy for the comparative buildings. The Lower Kuskokwim Regional Hospital (Bethel) is not included in the average due to the fact that hospitals use much more energy than the subject and other comparative buildings.

[2] The same fuel is used for space heating and domestic hot water (DHW) heating in this building, so the DHW heating energy is included in the Heating EUI

Figure 1.6



1.6 Energy Efficiency Measures

Figure 1.7 lists the EEMs evaluated for this facility, along with their estimated costs, savings and paybacks when available. Costs were estimated through several methods:

- The sources identified in the footnotes
- The auditor's previous experience with the cost of similar EEMs in other buildings
- Assuming 10% of the NG consumption is used for DHW heating (based on other clinics)
- As otherwise listed in the "savings potential" and "notes" sections of the table in Figure 1.7

The pre-feasibility study (EEM #10) using a 200 kW Capstone CHP (co-generation with heat and power) is found in Appendix D. See Appendix F for the abbreviations used in this table.

Figure 1.7 – EEMs Evaluated

EEM No.	EEM Description	Estimated cost	Savings potential	Annual Cost savings	Simple payback (yrs)	Notes
1	Implement boiler temperature resets based on OSAt	$5,000	2% of heating costs	$3,114	1.6	Burnham boilers only, Riello already has reset. Cost assumes boiler temperatures can be incorporated into Metasys BAS system with programming changes.
2	Vary hydronic circulation pump speed based on pressure	$15,000	-	-	-	Unclear what is controlling pump speeds now. Cost assumes differential pressure transducers can be installed and managed by BAS system. Savings are unknown.
3	Vary DHW re-circulation pump speed based on return water temperature	$5,000	1%-2% reduction in DHW heating costs	$346	14.4	All 3 buildings currently use variable speed DHW re-circulation pumps; it is not clear what is controlling the pump speed.
4	Replace hot water generators (HWG) in PCC1 and PCC3 with gas fired, condensing, storage HWH	$40,000	10% reduction in DHW heating costs	$1,730	23.1	If boilers in PCC1 & PCC3 are replaced with condensing units, retain HWG's; otherwise replace with condensing HWHs

EEM No.	EEM Description	Estimated cost	Savings potential	Annual Cost savings	Simple payback (yrs)	Notes
5	Upgrade remaining lighting to LED throughout	$495,876	0.9w/SF with LEDs = 148.8 kW x 260 work days x 10 hrs = 386,900 kWh/yr	$31,693	15.6	Typical lighting electric consumption in offices and exam rooms are 1.7w/SF using T8 and T5 florescent fixtures and 0.8w/SF using LED fixtures; cost estimate is based on $3.00/SF to retrofit existing fixtures
6	Add dual technology occupancy sensors to bathrooms where not already in place	$350-$500 each installed	25% reduction in lighting costs in that space	-	-	Some interior lighting controls are already in place, but other opportunities were observed
7	Add switch or ceiling mounted occupancy sensors to intermittently occupied spaces	$500-$800 each installed	25% reduction in lighting costs in that space	-	-	
8	Where possible, convert from glycol to water in hydronic heating systems	unknown	3-5% reduction in heat loads	-	-	A 50% glycol solution is 3-5% less efficient in thermal transfer than water.
9	Replace boilers as they reach their end of life (typically 25 years) with minimum 92% efficient condensing units	$80,000 each, installed	11% reduction in heating costs	$17,129	18.7	There are 4 standard efficiency boilers ranging in age from 2002 to 2008
10	Install 200 kW Capstone CHP unit	$500,000	reduction in electric demand and kWh costs	$82,292	6.1	Use in baseload mode to reduce electric demand, provide kWh and heating
Retro-commission heating and ventilation systems, optimize BAS settings for current use and occupancy:						
11	Implement SAt reset based on OSAt	$330,000	9% electrical savings, 4% demand savings; unknown heating savings	$25,000	13.2	Should be feasible through the Metasys BAS system
12	Implement compressor lockouts at 55F (adjustable)					May need to be performed at each rooftop module (RTM) controller
13	Enable economizer mode when OSAt <60F (adjustable)					May need to be performed at each rooftop module (RTM) controller
14	Implement demand-controlled ventilation (DCV) in all AHUs and RTUs, modulate OSAd based on CO2 levels					May require new or updated RTM controllers
15	Adjust DCV settings for consistent CO2 setpoint of 1000 ppm (adjustable) in all AHUs and RTUs					May need to be performed at each rooftop module (RTM) controller
16	Implement consistent unoccupied ventilation over-ride period of 2 hrs (adjustable)					May need to be performed at each rooftop module (RTM) controller
17	Implement occupied/unoccupied schedule for PCC3 AHU-3, turn off during unoccupied periods					Currently has no occupancy schedule per plans, so assumed to run continuously; schedule should be feasible through Metasys BAS system
18	Optimize building ventilation schedules based on current use and occupancy					Should be feasible through the Metasys BAS system
19	Set back VAV and fintube baseboard zone temperatures during unoccupied periods					Should be feasible through the Metasys BAS system
20	Enable boiler re-circulation and hydronic circulation pumps only when call for heat					Should be feasible through the Metasys BAS system
21	Put all exhaust fans on building occupancy schedule, turn off during unoccupied periods					Should be feasible through the Metasys BAS system
	TOTALS	**$1,680,876**		**$161,305**	**10.4**	

1.7 Energy Conservation Measures (ECMs)

No-cost and low-cost EEMs are called ECMs and are usually implemented by the owner or by the existing operations and maintenance staff (they are also called O & M recommendations). ECMs can result in cost and consumption savings, but they also prevent consumption and cost increases, which are more accurately called “avoided costs” rather than cost savings. Listed below are the ECMs applicable to the subject building.

1) **Ongoing Energy Monitoring-** Extensive research by a number of organizations has validated the value of building system monitoring as an effective means to reduce and maintain lower energy consumption. HVAC “performance drift” is the deterioration of an HVAC system over time, resulting from a number of preventable issues. Performance drift typically results in a 5% to 15 % increase in energy consumption. It is recommended to implement a basic energy monitoring system for this building,

   There is a range of simple to very complex building monitoring systems commercially available, most utilize a user-friendly internet or network-based dashboard and the BAS system in this facility may already have the capacity to monitor energy use with simple programming changes. They range from a simple do-it-yourself approach utilizing a spreadsheet and graph to public domain packages to proprietary software and hardware packages. One public domain system is the BMON system from the Alaska Housing Finance Corporation (AHFC). AHFC has developed a building monitoring software to use with Monnit or other sensors. This software is free to any user, open source, can be modified to user needs, and can absorb and display data from multiple sources. It can manage multiple buildings, and can be installed by anyone with a little IT experience. This software is available at https://code.ahfc.us/energy/bmon. Additional information can be obtained by contacting AHFC directly.

2) **Create an organizational “energy champion” and provide training**. It can be an existing staff person who performs a monthly walk-through of the building using an Energy Checklist similar to the sample below. Savings from this activity can vary from zero to 10% of the building’s annual energy cost.

ENERGY CHAMPION CHECKLIST - MONTHLY WALK THROUGH	initial
Check thermostat set points and programming	
Note inside and outside temperatures, is it too hot or cold in the building?	
Are computers left on and unattended?	
Are room lights on and unoccupied?	
Are personal electric heaters in use?	
Are windows open with the heat on?	
Review monthly consumption for electric and gas	

3) **Efficient Building Management:** Certain EEMs and ECMs are recommended not only to improve the energy efficiency and but also to reduce the cost of building management. Some examples:

   a. All lights should be upgraded at the same time, all lamps should be replaced as a preventative maintenance activity (rather than as they fail, one at a time), lamp inventory for the entire building should be limited to a single version of an LED or fluorescent tube (if at all possible), and all appropriate rooms should have similar occupancy controls and setback thermostats.

b. Extra HVAC components such as zone valves, thermostats and circulation pumps should be maintained in inventory to allow trouble shooting and quick replacement of existing components.

c. The same components should be used in all buildings to minimize the number of different parts in inventory, these include zone valves, thermostats, circulation pumps, lamps, ballasts, occupancy sensors, etc.

4) Air Infiltration: Minimize infiltration in the building by sealing all wall, ceiling and floor penetrations and properly maintaining all entry and roll up doors and windows so they close and function properly. All switch, electrical outlet and light fixture junction boxes should be sealed. Weather-stripping should be maintained if it exists or added if it does not and all doors, windows and siding penetrations should be properly caulked. It is recommended that the organization have an IR camera so that infiltration and areas of defective insulation can be identified and repaired.

5) Turn off plug loads including computers, printers, faxes, etc. when leaving the room. For workstations where the occupant regularly leaves their desk, add an occupancy sensing plug load management device (PLMD) like the "Isole IDP 3050" power strip produced by Wattstopper.

6) HVAC Maintenance should be performed annually to assure optimum performance and efficiency of the boilers, circulation pumps, exhaust fans, zone valves, actuators and thermostats in this building. An unmaintained HVAC component like a boiler can reduce operating efficiency by 3% or more. Repeated occupant complaints regarding overheated or underheated spaces suggest that zone valves and thermostats should be checked for correct operation as a first line of troubleshooting. It is recommended that the organization have an IR camera to allow the diagnosis of failed zone valves, inoperative thermostats, clogged heating coils, etc.

7) Vacant Offices & Storage Areas: If there are multiple-person offices and/or other common spaces which are currently vacant, consider moving staff such that the vacant offices are all in one zone, and turn down the heat and turn off lighting in that zone

8) Additional ECM recommendations:

a. Purchase and use an electronic timer as a power strip for large copy/scan/fax machines and any other equipment that has a sleep cycle. During their sleep cycle, they can consume from 1 to 3 watts. This can cost from $8-10/year per machine. Timers similar to the sample in Appendix J can be purchased for as little as $15.

b. At their end of useful life (EOL), replace refrigeration equipment and commercial cooking equipment with Energy Star versions.

c. Keep refrigeration coils clean.

d. Keep heating coils in air handlers, unit heaters and fan coil units clean.

2. AUDIT AND ANALYSIS METHODOLOGY

2.1 Program Description

This audit identifies and evaluates energy efficiency measures at the Alaska Native Primary Care Center. The scope of this project included evaluating the primary building systems including HVAC, ventilation and lighting. Measures were analyzed based on publicly available manufacturer's data for existing equipment, similar buildings and the auditor's experience with measures in similar buildings. Life cycle costing, inflation and internal rates of return were factored into the savings calculated in this analysis.

2.2 Audit Description

Preliminary audit information including the available building plans and utility consumption data was gathered in preparation for the site survey. Interviews were conducted with SCF's building maintenance, facilities and project management staff, RSA Engineering and the Neeser Construction superintendent to understand their objectives and insights and gather other information the auditor could use to make the audit most useful. The site survey provides critical information regarding the existing equipment, it's energy consumption and the savings opportunities that exist in this facility.

The building plans provided by the owner were reviewed, as well as information provided by the engineering team and the HVAC controls contractor, Johnson Controls.

2.3 Method of Analysis

The details collected during the site survey, from on-site staff and from available building plans enable the auditor to construct the "existing conditions" for the equipment observed; this is detailed in Section 3. The PEA involves distinguishing the different fuels used on site, analyzing their consumption in different activity areas of the existing building, determining the building's EUI and ECI and comparing these to similar use buildings.

Limitations of a Level 1 energy audit

In Level 2 and 3 energy audits, an energy simulation model is created and calibrated to actual consumption of each fuel used in the facility (natural gas and electricity in the case of this building). The auditor accesses every room and identifies all energy consuming equipment and includes this in the model. After calibration, the model is used to calculate savings for each EEM. Actual contractor costs are often obtained, rather than the auditors estimates. This results in a more comprehensive and accurate analysis.

A Level 1 audit does not provide this level of analysis or detail. It identifies potential areas of savings and presents approximate costs and savings to allow the owner to decide which measures they would like to further pursue in the future. The cost and savings estimates are assumed to be accurate within 50%.

Financial analysis including savings to investment ratios (SIR), life cycle costing, internal rates of return, inflation and energy cost escalation are not considered in this level of audit.

Simple payback is a cost analysis method whereby the investment cost of a project is divided by the first year's energy and maintenance savings to give the number of years required to recover the cost of the investment. This may be compared to the expected time before replacement of the system or component will be required. For example, if a boiler costs $12,000 and results in a savings of $1,000 in the first year, the payback time is 12 years. If the boiler has an expected life of 10 years, it would not be financially viable to make the investment since the payback period of 12 years is greater than the projected life.

The Simple Payback calculation does not consider likely increases in future annual savings due to energy price increases, nor does it consider the need to earn interest on the investment (i.e. the time-value of money). Simple paybacks are calculated based on estimated first costs for each measure. First costs include estimates of the labor and equipment required to implement a change but do not include any required engineering or permitting costs.

Interactive effects of EEMs:
It is important to note that the savings for each EEM are interactive. For example, implementing a reduced operating schedule for inefficient lighting will result in relatively high savings than implementing a reduced operating schedule for newly installed, efficient LED lighting, because the efficient lighting system uses less energy during each hour of operation.

If some of the recommended EEMs are not implemented, savings for the remaining EEMs will be affected, in some cases positively, and in others, negatively. If all EEMs are implemented, their order of implementation is irrelevant, because the total savings after complete implementation will be unchanged.

Lighting Penalty
When existing lighting is replaced with more efficient lighting, less heat is released into the space, so more heating energy is required during the heating season, and less cooling energy is required during the cooling season. These penalties are not considered in a Level 1 energy audit.

Assumptions and conversion factors used in calculations:
The underlying assumptions used in the calculations made in this audit follow:

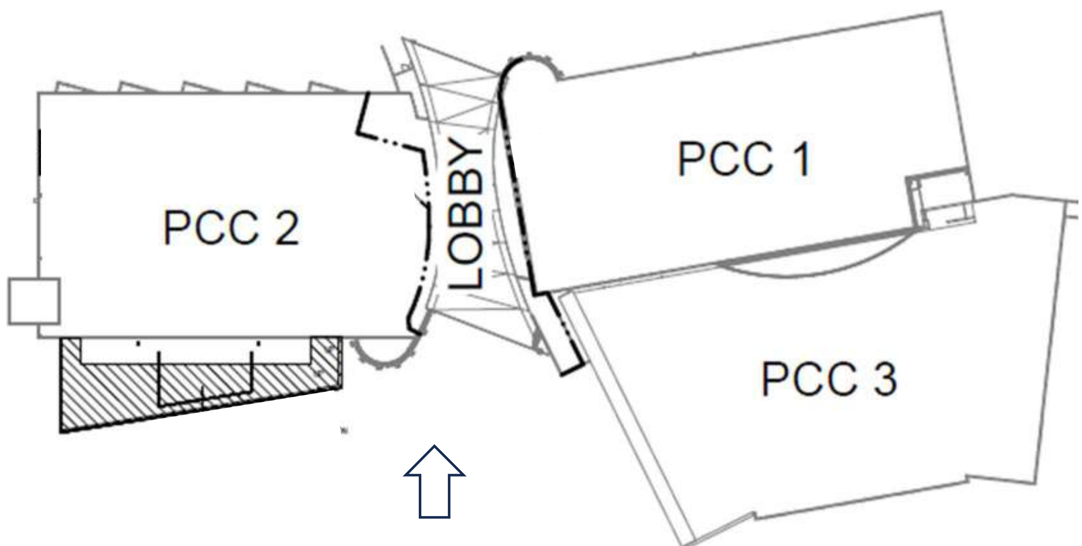
- 3412 BTU/kWh
- 66% load factor for all motors unless otherwise stated
- 100,000 BTU/therm or CCF of natural gas
- Building is occupied for 10 hour days, 5 days/week, 52 weeks/year, total 2600 hours/year

2.4 Limitations of Study

All results are dependent on the quality of input data provided. In some instances, several methods may achieve the identified savings. This report is not a design document and the auditor is not proposing designs, or performing design engineering. A design professional who is following the EEM recommendations and who is licensed to practice in Alaska in the appropriate discipline, shall accept full responsibility and liability for the design, engineering and final results.

3. ALASKA NATIVE PRIMARY CARE CENTER - EXISTING CONDITIONS

Figure 3.1 – Key Plan



3.1. Building Description

Based on plan dates, boiler serial numbers and RTU serial numbers, the construction dates of the three buildings are estimated as follows:

- 2-story PCC1 was constructed around 1997; 20,408 SF on each floor per plans
- 2-story PCC2 was constructed in 2001; 22,495 SF on first floor, 22,701 SF on second floor per plans
- PCC2 west expansion was performed in 2022
- 3-story PCC3 was constructed in 2008; 26,999 SF on first floor, 26,075 SF on second floor and 26,206 SF on third floor per plans

The total square footage of the facility is estimated to be 165,292 SF.

The buildings are assumed to occupied Monday through Friday from 8:00am until 6:00pm year-round. The number of occupants is unknown, but between staff and patients is assumed to be in excess of 300 at any given time.

A very incomplete plan set was available for PCC1, and no "M" or "E" sheets[3] were provided for the original building. More comprehensive plans were available for PCC2 and PCC3 including M

[3] Mechanical sheets with HVAC information and Electrical sheets with lighting information

and E sheets, although it was difficult to determine how complete and current they were. In any case, when plans were available, they were used to supplement observations made during the site survey.

See Appendix A for a schedule of mechanical equipment (BOD in the mechanical schedule in Appendix A means the plans were used to obtain the listed information, i.e. no observations of actual nameplates were possible). See Appendix C for rooftop plans.

In general, the building envelope appears to be in very good condition.

3.2. HVAC Systems Description

PCC1:

There are no mechanical plans for this building, so all HVAC related information is observed or assumed.

Heat Plants

Heat is provided by two 959 MBH, natural gas fired, 3-pass, cast iron, hydronic boilers manufactured in 2002 and 2007, located in a rooftop penthouse. (photo at right)

DHW is provided by a 118 gallon, natural gas fired, storage hot water heater, also located in the penthouse. DHW is re-circulated by a variable speed pump, which appears to run continually.

Cooling Plants

Cooling is supplied by three rooftop packaged DX air handlers with a total cooling capacity of 114 tons and two split condensing units with a total capacity 6 tons.

Heating and Cooling Distribution

Heat and cooling are distributed throughout this building through VAV boxes with hydronic re-heat coils controlled by local thermostats. There are perimeter baseboard fintube radiators only in the first and second floors of the 2018 east addition. Hydronic unit heaters supply heat to mechanical and storage areas and cabinet unit heaters in the arctic entries.

Building Ventilation

Mechanical ventilation is provided by the three rooftop packaged units with DX cooling. The AAON (no tag, east unit) and Trane (RTU-1, west unit) units have hydronic heating coils while the Daikin unit is cooling only.

HVAC Controls

Each packaged rooftop unit has on-board digital controls (RTMs). The AAON RTU appears to have the capability for CO2 based demand-controlled ventilation, but it is not clear if that capability is being utilized. It is not clear exactly what the BAS system controls[4] with regards to the packaged units and the hydronic system.

Lighting
Lighting on the first floor appears to have been upgraded to LEDs during the 2018 east addition. Lighting on the first and second floors of the 2018 east addition are LEDs. The remaining lighting in the building appears to utilize linear florescent T8 and T5 lamps and CFL plug ins. It also appears that much of the first-floor lighting also received upgraded motion and occupancy controls.

PCC2:

Heat Plants
Heat is provided by two 3,000 MBH Riello condensing, hydronic boilers manufactured in 2023, located in a rooftop penthouse. (photo at right)

DHW is provided by a 100 gallon, natural gas fired, condensing storage hot water heater, also located in the penthouse. DHW is re-circulated by a variable speed pump, which appears to run continually.

Cooling Plants
Cooling is supplied by four rooftop packaged DX air handlers with a total cooling capacity of 210 tons.

Heating and Cooling Distribution
Heat and cooling are distributed throughout this building through VAV boxes with hydronic re-heat coils and perimeter fintube baseboard radiators controlled by local thermostats. Hydronic unit heaters supply heat to mechanical and storage areas and cabinet unit heaters in the arctic entries.

Building Ventilation
Mechanical ventilation is provided by the four rooftop packaged units with DX cooling and hydronic heating coils. The RTU settings observed during the site survey are shown below:

- RTU-A (aka RTU-3)
    - OSAd 100% open
    - SAt cooling occupied setpoint 70F
    - SAt cooling unoccupied setpoint 70F

[4] Per the 2009 Johnson Controls AHU-1 & 2 sequence of operations, the BAS system only manages occupied/unoccupied signals (schedules are programmed at the RTM), heating and cooling setpoints and static pressure set points and to over-ride supply air and mixed air temperatures and duct static set points.

  - SAt heating occupied setpoint 68F
  - SAt heating unoccupied setpoint 68F
  - SAt morning warm up heating setpoint 74F
  - Low ambient compressor lockout when OSAt <39F
  - Hydronic heat enabled (control valve 0%)
- RTU-B (aka RTU-2)
  - 10,350 cfm OSA
  - Min OSA set point 2500 cfm
  - Economizer enabled, OSAd at 100%
  - OSA Enthalpy 23.5 BTU/lb
  - OSAt 63.4F
  - OSA RH 67%
  - Low ambient compressor lockout when OSAt <45F
  - Circuit 1 Evap temp 109.3F
  - Circuit 1 Saturated condenser temp 93.9F
  - Circuit 2 Evap temp 114.6F
  - Circuit 2 Saturated condenser temp 66.4F
  - SF VFD 57%
  - SA static pressure 1.4” WC
  - Hydronic heat enabled (control valve 0%)
- RTU-1
  - SAt occupied setpoint 55F
  - SAt 55.5F
  - SAt unoccupied setpoint 60F
  - SF motor 91.9% speed
  - Relief fan 0%
  - OSAt 69.3F
  - 1746 cfm OSA
  - Min OSA set point 2000 cfm
  - OSAd 14.2% open
  - Economizer min OSAd set point 14.2%
  - Economizer decision method – dry bulb
  - Economizer enabled at min OSAt=50F
  - CO2 7.4 ppm
- RTU-4
  - SF and RF speed controlled by duct static pressure
  - SAt occupied cooling setpoint 50F
  - SAt unoccupied cooling setpoint 40F
  - SAt occupied heating setpoint 55F
  - SAt unoccupied heating setpoint 40F
  - OSAt cooling reset start temp 90F, end temp 70F
  - OSAt reset amount 5F
  - Zone cooling reset start temp 72F, end temp 69F
  - Zone cooling reset amount 5F
  - OSAt heating reset start temp 32F, end temp 60F
  - OSAt heating max reset amount 5F
  - Zone heating reset start temp 69F, end temp 72F
  - Zone heating mas reset amount 10F
  - Economizer enabled, min OSAt setpoint 60F
  - Economizer min setpoint 19%

- Morning warm up setpoint 50F - disabled
- Daytime warm up setpoint 50F - disabled
- Unoccupied cooling, heating and economizing enabled
- DCV
    - Enabled at 400 ppm setpoint
    - CO2 design setpoint 1000 ppm
    - OSAd min position 5%
    - Min OSA flow 2000 cfm
- OSAd
    - Current position during site survey 9.7%
    - min design air flow 6000 cfm
    - min design position 15%
    - min position 25% at min SF speed
    - min position 15% at max SF speed

HVAC Controls

Each packaged rooftop unit has on-board digital controls. RTU-1 and RTU-4 appear to utilize CO2 based demand-controlled ventilation while RTU-2 (aka RTU-B) and RTU-3 (aka RTU-A) do not. It is not clear exactly what the BAS system controls[5] with regards to the packaged units and the hydronic system.

Sequence of operations for RTU-1 & RTU-4 from JCI submittals 2022:

3. AUTOMATED CONTROL:
    A. OPERATION MODE: DAY AND NIGHT MODE OF OPERATION WILL BE CONTROLLED BY AN OCCUPIED/UNOCCUPIED SCHEDULE.
    B. NIGHT MODE OPERATION: DURING THE NIGHT MODE OF OPERATION THE RTU WILL RUN BASED UPON ZONE NIGHT SETBACK TEMPERATURE. IF ANY ZONE DROPS BELOW NIGHT SETBACK THE UNIT WILL START AND RUN WITH THE OUTSIDE AIR DAMPERS FULLY CLOSED AND THE RETURN AIR DAMPERS OPEN.
    C. OVERRIDE MODE: ROOM DDC SENSOR OVERRIDE BUTTONS WILL OVERRIDE THE TIME SCHEDULE AND SET THE SYSTEM INTO DAY MODE FOR 2 HOURS.
4. DAY MODE OPERATION:
    A. THE OUTSIDE AIR DAMPERS WILL OPEN PAST THE MINIMUM TO MAINTAIN THE SUPPLY AIR TEMPERATURE SET POINT.
    B. THE RETURN AIR DAMPER MODULATES WITH THE OUTSIDE AIR DAMPER SUCH THAT WHEN THE OUTSIDE AIR DAMPER IS OPEN THE RETURN AIR DAMPER IS CLOSED.
    C. THE SUPPLY AIR TEMPERATURE WILL BE LINEARLY RESET BETWEEN THE TWO POINTS AS FOLLOWS: WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 60 F THE SUPPLY AIR TEMPERATURE WILL BE MAINTAINED AT 55 F; AT 30 F OUTSIDE THE SUPPLY AIR TEMPERATURE WILL BE MAINTAINED AT 65 F.
    D. VFD SUPPLY FAN: DUCT STATIC PRESSURE SENSOR, TWO-THIRDS OF THE WAY DOWN THE SUPPLY DUCT SYSTEM, WILL MODULATE THE VARIABLE SPEED DRIVE TO MAINTAIN THE SET POINT.
    E. RELIEF FAN: BUILDING A STATIC PRESSURE SENSOR, WILL MODULATE THE VARIABLE SPEED DRIVE TO MAINTAIN THE SET POINT.

Lighting

Lighting on the first floor and part of the second floor was upgraded to LED during the 2022 renovation and the remaining second floor lighting was upgraded in the last 2 years.

[5] ibid

PCC3:

Heat Plants

Heat is provided by two 2,957 MBH, natural gas fired, 3-pass, cast iron, hydronic boilers manufactured in 2008, located in the first floor PCC3 boiler room which is located in the PCC1 building. (photo at right)

DHW is provided by a 119 gallon, indirect hot water generator, served by the boilers. DHW is re-circulated by a variable speed pump, which appears to run continually.

Cooling Plants

Cooling is supplied by two packaged DX rooftop air handlers units with a total cooling capacity of 180 tons and a third DX cooling unit serving the cooling coil in AHU-3, with a capacity of 50 tons.

Heating and Cooling Distribution

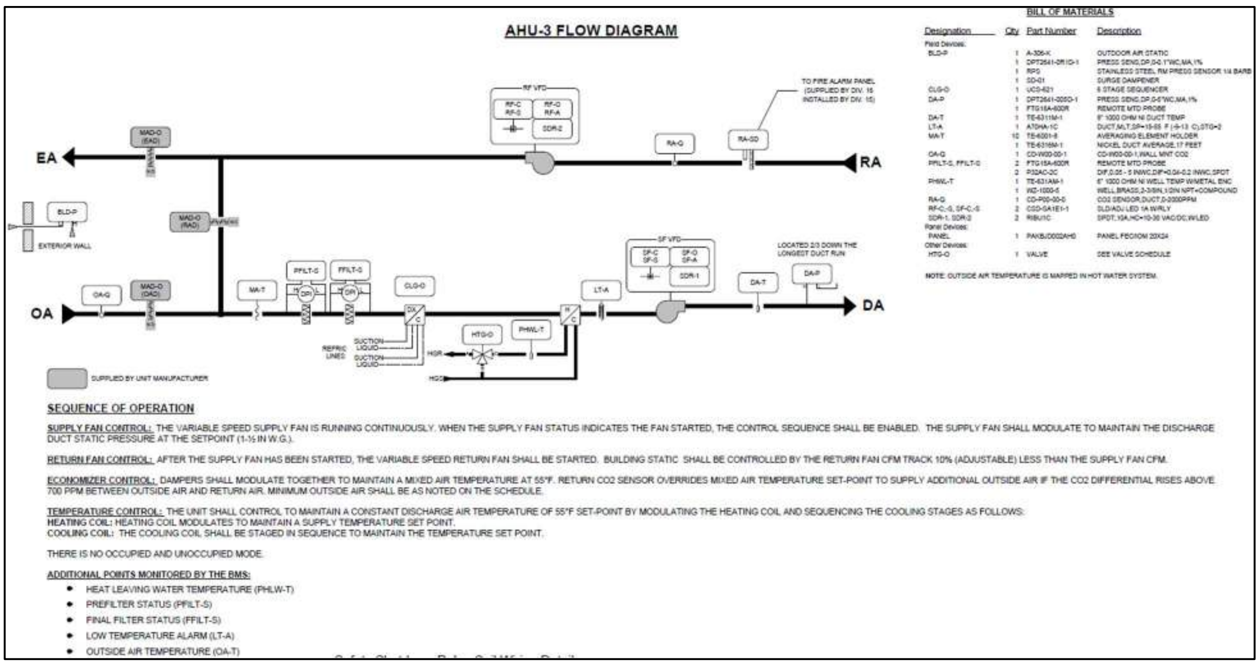
Heat and cooling are distributed throughout this building through VAV boxes with hydronic re-heat coils controlled by local thermostats and perimeter fintube baseboard radiators. Hydronic unit heaters supply heat to mechanical and storage areas and cabinet unit heaters in the arctic entries.

Building Ventilation

Mechanical ventilation is provided by the two rooftop packaged units with DX cooling and hydronic heating coils and an air handler located in a second floor fan room over the PCC3 boiler located room in PCC1 . The AHU has a heating coil supplied by the boilers and a cooling coil supplied by the 50 ton DX unit on the roof. The two RTU settings observed during the site survey are shown below:

- RTU-1, RTU-2 rooftop, called AHU-1 & AHU-2 on plans, discrepancy in specs, for example RTU-1 SF motors are (2) x 25 HP, on plans calls out (1) x 40 HP
- RTU-1 & RTU-2 motors:
    - SF are 2 x 25 HP, no display on VFD, so speed unknown
    - RF is 1 x 25 HP, no display on VFD, so speed unknown
- RTU-1 On Rooftop Module (RTM) Controller:
    - 4000 cfm OSA, occupied and cooling mode
    - SAt 55.9F
    - SAt cooling setpoint 52F
    - SAt unoccupied setpoint 58F
    - SAt morning warmup setpoints: initiate at 59F, terminate at 65F
    - RAt 70.3F
    - OSAt 63.2F
    - Economizer disabled

  - OSAd 43% open
  - Low ambient compressor lockout when OSAt <50F
- RTU-2 RTM:
  - 7950 cfm OSA, occupied, cooling mode
  - Economizer disabled
  - OSAd 5%-10% open
  - OSAt 62.5F
  - Low ambient compressor lockout when OSAt <37F
  - Evap temp 46.7F
  - Saturated condenser temp 91.2F
- AHU-3 also discrepancy between actual and plans; plans call for 20 HP SF and 7.5 HP RF, the actual AHU-3 motors, located in second floor fan room, are as follows:
  - SF 25 HP, running at 60 Hz, 19.8 A
  - RF 15 HP, running at 48 Hz, 9.25A
  - Has CO2 DCV with 700 ppm setpoint per 2009 sequence of operations



HVAC Controls

Each packaged rooftop unit has on-board digital controls. Neither of the RTU's or the AHU appear to utilize CO2 based demand controlled ventilation. It is not clear exactly what the BAS system controls[6] with regards to the RTU's, it is assumed the BAS system controls all aspects of the AHU.

Heating schematic and sequence of operations from JCI as-builts 2009:

[6] ibid

SEQUENCE OF OPERATION:

HOT WATER PUMP CONTROL: HOT WATER SIDE HEAT EXCHANGER PUMPS, P-1 AND P-2: PUMPS ARE 100% REDUNDANT AND SHALL RUN IN A LEAD/LAG SEQUENCE WITH AUTOMATIC ALTERATION ON A MONTHLY BASIS. THE BAS SHALL ENABLE THE OPERATION OF THE LEAD SECONDARY PUMP WHEN THERE IS A CALL FOR HEATING OR WHEN THE OUTSIDE AIR TEMPERATURE FALLS BELOW THE SYSTEM ENABLE SETPOINT. WHEN THE OUTSIDE AIR TEMPERATURE RISES ABOVE THIS SETPOINT, THE HOT WATER PUMPS SHALL TURN OFF. IF THE LEAD PUMP FAILS, A MAINTENANCE ALARM IS SIGNALED AND THE LAG PUMP SHALL START.

BOILER CONTROL: THE BAS PROVIDE ENABLE/DISABLE SIGNALS TO THE BOILER CONTROL PANEL FOR BURNER CONTROL. THE PRIMARY LOOP WATER SUPPLY SET POINT IS 185ºF (ADJUSTABLE). THE BOILER SHALL FUNCTION TO MAINTAIN A PRIMARY LOOP WATER SUPPLY TEMPERATURE BETWEEN PLUS OR MINUS 5ºF AT SET POINT.

BOILER SEQUENCING: THE BOILERS SHALL BE STAGED TO FIRE IN A LEAD/LAG SEQUENCE WITH AUTOMATIC ALTERATION ON A MONTHLY BASIS. THE LEAD BOILER SHALL FIRE FIRST. IF THE LEAD BOILER FAILS TO OPERATE, A CRITICAL ALARM SHALL BE GENERATED AND THE LAG BOILER SHALL BE DESIGNATED AS THE LEAD BOILER AND THE FIRING SEQUENCE CONTINUES.

BURNER FIRING CONTROL: ALL DIRECT BURNER CONTROL AND SAFETY INTERLOCKS SHALL BE CONTROLLED BY THE BOILER'S FACTORY CONTROLLER. AFTER A BOILER HAS BEEN ENABLED AND UPON A 'PROOF OF FIRE' STATUS SIGNAL FROM THE BOILER FACTORY CONTROLLER.

BURNER OPERATION: CYCLE UP: IF THE PRIMARY HOT WATER SUPPLY TEMPERATURE IS 5ºF (ADJUSTABLE) LESS THAN SET POINT, THE BOILER BURNER IS ENABLED AND START AT LOW FIRE. THE BAS DETERMINES, THROUGH THE USE OF AN ADJUSTABLE RATE OF RISE TIME CONSTANT, THE ACTUAL TEMPERATURE RATE OF RISE OF THE PRIMARY HOT WATER SUPPLY TEMPERATURE. IF THE RATE OF RISE IS INSUFFICIENT TO ACHIEVE SET POINT, BAS ENABLES LEAD BOILERS BURNER AS REQUIRED UP TO 100% CAPACITY. IF THE LEAD BOILER IS COMMANDED TO 100% CAPACITY AND THE RATE OF RISE IS STILL INSUFFICIENT, THE LAG BOILER CIRCULATION PUMP STARTS AND LAG BOILER'S FIRING RATE MODULATES UP IN A SIMILAR MANNER AS LEAD BOILER. THIS SEQUENCE CONTINUES UNTIL THE PRIMARY LOOP TEMPERATURE SET POINT IS REACHED OR BOTH BOILERS ARE OPERATING AT 100% CAPACITY.

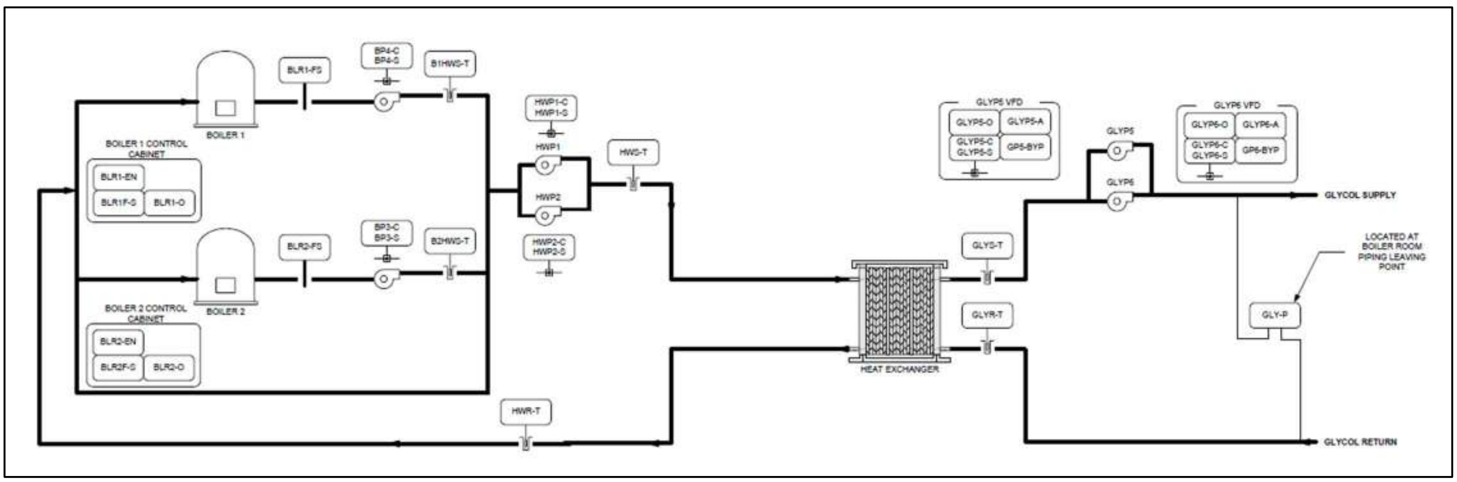
BURNER OPERATION: CYCLE DOWN: IF THE PRIMARY HOT WATER SUPPLY TEMPERATURE IS 5ºF (ADJUSTABLE) MORE THAN THE PRIMARY LOOP WATER TEMPERATURE SET POINT, THE LAG BOILER'S BURNER MODULATES DOWN AS REQUIRED. WHEN THE BURNER HAS REACHED MINIMUM FIRING CAPACITY (LOW FIRE), THE BURNER IS DISABLED AND THE BOILER'S CIRCULATION PUMP COMMANDED OFF. WHEN THE LAG BOILER HAS BEEN DISABLED, THE LEAD BOILER'S BURNER SHALL MODULATE DOWN TO MINIMUM FIRING RATE CAPACITY (LOW FIRE) AS REQUIRED, AND SHALL BE DISABLED. ONCE ENABLED, BOILERS SHALL RUN FOR A MINIMUM PERIOD OF TIME BEFORE BEING DISABLED. COORDINATE THE "MINIMUM RUN TIME" AND "LOW FIRE HOLD TIME BEFORE SHUTDOWN" WITH THE BOILER MANUFACTURER TO ENSURE THE INTEGRITY OF THE BOILER IS NOT COMPROMISED.

BOILER CIRCULATION PUMPS, P-3 AND P-4: THE LEAD BOILERS CIRCULATING PUMP SHALL BE CONTROLLED BY THE BAS SYSTEM. BEING ACTIVATED ON A CALL FOR HEAT, RUN FOR THREE MINUTES PRIOR TO BOILER FIRING TO START CIRCULATION AND SHALL CONTINUE TO RUN FOR 15 MINUTES AFTER THE BOILER HAS BEEN DISABLED. IF A BOILER CIRCULATION PUMP FAILS TO PROVIDE FLOW, A CRITICAL ALARM IS SIGNALED AND ITS ASSOCIATED BOILER IS DISABLED.

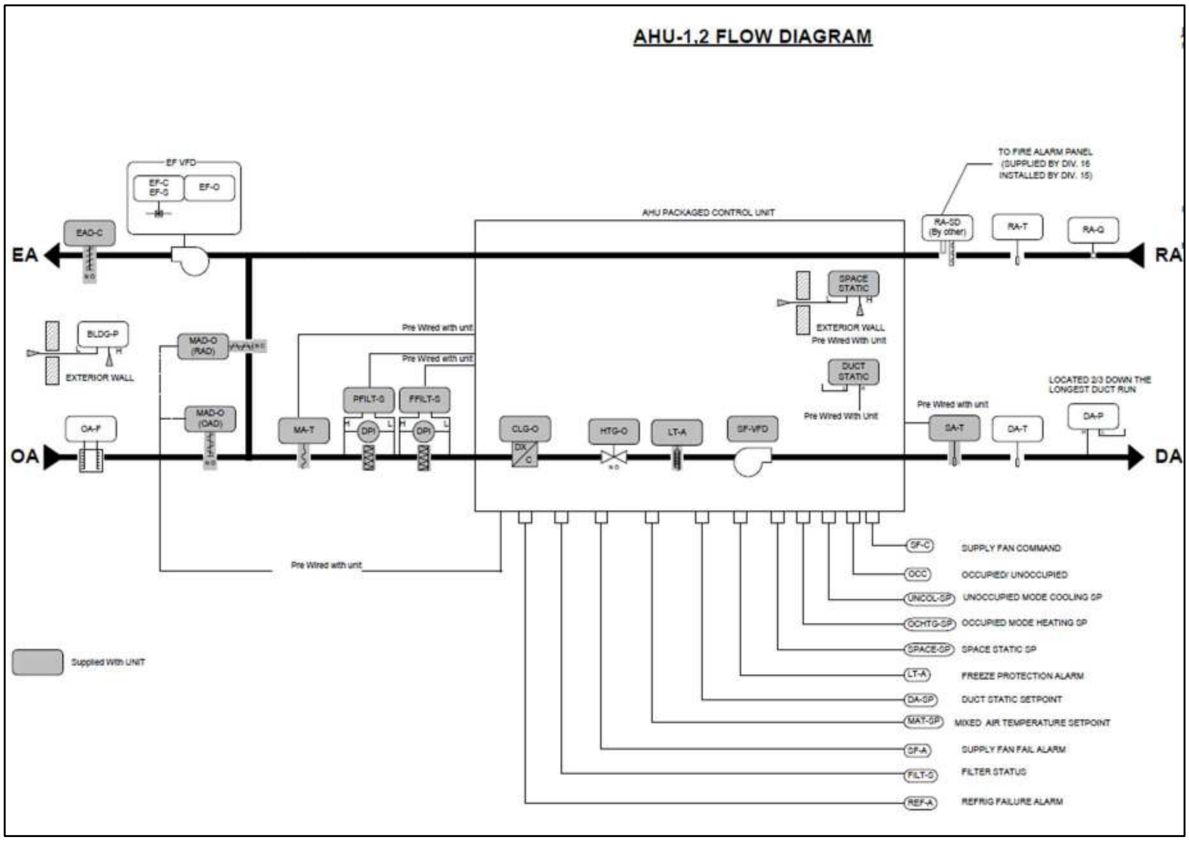
GLYCOL HEAT EXCHANGER CONTROL:
GLYCOL CIRCULATION PUMPS P-5 AND P-6: THE GLYCOL CIRCULATION PUMPS ARE 100% REDUNDANT AND SHALL RUN IN LEAD/LAG SEQUENCE WITH AUTOMATIC ALTERATION ON A MONTHLY BASIS. VFD'S ARE PROVIDED FOR SOFT START CAPABILITY AND TO ADJUST FLOW RATE AS DETERMINED BY DIFFERENTIAL PRESSURE MEASURE IN THE HEATING GLYCOL PIPING SYSTEM. THE PRESSURE SET POINT SHALL BE SET TO ALLOW MINIMAL CONSTANT CIRCULATION THROUGH THE SYSTEM, THE SET POINT SHALL BE DETERMINED AT TIME OF TAB, IF FLOW IS NOT PROVEN, A CRITICAL ALARM IS GENERATED AND THE LAG PUMP SHALL BE ENABLED. THE GLYCOL HEATING SYSTEM IS DESIGNED TO PROVIDE A MAXIMUM OF 180ºF SUPPLY GLYCOL.

INTERLOCK:
BOILER, B-1 AND B-2 SHALL BE INTERLOCKED WITH VENTILATION FAN MOTOR STARTER. BOILERS CAN NOT OPERATE UNLESS VENTILATION FAN IS OPERATING.

ADDITIONAL POINTS MONITORED:
1. HOT WATER SUPPLY TEMPERATURE (HWS-T)
2. HOT WATER RETURN TEMPERATURE (HWR-T)
3. GLYCOL SUPPLY TEMPERATURE (GLYS-T)
4. GLYCOL RETURN TEMPERATURE (GLYR-T)
5. GLYCOL VFD OPERATING MODE (GPx-BYP)



RTU -1 (AHU-1) & RTU-2 (AHU-2) Schematic and sequence of operations from JCI as-builts 2009:



AHU-1,2 SEQUENCE OF OPERATION

SEQUENCE OF OPERATION

THE AIR HANDLING UNITS ARE CONTROLLED FROM THE FACTORY SUPPLIED AND MOUNTED CONTROLS. THESE CONTROLS INCLUDE SUPPLY AIR TEMPERATURE CONTROL AND SUPPLY FAN VARIABLE SPEED DRIVES CONTROLLED BY THE DUCT STATIC PRESSURE SENSORS.
THE METASYS NETWORK CONTROL SYSTEM PROVIDES FOLLOWING CONTROL SIGNALS TO THE AHU UNIT:
1) OCCUPIED/ UNOCCUPIED SIGNAL
2) HEATING AND COOLING SET POINTS
3) STATIC PRESSURE SET POINT ADJUSTMENTS.
THE OCCUPIED SCHEDULES ARE DETERMINED AND PROGRAMMED AT THE OPERATOR TERMINAL.
THE FACTORY MOUNTED CONTROLS ALLOW FOR SUPPLY AIR TEMPERATURE, MIXED AIR TEMPERATURE AND DUCT STATIC SET POINT OVERRIDE CAPABILITY FROM METASYS NETWORK. THE FACTORY SYSTEM ALSO PROVIDES BINARY ALARM CONTACTS FOR MONITORING ON THE METASYS NETWORK.

OCCUPIED MODE: DURING OCCUPIED MODE THE UNIT SHALL BE WORKING AS FOLLOWS:

SUPPLY FAN CONTROL: THE VARIABLE SPEED SUPPLY FAN SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR STATIC PRESSURE SET POINT (1-½ IN W.G.).

EXHAUST FAN CONTROL: THE EXHAUST FAN SHALL MODULATE TO MAINTAIN THE BUILDING STATIC PRESSURE SET POINT. (THROUGH METASYS CONTROL SYSTEM)

ECONOMIZER CONTROL: DAMPERS OAD & RAD SHALL MODULATE TOGETHER TO MAINTAIN A MIXED AIR TEMPERATURE OF 55°F. RETURN CO2 SENSOR OVERRIDES MIXED AIR TEMPERATURE SET POINT TO SUPPLY ADDITIONAL OUTSIDE AIR IF THE CO2 DIFFERENTIAL RISES ABOVE 700 PPM BETWEEN OUTSIDE AIR AND RETURN AIR.

TEMPERATURE CONTROL: THE UNIT SHALL CONTROL TO MAINTAIN A A SUPPLY AIR TEMPERATURE SET POINT (ADJUSTABLE) BY MODULATING HEATING COIL AND BY COMMANDING COOLING COIL AS FOLLOWS:
HEATING COIL: HEATING COIL MODULATES TO MAINTAIN A SUPPLY AIR TEMPERATURE SET POINT.
COOLING COIL: THE COOLING COIL SHALL BE STAGED IN SEQUENCE TO MAINTAIN A SUPPLY AIR TEMPERATURE SET POINT.

MORNING WARM UP: DURING MORNING WARM UP MODE, OUTSIDE AIR DAMPER AND THE EXHAUST AIR DAMPER SHALL CLOSE AND, RETURN AIR DAMPER SHALL OPEN. HEATING COIL SHALL MODULATE TO MAINTAIN 90°F DISCHARGE AIR TEMPERATURE. WHEN RETURN AIR TEMPERATURE REACHES 70°F AHU SHALL BE SWITCHED TO OCCUPIED MODE.

UNOCCUPIED MODE: THE UNIT SHALL REMAIN OFF DURING UNOCCUPIED PERIODS. IF ANY AIR ZONE OR ROOM THERMOSTAT ASSOCIATED WITH THIS AHU SENSES 50° F OR LOWER, FAN SHALL SWITCH TO WARM UP MODE UNTIL 70°F IS REACHED AND THEN SWITCH BACK TO UNOCCUPIED MODE.

REMOTE SET POINTS FROM METASYS NETWORK:
- SUPPLY AIR DUCT STATIC SET POINT
- UNOCCUPIED ZONE COOLING SET POINT
- OCCUPIED HEATING SET POINT

ALARMS PROVIDED ON THE METASYS NETWORK:
- SUPPLY FAN FAILURE ALARM
- REFRIGERATION FAILURE ALARM
- DIRTY FILTER ALARM
- HEATING FAILURE ALARM

The AHU-3 sequence of operations is found with the AHU-3 flow diagram above.

Lighting

Lighting on all three floors of this building appear to utilize linear florescent fixtures with T8 and T5 lamps and CFL plug-ins as well as other miscellaneous florescent and HID fixtures.

APPENDICES

Appendix A – Major Equipment List

ALL SCHEDULES COMPILED FROM PLANS OR ON-SITE NAMEPLATE OBSERVATION, WHERE ACCESSIBLE BOD= basis of design, from plans				
AIR HANDLER & ROOFTOP UNIT SCHEDULE				
TAG	**MFGR/MODEL**	**FAN CFM**	**MOTOR DATA HP/VOLTS/PH**	**REMARKS**
PCC1				
no tag (RTU-1 east)	AAON, Inc model RM-009-3-0-GA05-EHJ	BOD 3320	SA motor 3/460/3; EA motor 2/460/3	8.3T DX cooling, 56 MBH hydronic heat capacity (coil supplied from PCC3 boilers), mfg 2017
RTU-1 (east)	Trane YHC074F3RHA0LD0D0C1B001A3000 00D0000		81% heating efficiency, SEER 17 cooling	6T DX cooling, 150 MBH gas heat input, 121.5 MBH output, 81% thermal efficiency ; SN 172910004L; mfg 2017
AHU-1	Daikin model RDT091DLYSY			100T DX cooling only; SN FBOU170502475
PCC2				
no tag (RTU-3)	Trane Intellipak SLHFC3043V00C5CD1011A00E000KL 000T008000		SF 15/460/3; RF not accessible	north RTU, 30T DX cooling, hydronic heating, SN C00J27105; NEMA EFF 92.4, PF 84; both fans on VFD; mfg 2000
no tag (RTU-2)	Trane Intellipak SLHFC604CV77C9BD9011A00E000KL 000T008050		SF 40/460/3, VFD 42.7 Hz, 24.8A; RF 15/460/3, VFD 36.7 Hz, 4.15A	South RTU, 60T DX cooling, hydronic heating, SN C00J27104; SF motor: NEMA EFF 94.1, PF 85; RF motor NEMA EFF 92.4, PF 84; both fans on VFD, mfg 2000
RTU-1	Trane Intellipak SLHMF6043A66EABE8001E0W0000 0A00R41M8A00	BOD 21,745	SF 50/460/3; VFD 89.6%, 25HP RF 15/460/3, VFD 46%, 18.6A	60T DX cooling, hydronic heating; SN C22H06788; SF motor NEMA EFF 94.5, PF 87; RF motor NEMA EFF 91.7, PF 82
RTU-4	Trane Intellipak RF0603441ABAA3H1G261000E0A4A	BOD 20,125		60T DX cooling, 500 MBH gas heating input, 405 MBH output, 81% thermal efficiency; SN C22G05975
PCC3				
RTU-1 (AHU-1 on plans)	Trane Intellipak SLHGC904F398EEED9001A0WE00K0 00RT0060	20,000-30,000	2 x SF and 1 x RF: 25/460/3	90T DX cooling, hydronic heat, PF 84.1, NEMA EFF 91.7; SN C09F06742
RTU-2 (AHU-2 on plans)	Trane Intellipak SLHGC904F398EEED9001A0WE00K0 00RT0060	20,000-30,000	2 x SF and 1 x RF: 25/460/3	90T DX cooling, hydronic heat, PF 84.1, NEMA EFF 91.7; SN C09F06741
AHU-3	Trane Climate Changer MCCB040N0F000000C0000000	20,000	SF: 25/460/3; RF: 15/460/3	Air handler with heating and cooling coil; cooling coil supplied by ACC-1; SF RF motor NEMA EFF 93, PF 82.4

EXHAUST FAN SCHEDULE

SYMBOL	MOTOR MFGR/MODEL	CFM	MOTOR DATA HP/VOLTS/PH	REMARKS
PCC1				
no tag	Penn model DX16B			East side, running
EF-1	Greenheck model 6-099-A-Z			running
EF-9	Loren Cook model 70C3B		.25/115/1	not running
EF-10	Loren Cook model 80C3B		.25/115/1	not running
no tag	Penn model DX16B			SW side, not running
no tag	Penn model DX16B			South side, running
PCC2				
EF-1	Loren Cook model 120 ACE 120C15D	1000	.25/115/1	running, mfg 2022
EF-1	Greenheck model 6-143-B-X			not running
EF-2	Greenheck model 6B-091-4-X			not running
EF-3	no nameplate	BOD 1625	BOD .75/115/1	mfg 2023; not running
EF-4	Loren Cook model 80C3B		.25/115/1	running
EF-6	Loren Cook model 135C4B		.3/115/1	not running
EF-6	BOD Greenheck G-180-VG	1625	.75/115/1	running, mfg 2022
EF-11	Loren Cook model 100 ACEH 100C17DH VF	350	.125/115/1	running
PCC3				
EF-1	Greenheck model CUE-140-10-VG-1-22-X	BOD 1690	BOD .5/120/1	SN 20253429; not running
EF-2	Greenheck model CUE-140-10-VG-1-22-X	BOD 1570	BOD .5/120/1	SN 20253446, not running
EF-3	Greenheck model CUBE-099-4-X	BOD 900	BOD .25/120/1	SN 16558900, not running

PUMP SCHEDULE

SYMBOL	MFGR/MODEL	GPM @ HD	MOTOR DATA HP/VOLTS/PH	REMARKS
PCC1				
CP1	US Elec motor, G156A		3/230/3	Heating circulation, NEMA EFF 78.5 (turned off)
CP2	NIDEC motor DJ3E2DU		3/230/1	Heating circulation, NEMA EFF 86.5, PF 77.5 (in HAND)

no tag	TACO model 0034eP-SF2	11 @ e18	88w/115/1	Variable speed pump, DHW re-circulation
PCC2				
CP-1	Baldor motor EJMM2333T-G		15/460/3; VFD 52.6 Hz, 12.6A running	on VFD; building hydronic heating; NEMA EFF 92.4, PF 83
CP-2	Baldor motor EJMM2333T-G		15/460/3; off	on VFD; building hydronic heating; NEMA EFF 92.4, PF 83
HWCP-1	Taco model 0026e-SF2		1.05A/115/1	Variable speed DHW re-circulation pump
PCC3				
P-1	Baldor motor M3311T; BOD Armstrong 4030	BOD 400 @ 40'	7.5/460/3	constant speed; serves HX; NEMA EFF 88.5, PF 79
P-2	Baldor motor M3311T; BOD Armstrong 4030	BOD 400 @ 40'	7.5/460/3	constant speed; serves HX; NEMA EFF 88.5, PF 79
P-3/CP-3	Baldor motor VEJMM3211T; Armstong pump model 4x4x6 4380	260 @ 25'	3/460/3	boiler re-circ, NEMA EFF 90.2, PF 77
P-4/CP-4	Century motor	BOD 260 @ 25'	BOD: 5/460/3	boiler re-circ, NEMA EFF 86.5, PF 80
CP-5	Century motor 78500240J	BOD 420 @ 100'	15/460/3	not in use; on VFD; building circulation, NEMA EFF 93, PF 81.5
CP-6	Century motor 07-850729-01-J	BOD 420 @ 100'	15/460/3	on VFD in bypass mode; building circulation, NEMA EFF 91, PF 82.5
CP-7	Grundfos UPS 15-58 FC	BOD 21 @ 15'	87w/115/1	assumed DHW building re-circ
no tag	Grundfos UPS 43-33 FD		203w/115/1	assumed HWG circulation
P-8 & 9	BOD Armstrong 1050 1-1/48	BOD 22 @ 20'	.33/120/1	BOD Snowmelt circulation
P-10	BOD Armstrong 1050 1-1/48	BOD 22 @ 20'	.33/120/1	BOD Snowmelt circulation
no tag	Taco VF15L-F		25-270w/110-240/1	Variable speed snowmelt circulation pump in use, serving SMC-1

COOLING EQUIPMENT SCHEDULE (see AHU and RTU schedule above for additional cooling equipment)

SYMBOL	MFGR/MODEL	EFFICIENCY	MOTOR DATA HP/VOLTS/PH	REMARKS
PCC1				
CU-1	Trane model 4TXK8633A10N0CA			Split condensing unit, 3T cooling capacity
CU-2	Trane model 4TXK8633A10N0CA			Split condensing unit, 3T cooling capacity
ACU-1	not observed			Laboratory AC unit - no longer exists replaced by 6T RTU-1
PCC2				
	See RTU/AHU schedule			
PCC3				

AC-1	BOD Liebert model MMD18WP0000		14.2 FLA/230/1	1.5T DX cooling, air cooled with drycooler; cools elevator mechanical room
DC-1	Witt dry cooler, model FSS103AVG		.33/460/3	does not appear to be in use; plans say it serves AC-1; SN E08L45563301001
AC-2	Trane model RAUCC504BZ13A00000010	EER 11.1		50T split condenser, located on rooftop, serves AHU-3; SN C08F06618

BOILER SCHEDULE

SYMBOL	MFGR/MODEL	EFFICIENCY	MOTOR DATA HP/VOLTS/PH	REMARKS
		PCC1		
B1	Burnham V907A	nominal 87% when new	burner motor: .33/115/1	959 MBH input, 834 MBH output, mfg 2007; SN 64819848; Powerflame burner model J30A-10; Combustion efficiency in 2013 82.7%
B2	Burnham V907A	nominal 87% when new	burner motor: .33/115/1	959 MBH input, 834 MBH output, mfg 2002; SN 64419921; Powerflame burner model J30A-10; combustion efficiency in 2013 84%
		PCC2		
B1	Riello model AR3000	96%	15.5 FLA/230/3	3000 MBH input, 2883 MBH output, mfg 2023; SN PR23S002469
B2	Riello model AR3000	96%	burner motor: .33/115/1	3000 MBH input, 2883 MBH output, mfg 2023;
		PCC3		
no tag	Burnham model PV1115WNP	87%	burner motor: 1.5/460/3	2957 MBH input, 2571 MBH output, mfg 2008; SN 65082824; Powerflame burner model BCCR3-G-20
no tag	Burnham model PV1115WNP	87%	burner motor: 1.5/460/3	2957 MBH input, 2571 MBH output, mfg 2008; SN 65070639; Powerflame burner model BCCR3-G-20

HOT WATER HEATER SCHEDULE

SYMBOL	MFGR/MODEL	GALLONS	HEATING CAPACITY	REMARKS
		PCC1		
no tag	Lochinvar model CGN400100A 118	118	390 MBH	Gas-fired, 378 gal/hr recovery, 80% thermal efficiency; SN 1638M000712
		PCC2		
WH-1	Rheem model GHE100SU-400A	100	399.9 MBH	Gas fired, 456 gph recovery, 95% thermal efficiency; SN A302300177, mfg 2023
		PCC3		
HWG	Amtrol WH120ZCDW	119	N/A	120F setpoint

Appendix B – Benchmark Analysis and Utility Source Data

A benchmark analysis evaluates historical raw consumption and cost data for each energy type. The purpose of a benchmark analysis is to identify trends, anomalies, and irregularities which may provide insight regarding the building's function and efficiency. 4-1/2 years of electric data was provided as well as 3-1/2 years of natural gas consumption data. Figures B.1 and B.2 show the source data used in this analysis and Figures B.3 and B.4 show the distribution of energy costs for the subject building.

Figure B.1 – Total Building Electric Consumption

	Combined meters (using 85% of meter T336 423 019)									
	2021		2022		2023		2024		2025	
	kWh	kW	kWh	kW	kWh	kW	kWh	kW	kWh	kW
Jan	187,920	371.0	182,580	410.3	194,880	450.2	213,890	430.5	234,300	450.1
Feb	198,330	381.0	201,470	403.5	199,820	411.0	229,400	443.7	226,880	455.4
Mar	189,080	396.5	176,270	381.4	209,610	409.5	209,310	433.8	228,360	450.8
Apr	202,460	376.3	176,070	372.2	204,020	433.0	206,100	413.2	239,140	505.6
May	197,300	456.3	187,520	482.9	207,440	471.0	236,670	459.7	267,570	502.3
Jun	222,740	496.0	258,640	537.6	230,390	518.5	248,760	537.4	245,090	541.3
Jul	241,590	527.8	244,420	555.6	236,460	513.4	261,760	559.6		
Aug	253,930	536.2	249,320	515.8	282,730	559.8	265,640	558.8		
Sep	206,470	521.6	196,610	462.4	209,720	531.5	237,530	507.6		
Oct	209,220	430.7	180,060	430.6	193,580	411.3	222,610	460.4		
Nov	195,380	389.8	216,560	441.3	222,110	416.6	238,190	475.4		
Dec	215,630	426.0	206,280	443.9	215,610	473.8	227,690	444.2		
TOTALS	**2,520,050**	**5,309.0**	**2,475,800**	**5,437.4**	**2,606,370**	**5,599.8**	**2,797,550**	**5,724.4**		

	Account 03304182; Meter T336 423 019 serves 85% PCC3 15% to parking garage (total values shown)									
	2021		2022		2023		2024		2025	
	kWh	kW	kWh	kW	kWh	kW	kWh	kW	kWh	kW
Jan	139,200	280.0	138,000	311.8	140,800	336.0	149,800	316.0	164,400	324.0
Feb	149,000	289.2	151,000	306.8	146,800	310.4	159,200	324.0	156,800	327.2
Mar	143,200	303.8	133,400	293.6	153,800	305.6	144,600	305.6	160,800	324.8
Apr	151,600	287.4	132,600	288.8	141,200	302.4	141,200	289.6	171,600	383.2
May	147,600	350.8	144,000	365.6	145,600	332.8	163,800	336.8	196,200	381.6
Jun	170,000	357.6	203,200	409.6	166,200	360.8	175,200	367.2	181,800	393.6
Jul	191,800	380.4	194,000	423.2	172,400	373.6	185,600	388.8		
Aug	198,600	404.2	208,800	408.8	208,200	417.6	189,600	410.4		
Sep	161,400	409.6	162,600	376.8	159,200	416.0	168,200	373.6		
Oct	162,000	355.4	142,000	342.4	146,800	315.2	154,600	324.0		
Nov	150,800	298.2	161,600	327.2	157,400	307.2	168,600	344.0		
Dec	162,200	337.0	148,000	327.2	152,200	374.4	153,800	320.0		
TOTALS	**1,927,400**	**4,053.6**	**1,919,200**	**4,181.8**	**1,890,600**	**4,152.0**	**1,954,200**	**4,100.0**		

	Account 03304736; Meter T336 423 520 serves PCC 1 & 2									
	2021		2022		2023		2024		2025	
	kWh	kW	kWh	kW	kWh	kW	kWh	kW	kWh	kW
Jan	69,600	133.0	65,280	145.28	75,200	164.64	86,560	161.92	94,560	174.72
Feb	71,680	135.2	73,120	142.72	75,040	147.20	94,080	168.32	93,600	177.28
Mar	67,360	138.2	62,880	131.84	78,880	149.76	86,400	174.08	91,680	174.72
Apr	73,600	132.0	63,360	126.72	84,000	176.00	86,080	167.04	93,280	179.84
May	71,840	158.1	65,120	172.16	83,680	188.16	97,440	173.44	100,800	177.92
Jun	78,240	192.0	85,920	189.44	89,120	211.84	99,840	225.28	90,560	206.72
Jul	78,560	204.4	79,520	195.84	89,920	195.84	104,000	229.12		
Aug	85,120	192.6	71,840	168.32	105,760	204.80	104,480	209.92		
Sep	69,280	173.4	58,400	142.08	74,400	177.92	94,560	190.08		
Oct	71,520	128.6	59,360	139.52	68,800	143.36	91,200	184.96		
Nov	67,200	136.3	79,200	163.20	88,320	155.52	94,880	183.04		
Dec	77,760	139.5	80,480	165.76	86,240	155.52	96,960	172.16		
TOTALS	**881,760**	**1,863.48**	**844,480**	**1,882.88**	**999,360**	**2,070.56**	**1,136,480**	**2,239.36**		

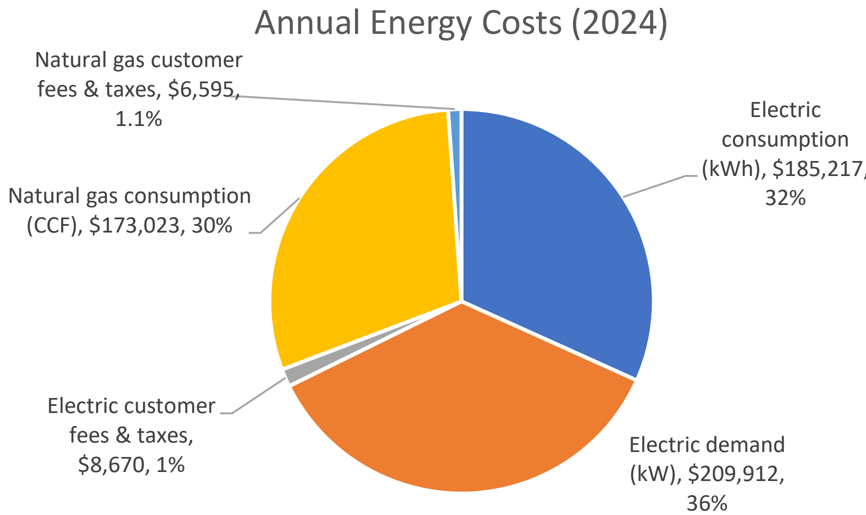
Figure B.2 – Natural Gas Consumption (CCF)

	Combined meters				Account 1687300518, Meter #192112, presumably serves PCC 1 & 3				Account 4999510000, Meter #738, presumably serves PCC 2			
	2022	2023	2024	2025	2022	2023	2024	2025	2022	2023	2024	2025
Jan	25,614	19,812	20,117	19,517	18,345	14,366	13,115	13,588	7,269	5,446	7,002	5,929
Feb	17,877	15,317	23,648	23,698	12,678	11,431	15,082	17,307	5,199	3,886	8,566	6,391
Mar	21,086	17,204	17,575	19,634	14,901	11,824	11,496	14,655	6,185	5,380	6,079	4,979
Apr	15,307	17,445	12,020	20,198	10,509	12,370	8,059	15,348	4,798	5,075	3,961	4,850
May	13,448	11,561	9,858	14,033	8,610	7,894	6,737	10,634	4,838	3,667	3,121	3,399
Jun	12,198	10,742	14,790		8,874	6,821	9,489		3,324	3,921	5,301	
Jul	9,845	12,454	8,346		7,451	8,300	5,221		2,394	4,154	3,125	
Aug	10,484	11,093	9,964		8,499	6,301	6,955		1,985	4,792	3,009	
Sep	10,582	10,766	13,776		8,054	6,518	9,045		2,528	4,248	4,731	
Oct	14,195	13,406	10,940		11,152	10,410	8,067		3,043	2,996	2,873	
Nov	15,930	14,282	14,510		12,820	11,493	9,412		3,110	2,789	5,098	
Dec	16,233	17,317	21,902		12,422	10,522	14,536		3,811	6,795	7,366	
TOTALS	**182,799**	**171,399**	**177,446**		**134,315**	**118,250**	**117,214**		**48,484**	**53,149**	**60,232**	

Figure B.3 – Tabular Summary

2024 Energy costs	
Electric consumption (kWh)	$185,217
Electric demand (kW)	$209,912
Electric customer fees & taxes	$8,670
Natural gas consumption (CCF)	$173,023
Natural gas customer fees & taxes	$6,595
TOTAL	**$583,418**

Figure B.4 – Graphic Summary



Electricity: According to Chugach Electric Association and the electric invoices received from SCF accounting, there are two electric meters serving the subject building and the adjacent parking garage. Neither of the electric meters were observed, so the meter numbers could not be confirmed.

SCF Accounting allocates 85% of the T336 423 019 meter to PCC3 and 15% to the parking garage. As seen in Figure B.1, this meter accounts for 70% of the total electric consumption and 73% of the total demand - even though PCC3 accounts for only 50% of the square footage and the primary electrical use in the parking garage is lighting, which typically consumes significantly lower use than the PCC buildings. <u>These discrepancies raise questions about the accuracy of the allocation.</u> It is recommended to submeter the parking garage to eliminate any inaccuracies in electric use.

Figure B.5 shows that the monthly electric consumption in the facility is consistent year over year, with a slight increase during the summer months due to the cooling loads in the building. Figure B.6 shows that the annual kWh consumption has been steadily increasing year over year, with a 5% increase in 2023 and another 7% increase in 2025 and the first six months of 2025 show another 7% increase over 2024. The electric demand has shown a 3% increase in 2023 and a 3% increase in 2024 and a 7% increase in the first six months of 2025. <u>This should be investigated</u>. Figure B.7 shows the expected summer increase in demand, again, due to the cooling loads.

Figure B.5

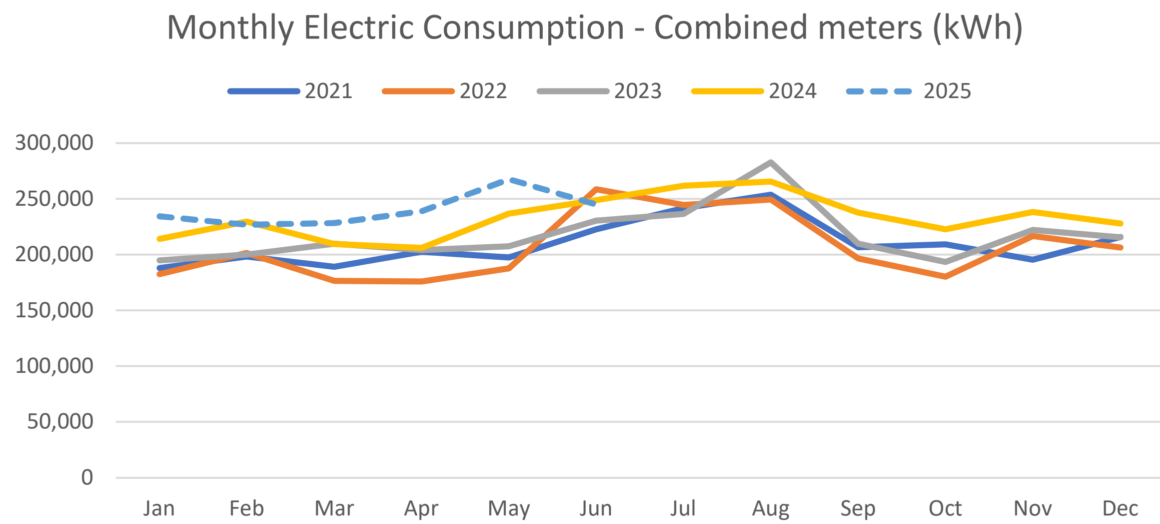


Figure B.6

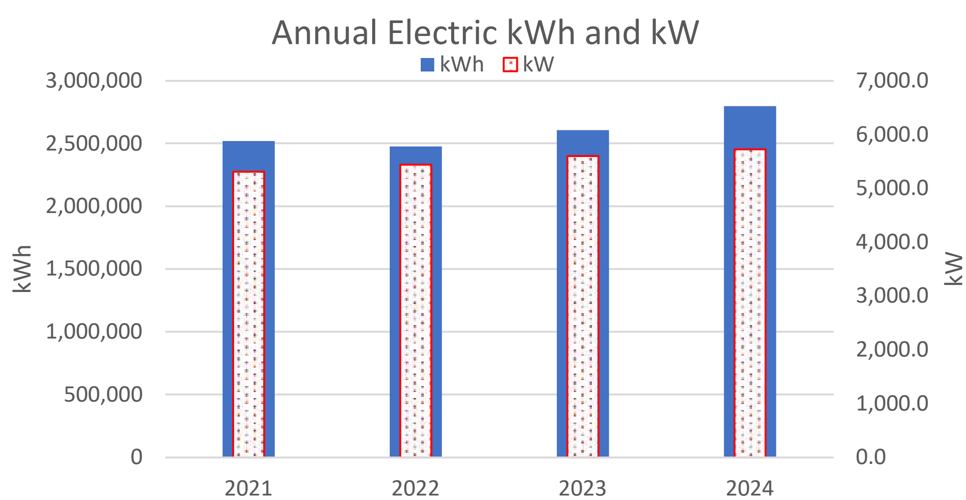
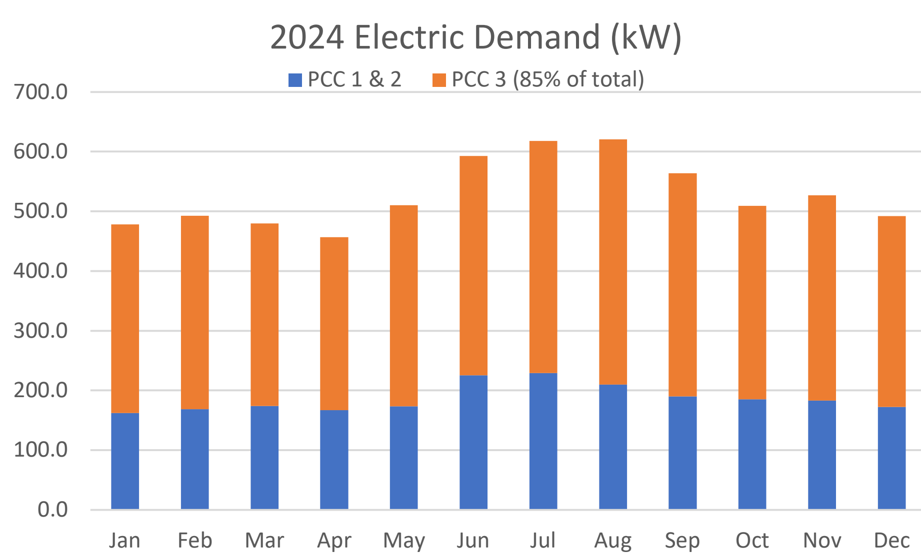


Figure B.7



Natural Gas:

Figure B.8 shows the monthly natural gas consumption over 3-1/2 years and Figure B.9 shows the annual natural gas consumption versus HDDs. The 6% reduction in natural gas consumption in 2023 was unusual because there was a 7% increase in HDDs. Conversely, the 4% increase in 2024 is anomalous due to the 1% reduction in the number of HDDs. These two anomalies indicate that the heating system is not responding proportional to the severity of cold weather. This usually indicates that the <u>HVAC controls are not properly managing the heating and cooling systems and should be investigated further.</u>

Figure B.8

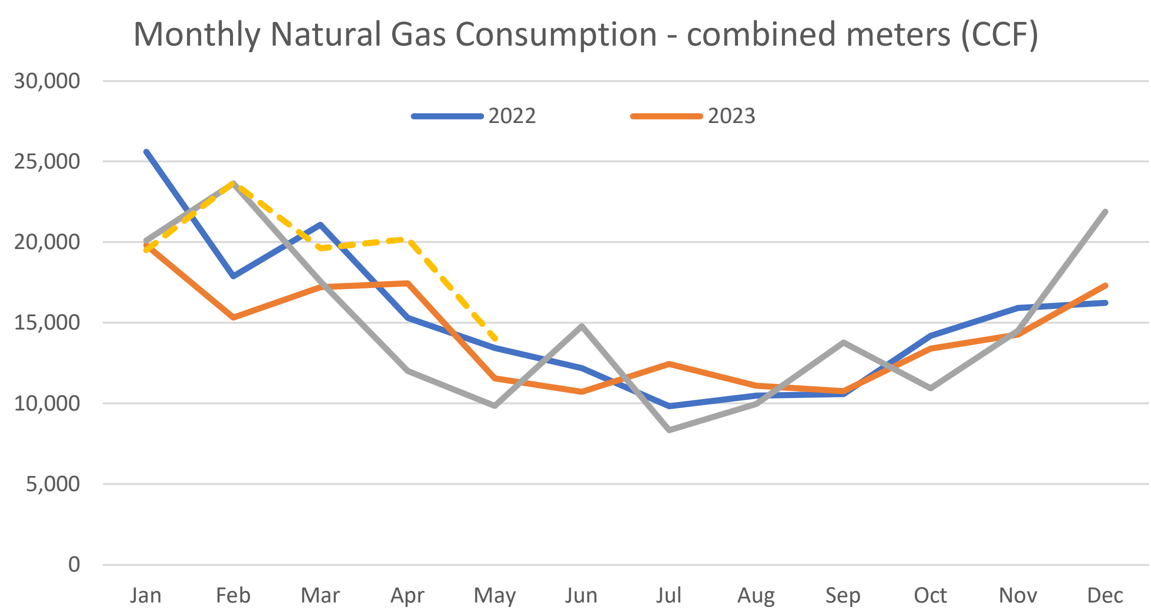
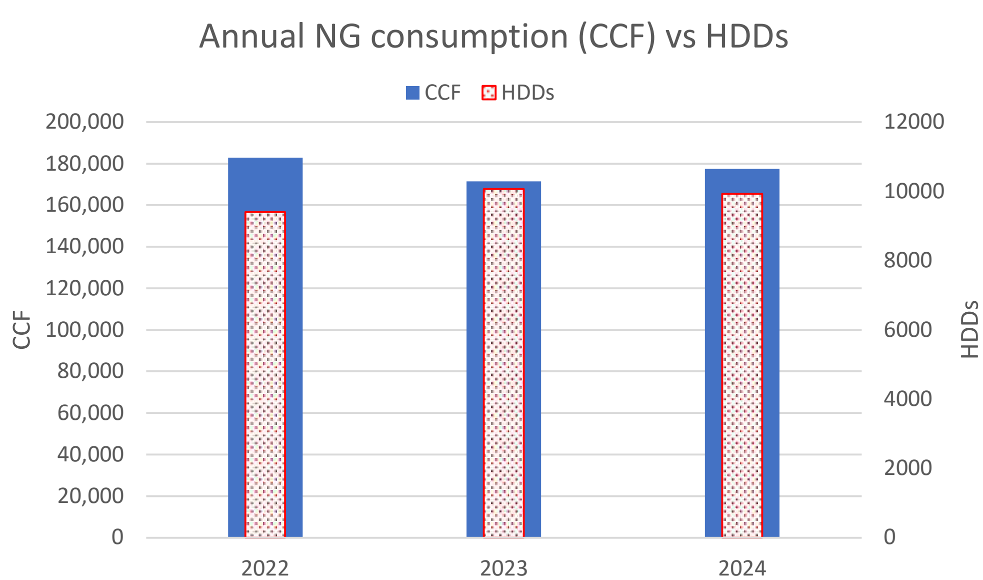


Figure B.9



Comparing EUIs: This SCF PCC building's electric and heating EUIs are compared in Figure B.10 with other similar use facilities. The Lower Kuskokwim Hospital (Bethel) is not included in the average because the EUI's of a fully functioning hospital is typically much higher than clinics and primary care centers like all the other comparative buildings; none the less, it is included for informational purposes. The auditor has performed energy audits on all of the comparative buildings; the data below has been verified through those audits.

This building's electric EUI is 28% higher than the average of the others and its heating EUI is 17% higher. Buildings with simultaneous heating and cooling, like the subject building, always have higher electric and heating EUIs due to the cooling of supply air to 55F or 60F during the summer months and then re-heating in it through VAV boxes to 70F, and by using outside, cool "economized" air during the winter months, then re-heating it in VAV boxes. The Fairbanks, Yakutat and Unalaska clinics all have this heating and cooling strategy and these three buildings have the highest heating EUI's when normalized by HDDs (Figure B.11).

Figure B.10

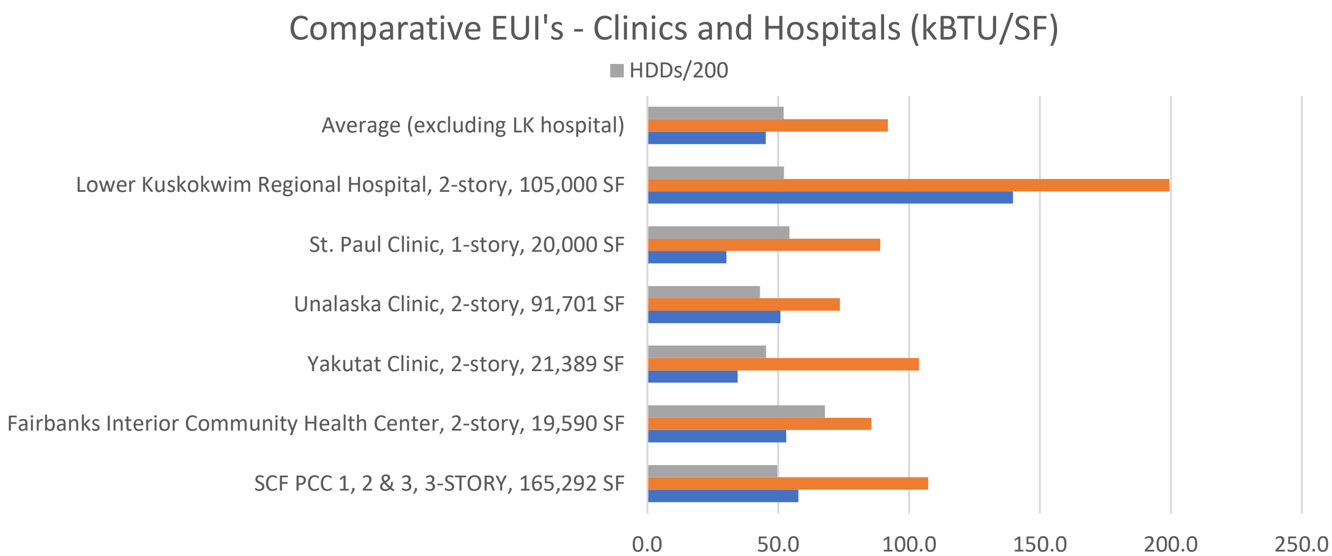
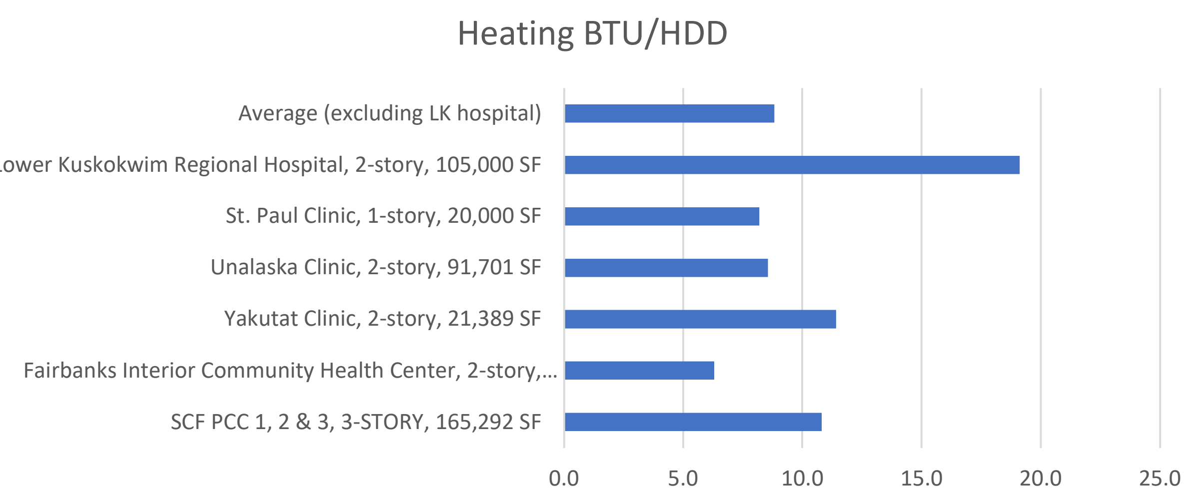
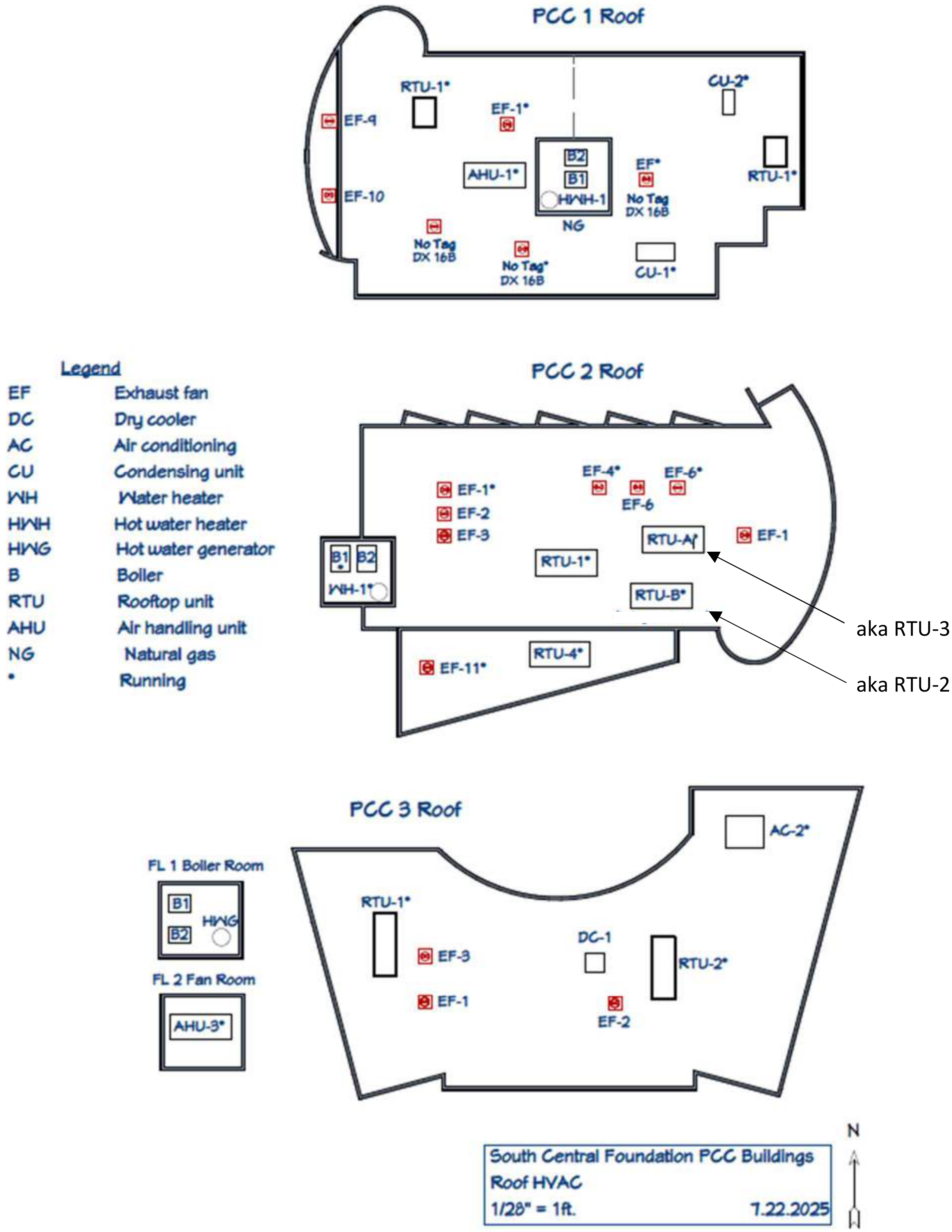


Figure B.11



Appendix C – Rooftop Schematics



Appendix D – CHP Feasibility

	BASELINE CONSUMPTION AND COST					CHP OPERATION (200 kW Capstone)					SAVINGS				
	Electric kWh	Electric kW	Elec cost	NG	NG Cost	NG use	NG Cost	kW production	kWh production	Heat production (BTU)	kWh savings	demand savings	CCF NG saved	NG cost savings	Gross Savings
Jan	213,890	430.52	$30,547	20,117	$19,616	16,644	$16,229	200	146,000	803,000,000	$9,860	$7,481	8,030	$7,830	$25,170
Feb	229,400	443.72	$32,088	23,648	$23,058	16,644	$16,229	200	146,000	803,000,000	$9,860	$7,481	8,030	$7,830	$25,170
Mar	209,310	433.84	$30,362	17,575	$17,137	16,644	$16,229	200	146,000	803,000,000	$9,860	$7,481	8,030	$7,830	$25,170
Apr	206,100	413.2	$29,373	12,020	$11,720	16,644	$16,229	200	146,000	803,000,000	$9,860	$7,481	8,030	$7,830	$25,170
May	236,670	459.72	$33,178	9,858	$9,612	16,644	$16,229	200	146,000	803,000,000	$9,860	$7,481	8,030	$7,830	$25,170
Jun	248,760	537.4	$36,900	14,790	$14,421	16,644	$16,229	200	146,000	803,000,000	$9,860	$7,481	8,030	$7,830	$25,170
Jul	261,760	559.6	$38,608	8,346	$8,138	16,644	$16,229	200	146,000	803,000,000	$9,860	$7,481	8,030	$7,830	$25,170
Aug	265,640	558.76	$38,838	9,964	$9,716	16,644	$16,229	200	146,000	803,000,000	$9,860	$7,481	8,030	$7,830	$25,170
Sep	237,530	507.64	$35,028	13,776	$13,433	16,644	$16,229	200	146,000	803,000,000	$9,860	$7,481	8,030	$7,830	$25,170
Oct	222,610	460.36	$32,252	10,940	$10,667	16,644	$16,229	200	146,000	803,000,000	$9,860	$7,481	8,030	$7,830	$25,170
Nov	238,190	475.44	$33,868	14,510	$14,148	16,644	$16,229	200	146,000	803,000,000	$9,860	$7,481	8,030	$7,830	$25,170
Dec	227,690	444.16	$31,989	21,902	$21,356	16,644	$16,229	200	146,000	803,000,000	$9,860	$7,481	8,030	$7,830	$25,170
			$403,032		$173,023		$194,749				$118,315	$89,768		$93,958	$302,041

CHP Annual cost and savings summary	
-$194,749	CHP operating cost (NG use)
-$25,000	Maintenance plan (per year)
$89,768	Elec demand savings
$118,315	Elec kWh savings
$93,958	NG savings
$82,292	Net total savings
$500,000	Implementation cost
6.1	Payback (years)

Appendix E – Photographs


Gas meter #738 on west wall (left photo) and presumably, meter 192112 on NE corner of PCC1 (right photo), although the meter number for the NE meter do not match up with accounting invoices

PCC1 penthouse “boiler in a box”

PCC2 boiler mechanical room exterior

PCC3 boiler mechanical room, hot water generator shown at left, boiler re-circulation pumps above both boilers


PCC3 heating circulation pump VFDs (photo at left) and AHU-3 fan motor VFDs in 2nd floor fan room (photo at right)

PCC2 rooftop unit RTU-B (aka RTU-2)

PCC3, RTU-2 VFD drives shown at left, 1 for each of 2 supply fan motors, shown at right and 1 for the return fan motor (not shown)

Appendix F – Abbreviations and Acronyms used in this Document

A	Amps
AHFC	Alaska Housing Finance Corporation
ASHRAE	American Society of Heating Refrigeration and Air Conditioning Engineers
BAS	Building Automation System
CFL	Compact florescent lamp
CFM	Cubic Feet per Minute
CHP	Cogeneration with Heat and Power
CO2/CO_2	Carbon Dioxide
COP	Coefficient of Performance
DDC	Direct Digital Control
DHW	Domestic Hot Water
ECI	Energy Cost Index
ECM	Energy Conservation Measure (no or low cost), also called O & M recommendations
EEM	Energy Efficiency Measure
EF	Exhaust Fan
EOL	End of Life
EUI	Energy utilization (or use) Index
F	degrees Fahrenheit
Ft	Foot
gal	Gallons
gpm	Gallons per minute
HDD	Heating Degree Day
HP	Horse Power
HPS	High Pressure Sodium
Hr/hr	Hour
HVAC	Heating Ventilation and Air Conditioning
IR	Infra-Red
kBTU	1000 BTU
kW	Kilowatt
kWh	Kilowatt-hour
LED	Light emitting diode
MBH	1,000 BTU/hour
MMBTU	1,000,000 BTU
O & M	Operations and Maintenance
OSA	Outside air
OSAt	Outside air temperature
OSAd	Outside air damper
PEA	Preliminary Energy Analysis (aka Benchmarking)
PPM	Parts per million
RA	Return air
RAt	Return air temperature
RF & SF	Return Fan, Supply Fan
RTM	Rooftop Module (packaged controller on rooftop and AHUs)
SA	Supply air
SAt	Supply air temperature
SF	Square feet or Square foot
SqFt	Square Feet, or Square Foot
w	Watt

format

Appendix F
Improvement Alternatives

Roof Access

As part of the strategy to improve roof access for maintenance personnel to the roof of PCC 3, the possibility of extending an interior elevator to the roof was considered. This option would require a near-total replacement of an existing elevator inside PCC 3, changing it from a 3-stop to 4-stop elevator. Challenges include structural changes to the roof, fire protection changes to the shaft, the need to create an enclosed elevator lobby on the roof, as well as adding access control to elevator to restrict rooftop access by non-maintenance personnel. This option is less versatile than a stair for both access to, and egress from, the roof. For these reasons, a standalone elevator option to the PCC 3 roof was not pursued. Note that improvement item A3-2 would provide elevator access to the PCC 3 roof level through the existing elevator at the parking garage.

Fall Protection

As part of the strategy to address safety for maintenance personnel on all the roofs of the ANPCC facility, the possibility of building taller parapet walls was considered. For new facilities on campus, SCF prefers minimum 42" high parapet walls so that harness-and-cable travel restraint systems are unnecessary for workers accessing the roofs. The existing parapet walls at ANPCC vary in height above roof from 0" to approximately 28" above top of existing membrane. Creating uniform 42" high minimum parapet walls around the entire facility would have a profound aesthetic consequence as well as a significant cost impact. For these reasons, this option was considered impractical and was not pursued.

Roof Drain Ice Damming

As part of the strategy to reduce wintertime roof maintenance and prevent the potential for ponding water due to adverse weather conditions (i.e. freezing and glaciation on top of the roof membrane), adding electrical heat trace to roof drains as a standard solution for this project was considered. This option is not standard practice at SCF, nor is it required by the SCF design standards. For these reasons, electric heat trace application is limited to specific locations where rooftop "melt zones" are intentionally created as part of the larger solution set for this project. Electrical heat trace at all roof drains as a standard measure was not pursued.

Roof Drain Leaders

As part of the work associated with replacing primary and overflow roof drains, the feasibility of providing separately piped drain leaders for primary and overflow drains was considered in order to comply with current SCF design standards. All drains at ANPCC currently have interconnected drain leader systems below the roof deck in compliance with MOA Handout P.02. Separating drain leader systems would require extensive work within PCC1, PCC2 and PCC3 and would come with high costs for little benefit. SCF design standards are primarily intended to address new construction, not renovations and remodels. For these reasons, independent drain leader systems were not pursued.

Atrium Roof Shed Zones

As part of the strategy to mitigate the accumulation of shedding snow from the Atrium roof onto PCC1 and PCC2 and thereby reduce the manual removal effort, alternatives to the preferred option were considered. These include:

- A 2023 design by KPB Architects that called for a series of new snow rails to be installed on the existing roof membrane. The current consultant team does not believe this solution, or any involving snow rails on the steep slopes of the existing Atrium roof, will work to retain snow on the Atrium roof during heavy snow years without damaging the existing membrane.

- Altering the "landing pad" at PCC1 subsections 1A and 1B to create a less complex area for shedding snow to accumulate. Alterations that require the seismic joint between PCC1 main and subsection 1A to be relocated and/or the parapet wall between PCC1 main and subsection 1B to be removed from of the shed zone would require significant structural rework and cost, and the recommended solution (A1-3) would still be needed to protect the PCC1 roof membrane and to decrease the effort of snow removal.

- Complete replacement - or construction of a flat roof on top – of the existing "twisted-saddle" Atrium roof in order to retain the snow and prevent it from shedding. This solution would significantly alter the aesthetics of ANPCC's signature design element and would likely require added time to the design and construction phases of the project. It would require significant structural rework as well as the addition of internal roof drains (which do not currently exist at the Atrium). Redesign that involves restructuring of the Atrium roof is beyond the current scope of the consultant team's services. This alternative could be pursued with changes to the above, or as a separate project.

- Using a rooftop radiant heating option to melt the accumulated snow in order to prevent maintenance staff from having to manually remove it. Options considered include radiant heated cast-in-place concrete or an "off the shelf" radiant heated modular tile system (HexTray by Tile Tech, for similar). Heating the rooftop snow accumulation zones would impose considerable long term operational costs on SCF, and the components of the system would require regular maintenance. These costs would likely exceed the labor cost involved in periodic manual removal of snow from the roofs. The consultant team could not obtain reliable performance data from the Tile Tech representative, and the performance of their system was in question as well as the resiliency of porcelain tile against falling ice and snow. For all of these reasons, radiant heating of accumulated snow was not pursued.

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Appendix G
Boiler Sizing Matrix

Boiler Options & Calculations

Existing Boilers	Existing Boiler Size (BTU INPUT)	Existing Boiler Size (BTU OUTPUT)	Boiler Efficiency	Existing Boiler Quantity
PCC1 - Burnham Cast Iron (V907A)	1,198,000	959,000	80%	2
PCC2 - Reillo Condensing (AR-3000)	3,000,000	2,600,000	87%	2
PCC3 - Burnham Cast Iron (PV1115WNP)	3,680,000	2,957,000	80%	2

Snowmelt

	Area (Sqft)	Output (BTU/sqft)	Total MBH	Comments
PCC1 Sidewalk Snowmelt - Zone D-1	979	157	153,703	Original
PCC1 Sidewalk Snowmelt - Zone D-2	573	157	89,961	Original
PCC1 Sidewalk Snowmelt - Zone E	901	180	162,180	Original
PCC1 Sidewalk Snowmelt - Zone F	1807	157	283,699	Not connected
PCC1 Sidewalk Snowmelt - Zone G	1772	157	278,204	Not connected
PCC1 Snowmelt Total			967,747	
PCC1 Snowmelt Total - Connected			405,844	Connected to PCC1 HX
PCC1 Snowmelt Total - Not Connected			561,903	Future connection to PCC1 or PCC3
PCC2 Sidewalk Snowmelt - Zone 1	625	150	93,750	Original
PCC2 Sidewalk Snowmelt - Zone 2	750	150	112,500	Original
PCC2 Sidewalk Snowmelt - Zone 3	965	150	144,750	Original
PCC2 Sidewalk Snowmelt - Zone 4	780	150	117,000	Original
PCC2 Sidewalk Snowmelt - Zone A-1	855	157	134,235	New
PCC2 Sidewalk Snowmelt - Zone A-2	765	157	120,105	New
PCC2 Sidewalk Snowmelt - Zone B-1	861	157	135,177	New
PCC2 Sidewalk Snowmelt - Zone B-2	710	157	111,470	New
PCC2 Sidewalk Snowmelt - Zone C	907	157	142,399	New
PCC2 Snowmelt Total			1,111,386	Connected to PCC2 Boilers
PCC3 Sidewalk Snowmelt - Zone 1	1100	150	165,000	Original
PCC3 Sidewalk Snowmelt - Zone 2	1320	150	200,000	Original
PCC3 Snowmelt Total			365,000	Connected to PCC3 Boilers
PCC Atrium Roof Snowmelt	4500	150	675,000	Area of sliding snow to snowmelt
PCC1 Roof Snowmelt for Atrium	850	150	127,500	Proposed New Area for Snowmelt
PCC2 Roof Snowmelt for Atrium	550	150	82,500	Proposed New Area for Snowmelt
Atrium Snowmelt Total			885,000	
PCC1 Roof Snowmelt for PCC3 Snowdrift	1350	150	202,500	Proposed New Area for Snowmelt

Building Loads

PCC1 Loads	Load (Btu/h)
Building Load (Assumed, w/ Boilers @ 66%)	1,453,030
PCC1 Snowmelt (Existing)	405,844
PCC1 2nd Floor Terminal Load (2North Asbuilts)	449,130
PCC1 1st Floor Terminal Load (2022 Renovation As-Builts)	583,044
Load Total (Existing)	1,438,018
Boiler Size @ 66% (Existing)	949,092
PCC1 Snowmelt (New)	561,903
Load Total (New)	1,999,921
Boiler Size @ 66% (New), 2 Primary Boilers w/ 1 Backup	1,319,948
PCC2 Loads	
Building Load (Original Calcs, w/ Boilers @ 66% & Original Snowmelt)	2,677,206
PCC2 Snowmelt (Original)	468,000
PCC2 Snowmelt (New)	643,386
Load Total	3,320,592
Boiler Size @ 66%	2,191,591
PCC3 Loads	
Building Load (Assumed, w/ Boilers @ 66% & Original Snowmelt)	4,480,303
PCC3 Snowmelt	365,000
PCC3 HWG (As-Builts)	150,000
PCC3 RTU-1 & 2, AHU-3 (As-Builts)	1,790,000
PCC3 Terminal Load (VAVs, As-Builts)	1,679,000
PCC3 Terminal Load (FT, As-Builts)	441,600
Load Total	4,425,600
Boiler Size @ 66%, 2 Primary Boilers w/ 1 Backup	2,920,896
Option M1-5B, PCC3 Boiler Replacement	
PCC1 Load (Existing)	1,438,018
PCC3 Load	4,425,600
Load Total	5,863,618
Boiler Size @ 66%, 2 Primary Boilers w/ 1 Backup	3,869,988
Option M1-6B, PCC3 Boiler Replacement	
PCC1 Load (Existing)	1,438,018
PCC3 Load	4,425,600
PCC1 Snowmelt (New)	561,903
Load Total	6,425,521
Boiler Size @ 66%, 2 Primary Boilers w/ 1 Backup	4,240,844
Boiler Size @ 50%, 3 Primary Boilers w/ 1 Backup	3,212,761
Option M1-9	
PCC1 Load (Existing)	1,438,018
PCC1 Snowmelt (new)	561,903
PCC3 Load	4,425,600
Atrium Snowmelt	885,000
PCC1 Roof Snowmelt for PCC3 Snowdrift	202,500
Load Total	7,513,021
Boiler Size @ 66%, 2 Primary Boilers w/ 1 Backup	4,958,594
Boiler Size @ 50%, 3 Primary Boilers W/ 1 Backup	3,756,511

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