



## Springfield Art Museum

### Building and Grounds

### Committee Meeting

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March 4, 2024

12:00 PM

Community Room  
1111 East Brookside Drive  
Springfield, MO 65807

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### TENTATIVE AGENDA

1. **Call to Order**
2. **Meeting Minutes**
3. **Director's Report**
  - 3.1. Follow-up on items from last meeting
  - 3.2. Project Update
4. **Adjournment**

*In accordance with Americans with Disabilities Act (ADA) guidelines, if you need special accommodations when attending any City meeting, please notify the City Clerk's Office at 417-864-1651 as soon as possible to ensure our ability to accommodate your needs.*

**Springfield Art Museum  
Building & Grounds Committee Meeting Minutes  
Thursday, February 15, 2024  
Springfield Art Museum Community Room - 4:00 p.m.**

**Board Members Present:**

- |                                                  |                                                            |
|--------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> Alia Lee                | <input checked="" type="checkbox"/> Amanda Stadler (Chair) |
| <input type="checkbox"/> Holly Acharya           | <input checked="" type="checkbox"/> Matt Edwards           |
| <input type="checkbox"/> Marco Denis             | <input type="checkbox"/> Tracy McGrady                     |
| <input checked="" type="checkbox"/> Mark Wheeler | <input type="checkbox"/> Valorie Rogers                    |

**Staff Members Present:** Nick Nelson (Museum Director)

**Others Present:** None

**Call to Order:** Meeting called to order by Amanda Stadler at 4:07 PM

**Director's Report:** Nick Nelson provided a report on the HVAC system. He stated that the Policy Committee met in January to discuss the HVAC system. The Policy Committee reviewed three options and scored them according to prioritized needs. The top priorities were in order:

- 1) Controllability or the ability of the system to maintain strict climate control standards,
- 2) Maintainability or how easy it will be for staff to maintain the system,
- 3) Life Expectancy/Durability or how long the system is likely to operate before replacement and how often components need to be replaced.

The three systems included:

Option 1: An Air to Water Four-Pipe Heat Pump System Coupled with Thermal Storage Batteries

Option 2: Full Geothermal Heat Pump System

Option 3: Single-Zone VAV AHUs with Variable Digital Inverter Compressors.

Option 1 was selected as it was determined to best meet the standard of controllability, maintainability, and life expectancy/durability. The Building & Grounds Committee members discussed the selection. Members expressed concern about the ice tank system that provided the Thermal Storage Battery system. Concerns included whether the system was maintainable by staff or local contractors. They asked if the technology was new and warned against purchasing untested technologies. Other questions included what manufacturer would be used for the equipment including the heat pumps and ice tank system. Other questions included to what level LEED certification is driving decision-making. It was also recommended that the system have some level of redundancy so that it can operate at less than 100% capacity. There was also a question as to whether the heat pump system could heat and cool at the same time for de-humidification purposes. It was determined that it could as it is a four-pipe system.

Nick presented the committee with project phasing options. Due to ARPA funding deadlines, the Museum must begin working on the project with all ARPA funds encumbered by 12/31/24. To do so the Museum will kick off an initial phase. The Museum will continue to design the full project so if funding becomes available there will be minimal delay between phases. The two-phased approach will include a first phase comprised of a temporary Education Wing on the southeast corner of the facility replacing the current Education Wing, improvements to the Back-of-House areas and

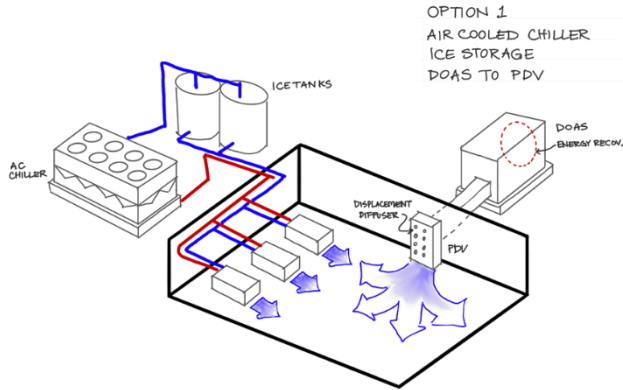
loading dock, and the conversion of the Auditorium into a new large, high-ceiling gallery space. One challenge the Museum faces is the aging HVAC system, which will need to be replaced by 2029. Major renovations to the HVAC system will take place in Phase I. The second phase will be comprised of improvements to the galleries, the addition of the two-story gallery on the southeast corner of the building and the completion of the west-facing Education wing. The Museum still must raise money for the planned Phase I. If funds aren't available, the Museum will go forward with a smaller Phase I which will include replacing the current Education Wing with a new Temporary Education Wing.

The Committee determined that they should keep the meeting on March 4<sup>th</sup> to answer any questions or to follow-up on any outstanding items. Nick will send a new calendar invitation to committee members.

**Other Items:** None

**Adjournment:** Meeting adjourned at 4:51 PM.

Submitted by: Nick Nelson, Museum Director

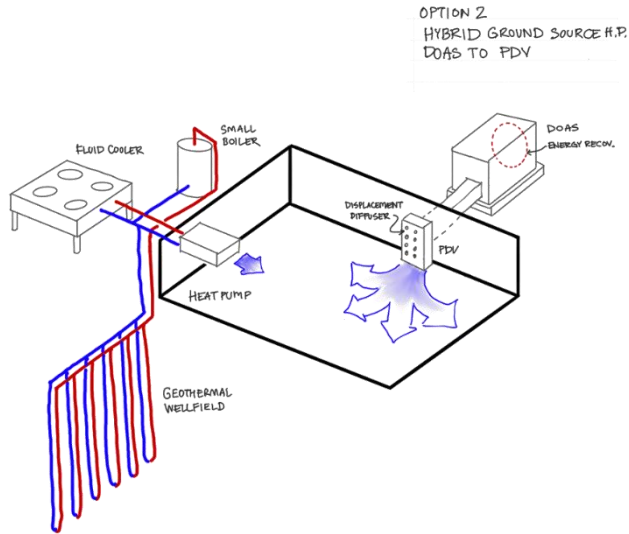


## Air to Water Four-Pipe Heat Pump System Coupled with Thermal Storage Battery System

- 1) Standard "ambient outdoor air" heat rejection
- 2) Multiple indoor air handling units – one per conditioning zone
- 3) Multiple chiller / heaters (heat-pumps) with variable circulating pump system – simultaneous heating and cooling
- 4) Dual temperature water distribution loop – colder water to DOAS, warmer water to indoor AHUs
- 5) Thermal ice storage system – utilized for OA dehumidification and winter cooling demand
- 6) DOAS unit(s) with general exhaust fan and energy recovery, air will be delivered by positive displacement ventilation
- 7) Supplemental heating water boiler

## Mechanical System

Option 1 – Air to Water Four-Pipe Heat Pump System Coupled w/ Thermal Storage Battery

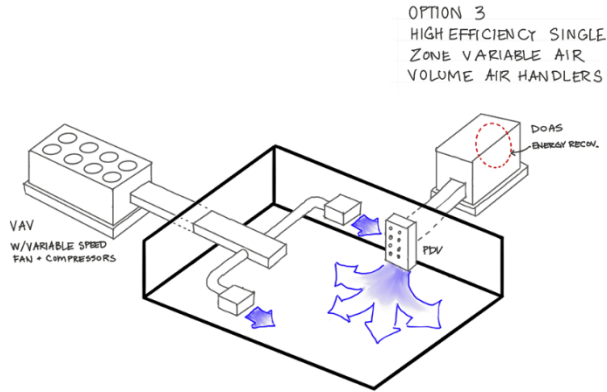


## Geothermal Heat-Pump System

- 1) Vertical ground source wellfield and ground source pumping system
- 2) Multiple 6-pipe heat exchanger units "heat pumps" with variable circulation system – simultaneous heating and cooling
- 3) Multiple indoor heat-pumps (AHUs) – one per conditioning zone
- 4) Supplemental fluid cooler and pumping system – auxiliary heat rejection
- 5) DOAS unit(s) with general exhaust fan and energy recovery, air will be delivered by positive displacement ventilation

# Mechanical System

## Option 2 – Geothermal Heat-Pump System



## Single-Zone Variable-Air-Volume Air-Handling Units with Variable Digital Inverter Compressors (DX Cooling)

- 1) Multiple indoor air handling units – one per conditioning zone
- 2) Remote (ground mounted) condensing units
- 3) Electric boiler and variable flow hot water circulating pump system
- 4) DOAS unit(s) with general exhaust fan and energy recovery, air will be delivered by positive displacement ventilation

# Mechanical System

## Option 3 – Single-Zone VAV AHUs with Variable Digital Inverter Compressors

## Energy Efficiency

Relates to mechanical system's ability to save energy compared to code minimum systems

1 2 3 4 5 6 7 8 9 10

## Affordability

How budget conscious does the HVAC system need to be when weighted against other qualities like maintenance, efficiency and controllability?

1 2 3 4 5 6 7 8 9 10

## Life Expectancy / Durability

Most code minimum systems wear out in 15 years. Other systems may last twice as long or longer, needing to be replaced less often.

1 2 3 4 5 6 7 8 9 10

## Maintainability

How important is it for staff to be able to easily maintain the equipment compared to other qualities? \*Routine maintenance may take place 100+ times over the life of the equipment

1 2 3 4 5 6 7 8 9 10

## Controllability

A consideration for how important controls and their ability to maintain tight temperature and humidity ranges for both art conservation and human comfort.

1 2 3 4 5 6 7 8 9 10

## Expandability

Rate the importance for the HVAC's ease of expansion should the museum add significant square footage in the next few decades.

1 2 3 4 5 6 7 8 9 10

## Aesthetics

Considerations not only for the exterior of the building, but how well the HVAC should be integrated into the architecture of the interiors, including gallery spaces.

1 2 3 4 5 6 7 8 9 10

## User Operability / Friendliness

How easily should the building operators be able to use the system?

1 2 3 4 5 6 7 8 9 10

## LEED Compatibility

LEED requires more of the HVAC than just efficiency and LEED is a goal of the project. Not all systems address LEED equally; how much should LEED weigh into the long-term decision of the system selection?

1 2 3 4 5 6 7 8 9 10

## Adaptability

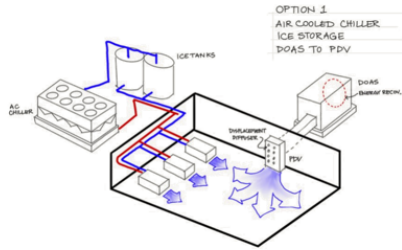
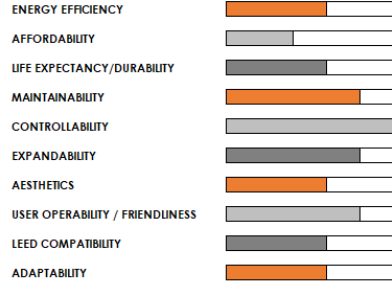
Different than expandability that speaks to growing the system, this relates more to the mechanical system's ability to be repurposed should space programming inevitably change in the future.

1 2 3 4 5 6 7 8 9 10

# Mechanical System Weighting Criteria

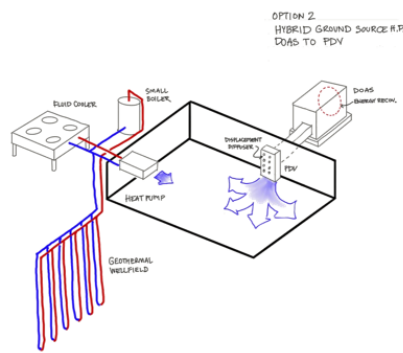
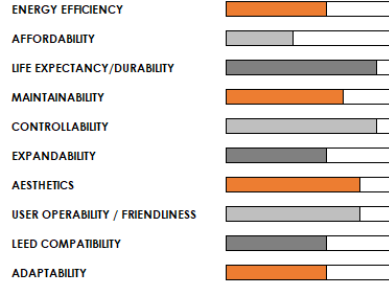
### OPTION 1

AIR COOLED CHILLER WITH THERMAL ICE STORAGE (DOAS TO PDV)



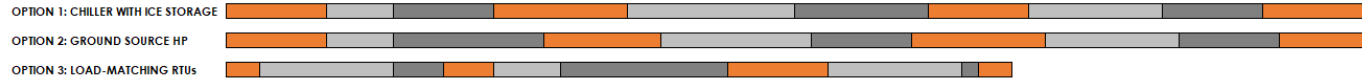
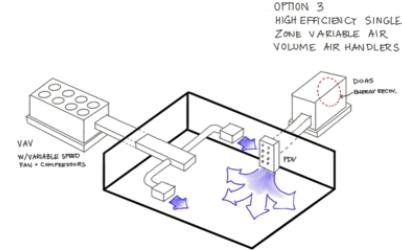
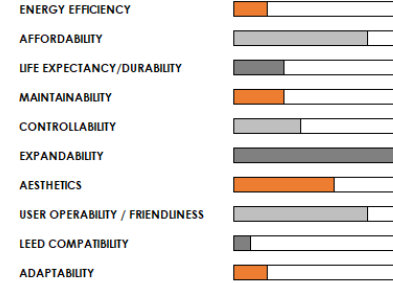
### OPTION 2

HYBRID GROUND SOURCE HEAT PUMP (DOAS TO PDV)



### OPTION 3

HIGH EFFICIENCY, SINGLE ZONE VAV RTUs (DOAS TO PDV)

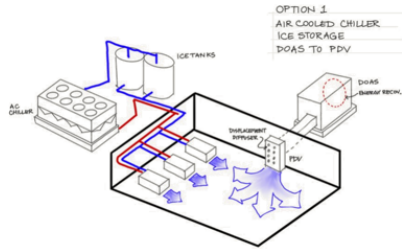
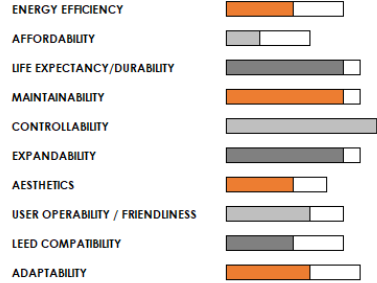


# Mechanical System

## Option Comparison

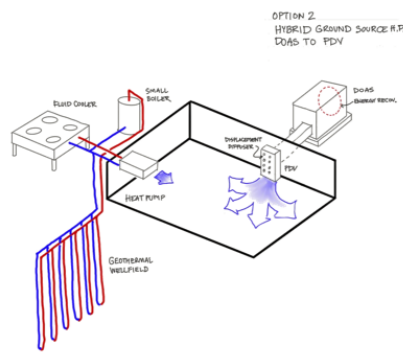
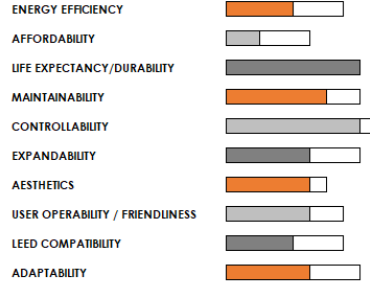
### OPTION 1

AIR COOLED CHILLER WITH THERMAL ICE STORAGE (DOAS TO PDV)



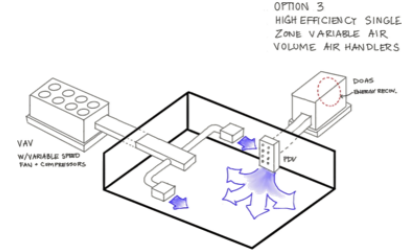
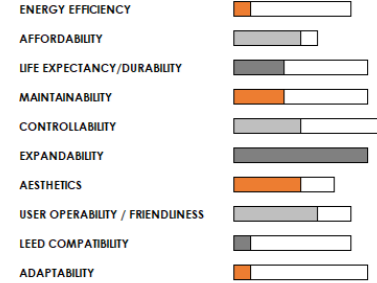
### OPTION 2

HYBRID GROUND SOURCE HEAT PUMP (DOAS TO PDV)



### OPTION 3

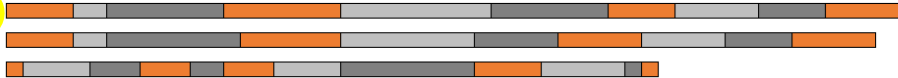
HIGH EFFICIENCY, SINGLE ZONE VAV RTUs (DOAS TO PDV)



OPTION 1: CHILLER WITH ICE STORAGE

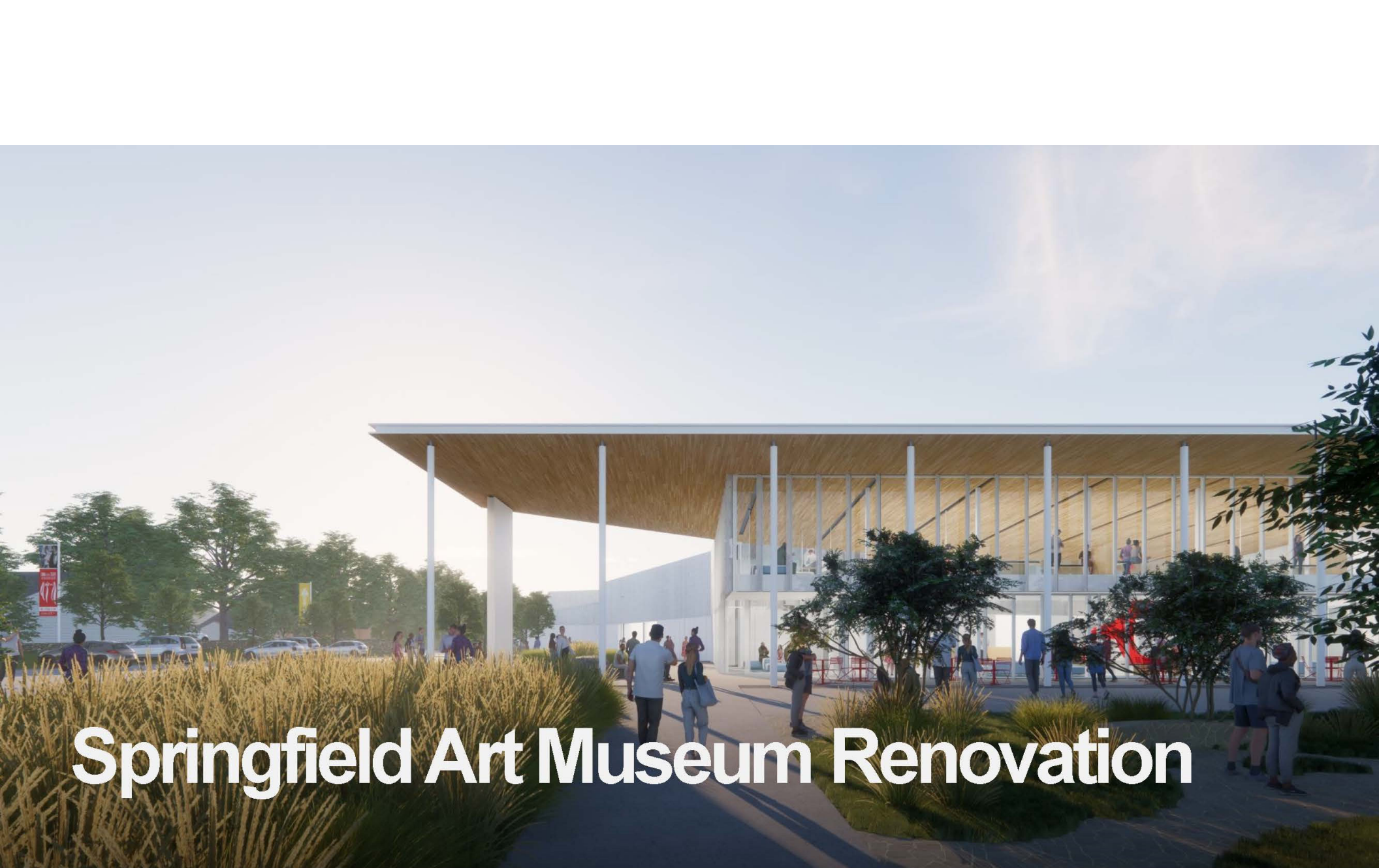
OPTION 2: GROUND SOURCE HP

OPTION 3: LOAD-MATCHING RTUs



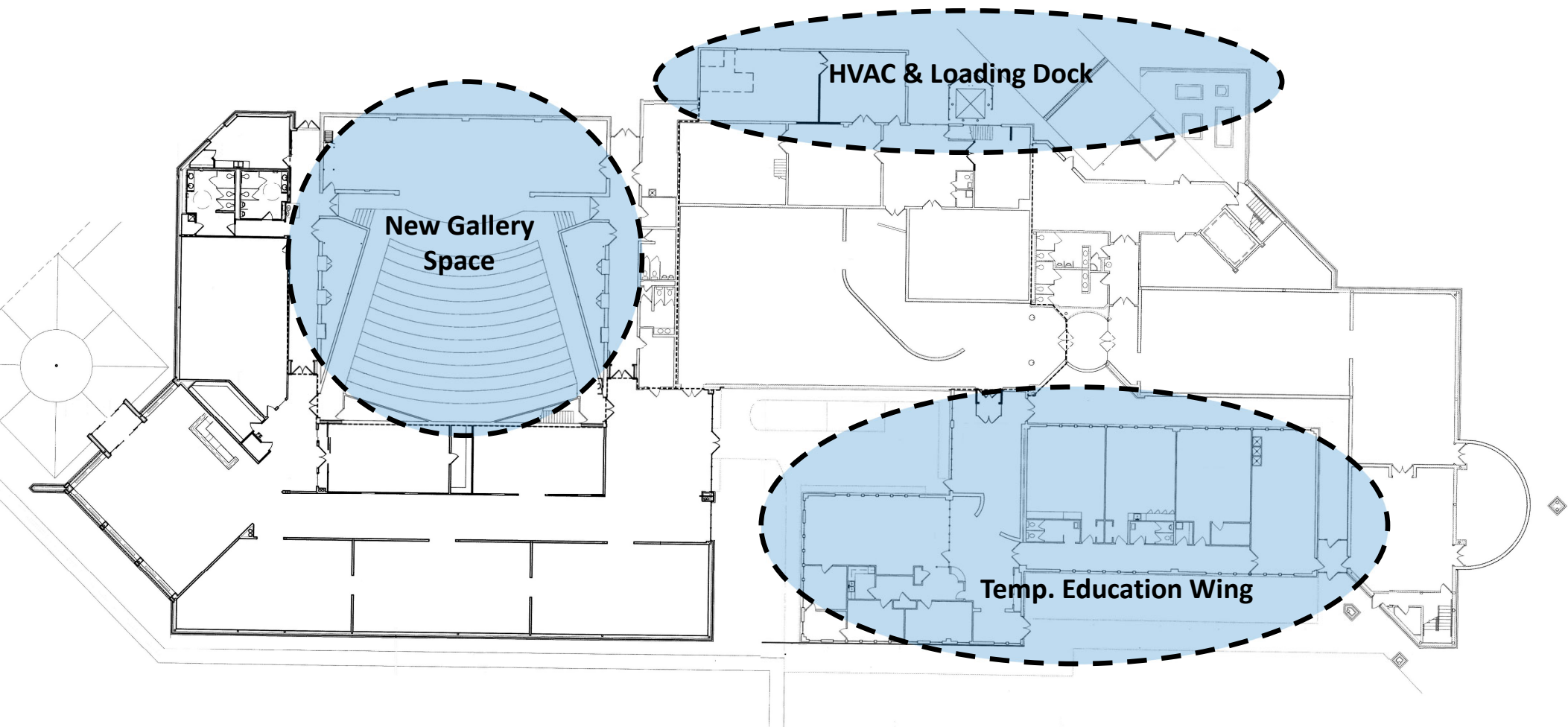
# Mechanical System

## Option Comparison – Museum's Prioritization

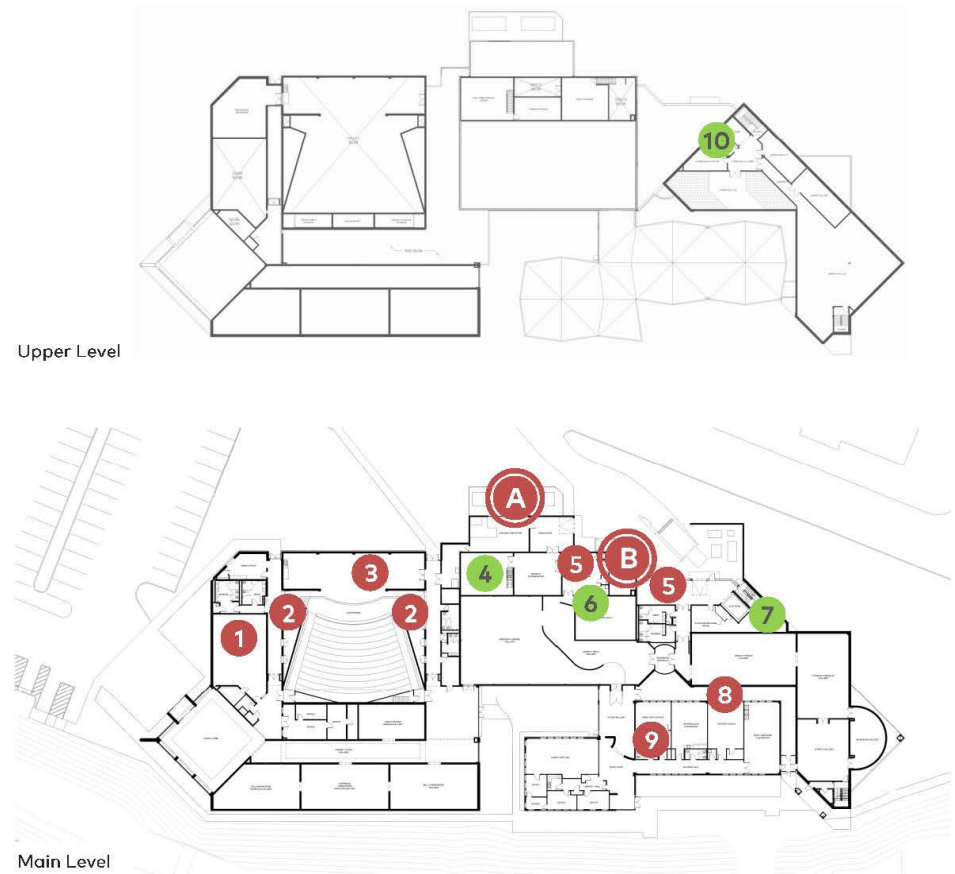
An architectural rendering of the Springfield Art Museum Renovation. The building features a long, low profile with a wide, flat roof supported by a series of white columns. The interior is visible through large glass walls, showing a modern, open-plan space with wooden flooring and a staircase. The exterior is landscaped with tall grasses, shrubs, and trees. People are shown walking along a path in front of the building, and a red sculpture is visible in the courtyard. The sky is a soft, hazy blue.

# Springfield Art Museum Renovation





| Unit (Description)                                                                | Life Expectancy | Future Age       | Remaining Life |
|-----------------------------------------------------------------------------------|-----------------|------------------|----------------|
| <b>A</b> (2) Air-Source Chillers                                                  | 20-25 years     | +/- 20 years old | ≈ 0-5 years    |
| <b>B</b> (2) Boilers                                                              | 15 years        | +/- 25 years old | Past life      |
| <b>1</b> (2) AHUs                                                                 | 15-20 years     | +/- 20 years old | Past life      |
| <b>2</b> (2) FCUs                                                                 | 15 years        | +/- 30 years old | Past life      |
| <b>3</b> (2) FCUs                                                                 | 15 years        | + 15 years old   | Past life      |
| <b>4</b> (2) AHUs<br><i>Serving Weisel Gallery</i>                                | 15-20 years     | +/- 12 years old | ≈ 5-10 years   |
| <b>5</b> (2) Small FCUs<br><i>Hung from ceiling</i>                               | 15 years        | + 15 years old   | Past life      |
| <b>6</b> (1) AHU<br><i>Serving L1 Vault</i>                                       | 15-20 years     | +/- 13 years old | ≈ 5-10 years   |
| <b>7</b> (2) AHUs<br><i>Serving L1 Musgrave</i>                                   | 15-20 years     | +/- 13 years old | ≈ 5-10 years   |
| <b>8</b> Ductless Split System (heat-pump units)<br><i>Serving '57 South</i>      | 15-20 years     | +/- 20 years old | Past life      |
| <b>9</b> Cassettes tied to (#9) ductless split system<br><i>Serving '57 South</i> | 15-20 years     | +/- 20 years old | Past life      |
| <b>10</b> (1) AHU<br><i>Serving L2 Musgrave</i>                                   | 15-20 years     | +/- 13 years old | ≈ 5-10 years   |



# Springfield Art Museum Renovation

## Existing Mechanical Assessment – 5 years into the future (2029)





Phase I (Reduced Scope)

The floor plan shows a building with a central auditorium and a large courtyard. The layout includes the following rooms and areas:

- Offices:** A cluster of five offices in the upper left, and several smaller offices throughout the building.
- Auditorium:** A large, curved seating area in the center.
- Family Leasing Center:** An orange-colored room on the lower left.
- Classrooms:** Three orange-colored rooms on the lower right.
- Restrooms:** Teal-colored rooms labeled "WOMEN'S RR" and "MENS RR" near the classrooms.
- Mural Gallery:** A long, narrow room at the bottom of the plan.
- Courtyard:** A green-colored outdoor space in the center-right.
- Red Dashed Line:** A red dashed line outlines a specific area in the upper right section of the building, which appears to be a small office or storage area.