Building Graphics Design

Getting More with Better Visuals

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Course Description

Building Graphics Design

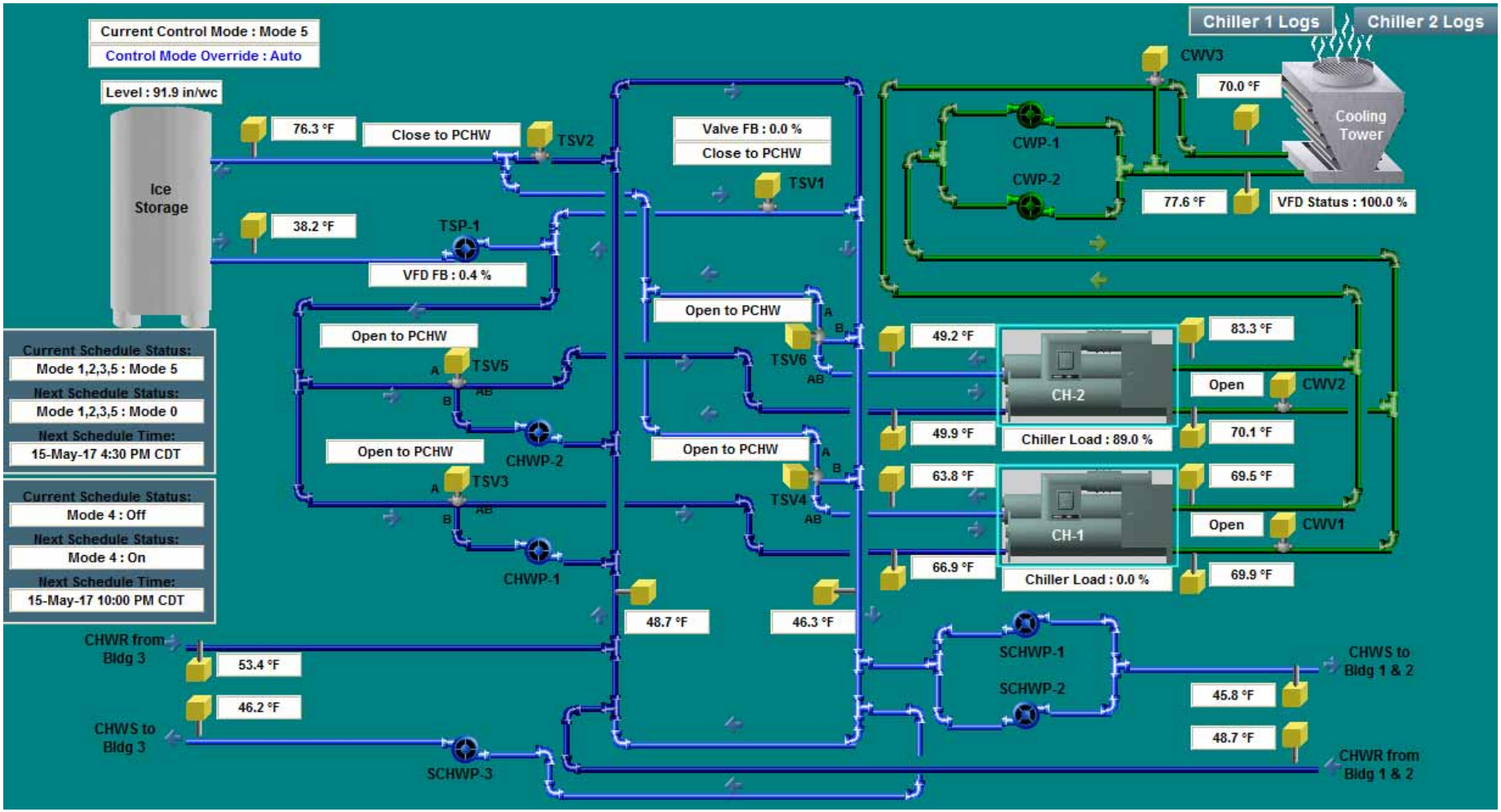
Getting More with Better Visuals

Building graphics (web-based interfaces that visualize building automation system operations) are essential for monitoring HVAC, lighting, and energy performance. Despite decades of use, their effectiveness in supporting operators and planners is often limited. Many graphics are siloed, inconsistent, and misleading, creating operational challenges. This session, supported by field photos and examples, demonstrates how poor graphics hinder decision-making and system understanding. Drawing from information visualization, industrial control, and commissioning best practices, it presents design strategies that improve usability, accuracy, and efficiency. Attendees will gain practical guidance to strengthen local facility interfaces before relying solely on cloud-based dashboards and analytics tools.

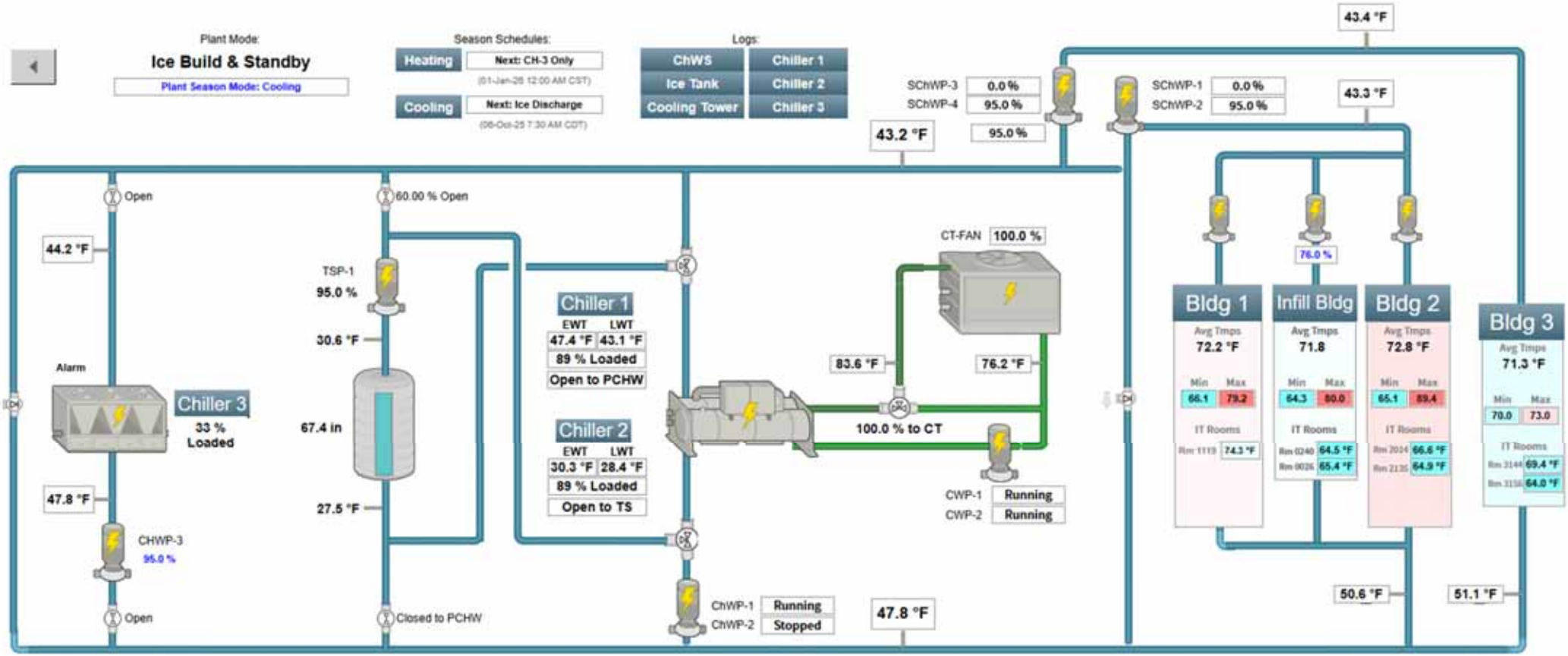
Learning Objectives

1. **Understand** the role of building graphics in representing building system operations
2. **Identify** issues in usability and accuracy issues for common building graphics
3. **Apply** design principles to improve HVAC, lighting, and building energy system visuals
4. **Create** best practices and new standards from published resources related to building graphics usability

What's wrong with this picture?

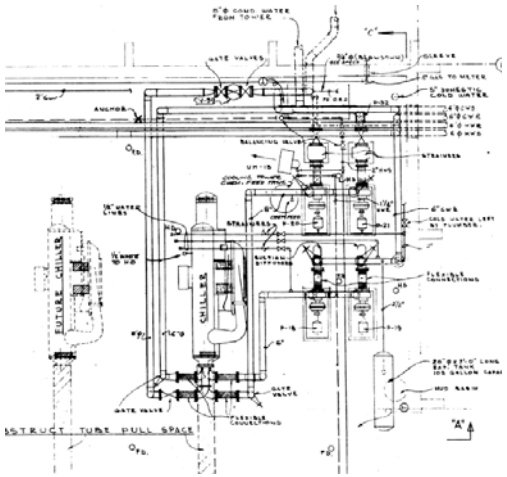


Building graphics are key to understanding & optimizing our systems

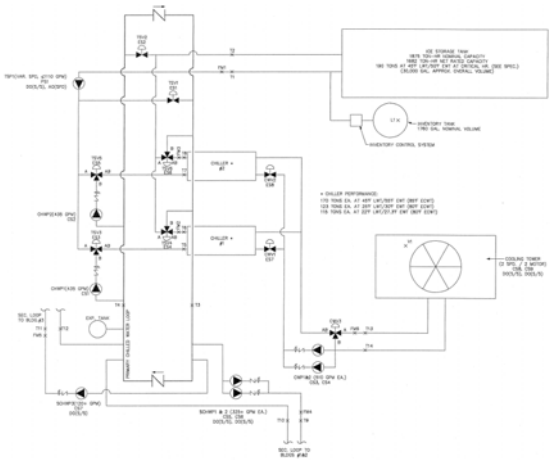


What drives the layout of our most important building graphics?

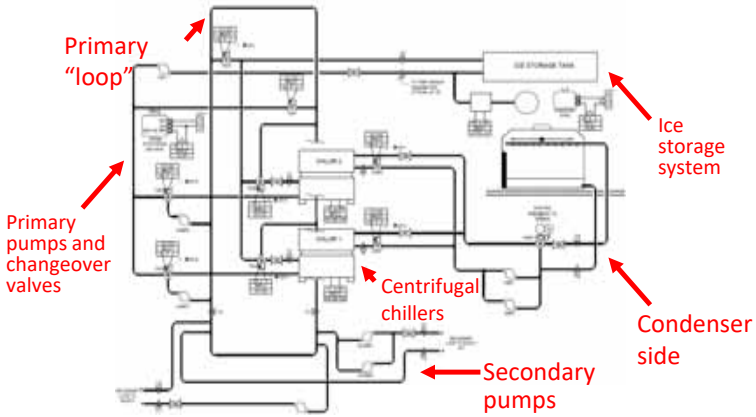
1968 HVAC Layout



1994 Piping Diagram



2005 Controls Drawing



I have 2 perspectives to share today on building graphics

Former Army Mechanic

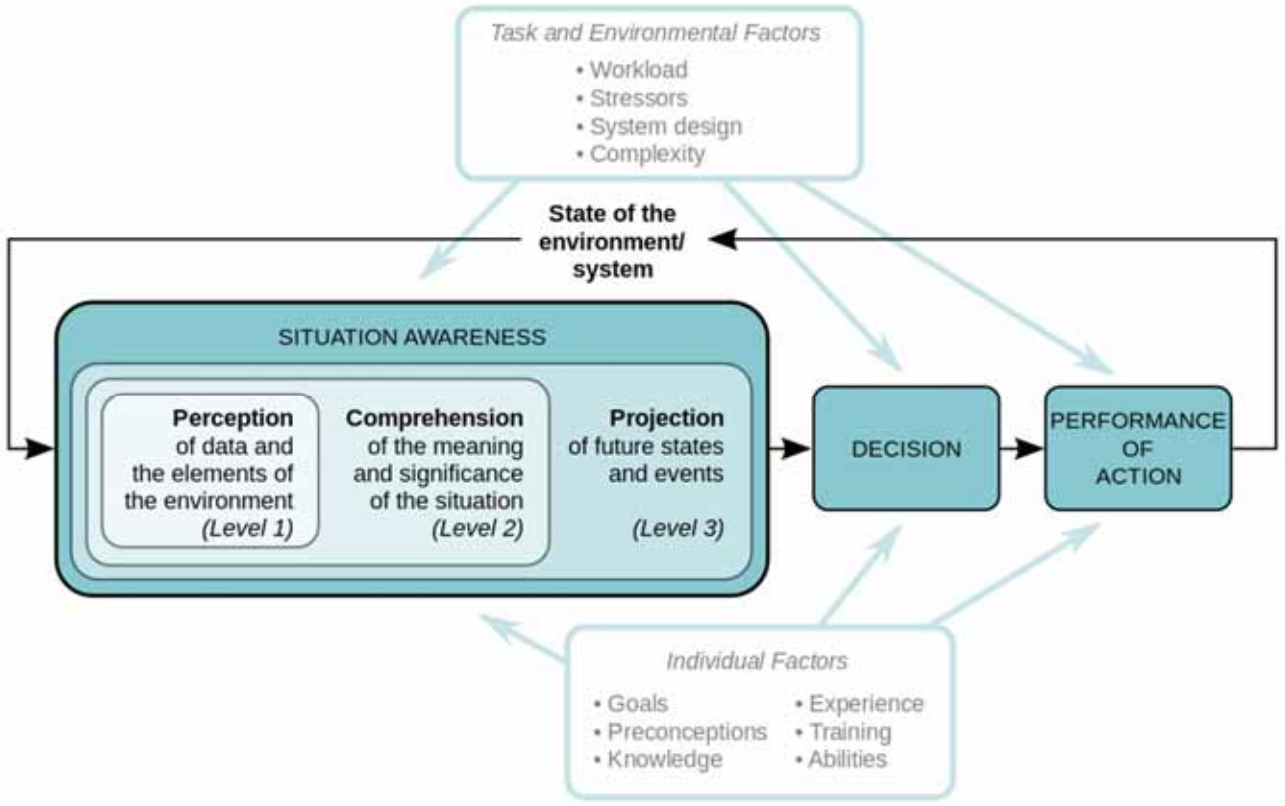
“we have sh!t graphics that don’t tell us much and wonder why it’s hard to get things working right”

Current Research Engineer

“The facility interface requires modernization using information visualization principles and cross-domain practices to improve usability”

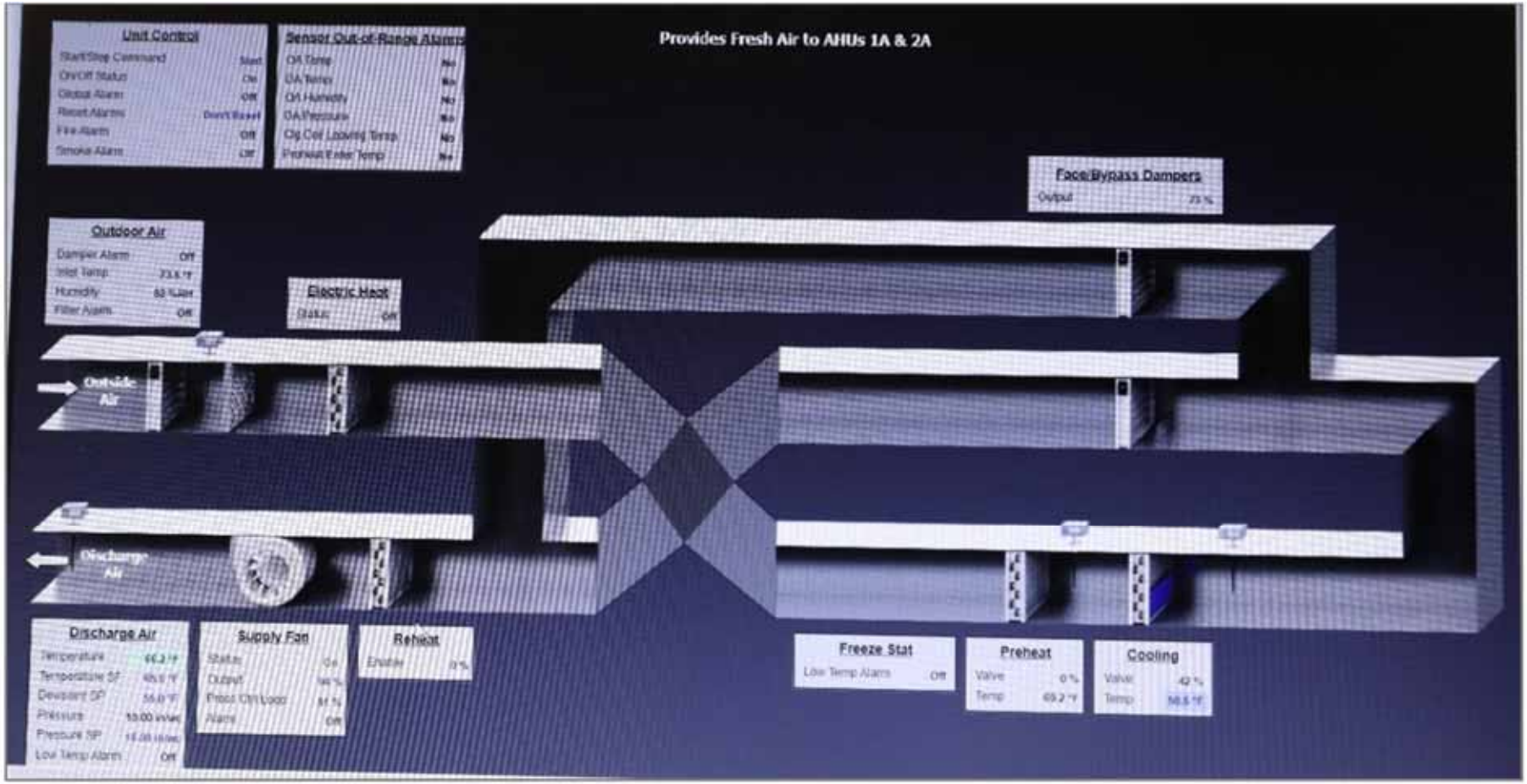
Building graphics should provide the right *Awareness* to FM roles

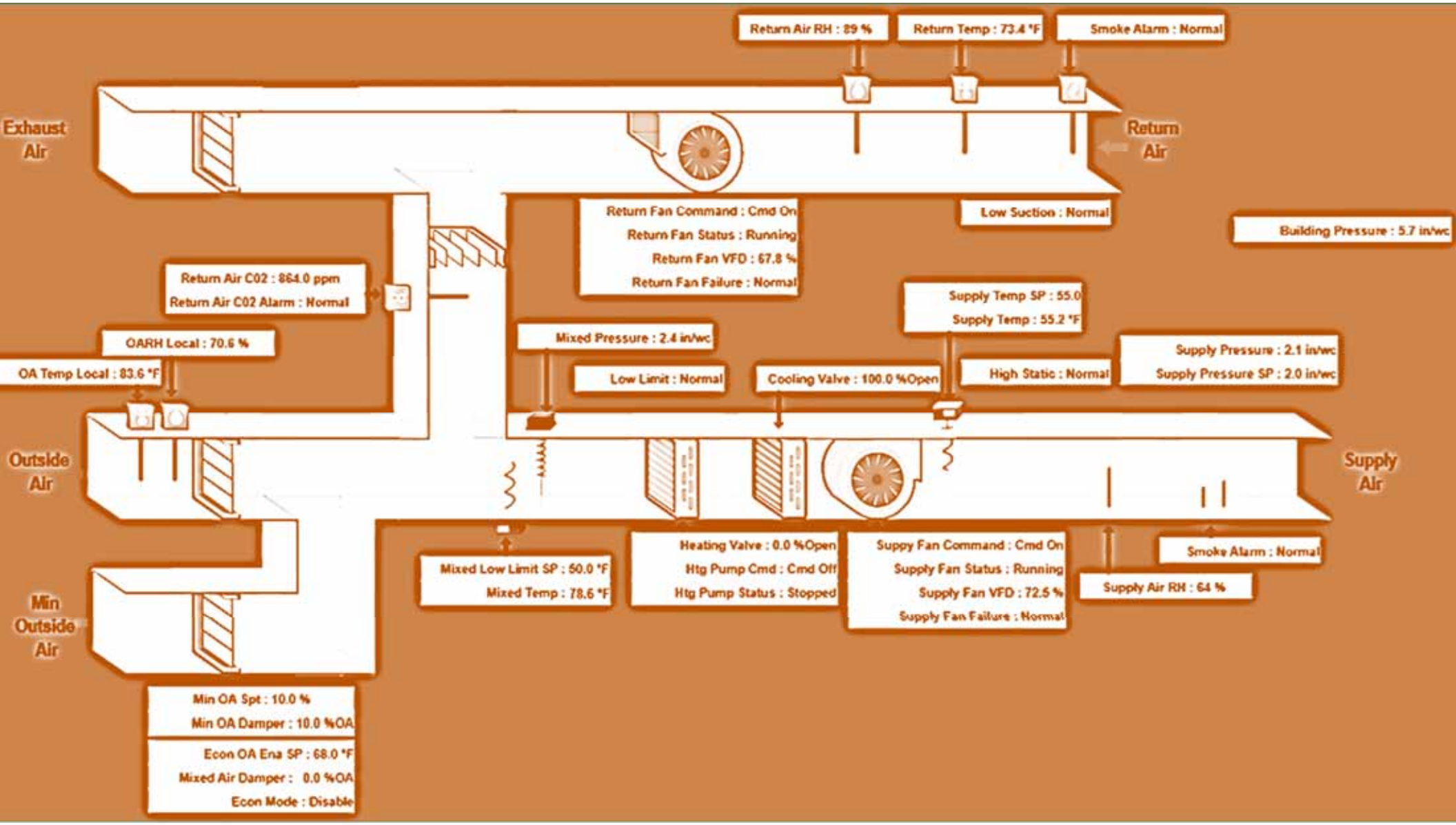
1. What is <u>happening</u>?
   - clean displays & arranged elements
   - custom role access & navigation
2. What does it <u>mean</u>?
   - system diagram layouts with context
   - not just raw data, with info layering
3. What <u>will</u> happen?
   - prioritized user notifications and displays
   - KPI trends that reveal key trends
   - resources & actions as decision-making support

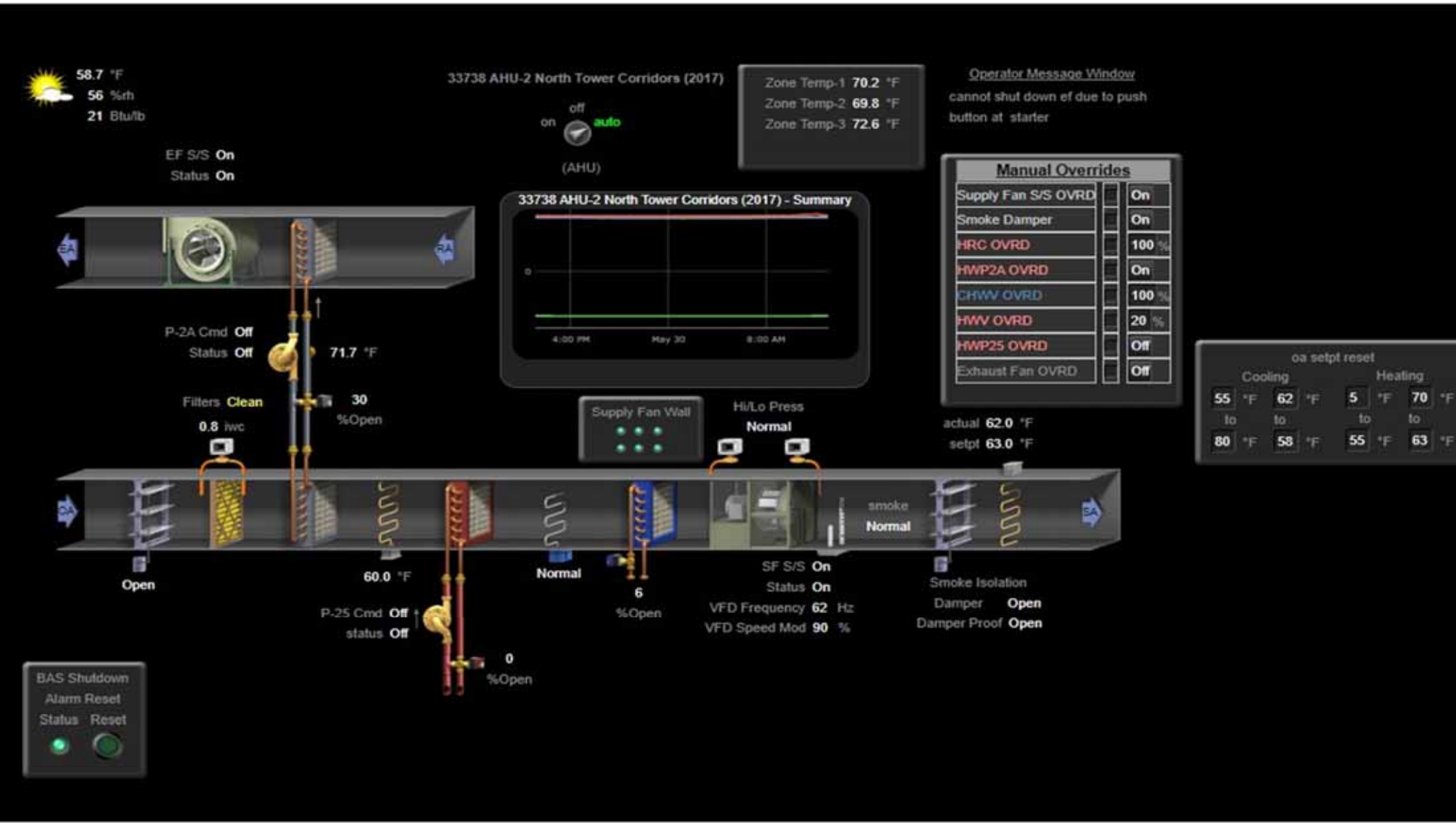


Endsley (1995)

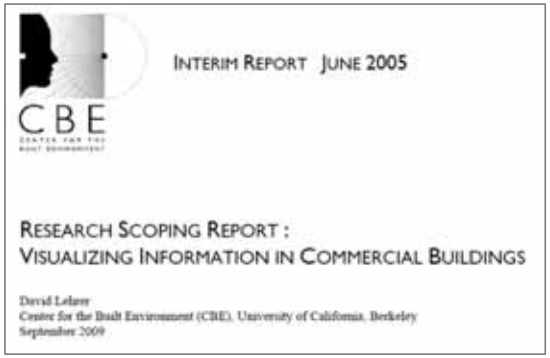
How’s our awareness level here?

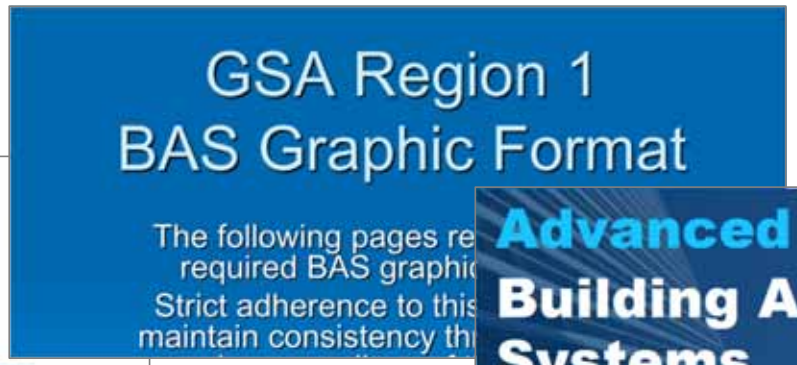



Return Air RH : 89 %
Return Temp : 73.4 °F
Smoke Alarm : Normal
Exhaust Air
Return Air
Return Fan Command : Cmd On
Return Fan Status : Running
Return Fan VFD : 67.8 %
Return Fan Failure : Normal
Low Suction : Normal
Building Pressure : 5.7 in/wc
Return Air C02 : 864.0 ppm
Return Air C02 Alarm : Normal
Supply Temp SP : 55.0
Supply Temp : 55.2 °F
OARH Local : 70.6 %
Mixed Pressure : 2.4 in/wc
Supply Pressure : 2.1 in/wc
Supply Pressure SP : 2.0 in/wc
OA Temp Local : 83.6 °F
Low Limit : Normal
Cooling Valve : 100.0 %Open
High Static : Normal
Outside Air
Supply Air
Heating Valve : 0.0 %Open
Htg Pump Cmd : Cmd Off
Htg Pump Status : Stopped
Suppy Fan Command : Cmd On
Supply Fan Status : Running
Supply Fan VFD : 72.5 %
Supply Fan Failure : Normal
Smoke Alarm : Normal
Mixed Low Limit SP : 50.0 °F
Mixed Temp : 78.6 °F
Supply Air RH : 64 %
Min Outside Air
Min OA Spt : 10.0 %
Min OA Damper : 10.0 %OA
Econ OA Ena SP : 68.0 °F
Mixed Air Damper : 0.0 %OA
Econ Mode : Disable

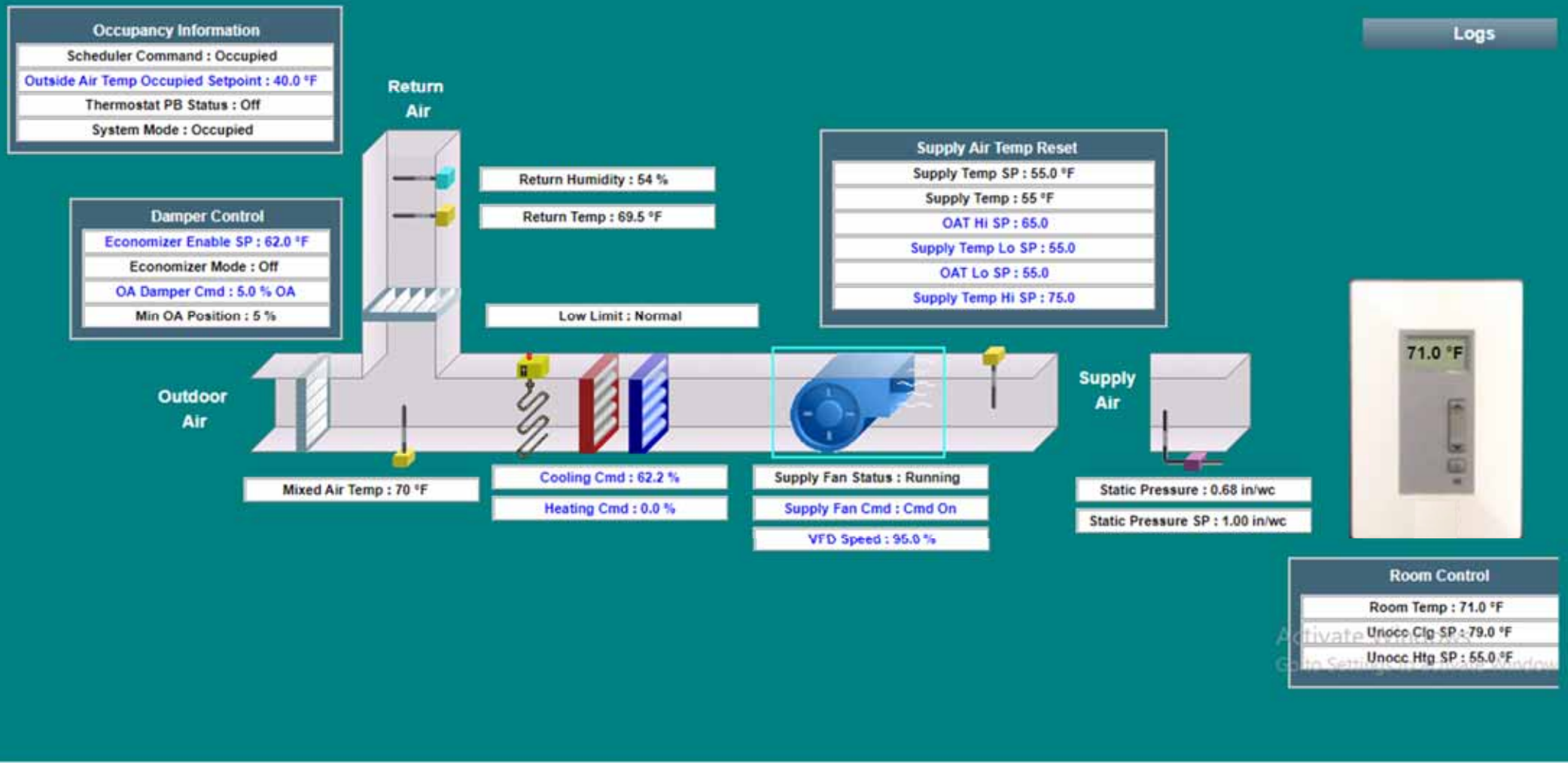

58.7 °F
56 %rh
21 Btu/lb
33738 AHU-2 North Tower Corridors (2017)
off
on
auto
(AHU)
Zone Temp-1 70.2 °F
Zone Temp-2 69.8 °F
Zone Temp-3 72.6 °F
Operator Message Window
cannot shut down ef due to push button at starter
EF S/S On
Status On
33738 AHU-2 North Tower Corridors (2017) - Summary
4:00 PM
May 30
8:00 AM
Manual Overrides
Supply Fan S/S OVRD On
Smoke Damper On
HRC OVRD 100 %
HWP2A OVRD On
CHWV OVRD 100 %
HWV OVRD 20 %
HWP25 OVRD Off
Exhaust Fan OVRD Off
oa setpt reset
Cooling
Heating
55 °F to 80 °F
62 °F to 58 °F
5 °F to 55 °F
70 °F to 63 °F
P-2A Cmd Off
Status Off
71.7 °F
Filters Clean
0.8 iwc
30
%Open
Supply Fan Wall
Hi/Lo Press
Normal
actual 62.0 °F
setpt 63.0 °F
smoke
Normal
Open
60.0 °F
Normal
6
%Open
SF S/S On
Status On
VFD Frequency 62 Hz
VFD Speed Mod 90 %
Smoke Isolation
Damper Open
Damper Proof Open
P-25 Cmd Off
status Off
0
%Open
BAS Shutdown
Alarm Reset
Status
Reset

There are some great resources that touch on building graphics design





Let’s start with the main display elements and try to build a better graphic



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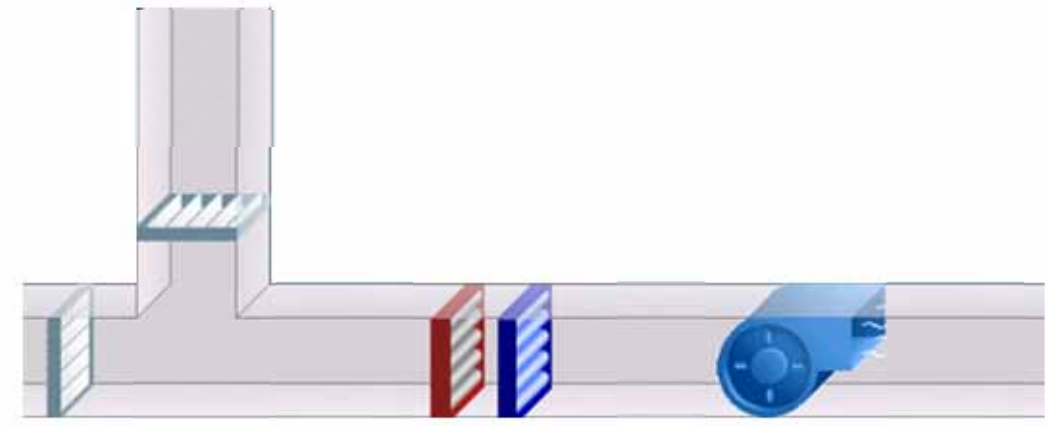
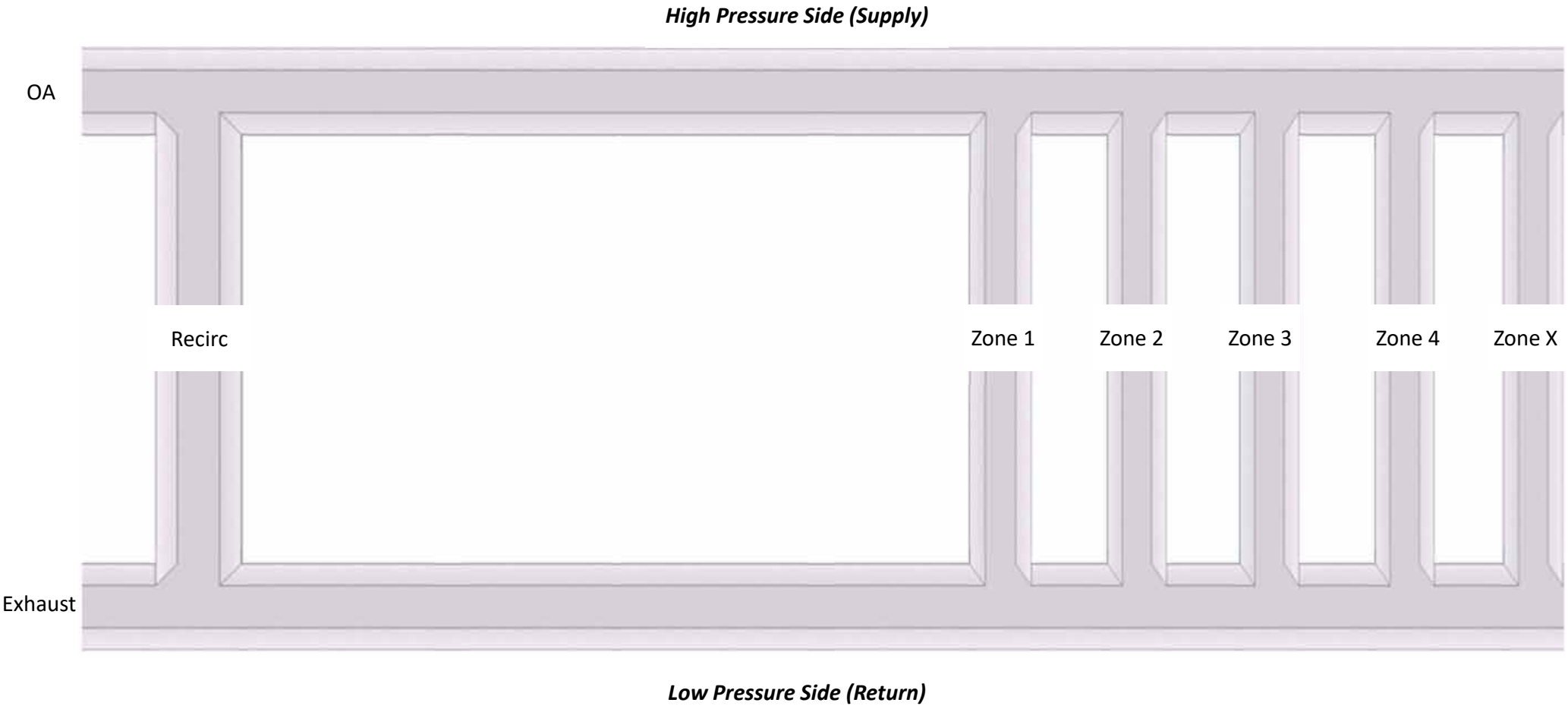


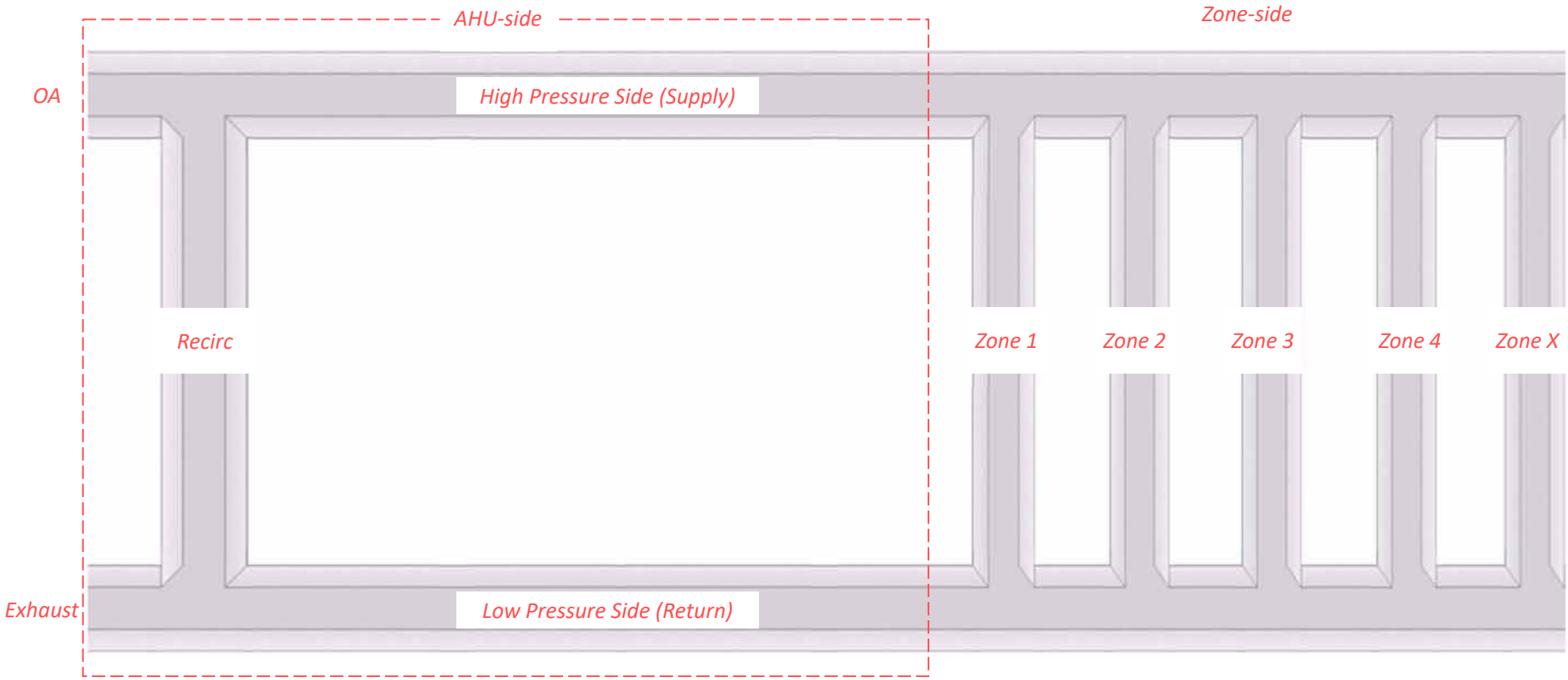
Piping or ductwork will be the framework for most *system* graphics

Use *System Diagram* structures as consistent & comprehensive mental maps

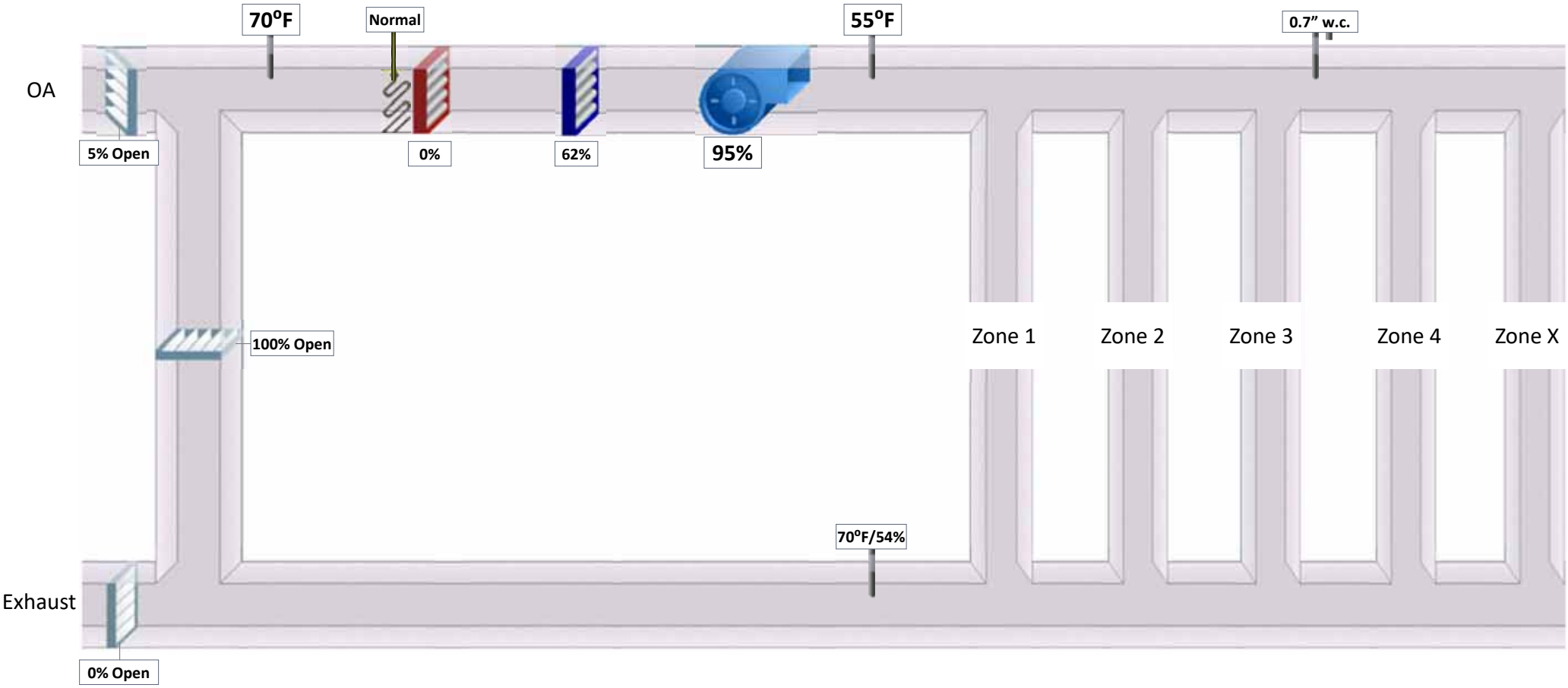
Use *System Diagram* structures as consistent & comprehensive mental maps



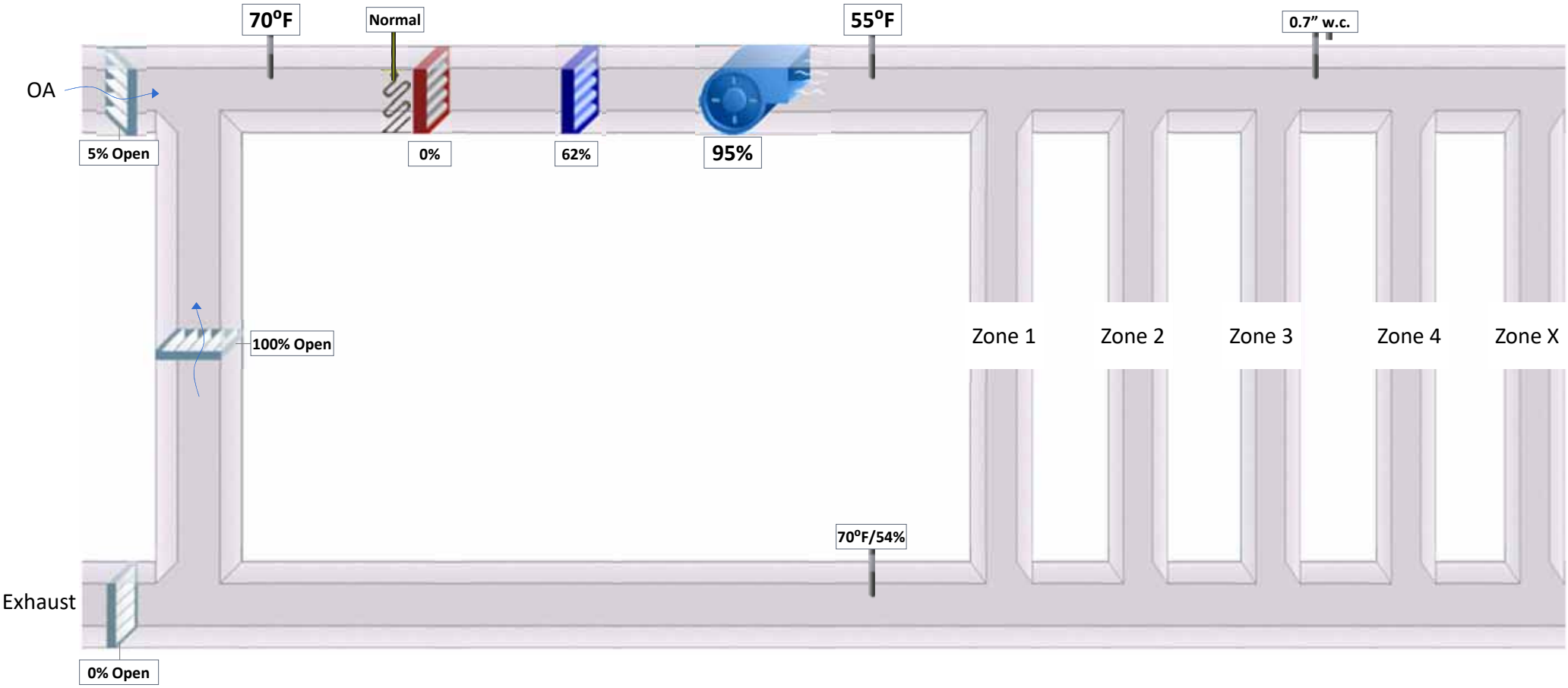
Use *System Diagram* structures as consistent & comprehensive mental maps



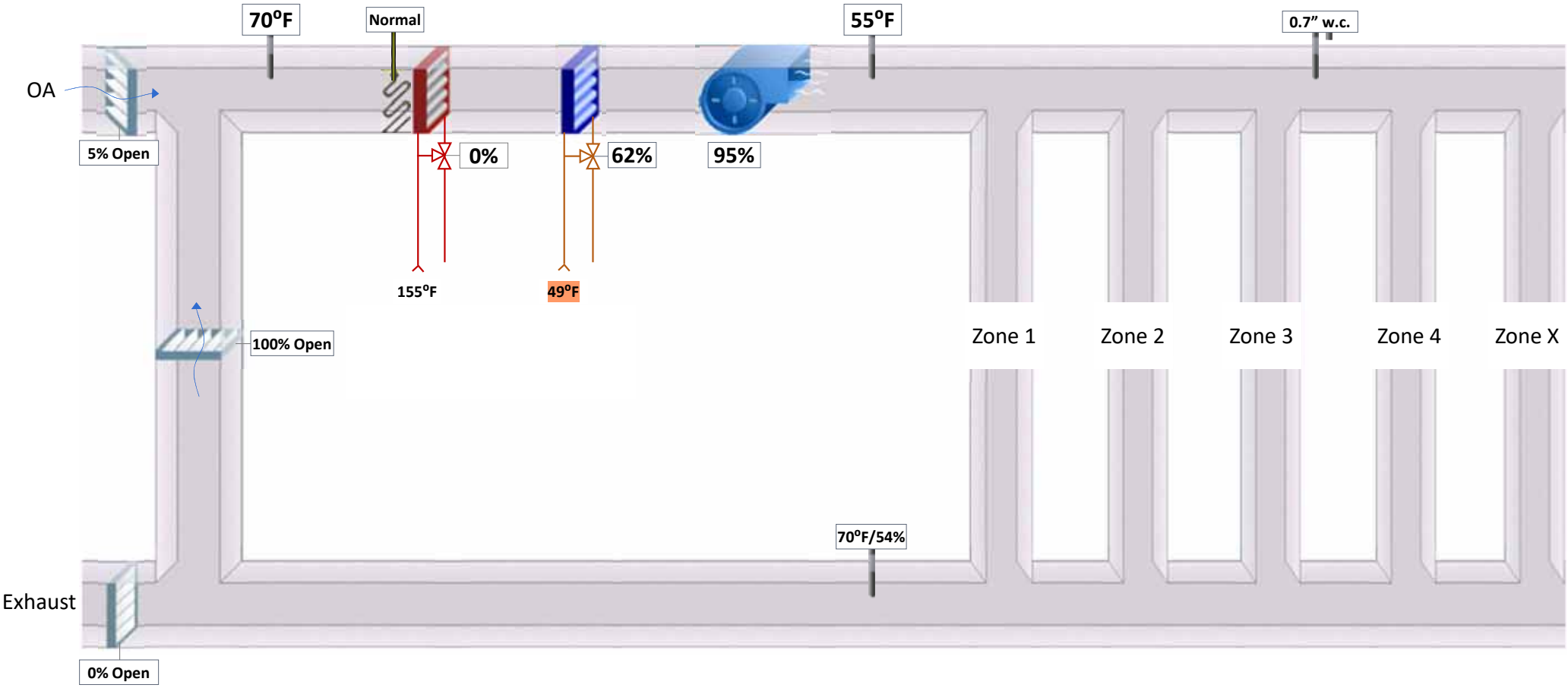
Overlay simple HVAC components on the System Diagram layout



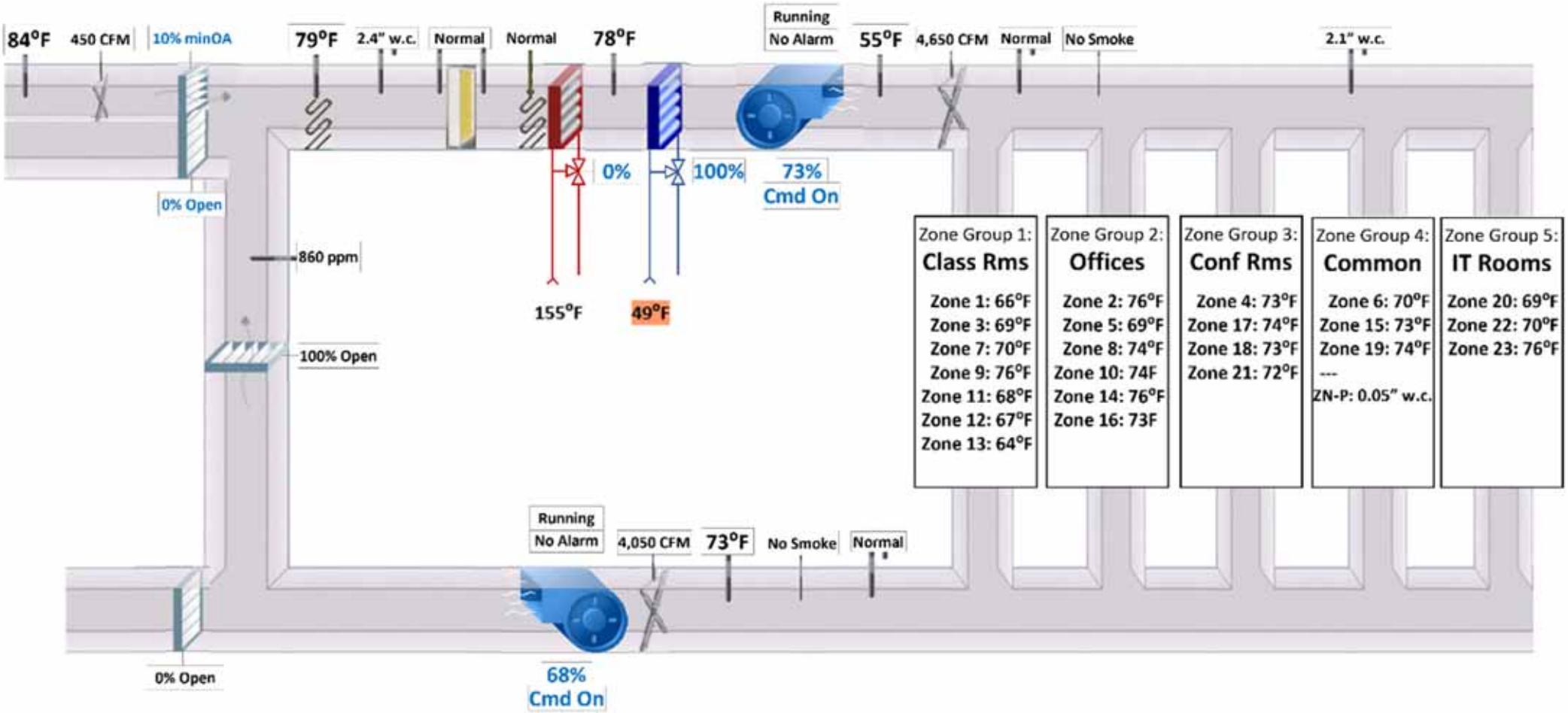
Use light icon animation for status or value changes



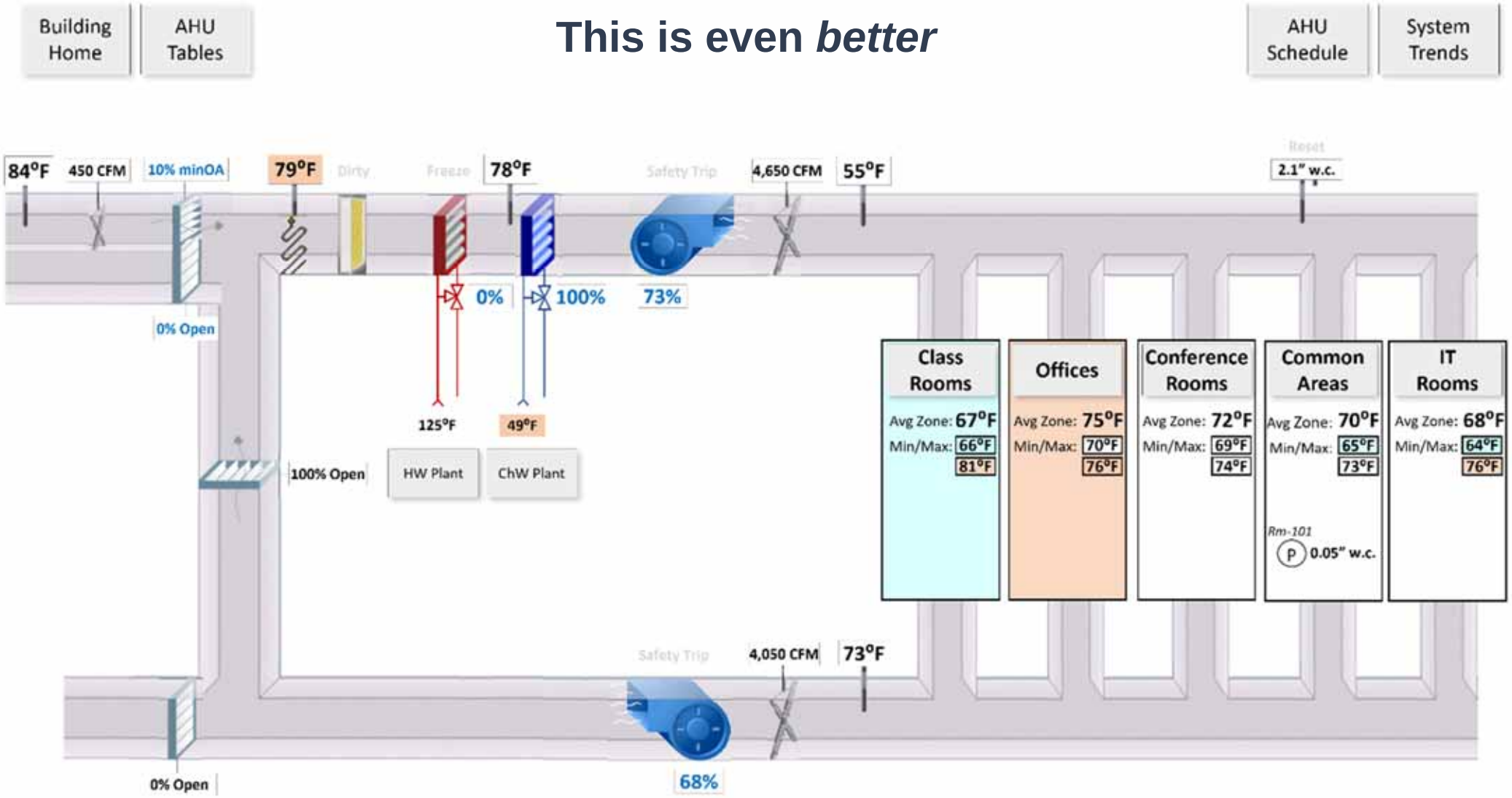
Incorporate related valve and plant data for context



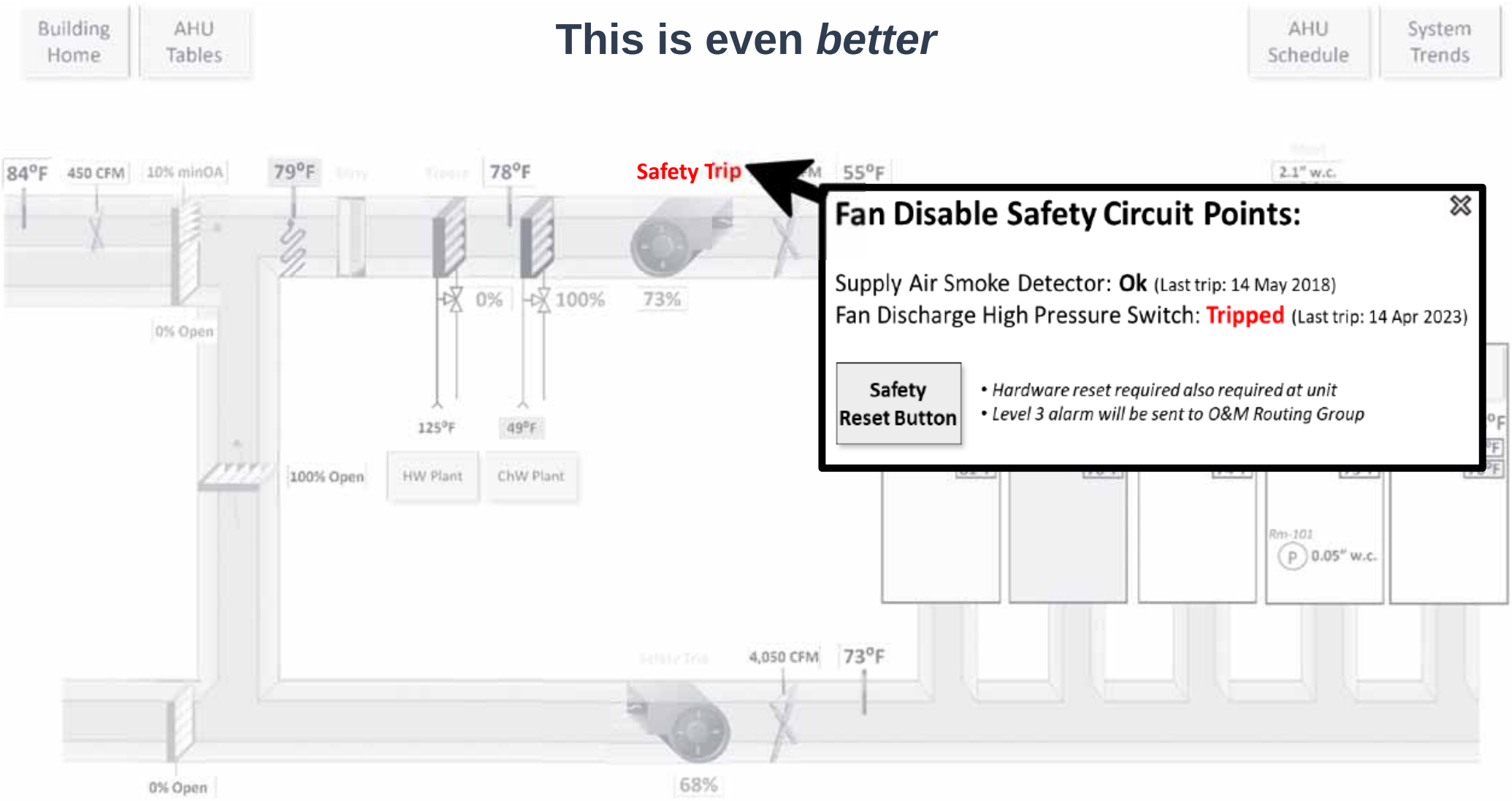
This restructured and reoriented air-side system graphic is *better*



This is even *better*



This is even *better*



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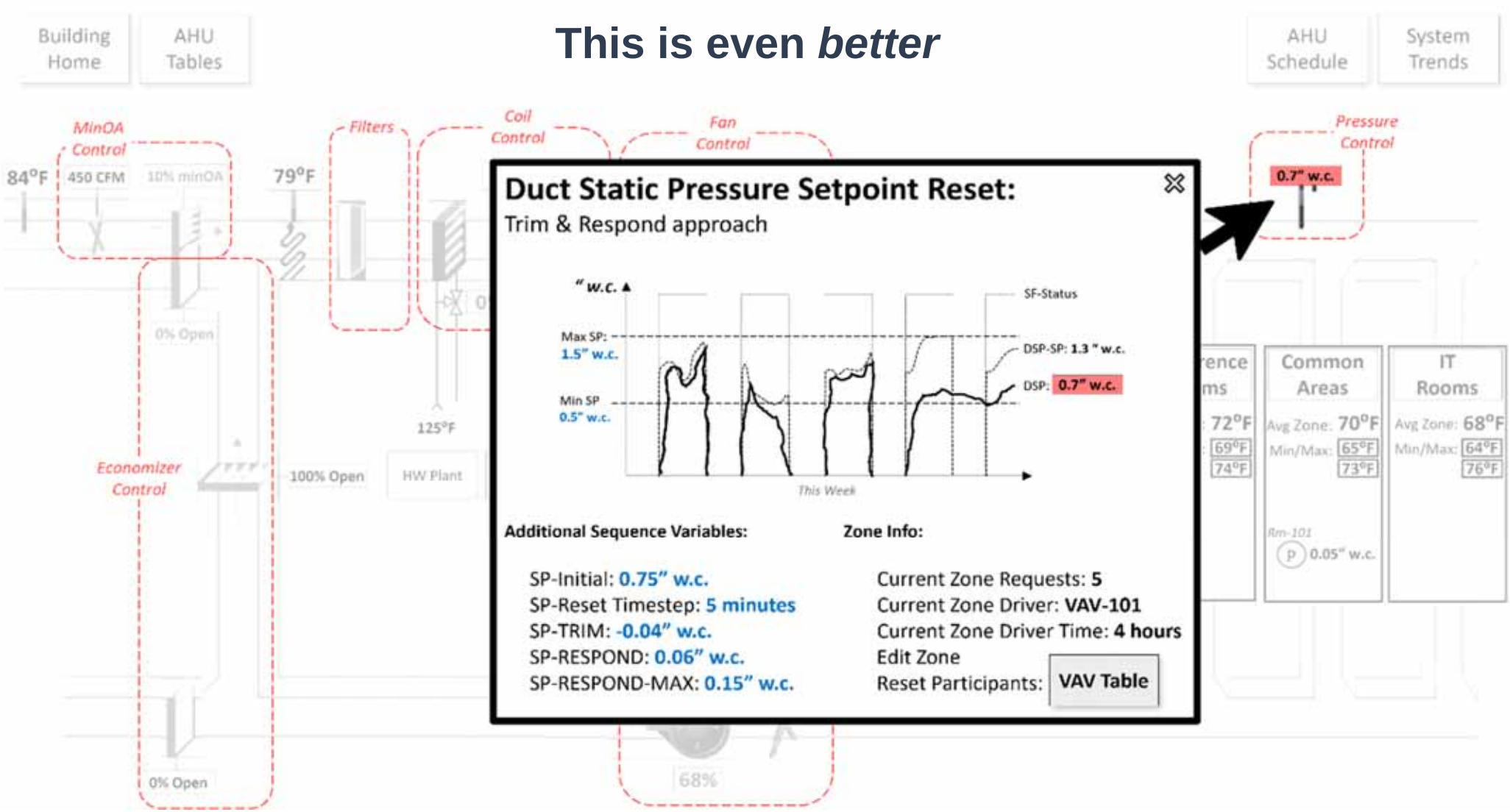
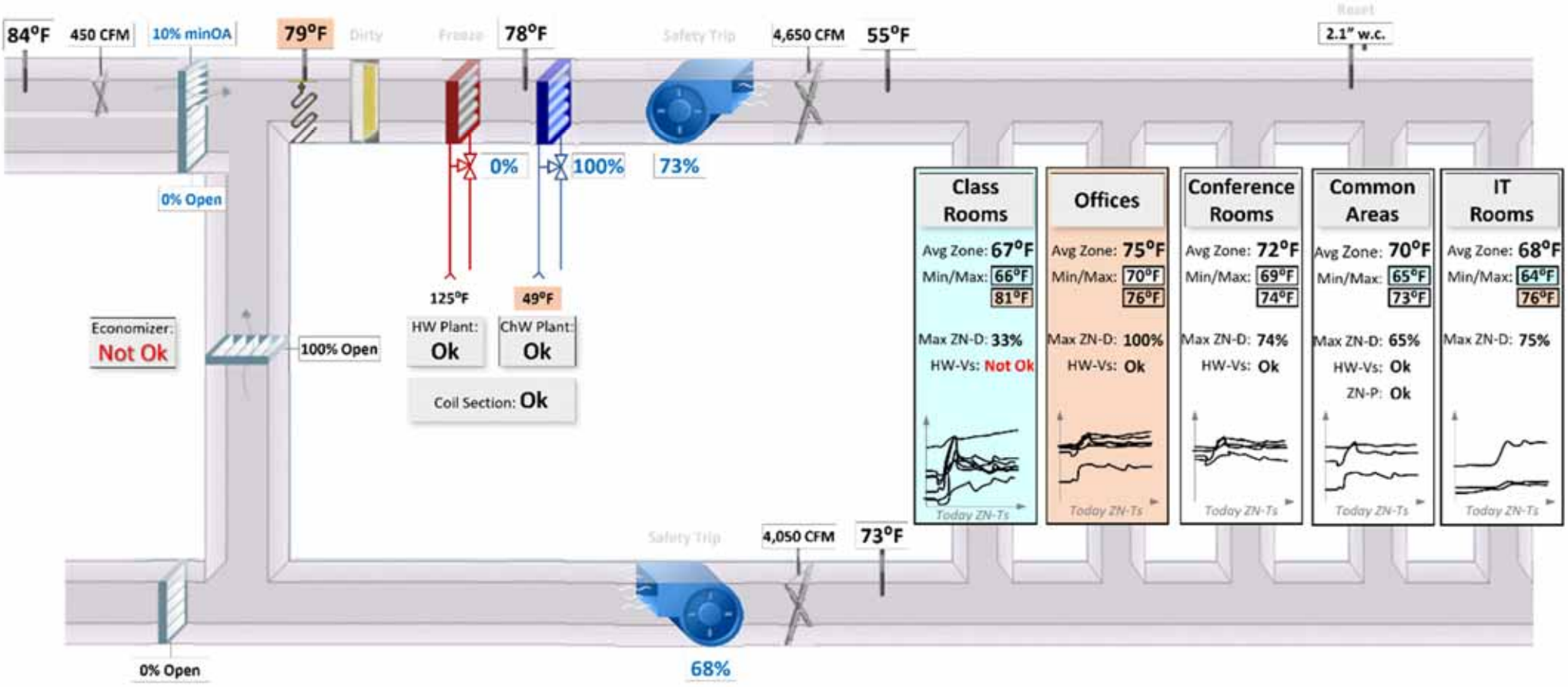


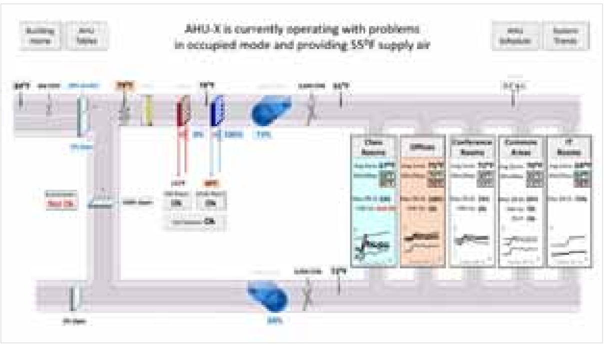
Building Home | AHU Tables

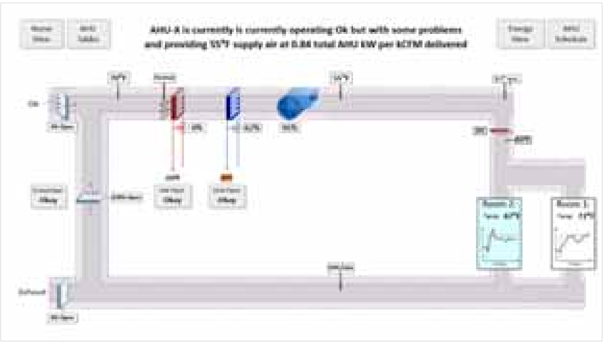
AHU-X is currently operating with problems in occupied mode and providing 55°F supply air

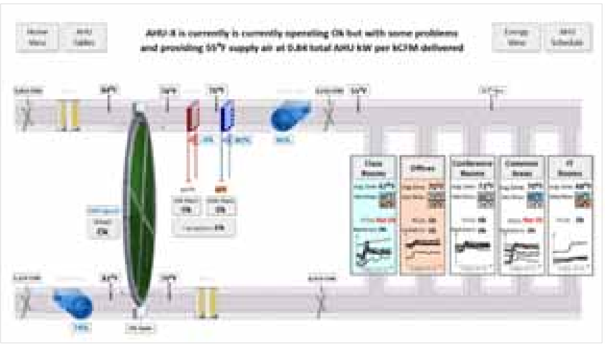
AHU Schedule | System Trends

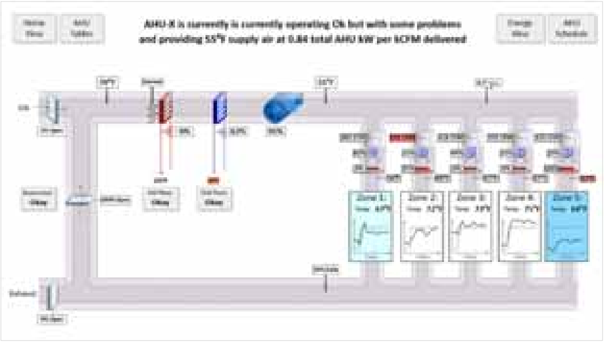


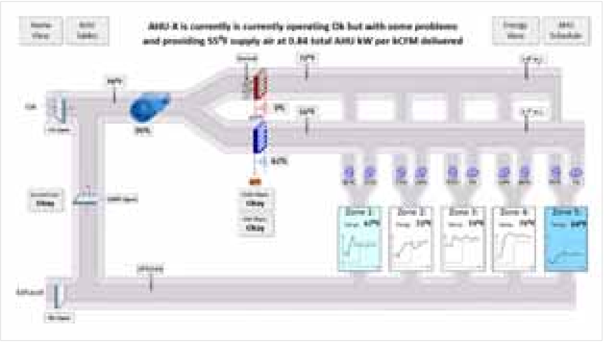
These are great approaches with high usability & scalability

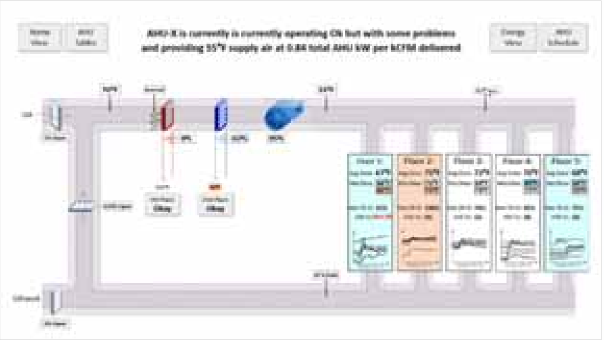






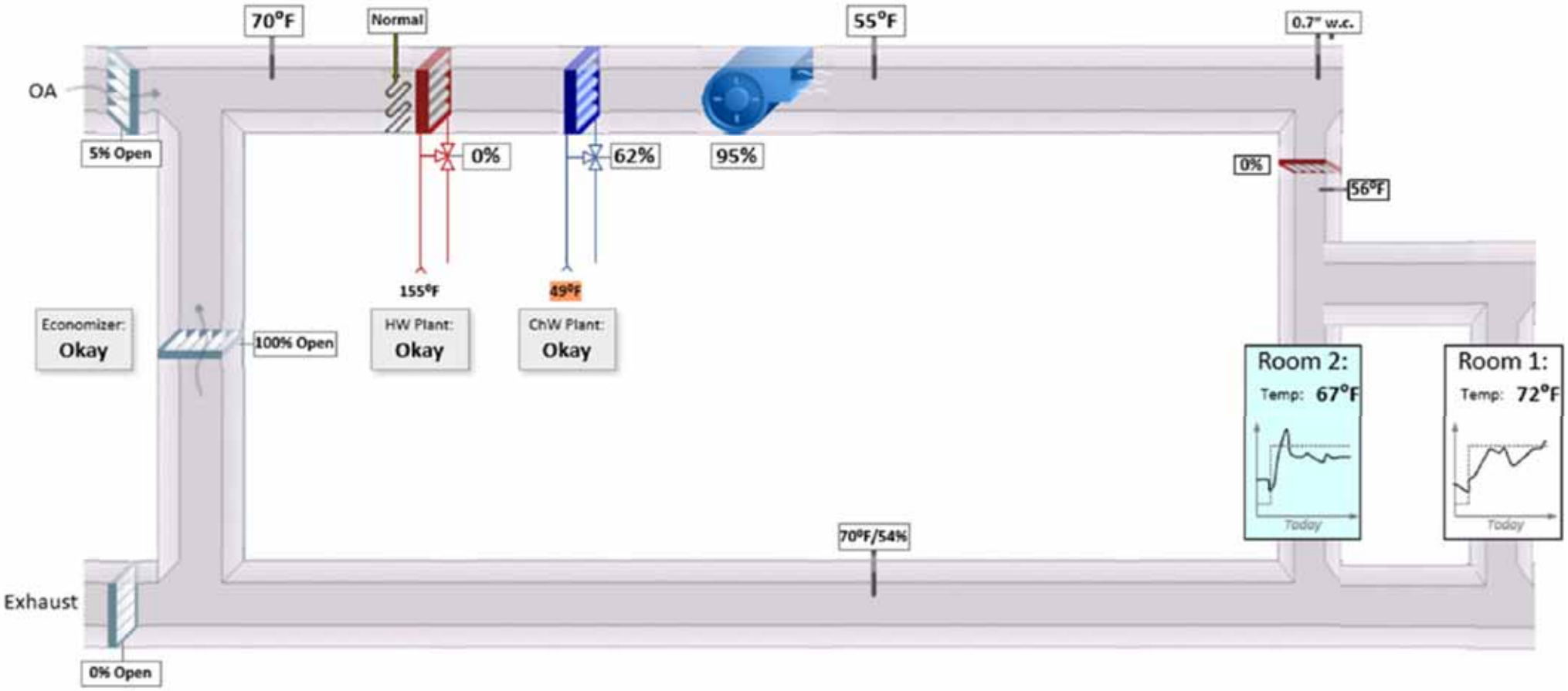






Home View | AHU Tables | Energy View | AHU Schedule

AHU-X is currently is currently operating Ok but with some problems and providing 55°F supply air at 0.84 total AHU kW per kCFM delivered



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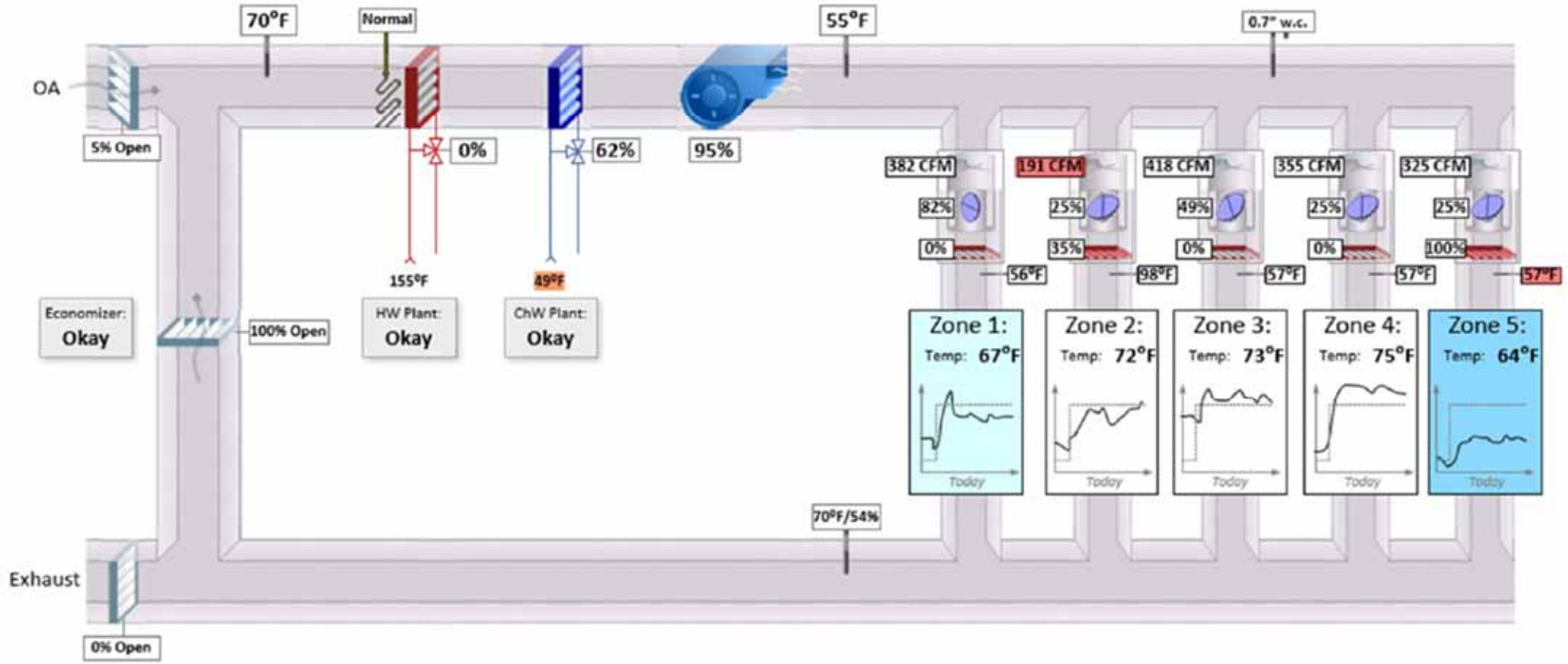

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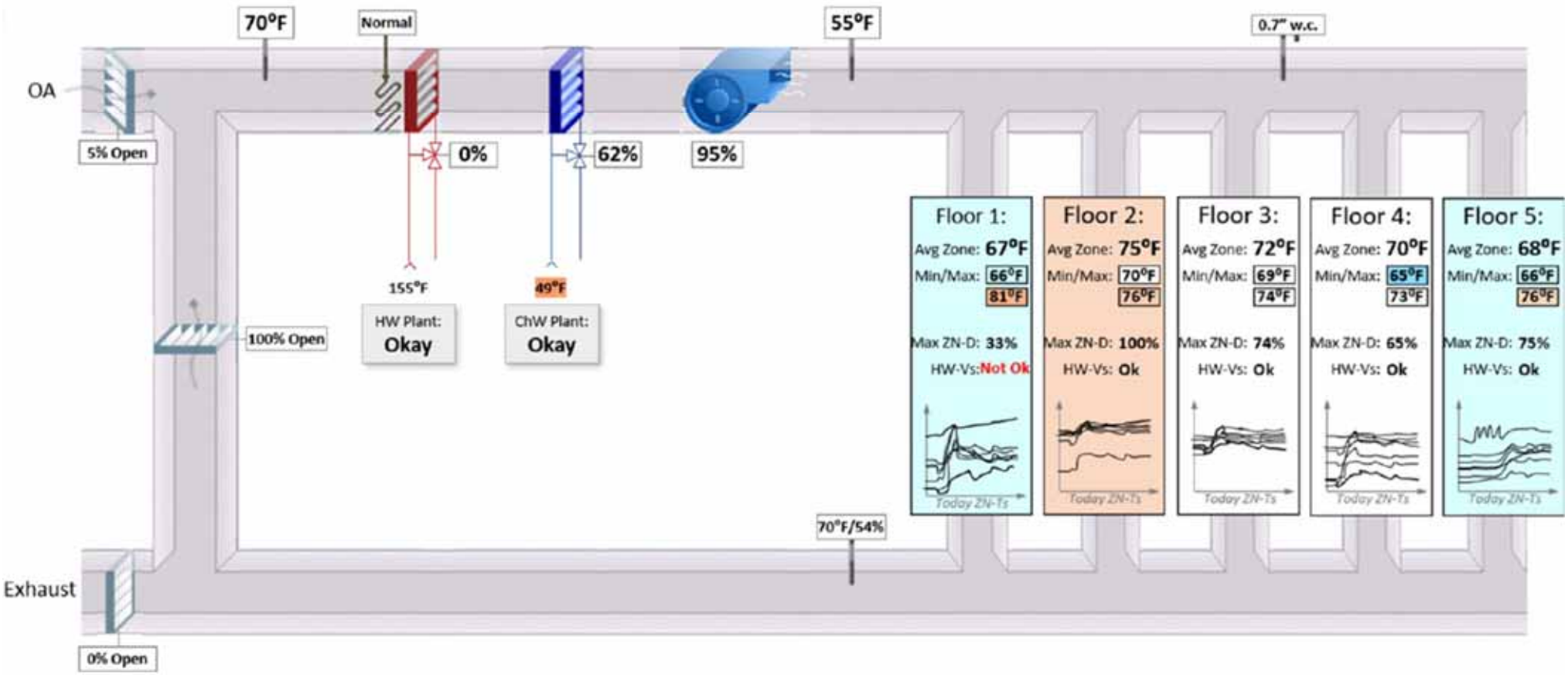
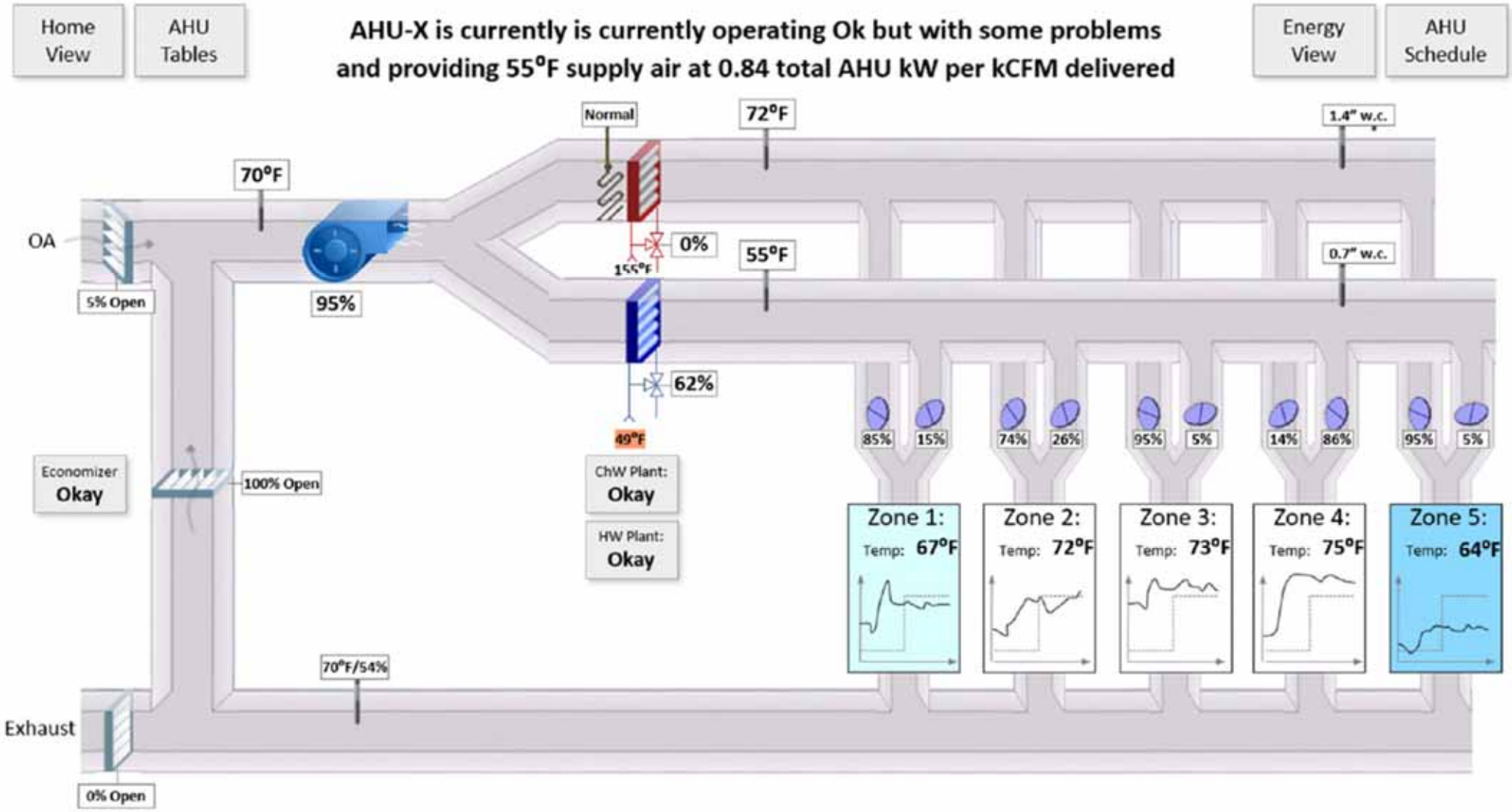
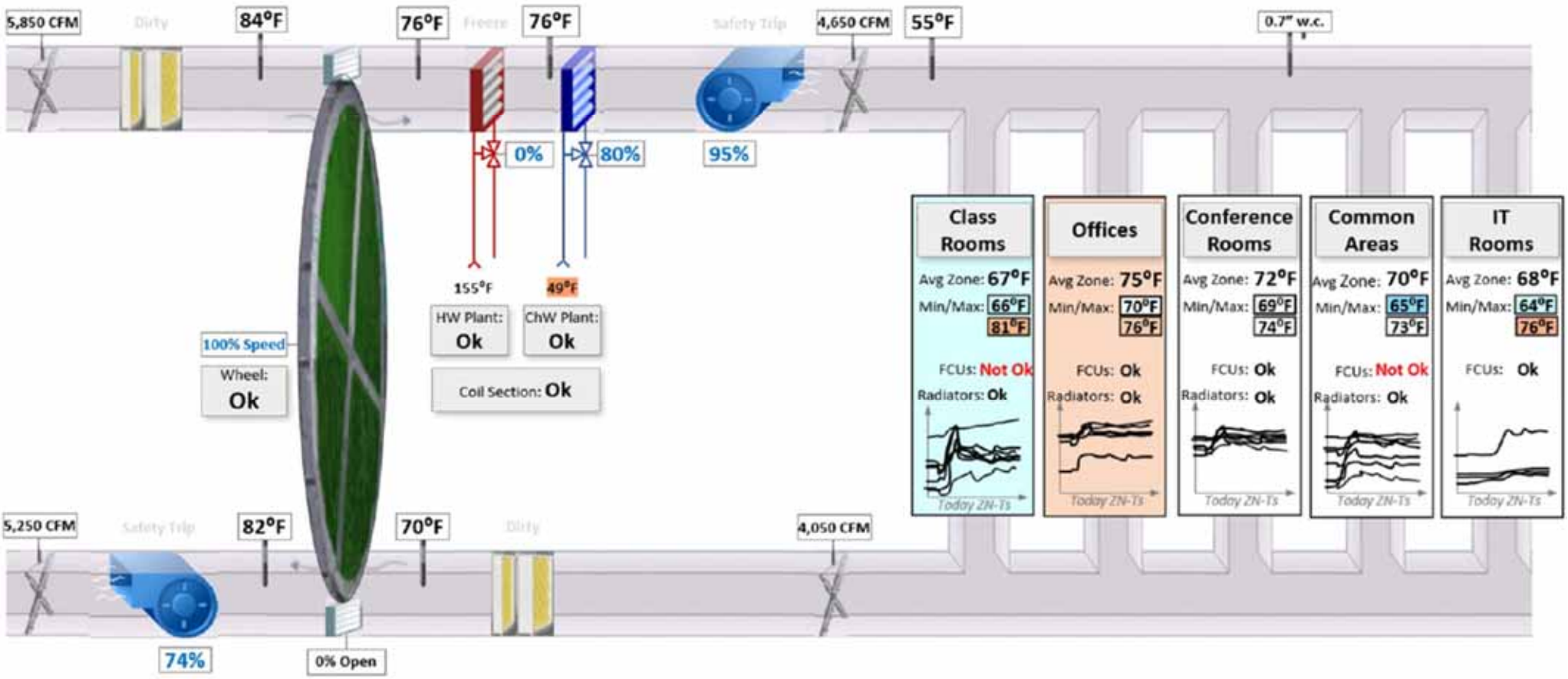


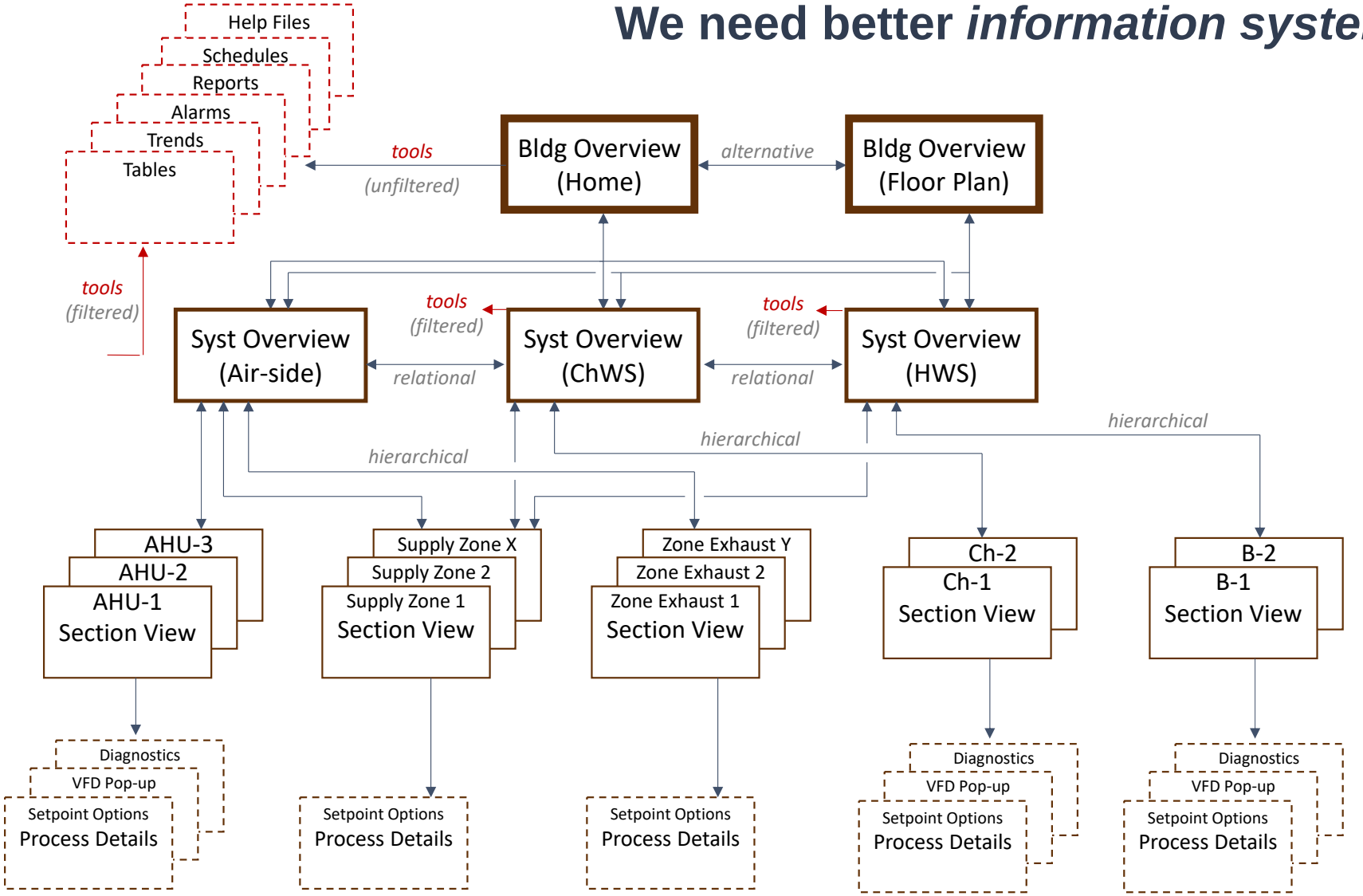

Home View
AHU Tables
AHU-X is currently is currently operating Ok but with some problems and providing 55°F supply air at 0.84 total AHU kW per kCFM delivered
Energy View
AHU Schedule
Normal
72°F
1.4" w.c.
70°F
OA
5% Open
95%
0%
55°F
0.7" w.c.
62%
49°F
85%
15%
74%
26%
95%
5%
14%
86%
95%
5%
Economizer
Okay
100% Open
ChW Plant:
Okay
HW Plant:
Okay
Zone 1:
Temp: 67°F
Zone 2:
Temp: 72°F
Zone 3:
Temp: 73°F
Zone 4:
Temp: 75°F
Zone 5:
Temp: 64°F
70°F/54%
Exhaust
0% Open

Home View | AHU Tables | Energy View | AHU Schedule

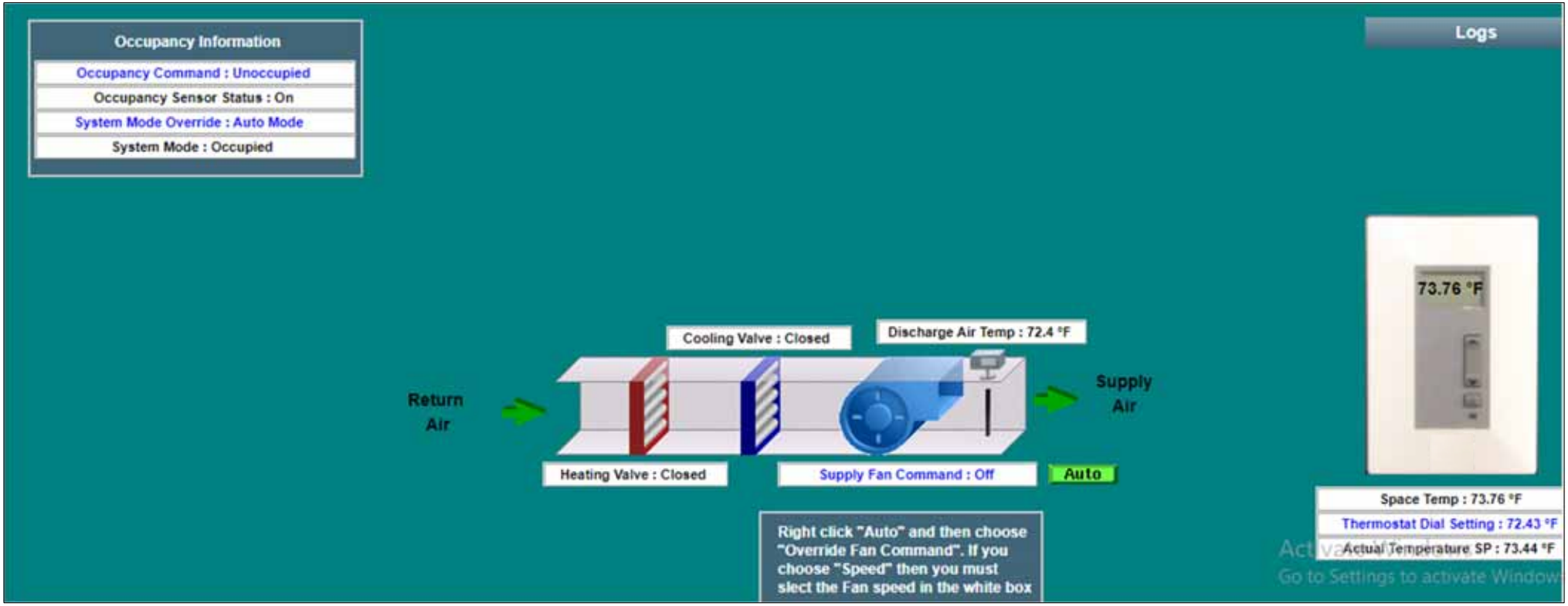
AHU-X is currently is currently operating Ok but with some problems and providing 55°F supply air at 0.84 total AHU kW per kCFM delivered



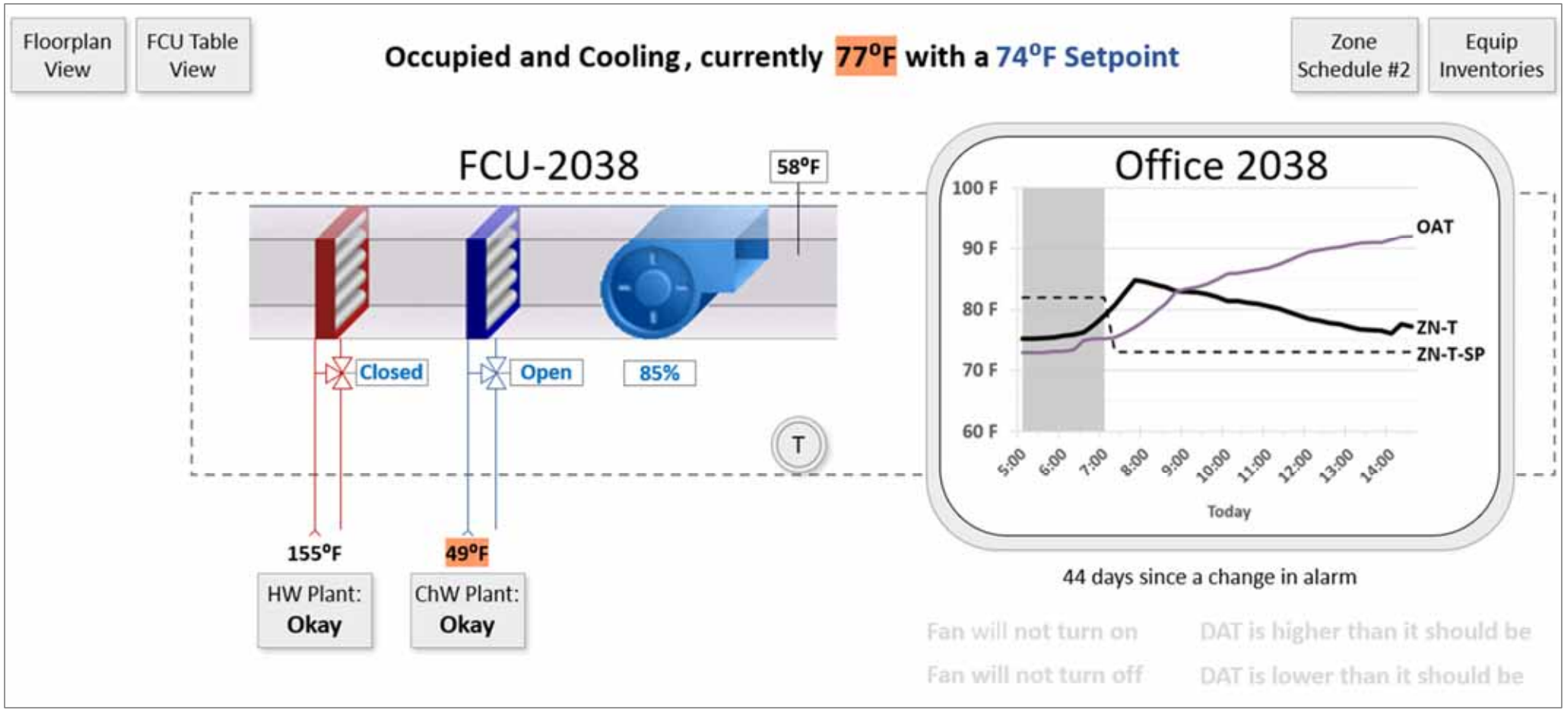
We need better *information systems*



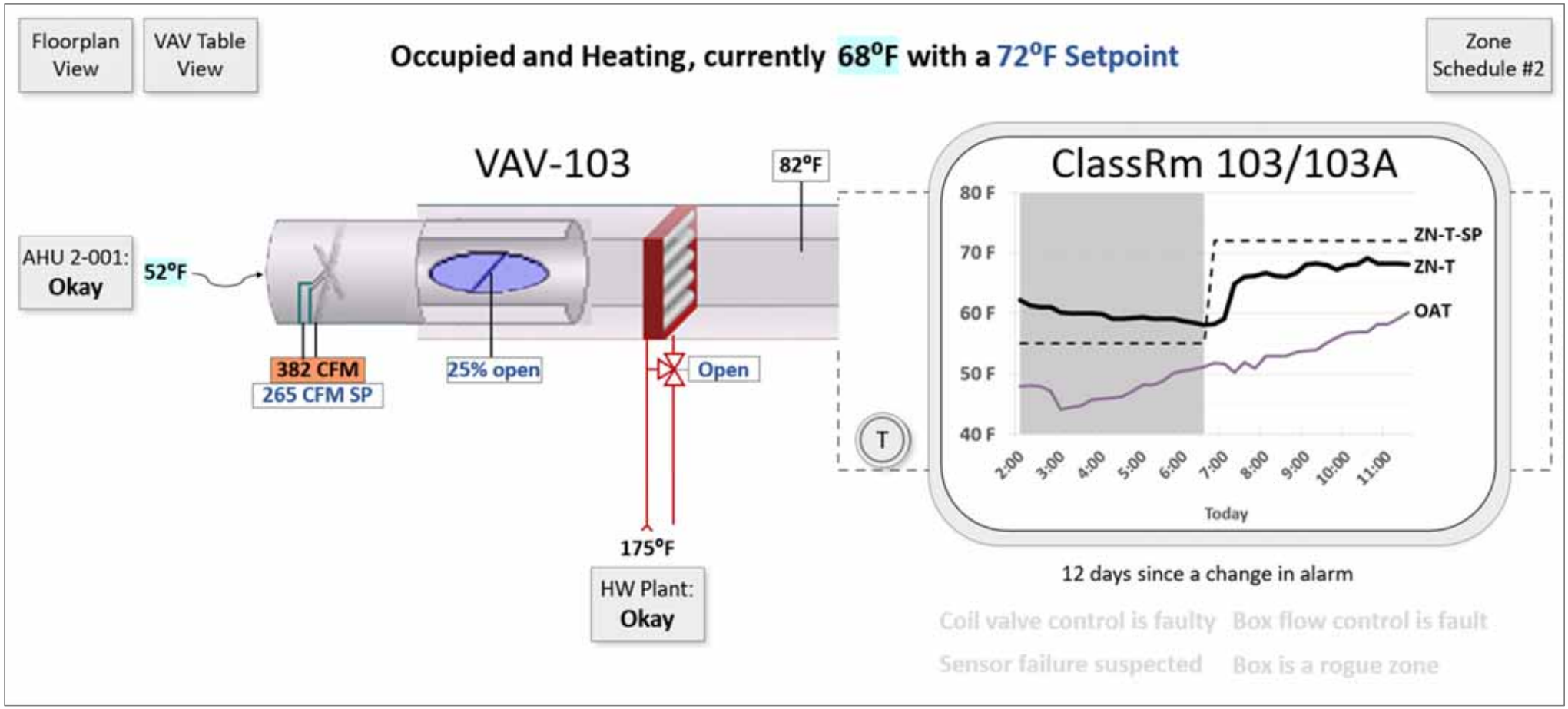
How is this effective is this *typical* zone-level graphic?



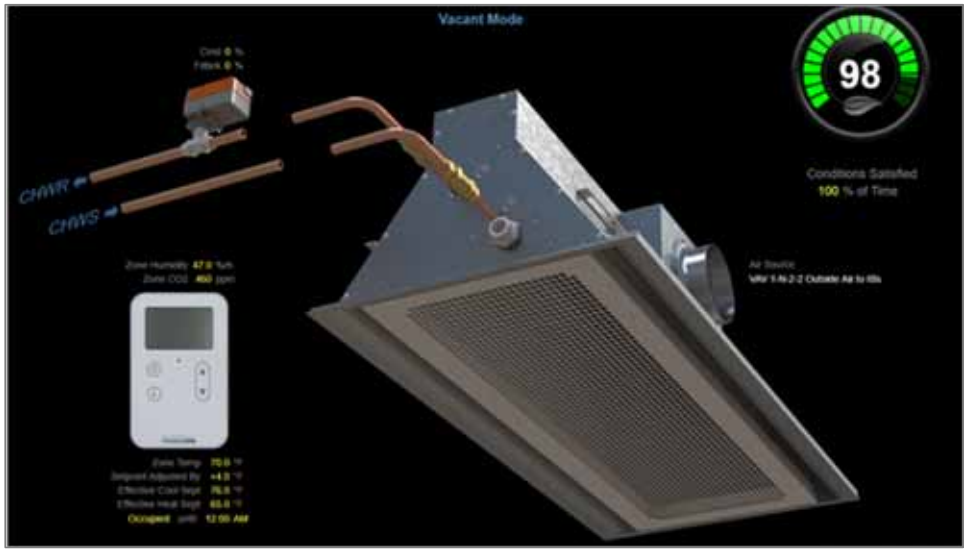
How is this effective is this *enhanced* zone-level graphic?

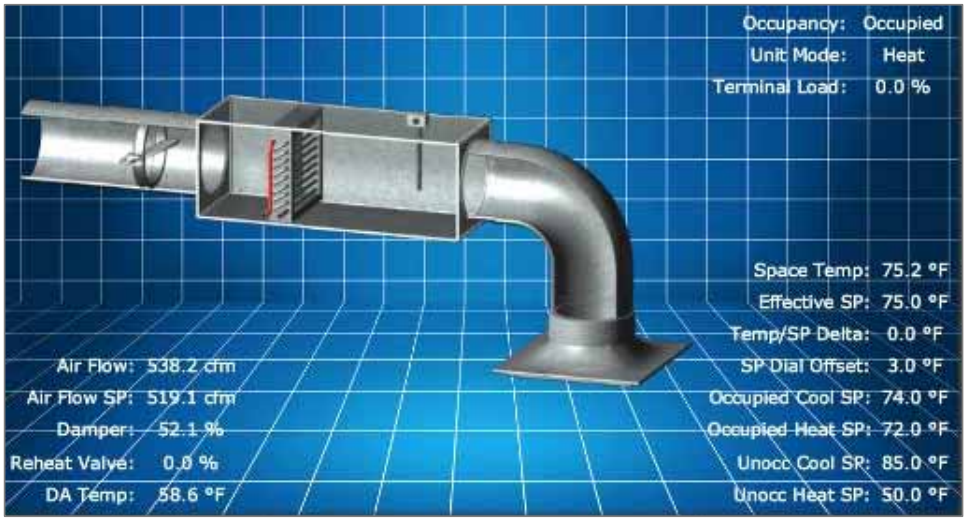


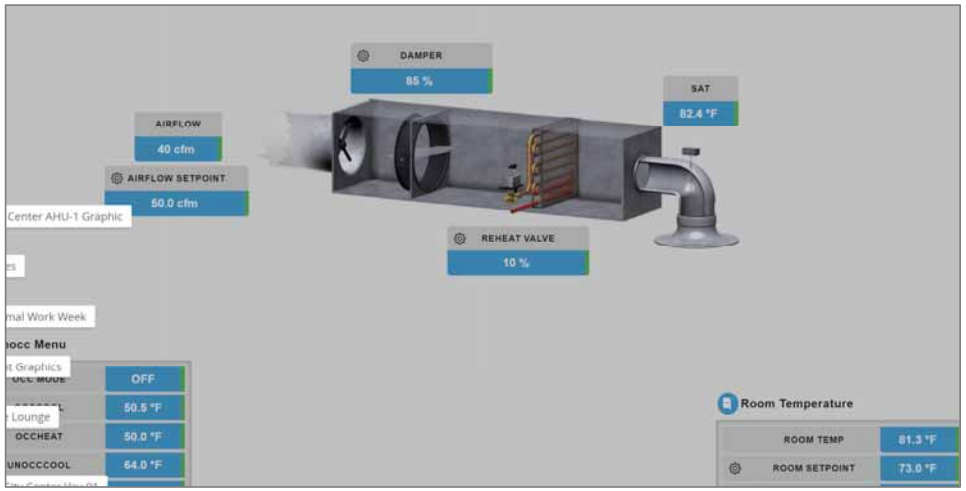
How is this effective is this *enhanced* zone-level graphic?

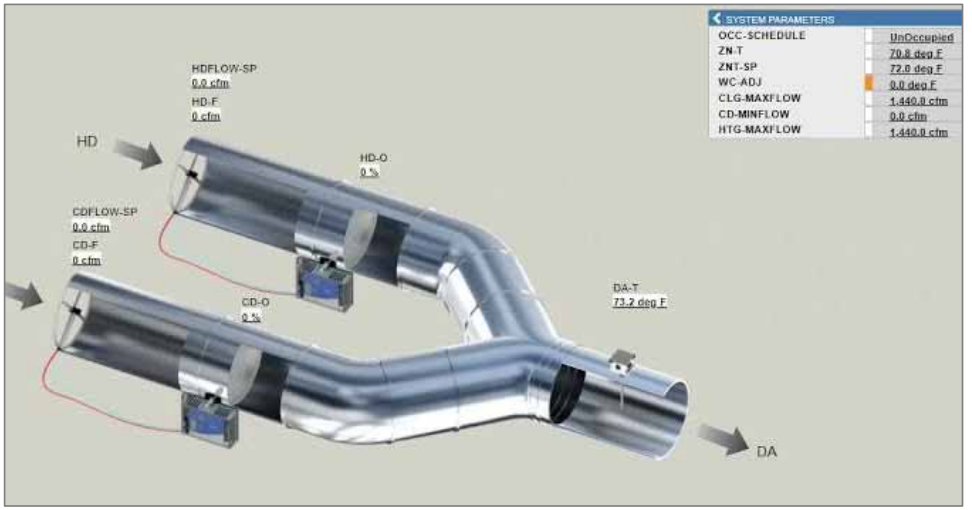


Building graphics can have endless design variations

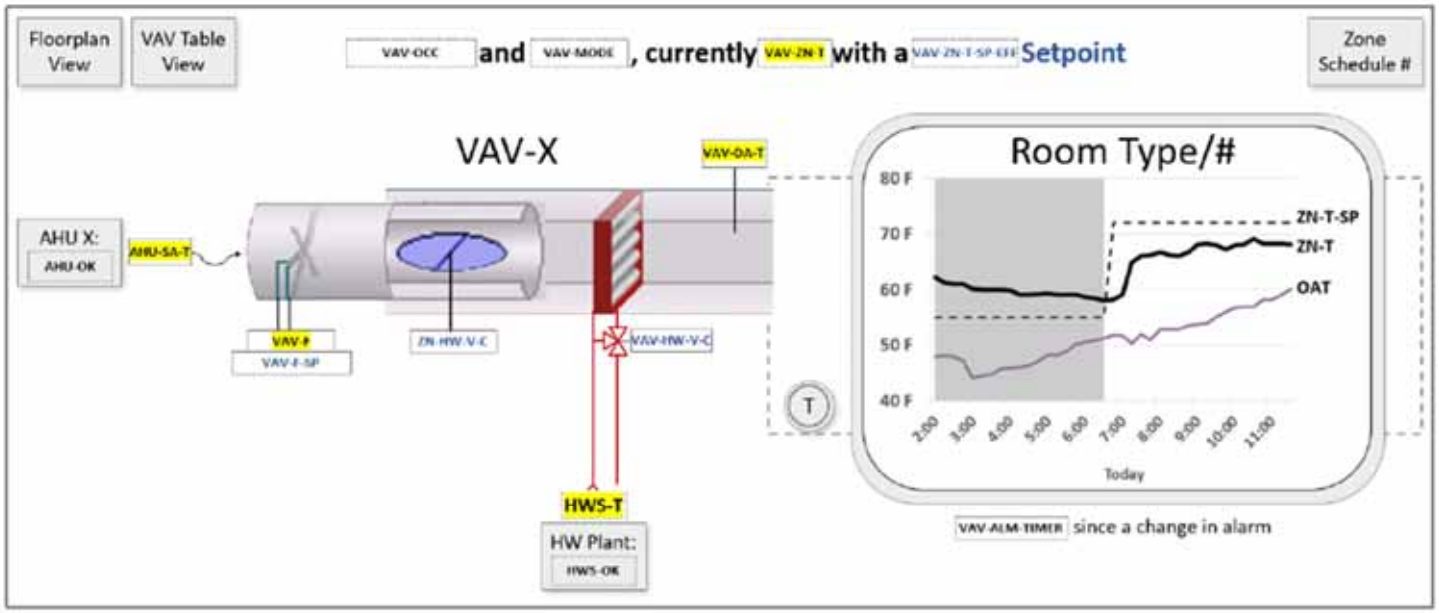








Building Graphics Design Sheets can help



* Designer Notes:

1. **Point names**: see Points Schedule drawing to match point field names shown.
2. **Icon animation**: analog or numerical animation at damper and coil point icons
3. **Performance chart**: initially configured points, format, and range as shown
4. **Point formatting**: apply setpoint deviation at *highlighted* points, override or configure functionality at *blue-font* points (see Points Schedule and graphics formatting design sheets for more detail)
5. **Navigation**: as shown in *gray outline* (seven total "buttons")
6. **Pop-up detail navigation**: as a pop-up subset of navigation, t-stat icon button (see zone temperature control module graphics design sheet)

How is this effective is this *typical* zone table graphic?

AHU-1-001 VAV Table

VAV Name	Serves	Room Temp	Room Temp Spt	Discharge Temp	Hw Valve Pos	Air Flow	Air Flow Spt	Damper Pos	Push Button Ovr
VAV_1010	Hall west of main entrance	69.9 °F	76.0 °F	68.3 °F	100.0 %	127 cfm	125 cfm	79.3 %	OFF
VAV_1023	Lab Entry	74.9 °F	74.0 °F	64.1 °F	0.0 %	473 cfm	500 cfm	66.4 %	OFF
VAV_1024	Lab	66.1 °F	70.0 °F	57.8 °F	100.0 %	0 cfm	301 cfm	100.0 %	OFF
VAV_1026	Office	72.8 °F	74.0 °F	80.2 °F	34.0 %	225 cfm	218 cfm	100.0 %	OFF
VAV_1027	Lab	72.2 °F	74.0 °F	95.0 °F	46.1 %	195 cfm	199 cfm	71.3 %	OFF
VAV_1028	Reception Area	74.5 °F	74.0 °F	80.8 °F	0.0 %	0 cfm	199 cfm	98.5 %	OFF
VAV_1030	Office	69.1 °F	0.0 °F	68.9 °F	0.0 %	61 cfm	49 cfm	3.9 %	Off
VAV_1031	Office	72.6 °F	74.0 °F	82.2 °F	45.0 %	66 cfm	49 cfm	85.8 %	Off
VAV_1035	Lab	68.8 °F	74.0 °F	95.0 °F	38.5 %	0 cfm	100 cfm	45.7 %	OFF
VAV_1036	Lab	72.8 °F	75.0 °F	92.0 °F	87.0 %	93 cfm	93 cfm	84.0 %	OFF
VAV_1038	Lab	68.7 °F	68.0 °F	55.9 °F	0.0 %	487 cfm	496 cfm	58.8 %	OFF
VAV_1039N	Lab	70.9 °F	73.0 °F	nan °F	100.0 %	394 cfm	398 cfm	24.1 %	Off
VAV_1039S	Lab	70.9 °F	74.0 °F	nan °F	100.0 %	375 cfm	373 cfm	6.6 %	On
VAV_1100	Hall north of main entrance	71.0 °F	76.0 °F	74.4 °F	100.0 %	148 cfm	150 cfm	71.6 %	OFF
VAV_1110	Reception Area	69.0 °F	68.0 °F	56.2 °F	0.0 %	479 cfm	473 cfm	66.3 %	Off
VAV_1113	Security Office	69.5 °F	69.0 °F	56.8 °F	0.0 %	112 cfm	110 cfm	39.9 %	OFF
VAV_1114	Office	64.5 °F	68.0 °F	56.3 °F	0.0 %	509 cfm	74 cfm	100.0 %	OFF
VAV_1118	Restrooms	69.4 °F	72.0 °F	58.5 °F	100.0 %	0 cfm	51 cfm	52.4 %	OFF
VAV_1150	Office	72.7 °F	73.0 °F	58.4 °F	0.0 %	0 cfm	49 cfm	3.1 %	OFF
VAV_1151	Office	73.3 °F	73.0 °F	59.1 °F	0.0 %	100 cfm	100 cfm	97.8 %	OFF

How is this effective is this *enhanced* zone table graphic?

AHU 1-001 View | Floorplan View | VAV Inventory View | VAV Trend View

AHU Status: **Okay**
AHU SAT: **52°F**

Occupied zones are average 72°F with a 70°F min, 75°F max, and 1 alarm

Zone X has been driving the DSP SP reset sequence for ## hours

VAV #	Zone Group	Occ Status	Current Mode	Zone Temp	CFM Reading	Damper Cmmd	RH Valve Cmmd	DAT Reading	Include in DSP Reset?	Days Since a Change in Alarm
1	Office 1	Occupied	Heating	71°F	382 CFM	25% open	100% open	96°F	X	12 days
2	Class Rm 1	Unoccupied	-	69°F	-	0% open	0% open	56°F	X	48 days
3	Office 1	Standby	-	69°F	120 CFM	12% open	0% open	57°F	-	129 days
:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:
X	Office 2	Occupied	Cooling	75°F	575 CFM	100% open	0% open	58°F	X	2 days

Where do we need *additional* summary tables?

AHU Tables Status | AHU Tables Values

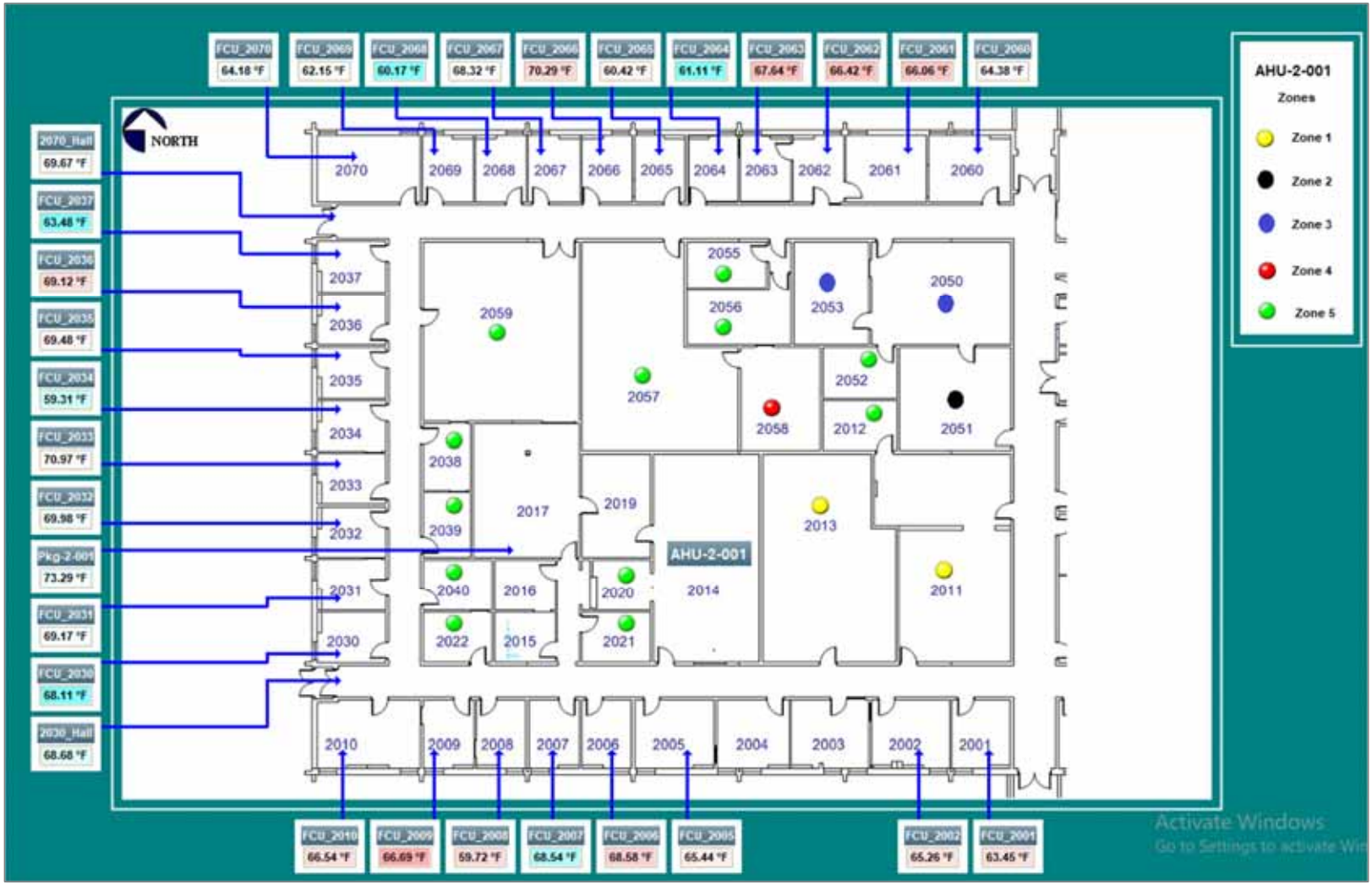
AHU #	Schedule Type	Operating Status	minOA Flow	Econo State	Filter Status	Coil Section	Supply Air	DSP Fan Control	Return Air	AHU Power	AHU KPI
1	Office 1	Running	Reset	Free Cooling	Clean	Ok	Ok	Reset	Ok	#1	A
2	Class Rm 1	Running	Design	Free Cooling	Dirty	Not Ok	Ok	Design	Ok	#2	B
3	Office 1	Stopped, Ok	Disabled	Disabled	Dirty	Disabled	Disabled	Disabled	-	-	C
:	:	:	:	:	:	:	:	:	:	:	:
X	Office 2	Running	Design	Econo + ChW	Clean	Ok	Ok	Design	Not Ok	#3	D

AHU Tables Status | **AHU Tables Values**

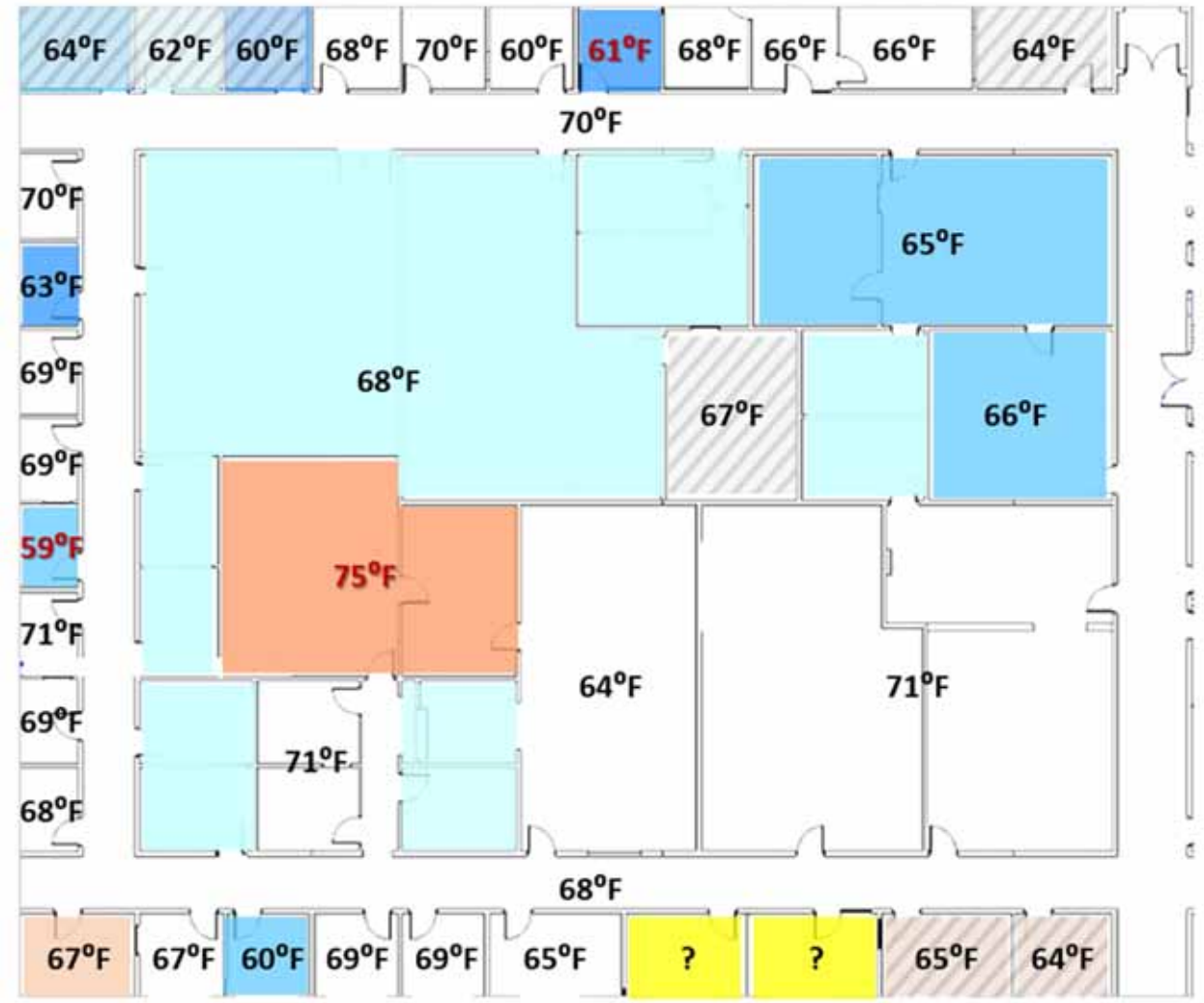
14.5 kW

AHU #	Schedule Type	Operating Status	minOA Flow	Econo State	Filter Status	Coil Section	Supply Air	DSP Fan Set Point	Return Air	AHU Power	AHU KPI
1	Office 1	85%/74% SF/RF	1,080 CFM	100% OAD, 55°F MAT	0.01" pre-filter 0.1" post filter	HC: 0%, 56°F CC: 0%, 56°F	4,350 CFM	0.8" wc	75°F	4.1 kW	0.9 kW per kCFM supply
2	Class Rm 1	65%/40% SF/RF	480 CFM	100% OAD, 56°F MAT	0.08" pre-filter 0.2" post filter	HC: 0%, 85°F CC: 100%, 54°F	3,420 CFM	1.5" wc	73°F	3.5 kW	1.0 kW per kCFM supply
3	Office 1	-/- SF/RF	-	0% OAD	0.01" pre-filter 1.1 post-filter	HC: 0% CC: 0%	-	-	-	-	-
:	:	:	:	:	:	:	:	:	:	:	:
X	Office 2	100% SF	2,080 CFM	100% OAD, 59°F MAT	0.01"/0.3"	HC: 0%, 59°F CC: 32%, 56°F	4,100 CFM	1.7" wc	78°F	6.9 kW	1.5 kW per kCFM supply

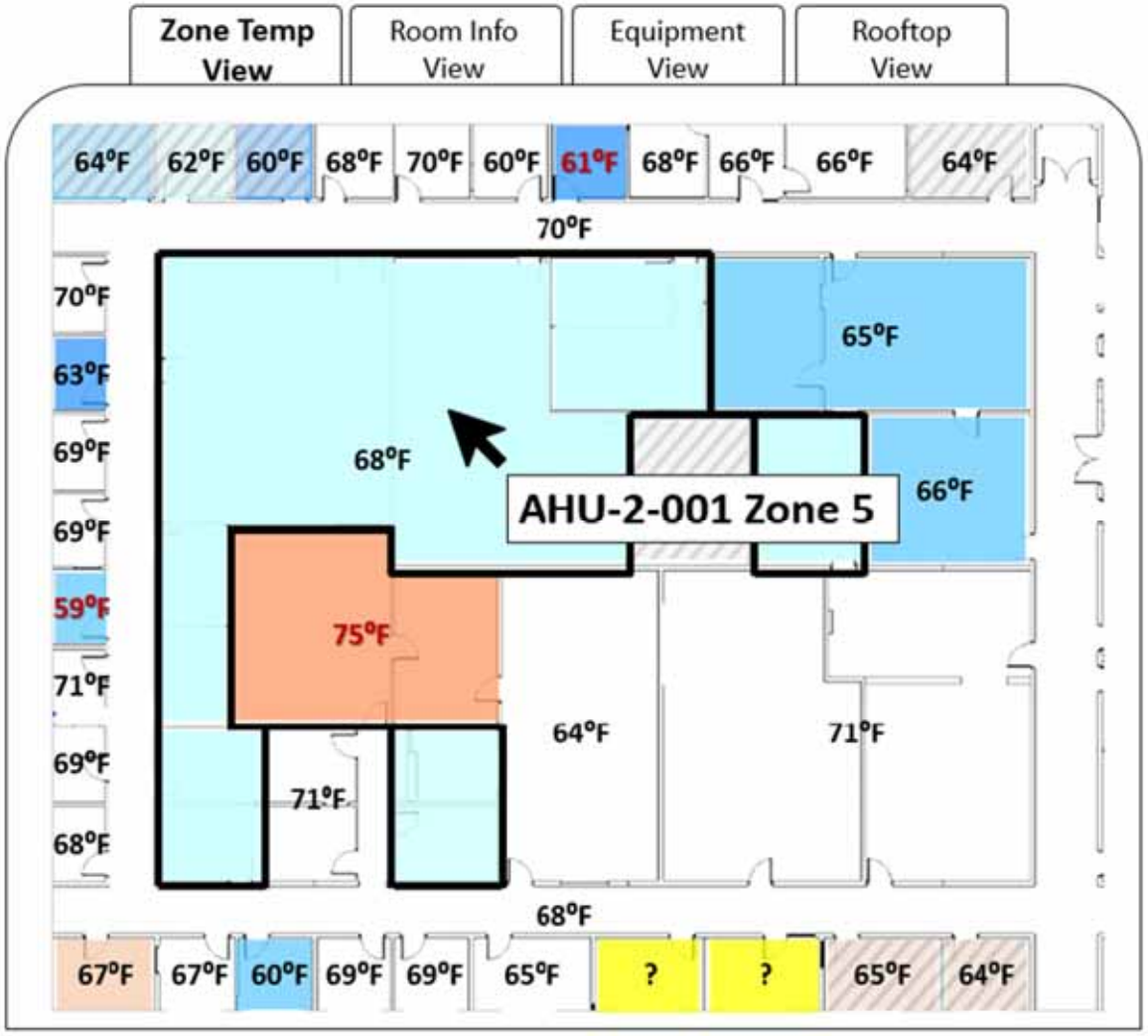
How is this effective is this *typical* zone floor plan graphic?



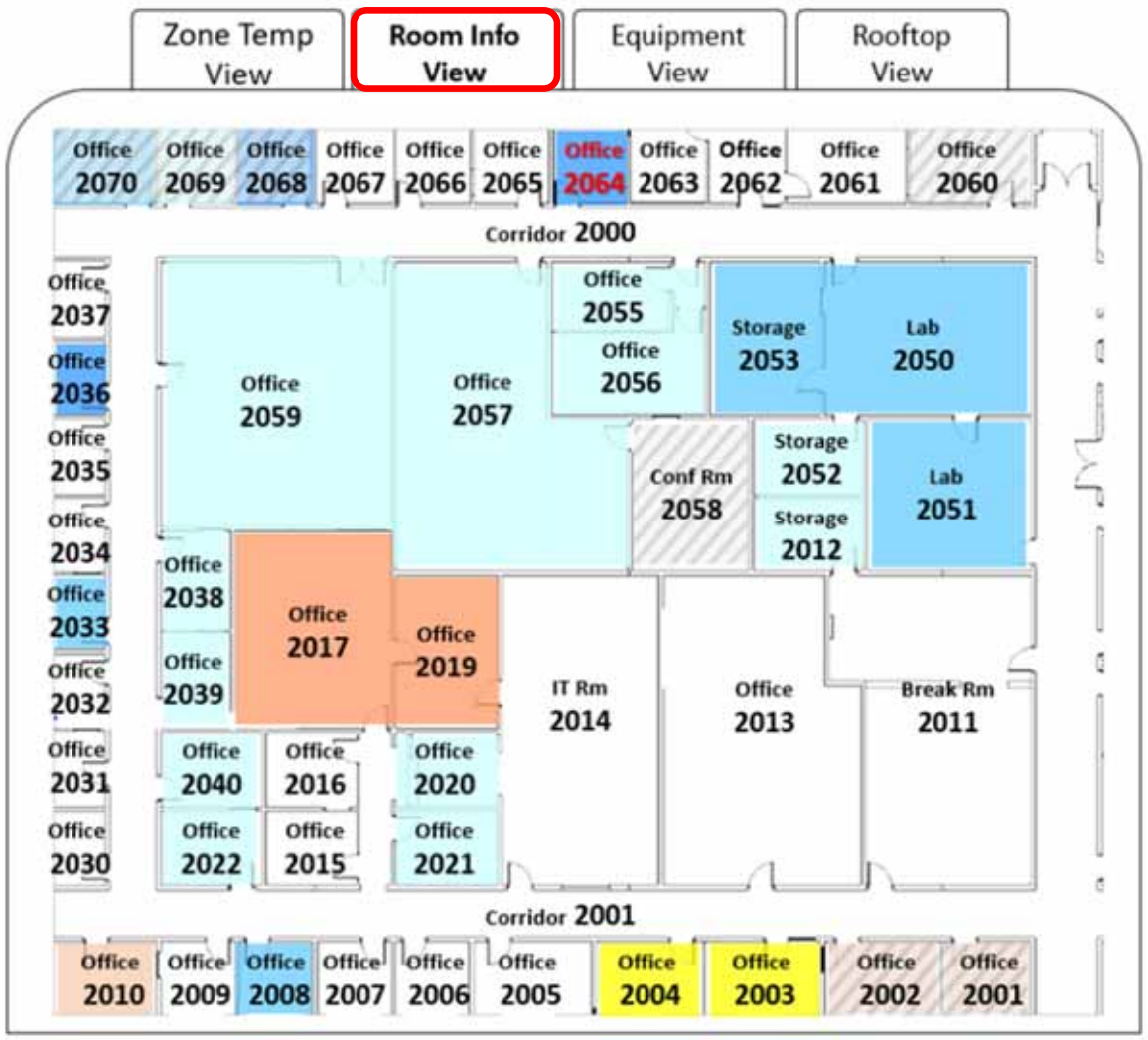
How is this effective is this *enhanced* zone floor plan graphic?



How is this effective is this *enhanced* zone floor plan graphic?



How is this effective is this *enhanced* zone floor plan graphic?



How is this effective is this *enhanced* zone floor plan graphic?

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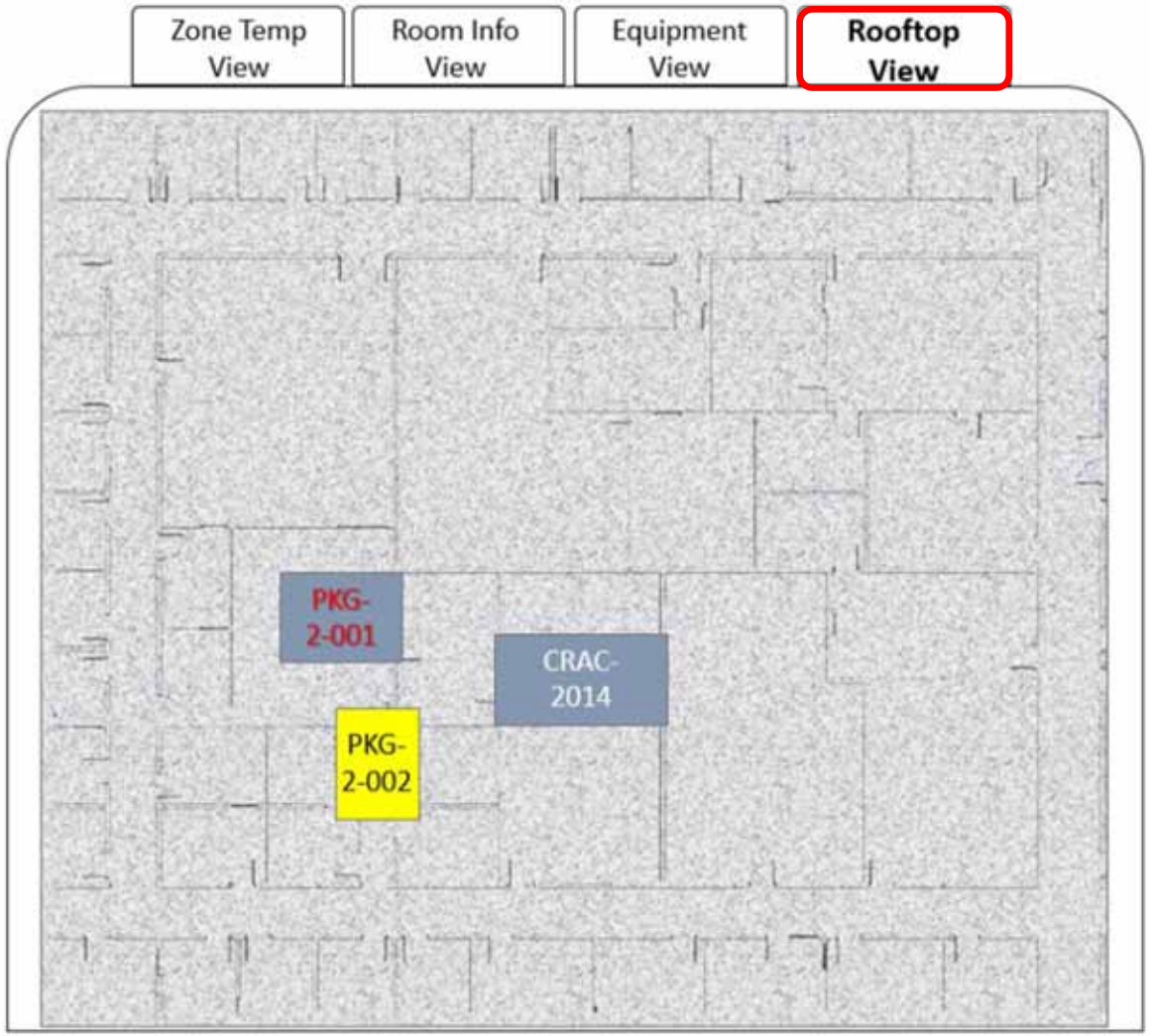


Building Graphics *Formatting* Sheets can help

Do not apply Occupancy or Deviation Formatting to the following spaces with no design occupancy and low criticality:

- *Corridors*
- *Bathrooms*
- *Storage Rooms*

Layer 1 - Values (Top)

Display Example: **70°F** *or* **61°F**
Font: *Bold, min 12pt*
Font Color: *Black (Normal)*
Red (FCU in Alarm)
Precision: *0, Rounded*
Units: *"°F"*
Location: *Centered on Zone*

Layer 2 – Occupancy Format

Occupied Zone Status:
Fill: *None*

Unoccupied or Standby:
Fill: *Gray & White Crosshatch*

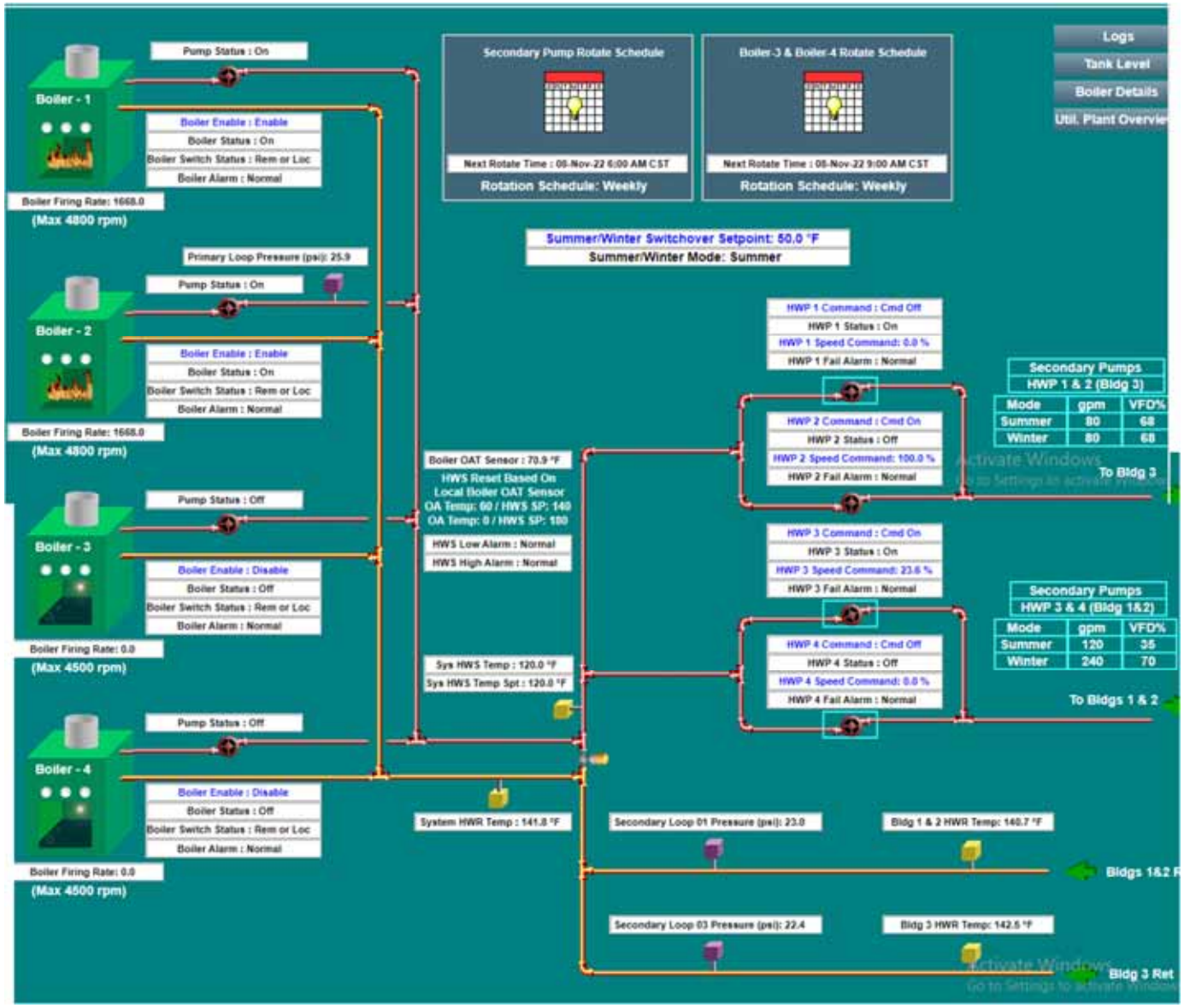
Layer 3 – Deviation Format

Relative to Setpoint:

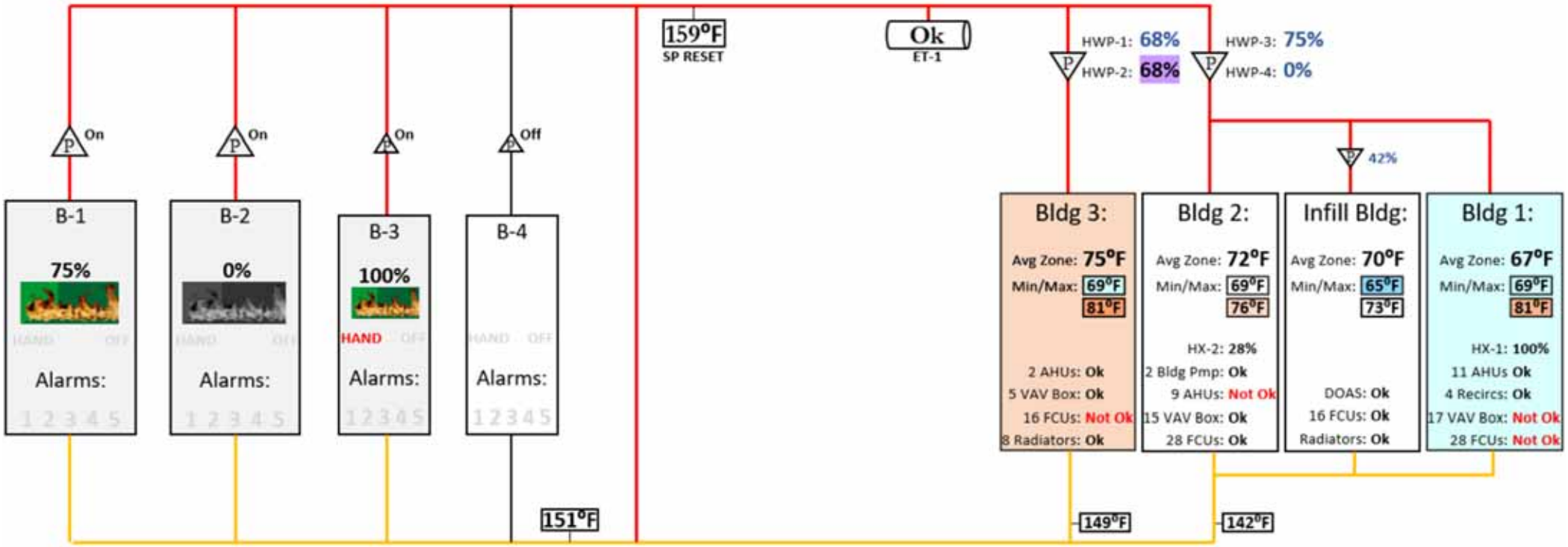
- 6°F	- 3°F	+/-3°F	+ 3°F	+ 6°F

(no network connectivity)

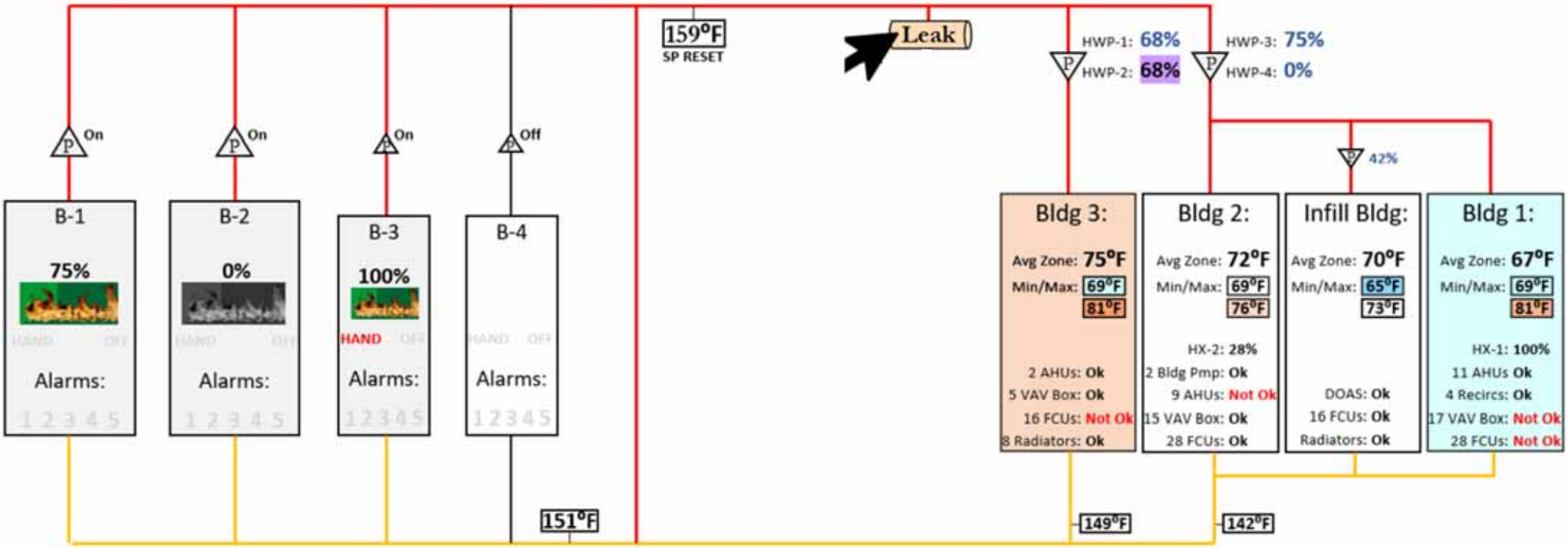
How about this *typical* hot water system graphic?



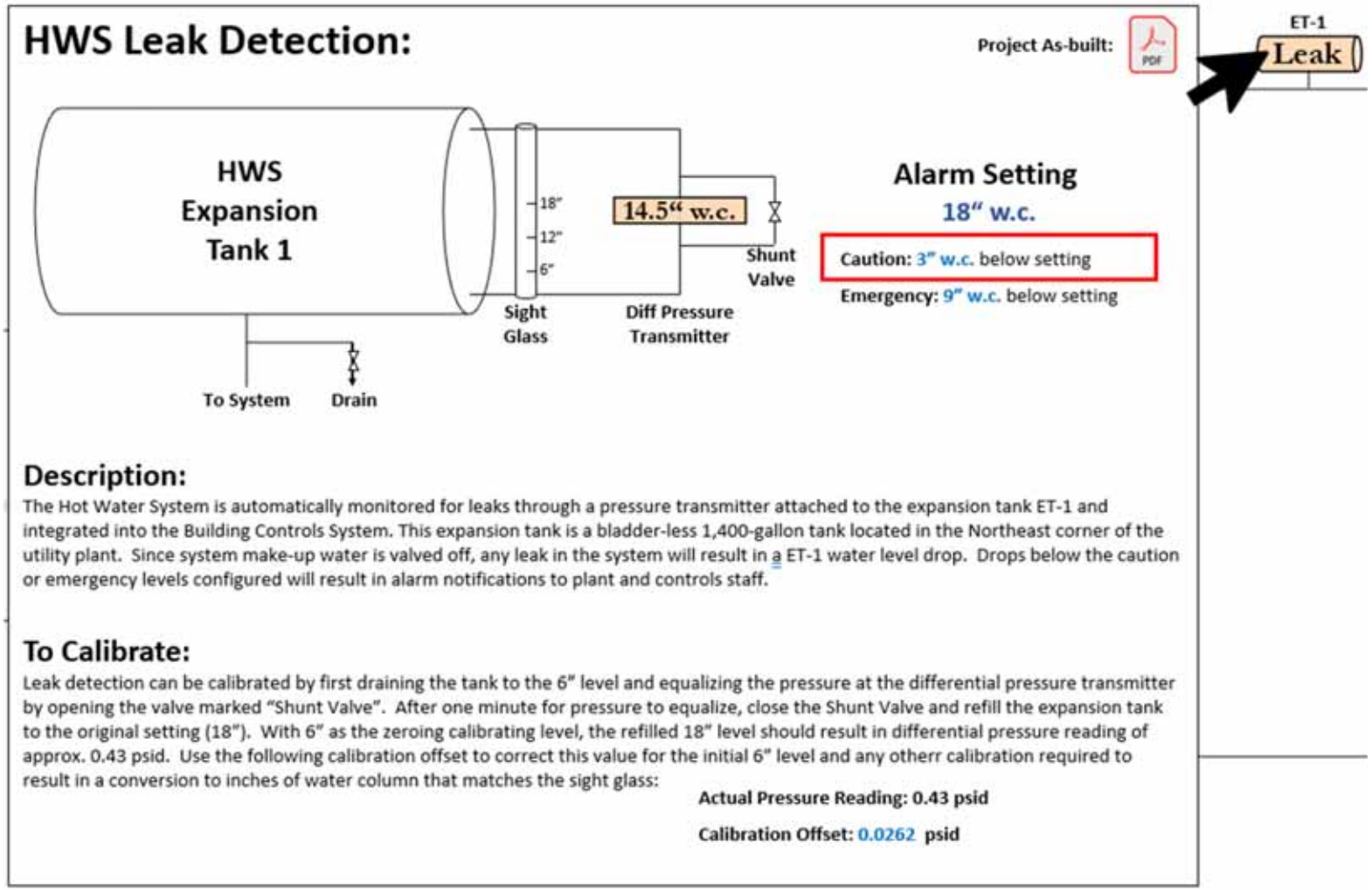
What about this enhanced HWS graphic?



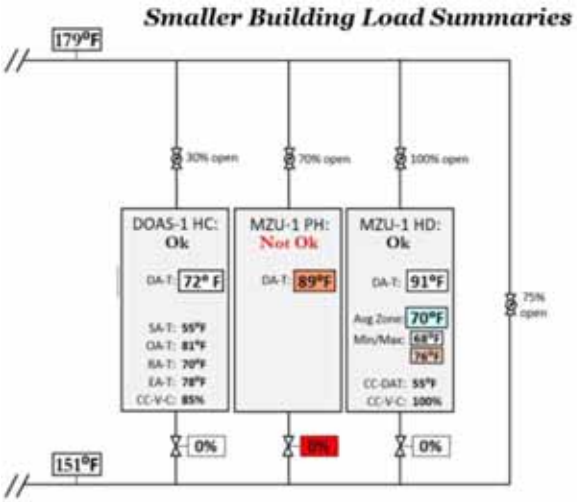
What about this enhanced HWS graphic?

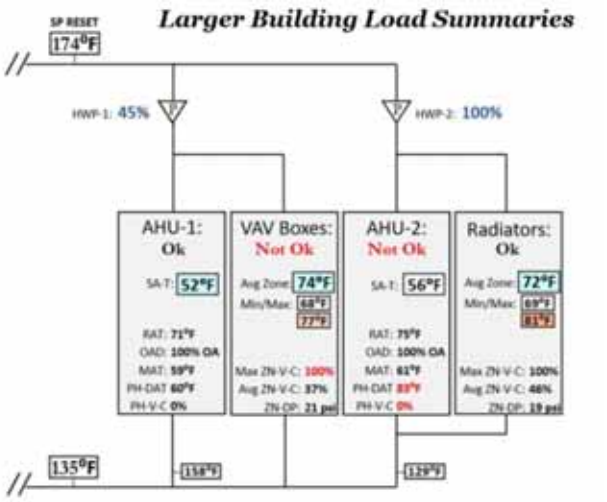


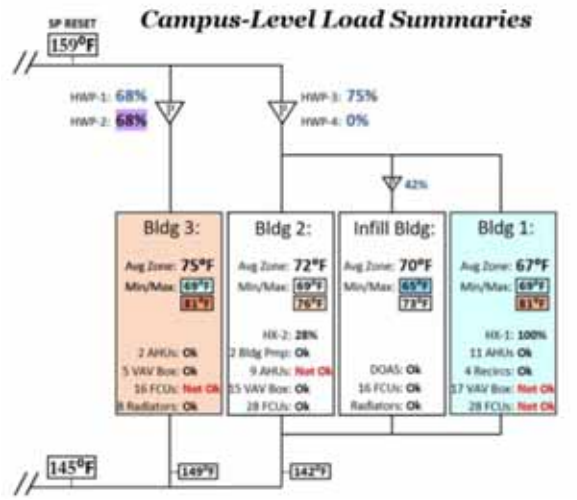
What about this enhanced HWS graphic?

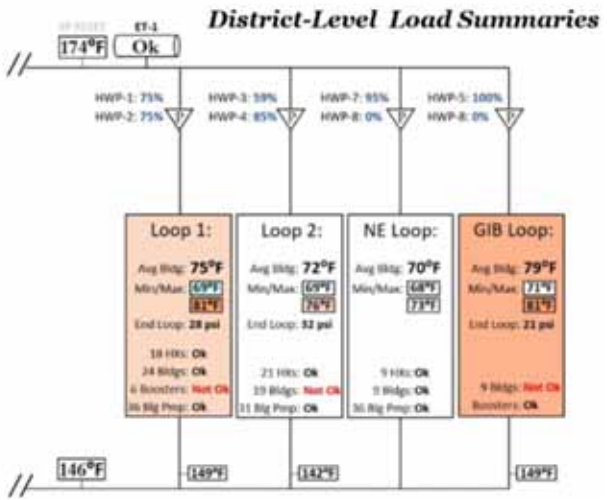


These standard plant graphics are highly scalable



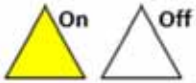






Building Graphics *Formatting* Sheets can help

Equipment Status Formatting

Firing Status (BLR-FIRE > 0%)	Enable Status (BLR-ENA = YES)	Disable Status (BLR-ENA = NO)	Alarm Status (BLR-ALM = YES)	Pump Status (PMP-S = ON)
B-X 	B-X 	B-X	B-X	
Animation: Flame GIF	*Image: Gray Flame JPEG*	*(None)*	*Outline: Red, Blinking*	*Fill: Yellow/None*

Point Text Formatting

Critical Info	Non-Critical Info	Configuration
HAND OFF Alarms: 1 2 3 **4** 5	SP RESET **SP RESET**	**Configurable** **Overridable** **Overridden**
Font: Gray vs Red, Bold	*Font: Gray vs Black, Bold*	*Font, Fill: Blue vs Black None vs Purple*

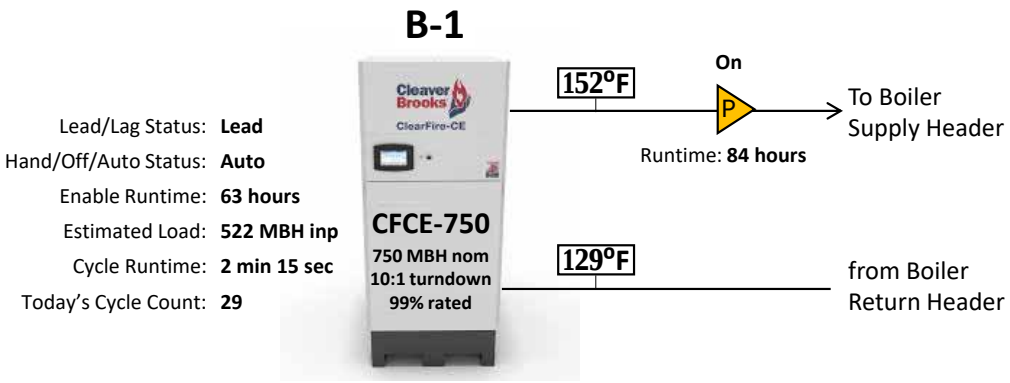
Format Color Ranges

Temp Setpoint Deviation	Flow Status
- 6°F + 3°F - 3°F + 6°F +/-3°F *(no network connectivity)*	*Flow, Supply* *Line: Solid, Red, 1.5pt* *Flow, Return* *Line: Solid, Orange, 1.5pt* *No Flow* *Line: Solid, Black, 1pt*

What about equipment *gateway* graphics?

Better Gateway?

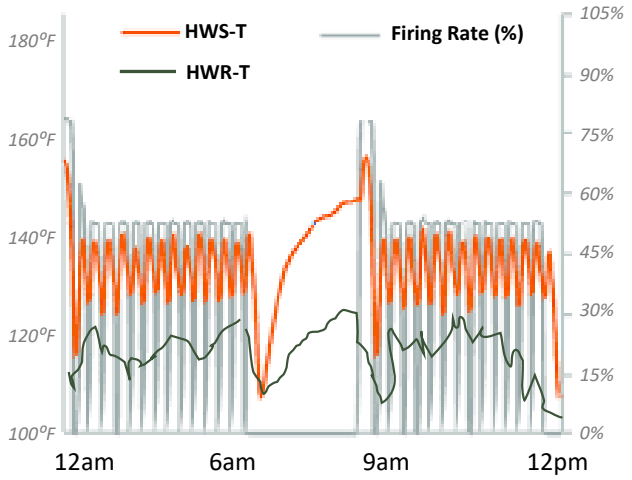
Boiler Performance:



Total Runtime: **12,085 hours**

Total Cycles: **5,785**

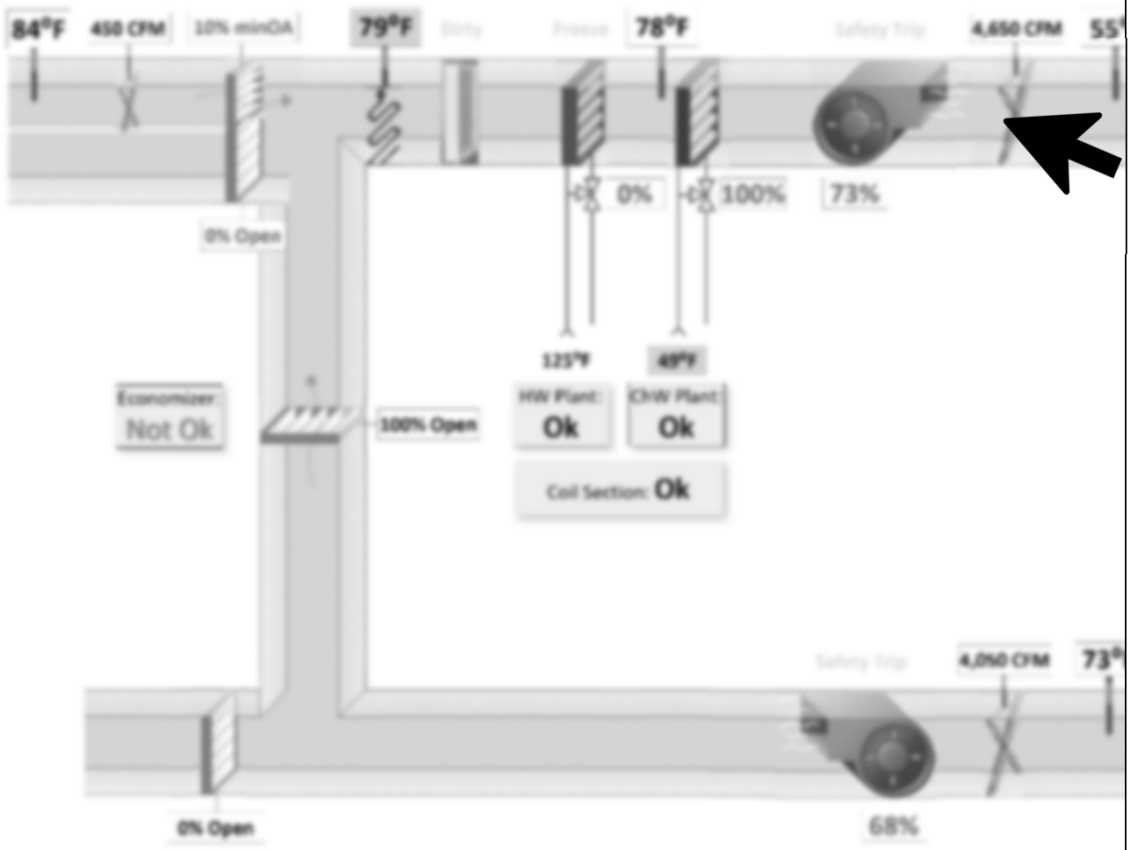
Estimated Efficiency: **84% average**



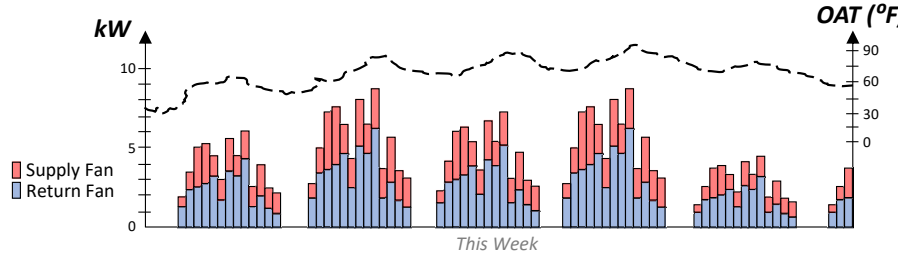
Boiler Alarms:

1. **High Gas Pressure:** gas line pressure switch to prevent combustor overheat/burn-out
2. **Low Gas Pressure:** gas line pressure switch to prevent burn-out and explosion hazard
3. **High Limit Temp:** from discharge temp sensor to indicate slow flow or tuning issue
4. **Low Water Cutout:** return water flow switch to prevent overheat damage/hazard
5. **Short-Cycle Alert:** notification for energy waste/wear from excessive purge cycles

Alarm #	Current Alarm Status	Total Alarm History Count	Last Change in Alarm
1	Ok	0	549 days
2	Ok	1	542 days
3	Ok	7	205 days
4	Ok	2	119 days
5	**Alarm**	119	1 days



AHU VFD Devices:



	SF-1	RF-1	KPI or Fault
Speed Feedback:	95%	74%	Reverse Run Fault
Frequency:	57 Hz	45 Hz	
Power:	1.2 kW	1.1 kW	0.50 kW/kCFM supply
Energy This Year:	3,740 kWh	3,410 kWh	360 kWh/SF served
Run Time:	3 hours	3 hours	12,410 hours total
Readiness:	Ready	Ready	Status Fail
Drive Temperature:	181°F	162°F	Overtemp Fault
Current:	5.0 A	4.6 A	Overcurrent
Voltage:	226 V	227 V	Output Phase Fault Input Phase
			Undervoltage Fault Ground Fau
Minimum Speed:	15%	15%	
RF Flow Difference:		500 CFM	
Acceleration Time:	10 seconds	10 seconds	
Deceleration Time:	5 seconds	5 seconds	

Clear Faults

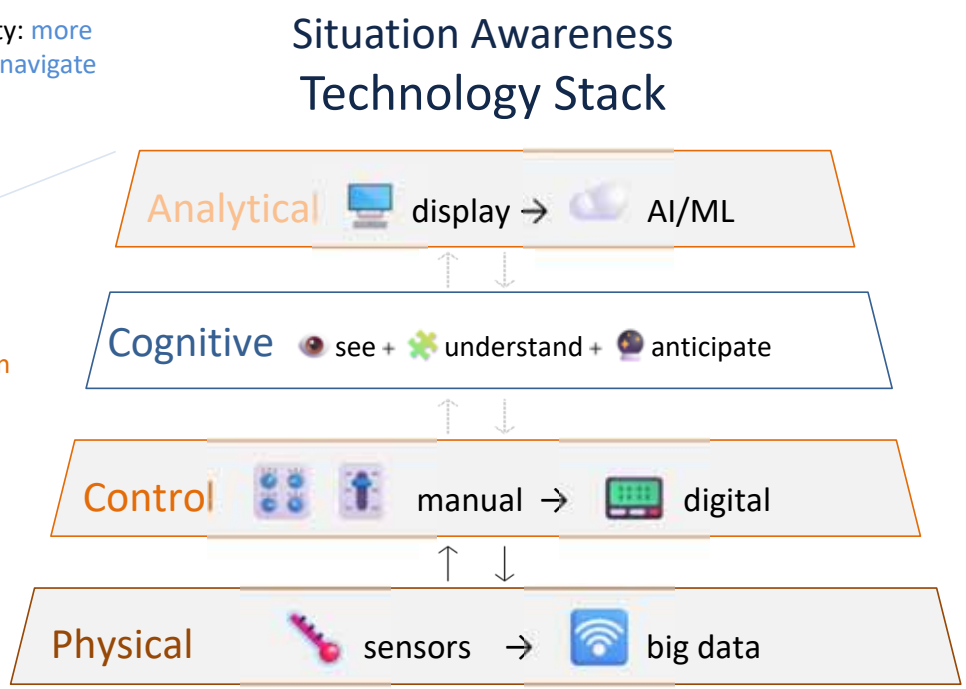
System Schedule

Pro
D

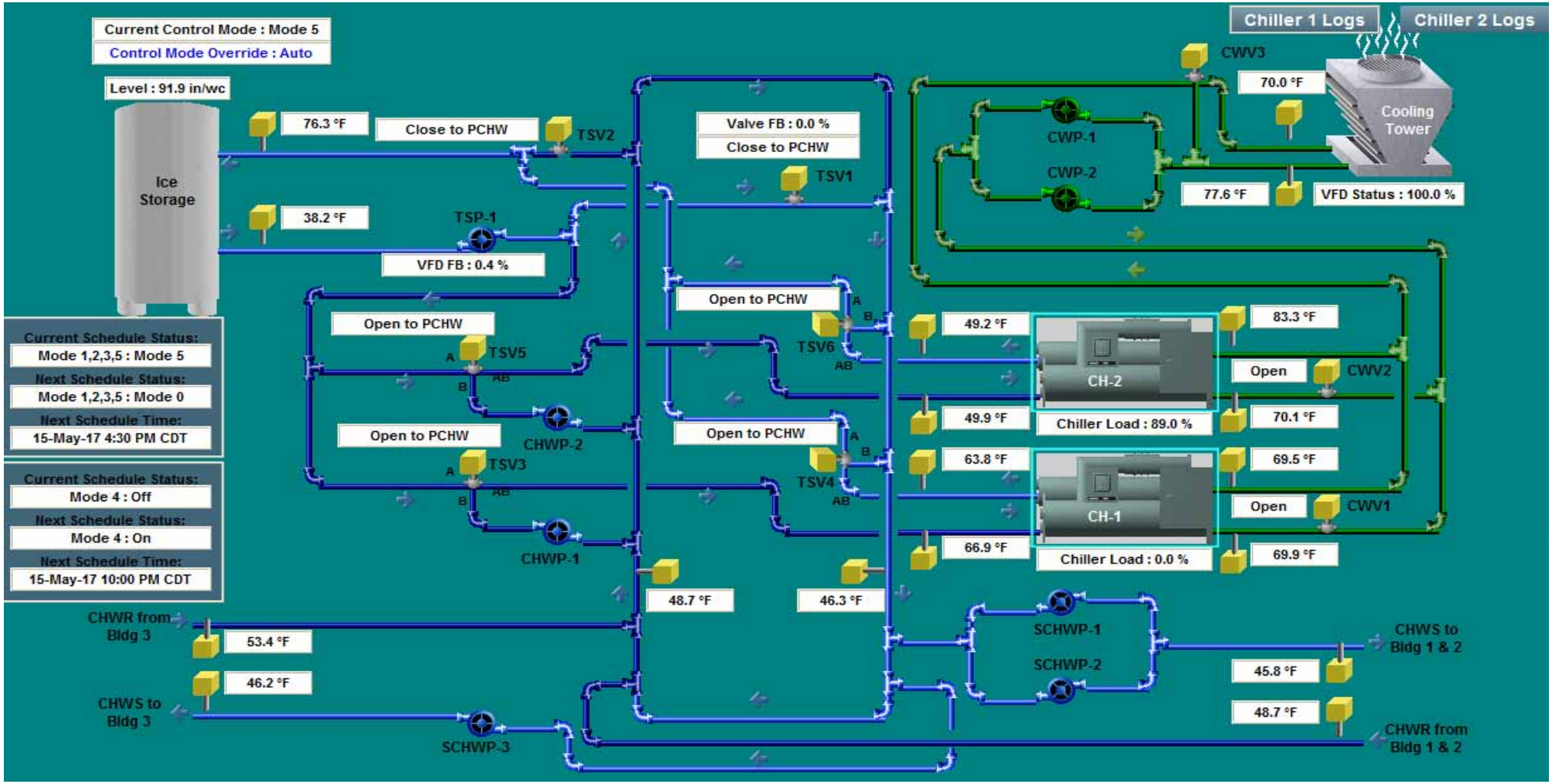
“But I want to see everything” template

FUNCTION	NAME	DESCRIPTION	DDC HARDWARE ID	SETTING (WITH UNITS)	IO TYPE	HOA REQ'D	CONFIG. TYPE	M&C VIEW AND OVRD	TREND REQ'D
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	DDC-1		BI			ON	COV
	RF-S	RETURN FAN STATUS	DDC-1		BI			ON	COV
	SA-SMK	SUPPLY AIR SMOKE	DDC-1		BI		H	~	~
	RA-SMK	RETURN AIR SMOKE	DDC-1		BI		H	~	~
	CLG-DA-T-LL	COOLING COIL DISCHARGE TEMP LOW LIMIT SWITCH	DDC-1	39 DEG F	BI		H	~	~
	SA-P-HL	SUPPLY AIR PRESSURE HIGH LIMIT	DDC-1	3.5" w.c.	BI		H	~	~
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	DDC-1		BI			~	~
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	DDC-1		AI			69°F	15m
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	DDC-1	55 DEG F			C	55°F	~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)			NET-IN			OCC	15m
	SF-SS	SUPPLY FAN START/STOP	DDC-1		BO	X		ON	COV
	UNIT STATUS	UNIT STATUS	DDC-1		NET-OUT			COOL	COV
SUPPLY FAN CAPACITY CONTROL	SA-P	SUPPLY AIR PRESSURE	DDC-2		AI			V	5m
	SA-P-SP	SUPPLY AIR PRESSURE SETPOINT	DDC-2	0.5-1.5 " w.c.			C	1.2 " w.c.	5m
	SA-P-SP-RT	SUPPLY AIR PRESSURE SETPOINT RATE OF CHANGE	DDC-2	0.01 " w.c./min			C	0.01 " w.c.	~
	SF-C	SUPPLY FAN COMMAND	DDC-2		AO	X		72%	5m
	SF-C-MIN	SUPPLY FAN COMMAND MINIMUM	DDC-2	25%	NET-OUT		OC	25%	~

Cognitive loads & system complexity have increased an already messy workflow



Pilot effort show that these approaches to building graphics help



Best Practice 1: Define roles, tasks, and usability testing requirements

				Building Graphics Level				
Group/Personas	**Description**	**Examples Positions**	**Building Interface Activities**	**Lvl 0 Port-folio Ovw**	**Lvl 1 Bldg Ovw**	**Lvl 2 Syst Ovw**	**Lvl 3 Sect-ion View**	**Lvl 4 Loop Det-ails**
Occupant	Conducts missions or activities **using individual spaces** or space sets of a building	Any user or tenant physically occupying portions of a building's interior	Adjust energy-related behavior based on manager direction or building feedback and report failed or failing conditions		(X)			X
Technician	Proactively and reactively **maintains** specific systems of buildings	HVAC, Controls, or O&M Technician	Conduct repair, replacement, and troubleshooting of system components based on manager direction or building feedback	(X)	X	X	X	X
Specialist	Provides specific **functional expertise** to improve lifecycle decisions for buildings	Engineer, Controls Specialist, REM, ESCO, Contracting Office, QAR, Designer, Analyst, Cyber, Operator, Researcher, Contractor	Helps understand, implement, or optimize building operations through expert use of building information and practices	(X)	(X)	(X)	(X)	(X)
Manager	Oversees or directs **building-level resources** (money, labor, energy, water, or space)	Building/Space Manager, Energy Manager, O&M Chief, Master Planner, DPW, Project Manager	Allocates staffing, funding, and decision-making; reports operations data using building dashboard or report summaries	(X)	X			
Leader	Establishes or oversees **portfolio-level resources** for buildings	Garrison staff, ID-level, AMC or IMCOM G4, MDEP Mgr, DCS G-9, OASA(IE&E) or OASD(EI&E)	Adjusts policy or PPBE requests by understands building lifecycle themes using dashboard and manager info	X	(X)			

Best Practice 2: Stick to building graphics design principles

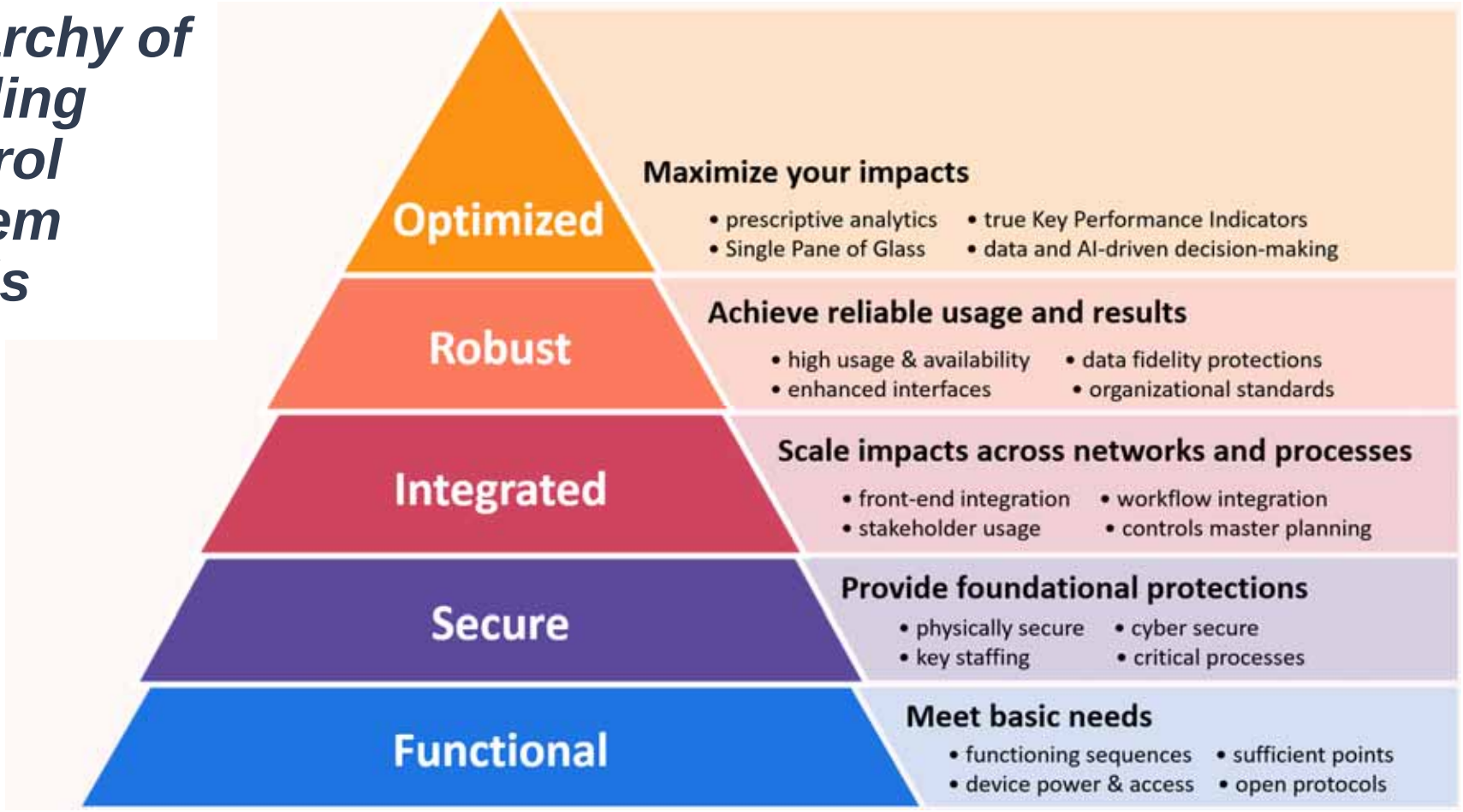
Layout	**1. Structure Holistically**	Comprehensive system views that respect order of connection and spatial-functional relationships
	2. Practice Minimalism	Simplified icons, menus, backgrounds, labeling, and precision to emphasize data and insights
	3. Order Like Facets	Visual tidiness through non-arbitrary object grouping, alignment, and sizing for rapid understanding
Focus	**4. Format Purposefully**	Consistent minimalistic formatting with color limitations that keep overall displays digestible
	5. Layer Proportionately	Display levels and elements that emphasize information in proper relation to its likely value
	6. Link Multi-directionally	Intuitive means of navigating up, down, and across the system-of-systems control hierarchy
Value	**7. Simplify Conditions**	Visual analysis with summary status beyond raw component-level data
	8. Construct Insights	Meaningful metrics, charts, and diagnostics summaries with clear performance context
	9. Aim to Teach	Graphics that help people understand their systems as evergreen knowledge management tools
	10. Build to Replicate	Scalable and flexible graphics deployments built to maintained with templates and relative paths

Best Practice 3: Be specific about building graphics in procurement

1. *Identify* who will determine the Graphics Design:
   - **A. Use existing organizational standard**
   - **B. HVAC Controls Designer will create**
   - **C. Controls Contractor will create**
2. *Design* Building Graphics using Guiding Principles as Criteria
3. *Provide* Shop Drawings, PVT/QC, Usability Tests & Training

Where does your want your building need to be?

Hierarchy of Building Control System Needs

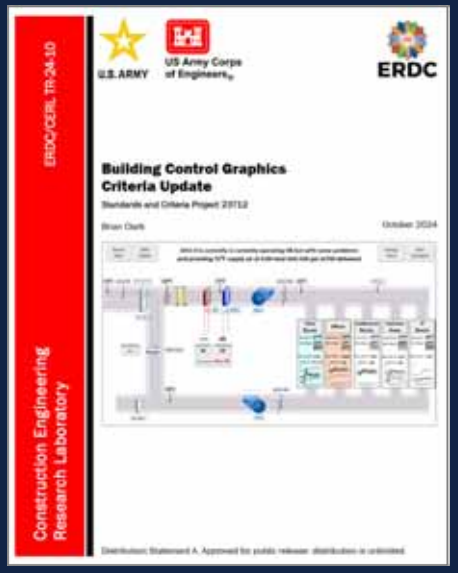


Help us get more from our building graphics

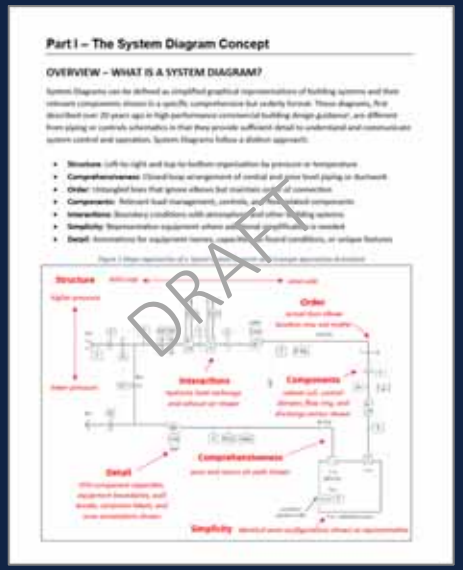
2025 ASHRAE Journal

Read the Full Article

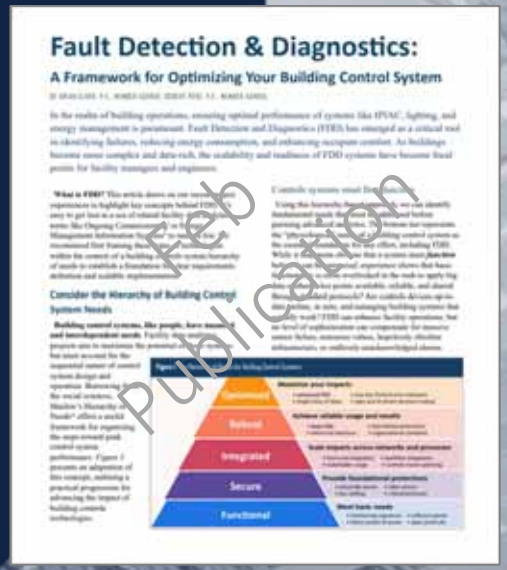
Army Tech Report



Syst Diag Engr Reg



2026 ASHRAE Journal



Brian Clark, PE
brian.c.clark@usace.army.mil

Help us get more from our building graphics – email me for more info

Coming in 2026: free 1-hour building graphics usability test & training

Task Execution

"I'm going to give you a series of questions about building performance…5–10 min ea…navigate across screens…please think aloud"

*#1 "how is this building performing **compared to**…"*

*#2 "**which equipment** has problems…"*

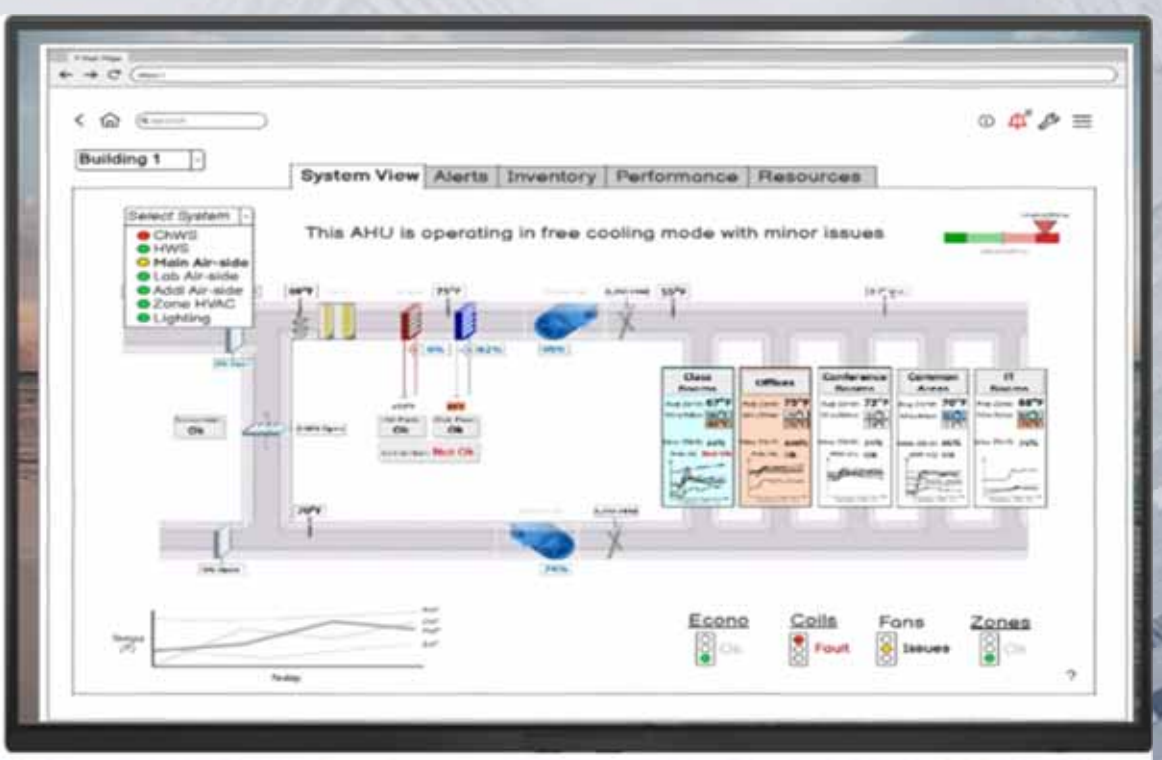
*#3 "**how many** …**in the past**…"*

*#4 "under **what conditions**…"*

*#5 "where should we **prioritize** attention…"*

…

*#12 **"write** a brief summary…"*



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