



# Planning for Operations HVAC & LIGHTING

**Presented To:**

**Association of Art Museum Administrators**

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# Presentation Overview

- General Process Recommendations
- HVAC Considerations
- Lighting Considerations



# General Process Recommendations

- Early Design Phase
- Design Phase
- Post Construction



# General Process Recommendations

## ■ Early Design

- Define multiple levels of design options
- Life cycle cost analysis



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# General Process Recommendations

## ■ Design

- Define system performance criteria
- Estimate associated operating budget
- Incorporate monitoring systems



# General Process Recommendations

## ■ Post Construction

- Verify system performance meets criteria
- Monitor operating costs



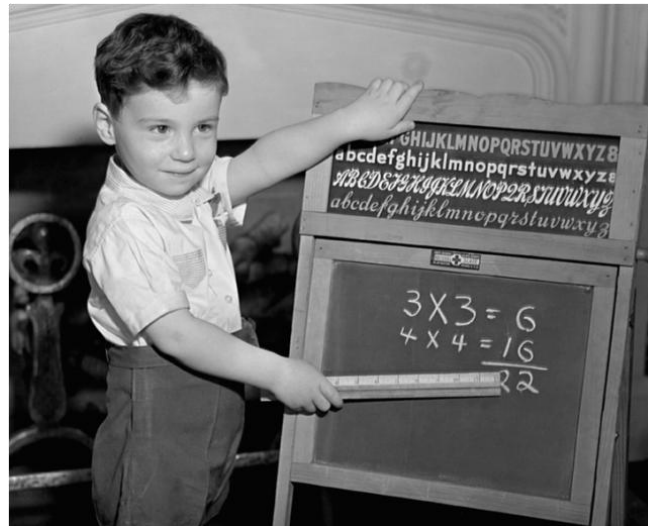
# HVAC Considerations

<b>ENVIRONMENTAL CONTROL</b>	<b>OPERATING COST</b>
Humidification	↑
Dehumidification	↑
Very tight temperature controls	↑
High efficiency particle filtration	↑
Gaseous filtration	↑

# HVAC Considerations

## ■ Be Realistic from the Beginning

- Determine operating budget early
- Design best possible system within budget
  - Modeling
  - Life cycle cost analysis
- Avoid spending capital on systems that won't be used





# HVAC Considerations

## ■ Levels of Humidity Control

- 50%RH +/-3% year-round
- 40%RH winter / 50%RH summer / drift between
- 35%RH winter / 55%RH summer / drift between

## ■ Operating Cost Influences

- Climate
  - Dry
  - Humid
  - Both
- Humidification energy source



# HVAC Considerations

## ■ Building Envelope

- Windows
- Walls
- Roof
- Doors



## ■ Operating Cost Influences

- Climate
- Insulation quality and quantity
- Vapor barrier quality and quantity

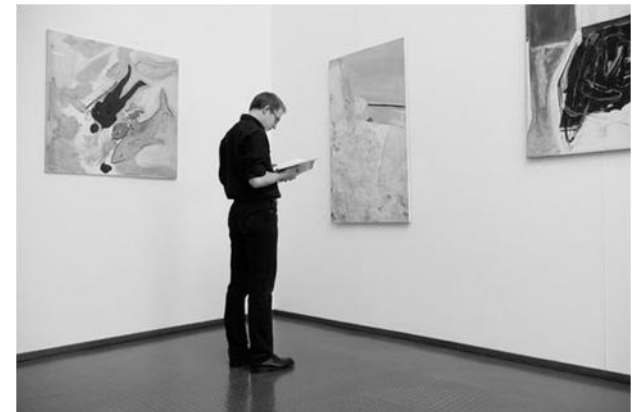
# HVAC Considerations

## ■ Levels of Temperature Control

- 65°F +/-2% year-round
- 70°F +/-2% year-round
- 68°F winter / 74°F summer / drift between

## ■ Operating Cost Influences

- Climate
  - Cold
  - Hot
  - Both
- Heating/cooling energy source



# HVAC Considerations

## ■ Levels of Air Filtration

- 65% efficient
- 95% efficient
- 99%+ HEPA filters
- Gaseous filtration



## ■ Operating Cost Influences

- Outdoor air quality
- Replacement costs
- Electric rates

# HVAC Considerations

## ■ Ventilation

- Design for full occupancy
- Control for varying occupancy





# Lighting Considerations

High Cost, High Impact, High Volume.  
Light levels and hours of operation are only the start. Lighting impact on operations doesn't stop at the bulb!

- Heating
- Cooling
- Square Footage
- Etc...



# Lighting Considerations

## Control Systems

- Need v. Want
- Flexibility
- Interface
- Capacity



# Lighting Considerations

## Gallery Lighting Systems

- Light is Relative
- Gallery Track Systems
  - Flexibility
  - Capacity
- Lamps and Fixture Heads
  - Number
  - Kind





# Lighting Considerations

## Other Lighting Systems

- Fluorescent Emergency/Night Lighting
- Lower Light Levels
- Higher Efficacy



# Lighting Considerations

## Infrastructure / Capacity

- Need v. Want
- Flexibility
- Capacity

# *Discussion*

