

# HINGHAM CENTER FOR ACTIVE LIVING

## BUILDING COMMITTEE MEETING

AUGUST 26, 2025



# MEP SYSTEMS

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## key selection criteria

- Maintenance
- Reliability
- Simplicity / Serviceability
- Indoor air quality
- Occupant thermal comfort
- Energy efficiency / environmental impact
- First cost / return on investment
- System noise
- Compliance with CMR 223 as adopted by Hingham

# MEP SYSTEMS

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## HVAC systems proposed

- Dedicated Outdoor Air System (DOAS) for ventilation
- Fan coil units (FCU's) for space heating & cooling
- Air-source heat pump to produce hot & chilled water for FCU's
- Supplemental back-up heating
- **Two heating/cooling plant options for above systems**
  - **Air-source heat pump with electric back-up boiler**
  - **Geothermal heat pump**

# MEP SYSTEMS

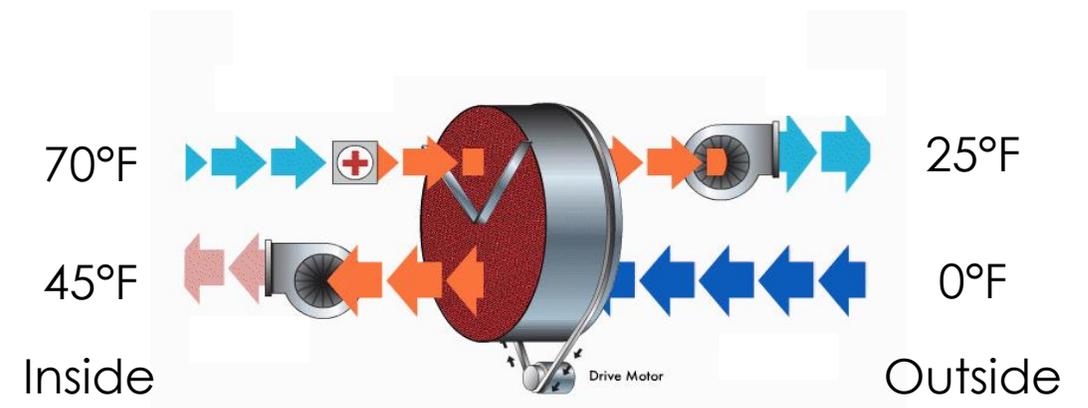
## ventilation requirements

### Dedicated Outdoor Air System (DOAS)

(Common to both system Options)

#### Features

- Direct ducted ventilation air to each space
- Direct ducted exhaust air from each space
- No mixing of air from different spaces
- Smaller duct systems
- Total energy recovery
- Improved IAQ



# HVAC SYSTEM OPTIONS

## 1 - Four Pipe Fan Coil Units (FCU):

*Air-to-water heat pump to generate heating hot water and chilled water*

- Heat pump located at grade
- Hot & chilled water piping routed throughout
- FCU's located throughout to supply warm or cool air to the space
- Typically one FCU serves one large space or multiple small spaces

## 2 - Variable Refrigerant Flow (VRF):

*VRF heat pumps to generate heating and cooling*

- VRF heat pumps located at grade or on roof
- Smaller refrigerant piping routed throughout
- VRF units located throughout to supply warm or cool air to the space
- Typically, one large ducted VRF unit serves one large space or smaller "cassettes" can be used for small rooms (e.g. offices)

## 3 - Geothermal:

*Can be paired w/ either option #1 or #2*

- Requires geothermal bores ("wells") that are installed on site.
- Each bore is typically 500-800 feet depending on ground conditions
- Depending on ground conditions, the building would require approximately 15-25 bores
- Heat pumps are then located indoors rather than outdoors.

# HVAC SYSTEM OPTIONS

## pros and cons

### 1 - Four Pipe Fan Coil Units (FCU):

Air-to-water heat pump to generate heating hot water and chilled water

- Non-proprietary
- Future refrigerant changes impact this system less
- No refrigerant in the building
- Simple to replace equipment in the future
- More expensive upfront cost
- Backup electric boiler or electric resistance heat required

### 2 - Variable Refrigerant Flow (VRF):

VRF heat pumps to generate heating and cooling

- Less expensive up-front cost
- Highly efficient, works well at low ambient temps, requires less supplemental heat
- Proprietary systems
- Requires refrigerant in the building
- Susceptible to future refrigerant changes

### 3 - Geothermal:

Can be paired w/ either option  
*#1 or #2*

- Increases the efficiency of either system (reduced utility costs)
- Reduces/eliminates requirements for supplemental electrical resistance back-up heating
- High upfront cost
- Slightly more maintenance
- Federal funding not guaranteed to help offset capital cost

# MEP SYSTEMS

first cost and annual energy cost comparison

	<b>Option 1: ASHP – 4 Pipe FCU</b>	<b>Option 2: VRF</b>	<b>Alternate: Full Geothermal</b>
First cost for HVAC	AVG \$90-95/SF	AVG \$80-85/SF	\$0.9M-\$1.2M <b>add'l</b>
Annual energy use	+ 5-10% Increase	Base Line EUI = 27-32 kBtu/SF/yr	- 10-15% Reduction
ROI	N/A	N/A	>30 Years Typically (pending rebates)

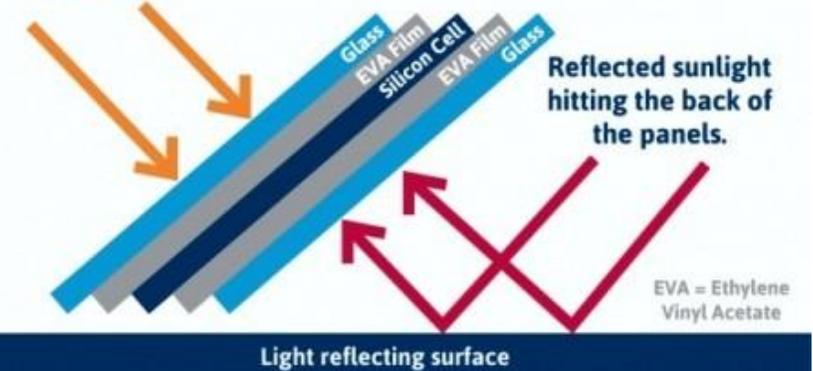
# MEP SYSTEMS

## photovoltaic (PV)

- **Approx. 185kW PV array required to be Net Zero**
  - Assumes an EUI of 30 kBtu/sf/year
  - Equates to about 10k SF of roof area
  - This will be updated as the design is furthered
- **Recent Impacts on incentives/tax credits**
  - Solar projects that begin construction after July 4, 2026 must be placed in service before Dec 31, 2027.
  - No requirement for in-service date if beginning construction before July 4, 2026
- **Current pricing typically in the \$3-4/W. Pricing will be provided as part of schematic design**
- **Limited incentives through HMLP**

### Bifacial Solar Panel Cross Section

Direct sunlight hitting the front of the panels.



# MEP SYSTEMS

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generator

## Two Options for Sizing:

**Option #1:** Sized to provide power of emergency loads (heating, emergency lighting, refrigeration, IT loads, etc.). Approx. 250kW

**Option #2:** Sized to accommodate the entire building (minus EV charging loads).

Approx. 400kW



*\*Natural gas vs. diesel fuel  
pros/cons discussion*

# MEP SYSTEMS

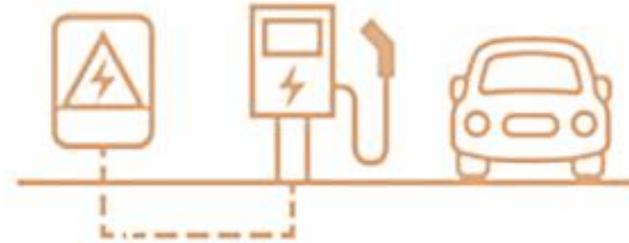
## EV charging

*“New or reconstructed parking lots containing **20 or more parking spaces** shall provide infrastructure to make a minimum of **25 percent** of the spaces compatible with electric vehicle charging and a minimum of **10 percent** shall be equipped with at least Level 2 electric vehicle charging stations”*

– **Hingham Zoning By-Law** Section V-A, 5



EV Ready



EV Installed

- Will need to install charging stations for 10% of EV ready parking spaces – current standard in Town
- The remaining spaces will need infrastructure installed (wiring and conduits) but can omit the EV charging station for now, if desired.

# SUSTAINABILITY GOALS

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**BALANCED  
SITE**



**PERVIOUS  
ASPHALT**



**RAINWATER  
FOR GARDEN**



**FULLY ELECTRIC**



**BIRD FRIENDLY  
GLAZING**



**RAIN GARDENS**



**VEGETABLE  
GARDEN**



**HIGH PERFORMANCE  
ENVELOPE**



**ELECTRIC VEHICLE  
CHARGING**

# SUSTAINABILITY GOALS



**OUTDOOR PHYSICAL  
ACTIVITY**



**SCENIC TRAILS**



**NATURAL LIGHT**



**FOSTER SOCIAL  
CONNECTION**



**SITE SAFETY AND  
WAYFINDING**



**ACCESS TO  
NATURE**



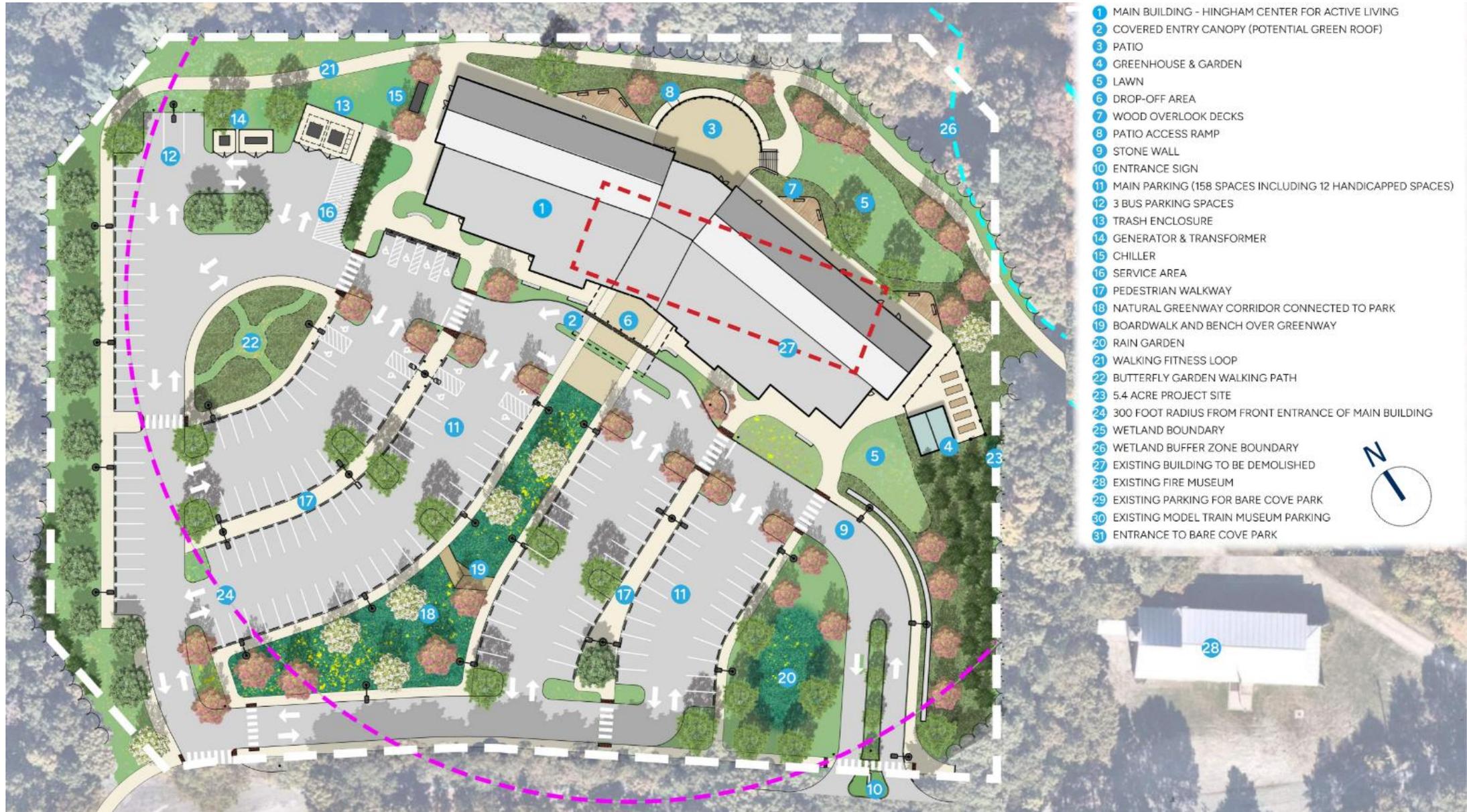
**BIOPHILIA**  
nature-evoking design



**GREENHOUSE**

**COMMENTS** | QUESTIONS

# OVERALL SITE PLAN



# OVERALL FLOOR PLAN



**SQUARE FOOTAGE:**  
**25,950SF**