

A 21<sup>st</sup> CENTURY

# HEADQUARTERS

**AGU  
100**

ADVANCING EARTH  
AND SPACE SCIENCE



A FEW WORDS

# ABOUT THE TEAM

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Holly Lennihan

Director of Sustainable Design, Senior Associate

Hickok Cole Architects



Roger Frechette

Managing Principal

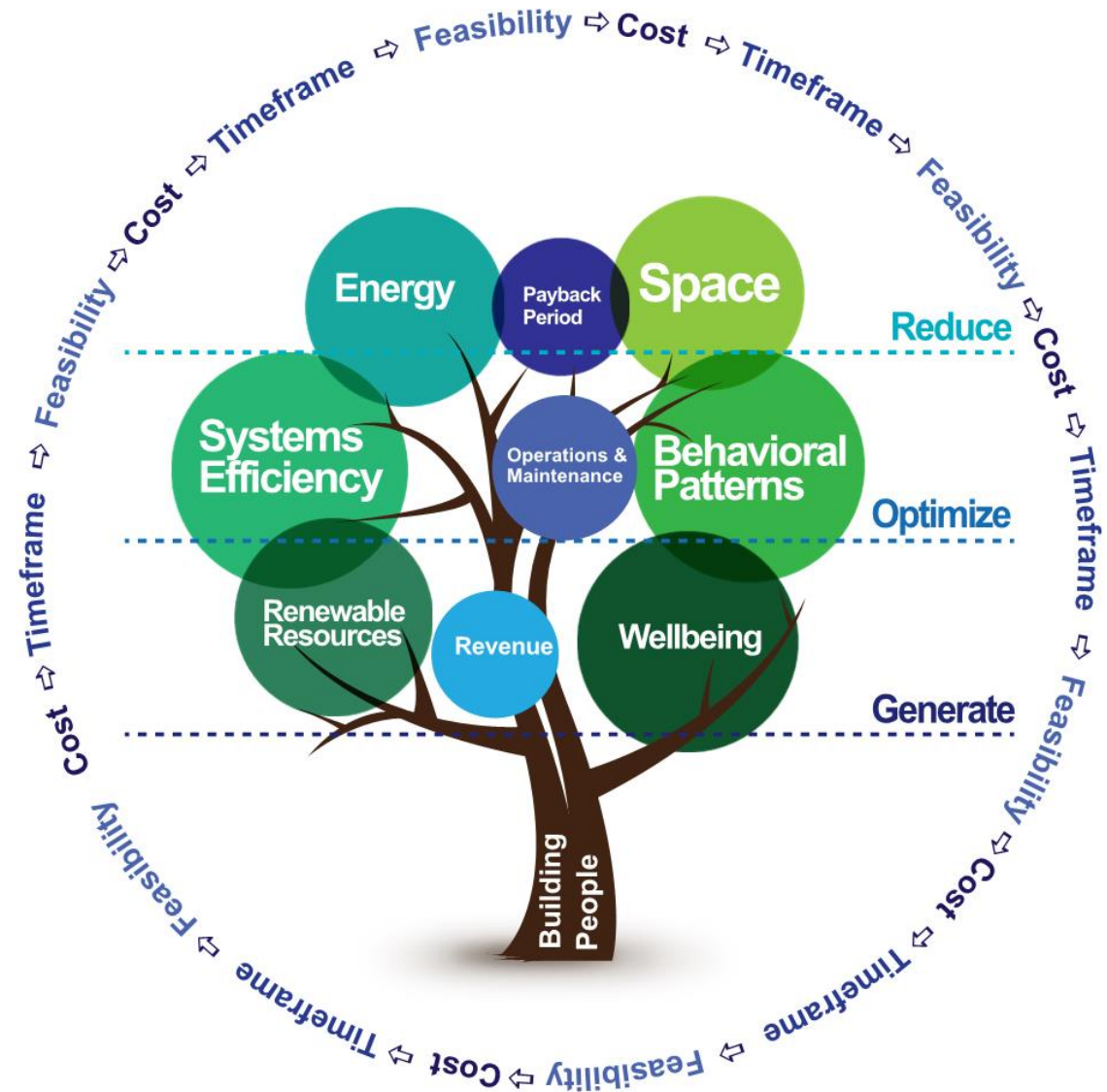
Interface Engineering



# PROJECT GOALS

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- Develop a workplace environment that is state of the art
- Consistent, flexible and adaptable 21st century work environment
- Work environment that makes it easy to collaborate with our members and other partners/ vendors
- Showcase the contributions of Earth and space science
- Push the limits of the building performance in terms of energy, water, the work environment; Net Zero
- Raise the visibility of AGU through this project



# THE EXISTING BUILDING



LOOKING WEST ON FLORIDA AVENUE



CORNER OF 20TH STREET AND FLORIDA AVENUE



LOOKING NORTH UP 20TH STREET



LOOKING EAST ON FLORIDA AVENUE

CURRENT



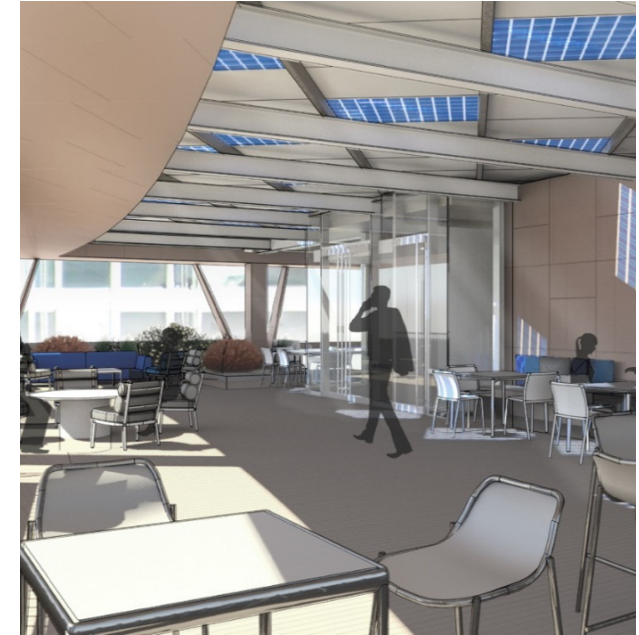
PROPOSED



# THE A & E

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1. Radiant Ceiling Grid & DC lights
2. The Hy-Phy Wall and Biophilia
3. PV Array as Amenity on the Roof
4. Transparency and Openness



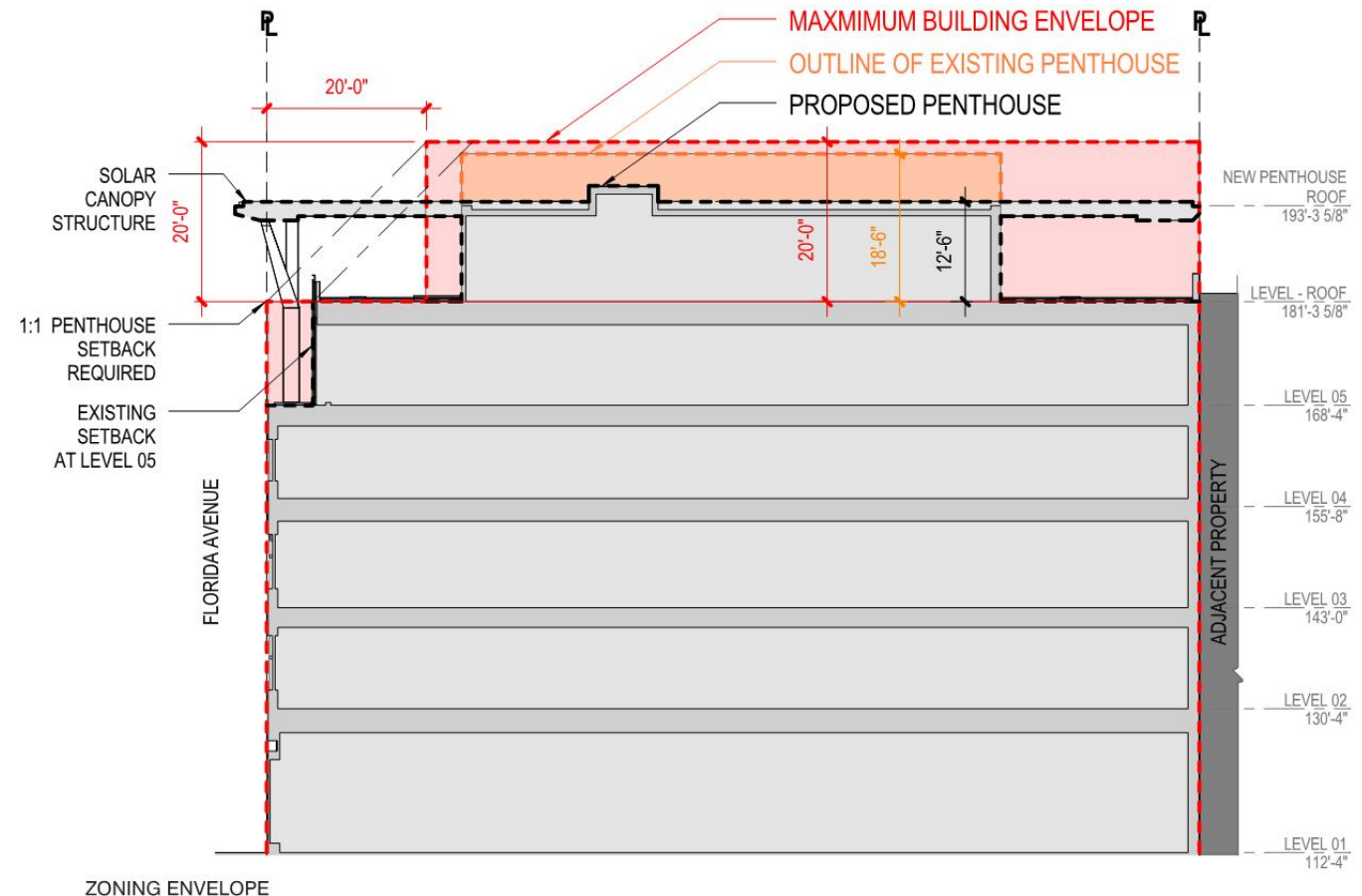
# JURISDICTIONAL

# CHALLENGES & APPROVALS

## COMMUNITY ENGAGEMENT

- ZP&D COMMITTEE OF THE ANC (2/25)
- DUPONT CIRCLE CONSERVANCY (3/08)
- DUPONT CIRCLE CITIZENS ASSOCIATION (3/16)
- COMMUNITY MEETING AT AGU (3/16)
- HISTORIC PRESERVATION REVIEW BOARD HEARING
- ZP&D COMMITTEE OF THE ANC (4/06)
- DUPONT CIRCLE CONSERVANCY (4/12)
- ANC 2B APRIL MEETING (4/13)
- DUPONT CIRCLE CITIZENS ASSOCIATION (5/20)

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# OPENING UP THE NEW BUILDING





A NEW WAY OF WORKING

# EMBODY THE MISSION

**SHARED SPACES** .....  
PRE-FUNCTION SPACE AT  
EXECUTIVE CONFERENCING

**SHARED SPACES** .....  
SEMI-PRIVATE MEETING  
SPACES FOR OPEN TEAMING

**QUIET SPACES** .....  
FOR FOCUSED WORK OR  
PRIVATE MEETINGS

**IMPROVED CIRCULATION** .....  
PERIMETER & VERTICAL  
CONNECTION AT ALL AGU  
WORK FLOORS



**FORMAL  
CONFERENCING  
AT PROW**

**ARRIVAL LOBBY  
FEATURING "CROSS  
SECTION THROUGH  
MEMBER SCIENCE"  
WALL**

**OPEN OFFICE  
PERSONAL WORKSPACE  
FOR INCREASED  
COLLABORATION**

A NEW WAY OF WORKING

# EMBODY THE MISSION

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Typical Open Office

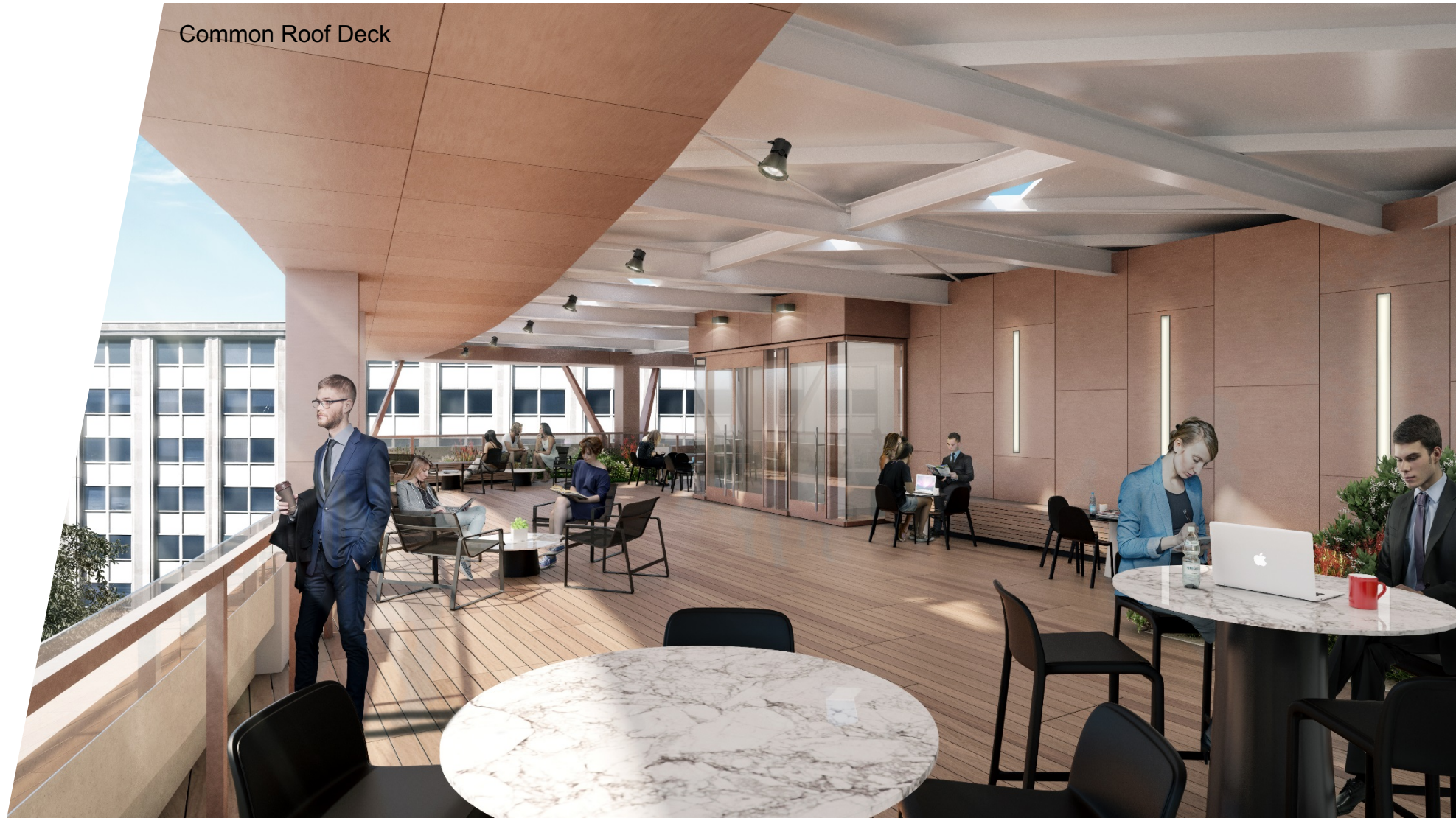


A NEW WAY OF WORKING

# EMBODY THE MISSION

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Common Roof Deck



THINKING ABOUT THE OCCUPANTS  
**WELLNESS**

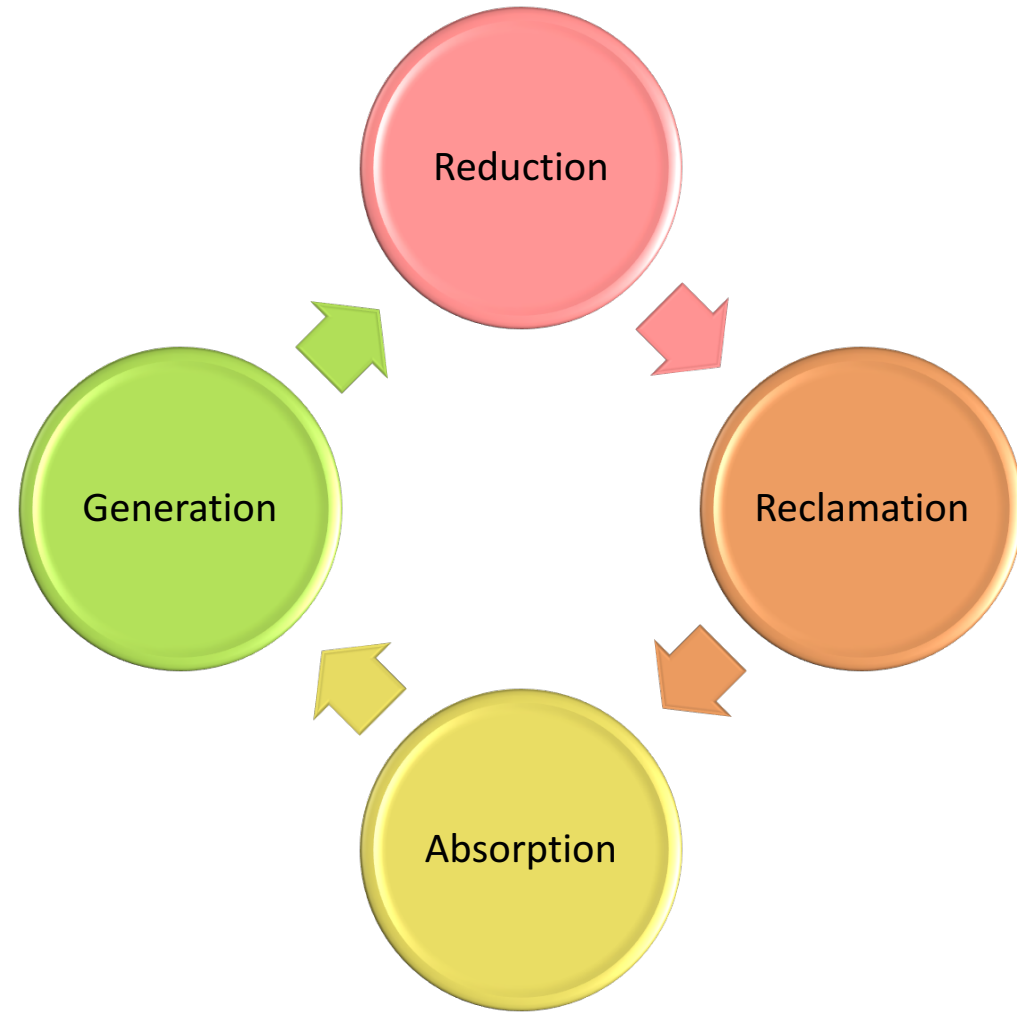
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HIGH PERFORMANCE DESIGN

# METHODOLOGY

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# EXPLORING ALL OF THE OPTIONS

# PROCESS

B4-a	Building Energy Dashboard
B2-d	Cloud-based Computing
C6-b	Daylight Optimization
C3-e	DOAS System
F3	Eco-District Designation
F2-b	Electric Vehicle/Battery Storage
C7	ENERGY STAR Appliances
C5	Enhanced Glazing
C3-f	Geothermal System
C1-c	Grey Water Reclamation
C3-h	Heat Recovery Wheel
C3-i	High Efficiency Motors
B5-c	Hydroponic Phytoremediation
C2-f	Integrated Wind Turbines
C6-a	High Efficiency Lighting
C5-f	Phase Change Material Walls
<b>C3-c</b>	<b>Radiant Ceiling</b>
A2-b	Roof Garden
C3-b	Municipal Heat Extraction
C4-a	Solar Hot Water System
C2-a	Solar PV Array
C1-a	Storm/Condensate Water Capture
C3-k	Variable Refrigerant Flow (VRF)
C3-j	VFD's on 3-phase Motors

**Sustainable Strategies**  
American Geophysical Union  
2015-0338

Prepared for:  
American Geophysical Union

Prepared by:  
Roger Frechette, PE, LEED AP - Managing Principal  
Kevin Cahill, PE, LEED AP - Mechanical

Percent EUI Contribution
<b>Radiant Ceiling</b>
<b>12.3%</b>

First Draft  
August 26, 2015

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**INTERFACE ENGINEERING**

**Sustainable Strategies**  
American Geophysical Union  
2015-0338

Prepared for:  
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Percent EUI Contribution
<b>Hydroponic Phytoremediation</b>
<b>N/A</b>

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**INTERFACE ENGINEERING**

**Sustainable Strategies**  
American Geophysical Union  
2015-0338

Prepared for:  
American Geophysical Union

Prepared by:  
Roger Frechette, PE, LEED AP - Managing Principal  
Kevin Cahill, PE, LEED AP - Mechanical

Percent EUI Contribution
<b>Concentrators Solarium</b>
<b>19.9%</b>

First Draft  
August 26, 2015

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**INTERFACE ENGINEERING**

# HIGH PERFORMANCE DESIGN STRATEGIES

- Solar Photovoltaics (PV)
- Enhanced Envelope Insulation
- Free Cooling Condenser Operation
- DC Powered Workspace
- Direct Current LED Lighting
- Hydroponic Phytoremediation (Hy-Phy)
- Heat Recovery Water Chiller
- Dynamic Glass Shading
- Triple-Pane Glazing
- Dedicated Outside Air System (DOAS)
- Exhaust Air Heat Recovery
- Rain Water Collection & Reuse
- Daylight Responsive Controls (DRC)
- Dynamic Toilet Room Exhausting
- Variable Frequency Drives
- Radiant Ceiling Cooling System
- Occupancy Sensors & Controls
- Condensate Water Collection & Reuse
- Sewer Heat Exchange System
- Low-Flow Plumbing Fixtures
- Recycled Water Flushing
- Access Control – Power Management
- Energy Usage Display Monitors



# HIGH PERFORMANCE DESIGN STRATEGIES

- **Solar Photovoltaics (PV)**
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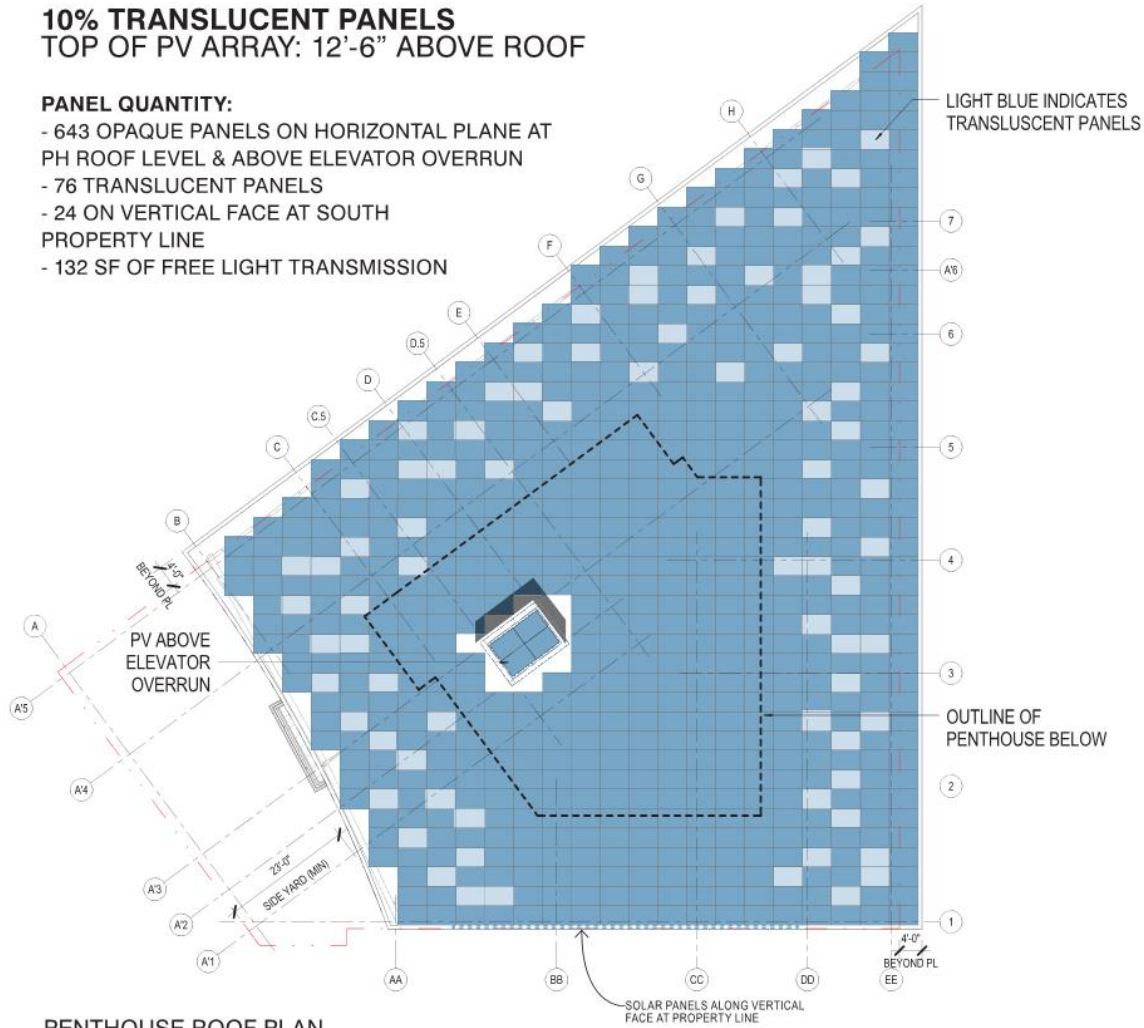




**10% TRANSLUCENT PANELS**  
 TOP OF PV ARRAY: 12'-6" ABOVE ROOF

**PANEL QUANTITY:**

- 643 OPAQUE PANELS ON HORIZONTAL PLANE AT PH ROOF LEVEL & ABOVE ELEVATOR OVERRUN
- 76 TRANSLUCENT PANELS
- 24 ON VERTICAL FACE AT SOUTH PROPERTY LINE
- 132 SF OF FREE LIGHT TRANSMISSION

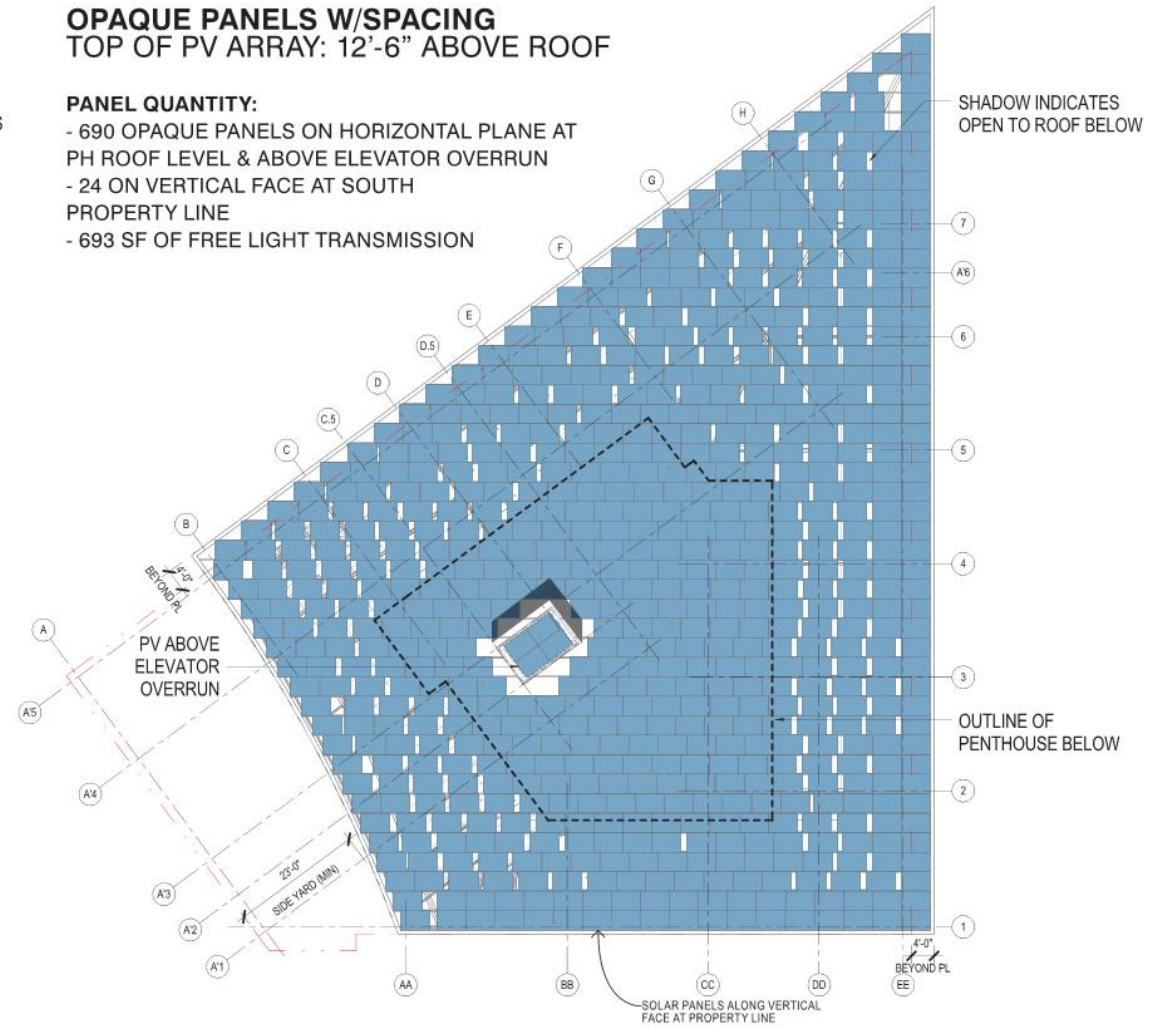


PENTHOUSE ROOF PLAN  
 5/26 - HPRB SUBMISSION

**OPAQUE PANELS W/SPACING**  
 TOP OF PV ARRAY: 12'-6" ABOVE ROOF

**PANEL QUANTITY:**

- 690 OPAQUE PANELS ON HORIZONTAL PLANE AT PH ROOF LEVEL & ABOVE ELEVATOR OVERRUN
- 24 ON VERTICAL FACE AT SOUTH PROPERTY LINE
- 693 SF OF FREE LIGHT TRANSMISSION



7/15 REVISED - PV PANEL LAYOUT

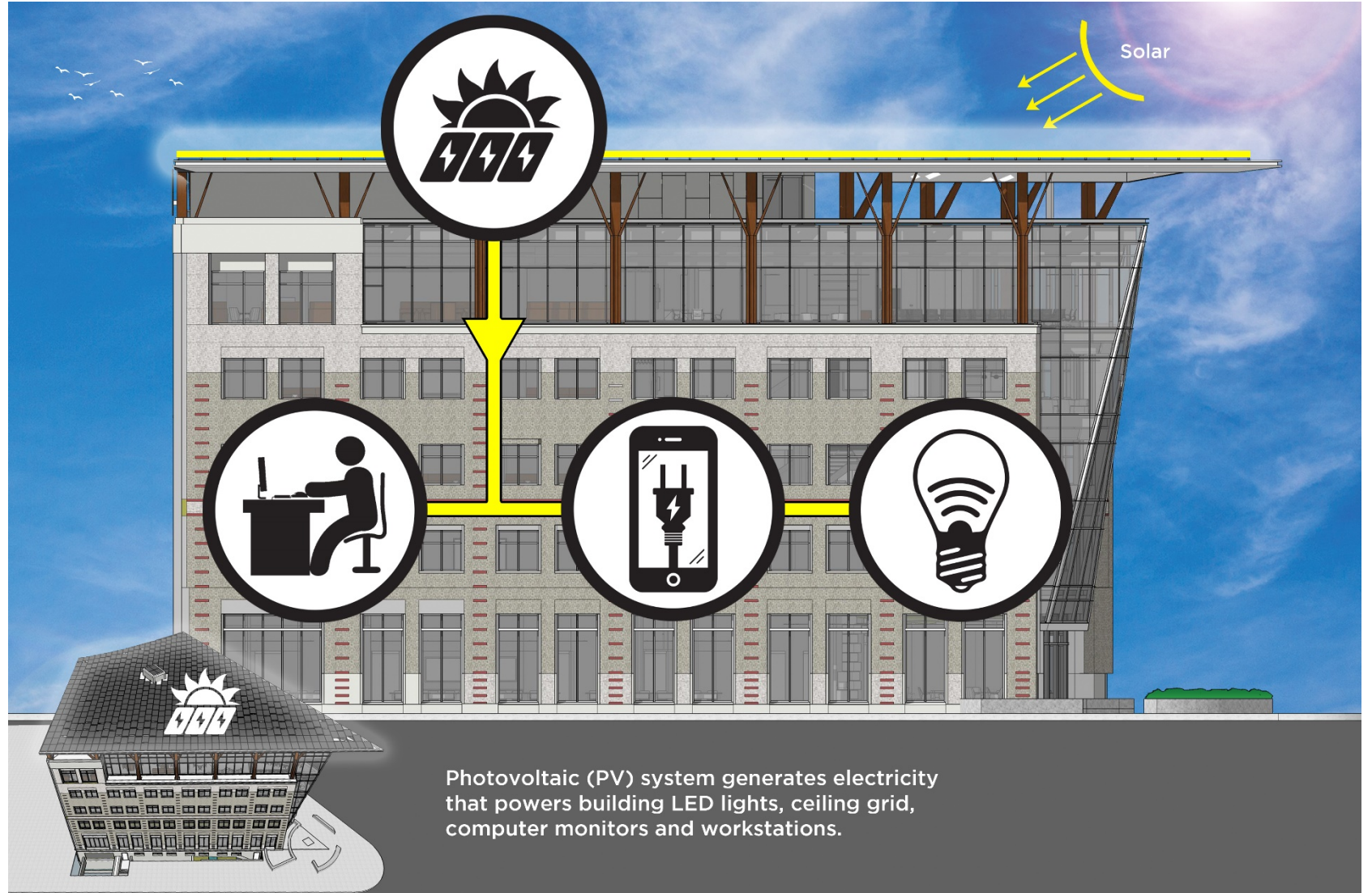
# PHOTOVOLTAIC ARRAY AND THE DC GRID



16-Port DC Power Module



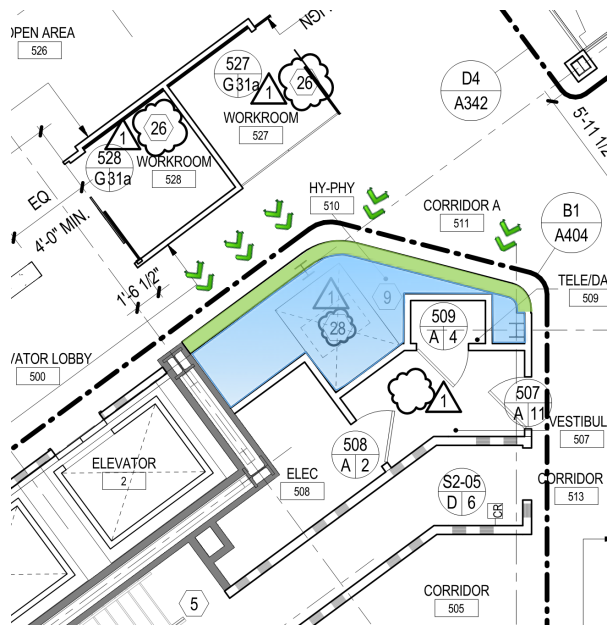
Electrified Ceiling Grid



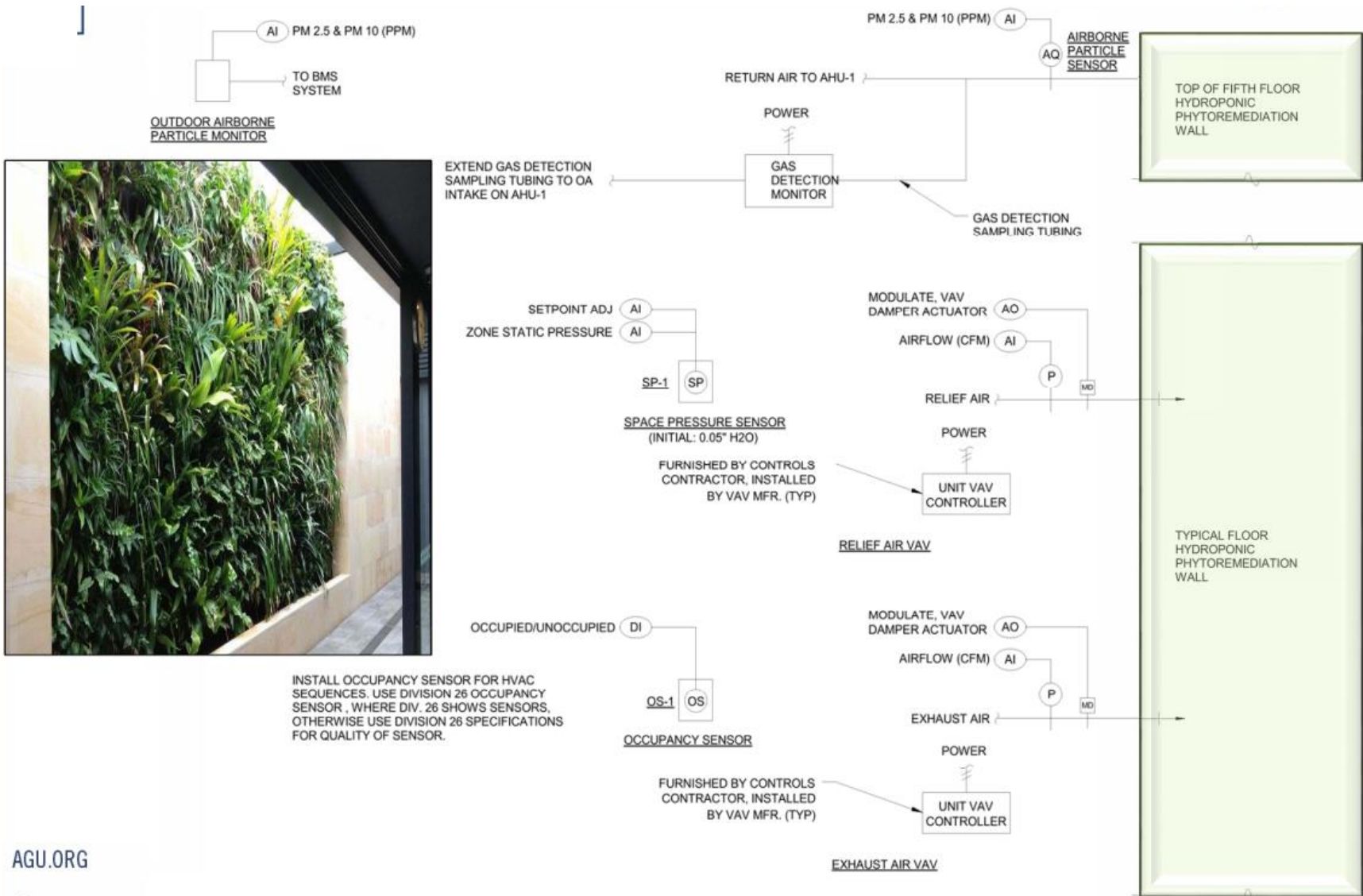
Photovoltaic (PV) system generates electricity that powers building LED lights, ceiling grid, computer monitors and workstations.

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## PHOTOVOLTAIC ARRAY AND THE DC GRID



**HYDROPONIC PHYTOREMEDIATION 'HY-PHY' WALL**

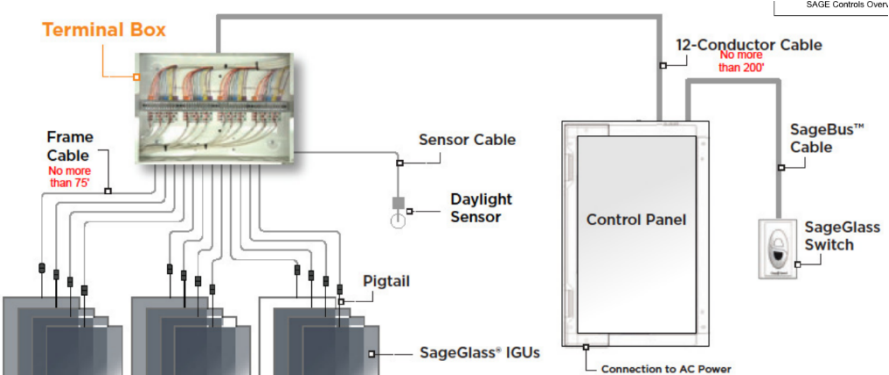


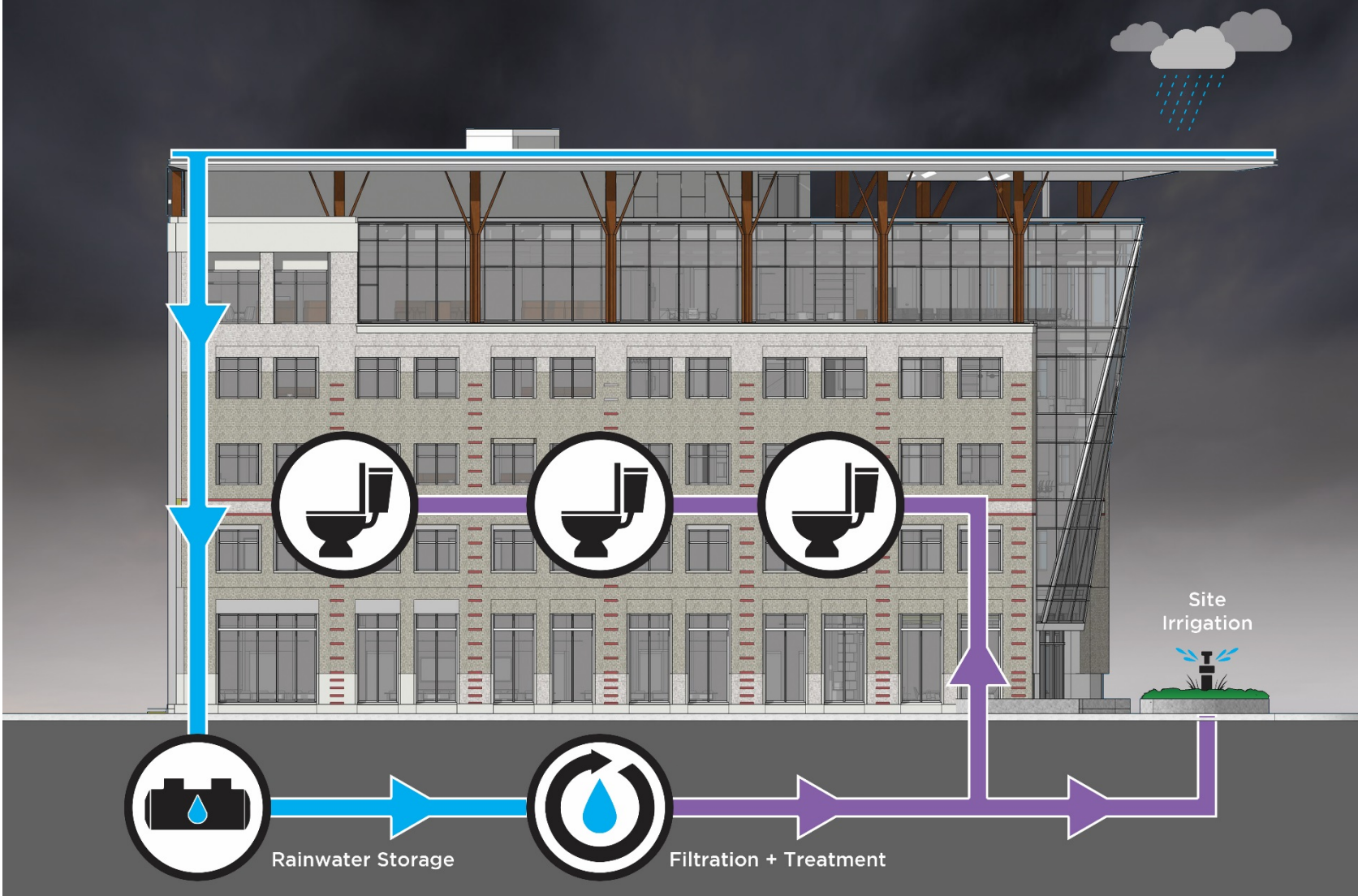
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# HYDROPONIC PHYTOREMEDIATION 'HY-PHY' WALL



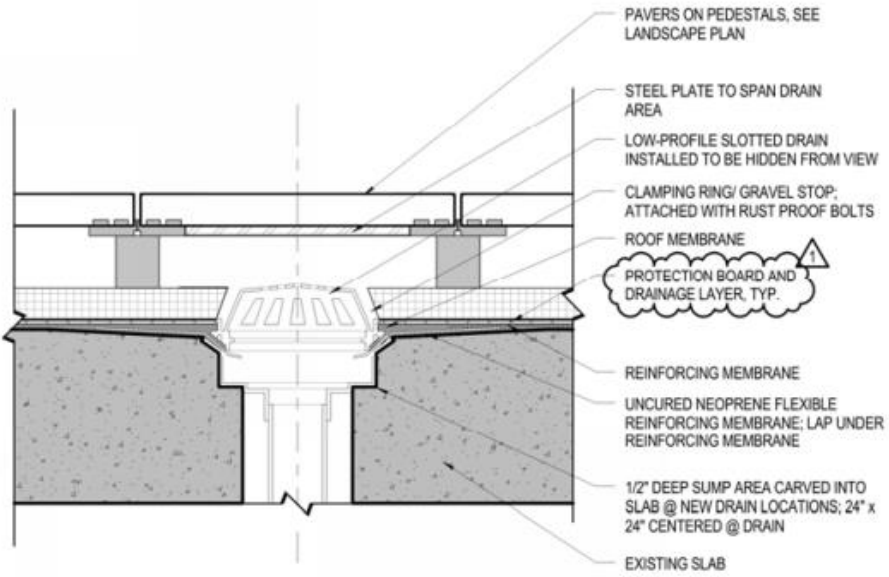
# DYNAMIC GLAZING



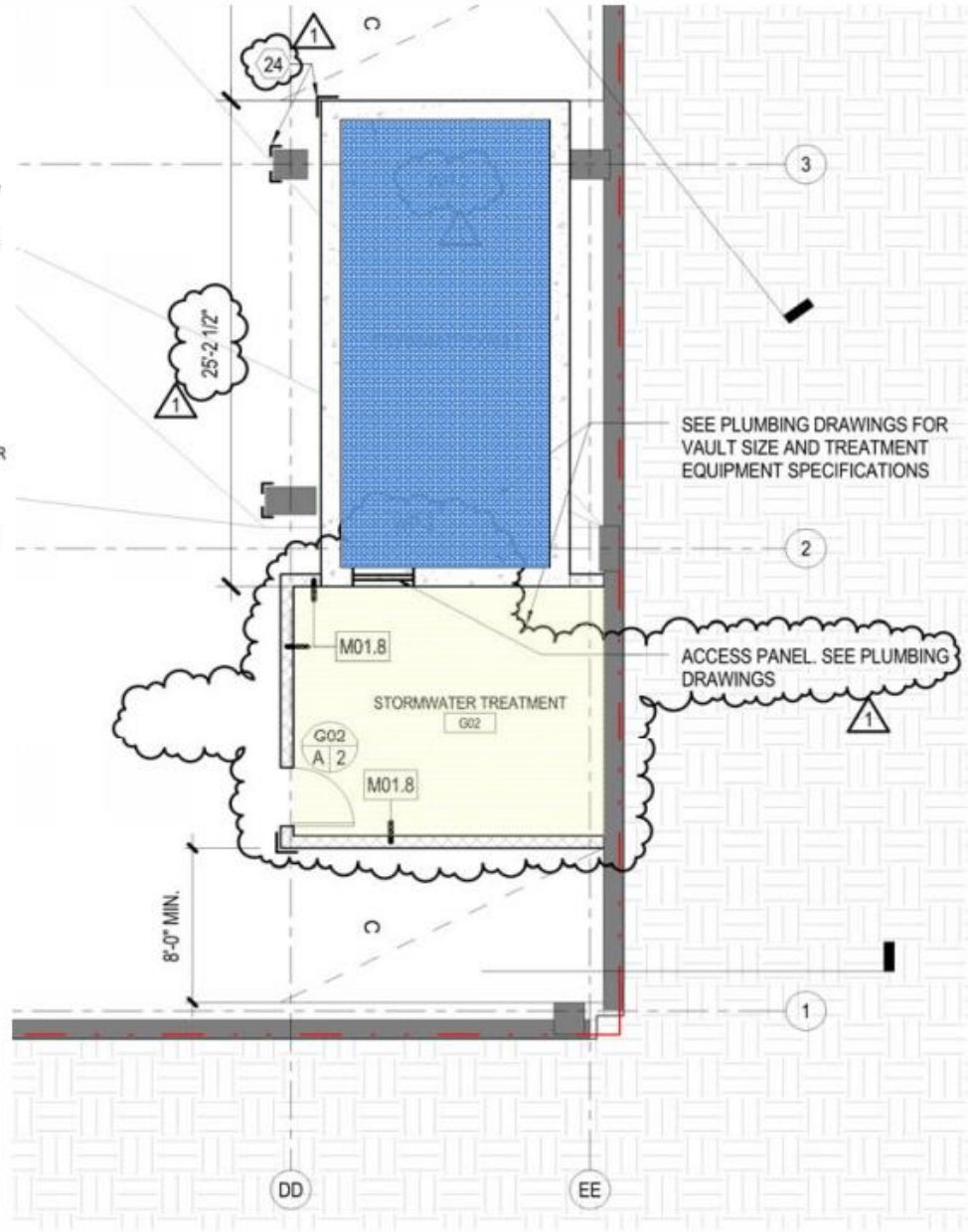


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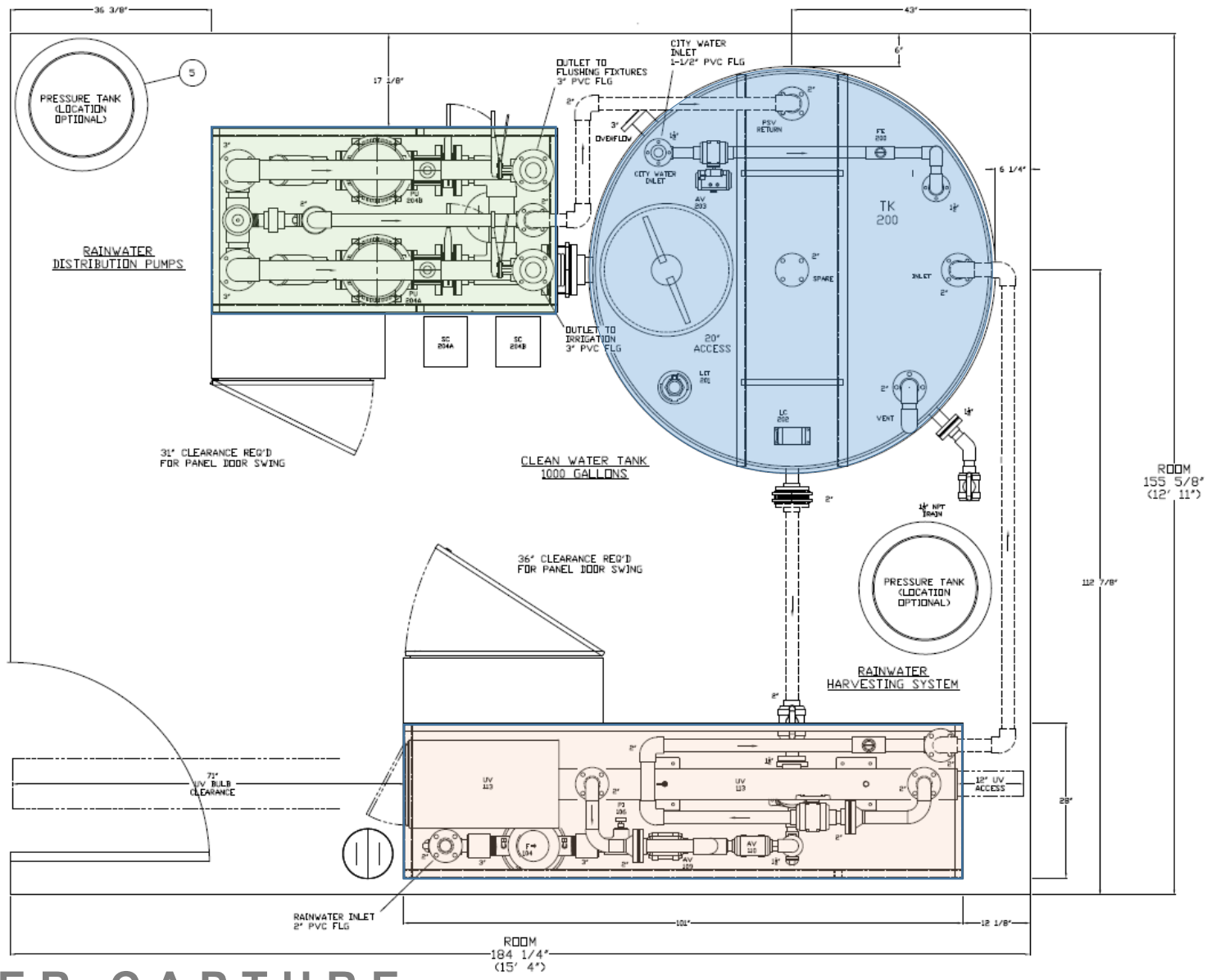
RAIN WATER CAPTURE  
AND REUSE



Storage Capacity  
Storm Water Vault  
= 11,300 gallons

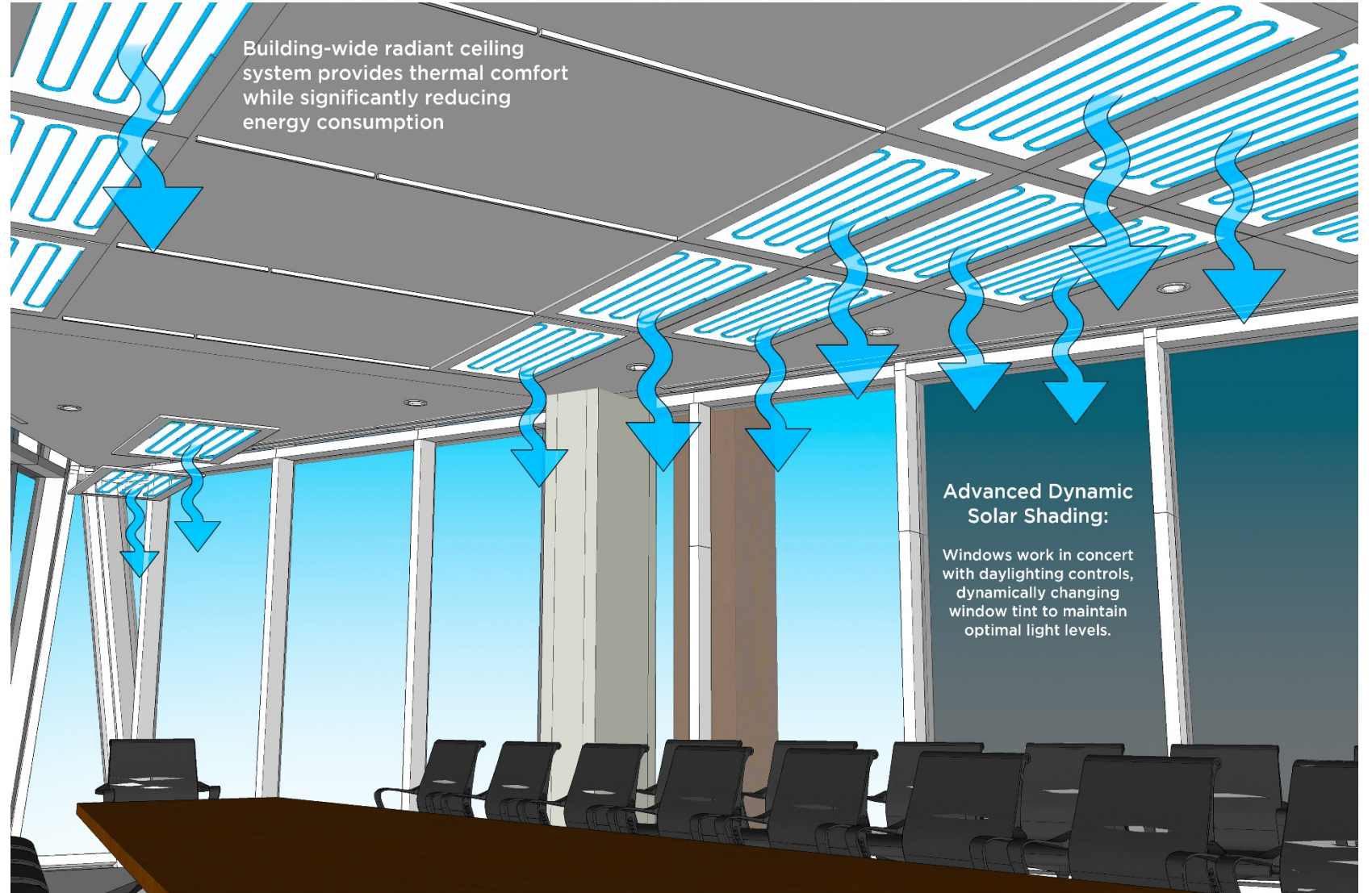


# RAIN WATER CAPTURE AND REUSE



# RAIN WATER CAPTURE AND REUSE





Building-wide radiant ceiling system provides thermal comfort while significantly reducing energy consumption

**Advanced Dynamic Solar Shading:**

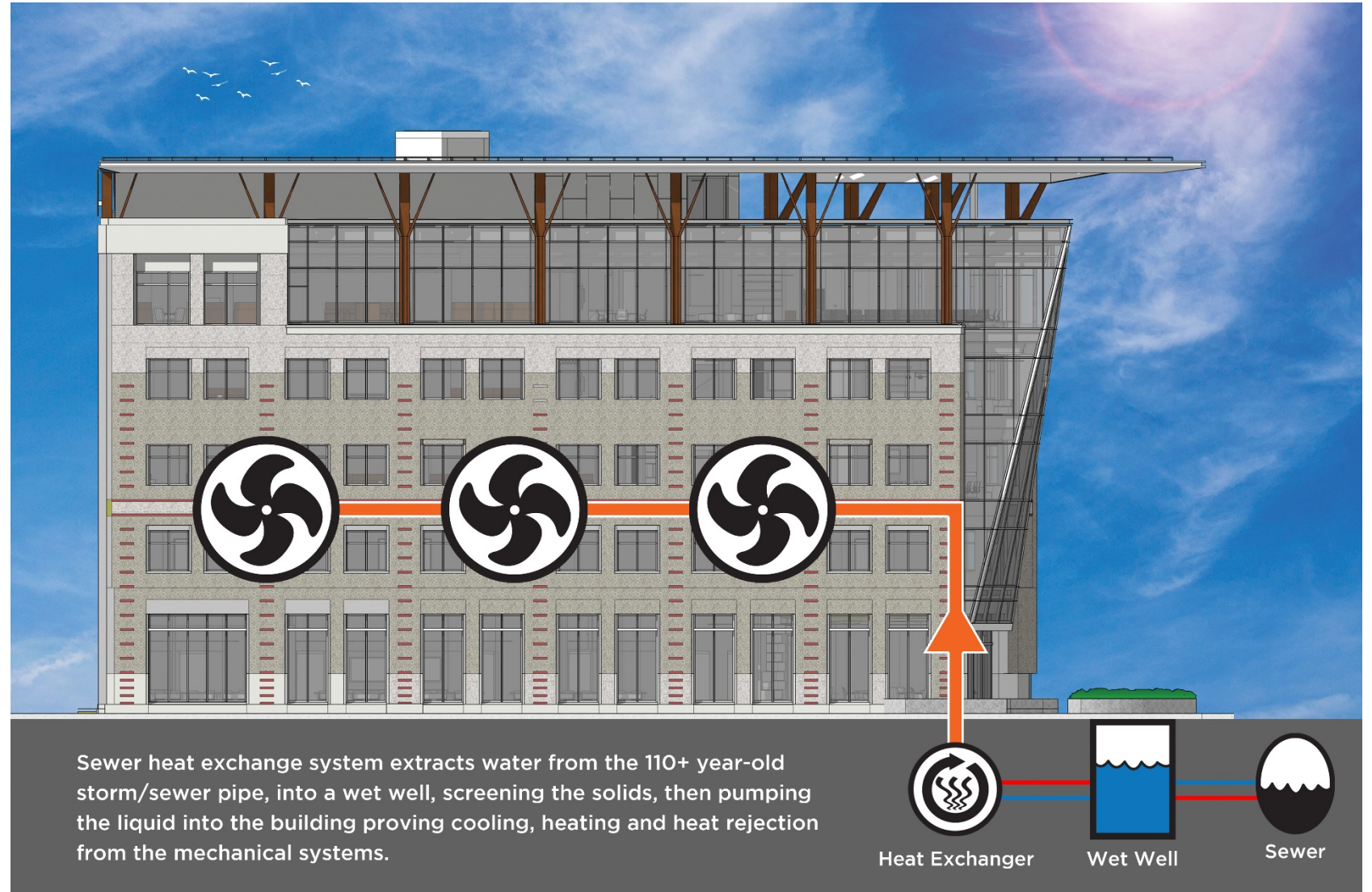
Windows work in concert with daylighting controls, dynamically changing window tint to maintain optimal light levels.

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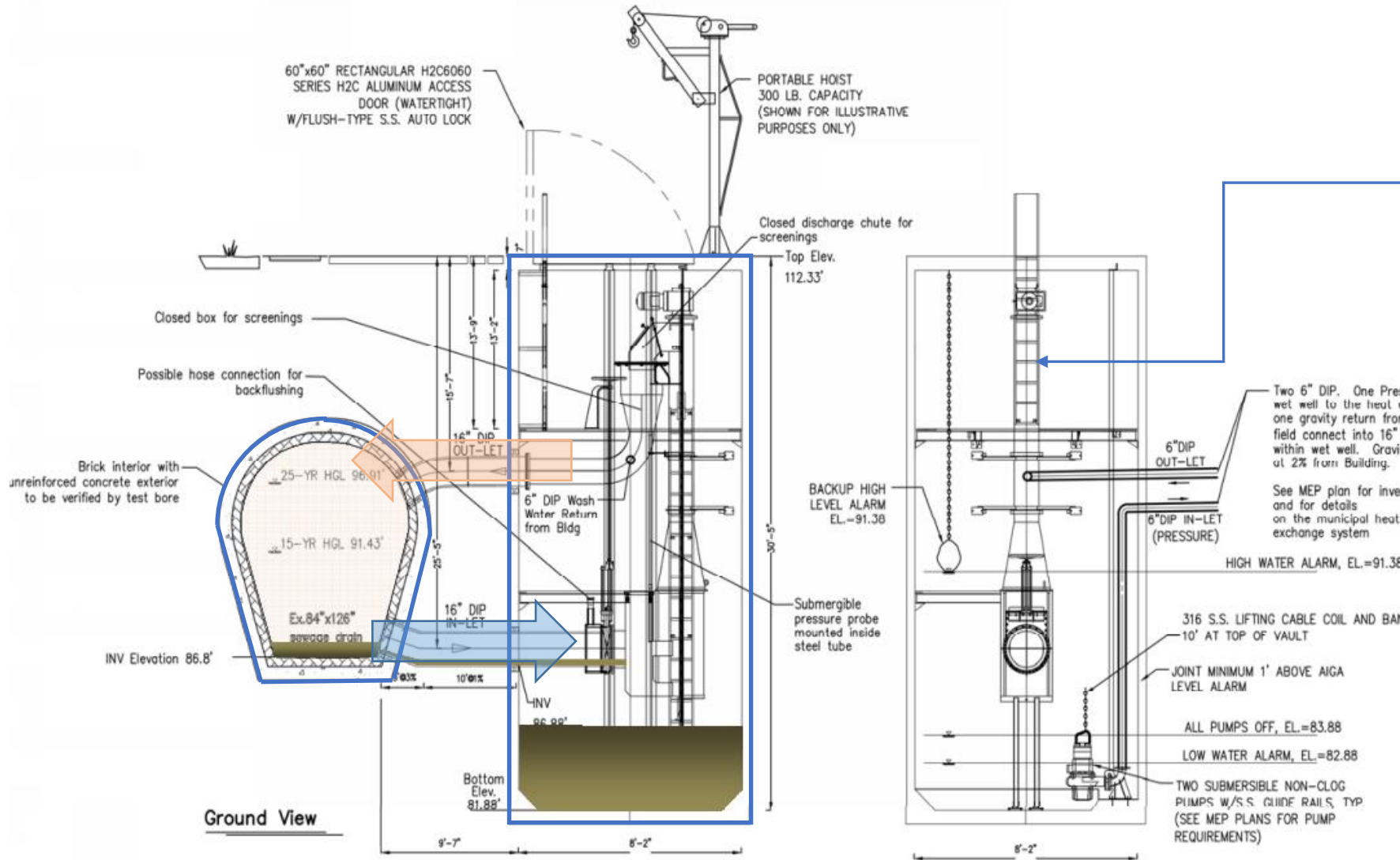
## RADIANT CEILING SYSTEM



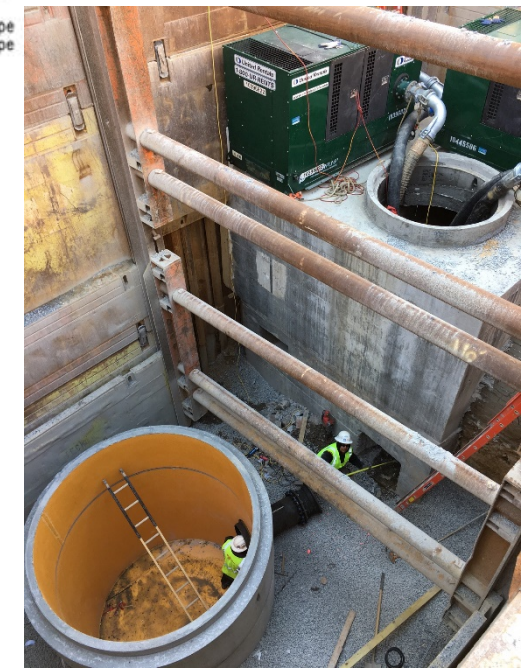
8' x 8' – 150 year old sewer



## MUNICIPAL HEAT EXCHANGE



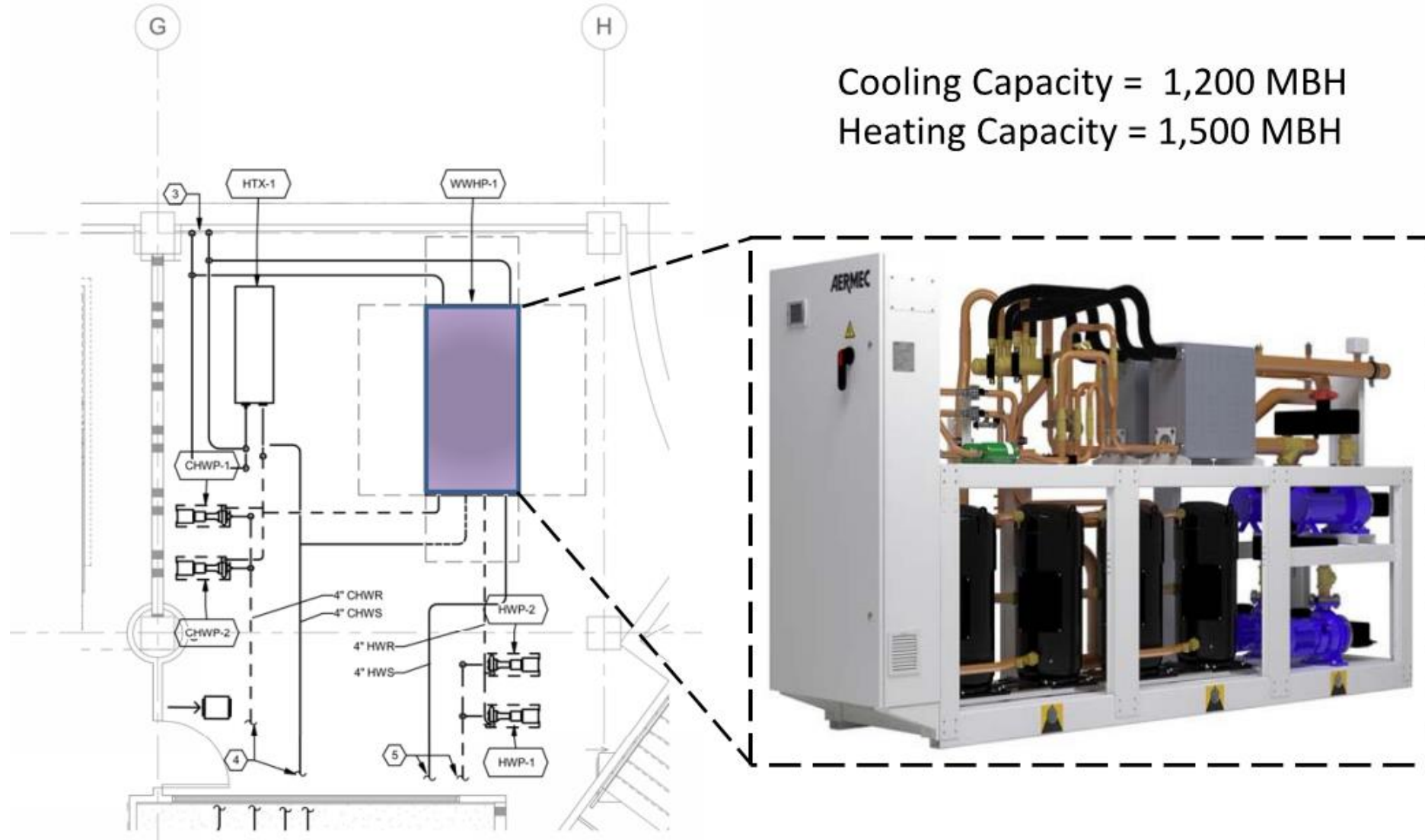
Screening Pump



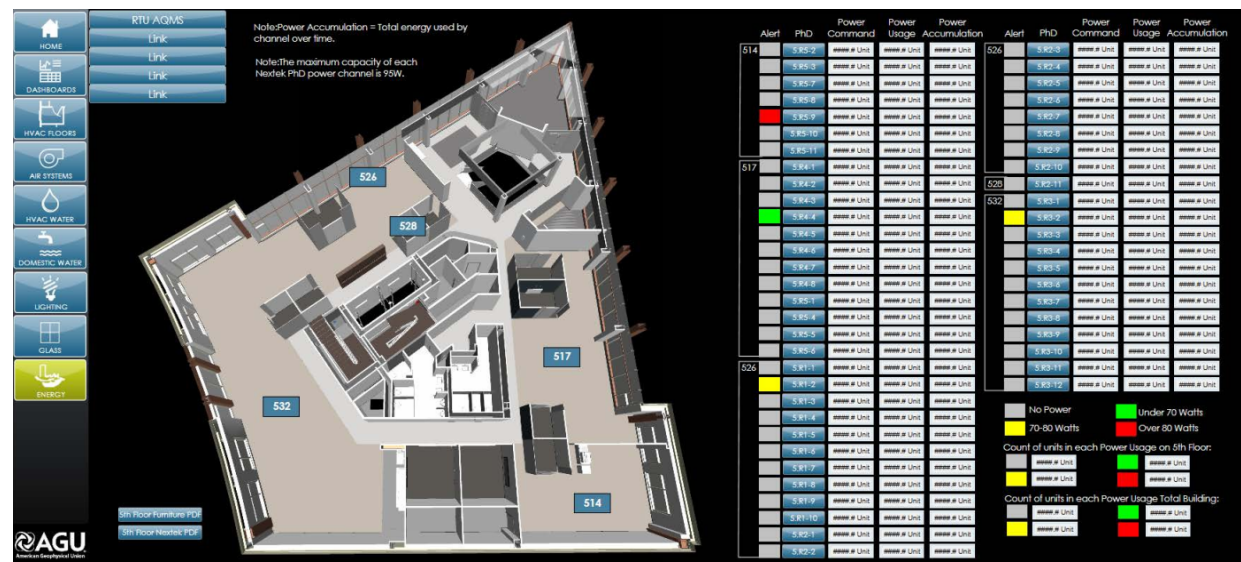
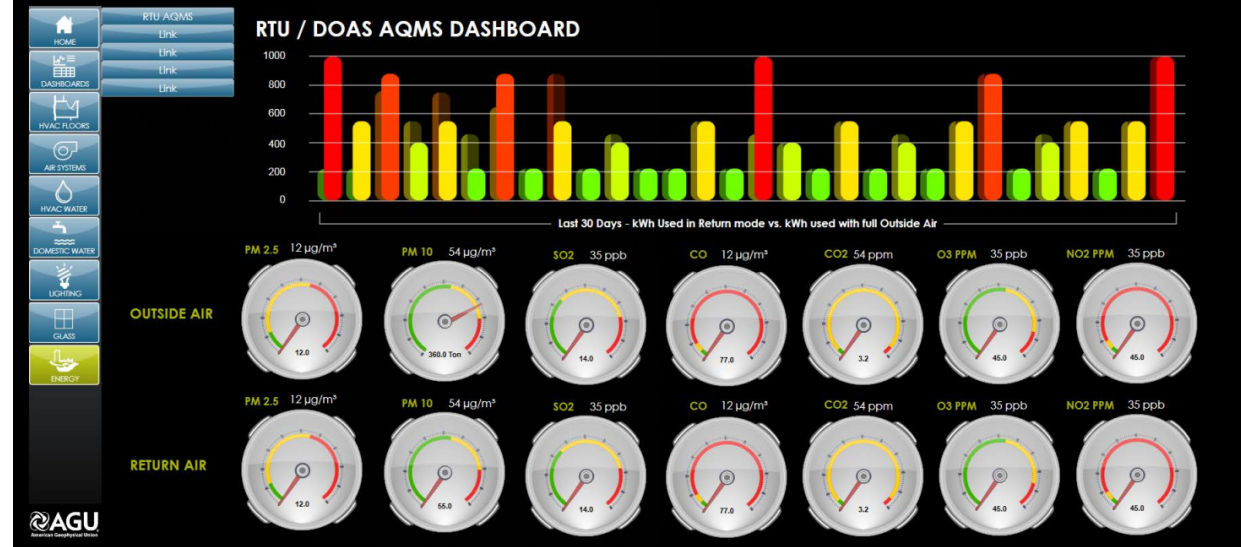
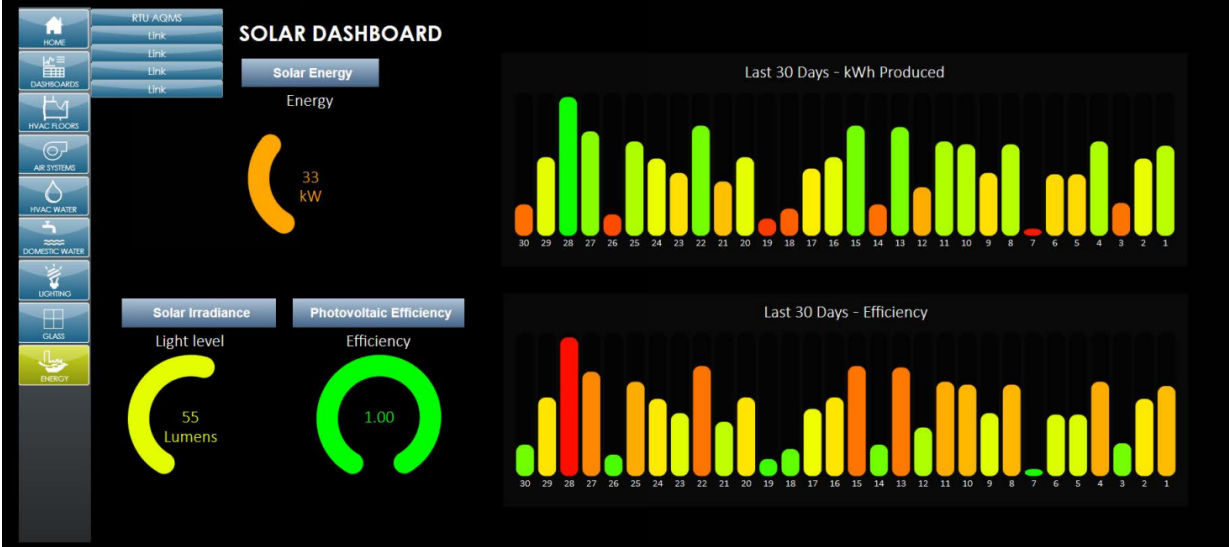
Wet Well & Sewer Connection

# MUNICIPAL HEAT EXCHANGE

Cooling Capacity = 1,200 MBH  
Heating Capacity = 1,500 MBH



**MUNICIPAL HEAT EXCHANGE**



# INTEGRATED BUILDING TECHNOLOGIES

A 21<sup>st</sup> CENTURY

# HEADQUARTERS



# Q&A

