2024 Critical Environments Summit

Smart Lab Solutions

Control, IAQ, and Energy Initiatives

Tyler Kee 1/17/2024

What is a Smart Lab?

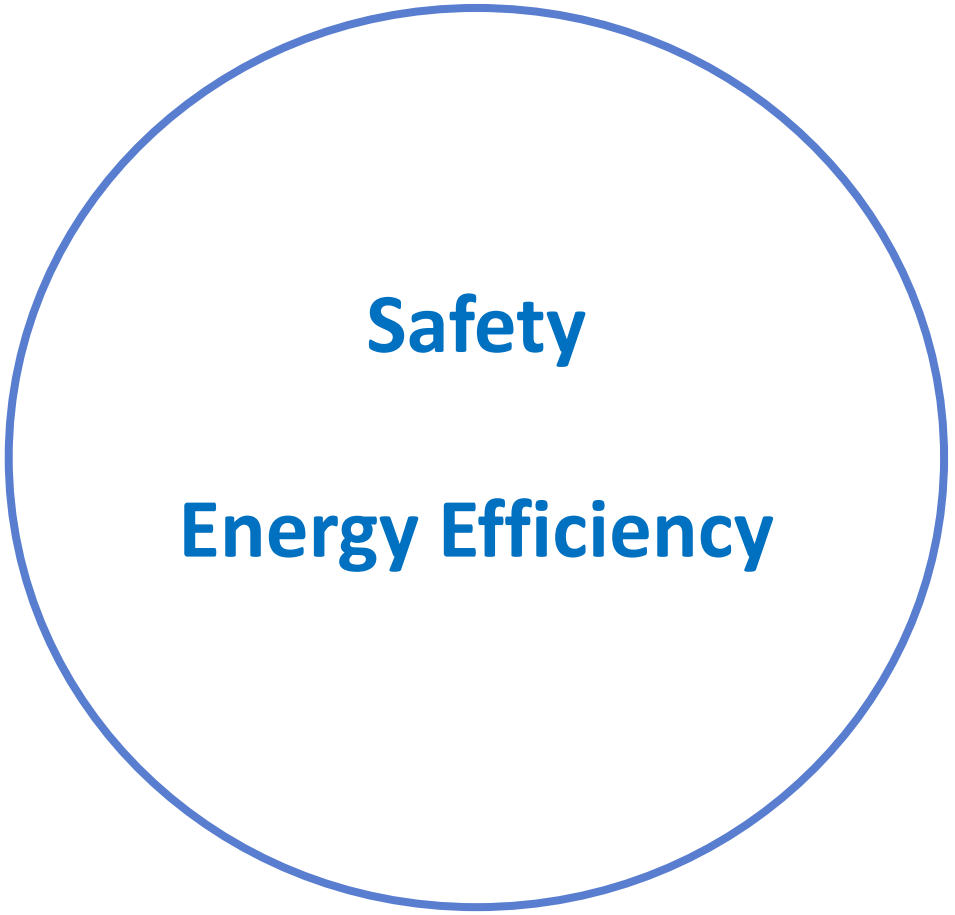
International Institute for Sustainable Laboratories

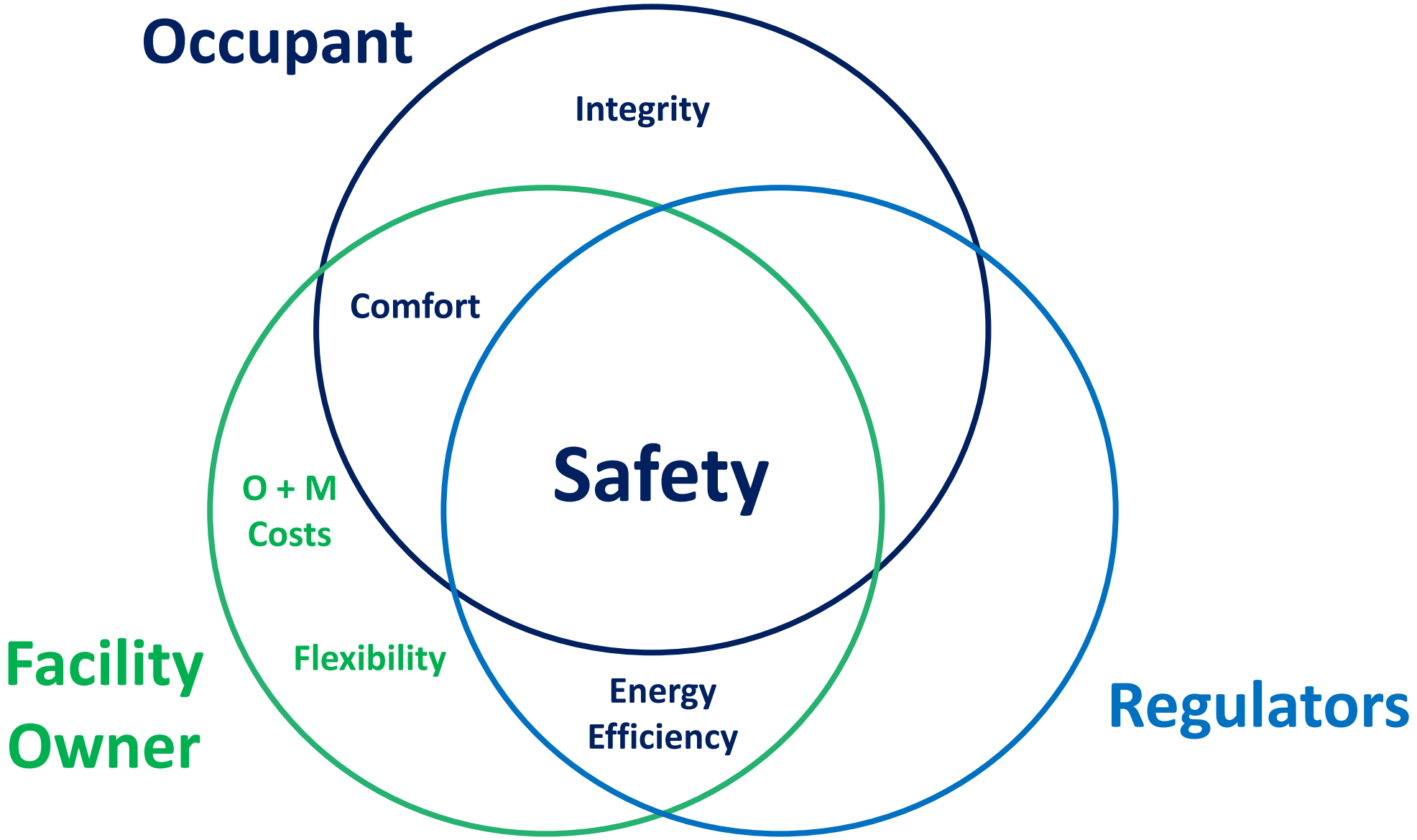
Smart Labs enable **safe** and **efficient** world class science to occur in laboratories through **high-performance methods**. A Smart Labs program employs a **combination** of **physical, administrative**, and **management** techniques to **assess, optimize**, and **manage** high performance laboratories. A smart lab program designs and operates labs based on **containing ventilation risk** as determined by a ventilation risk assessment.

Occupant Expectations

Facility Owner Expectations

Regulatory Expectations



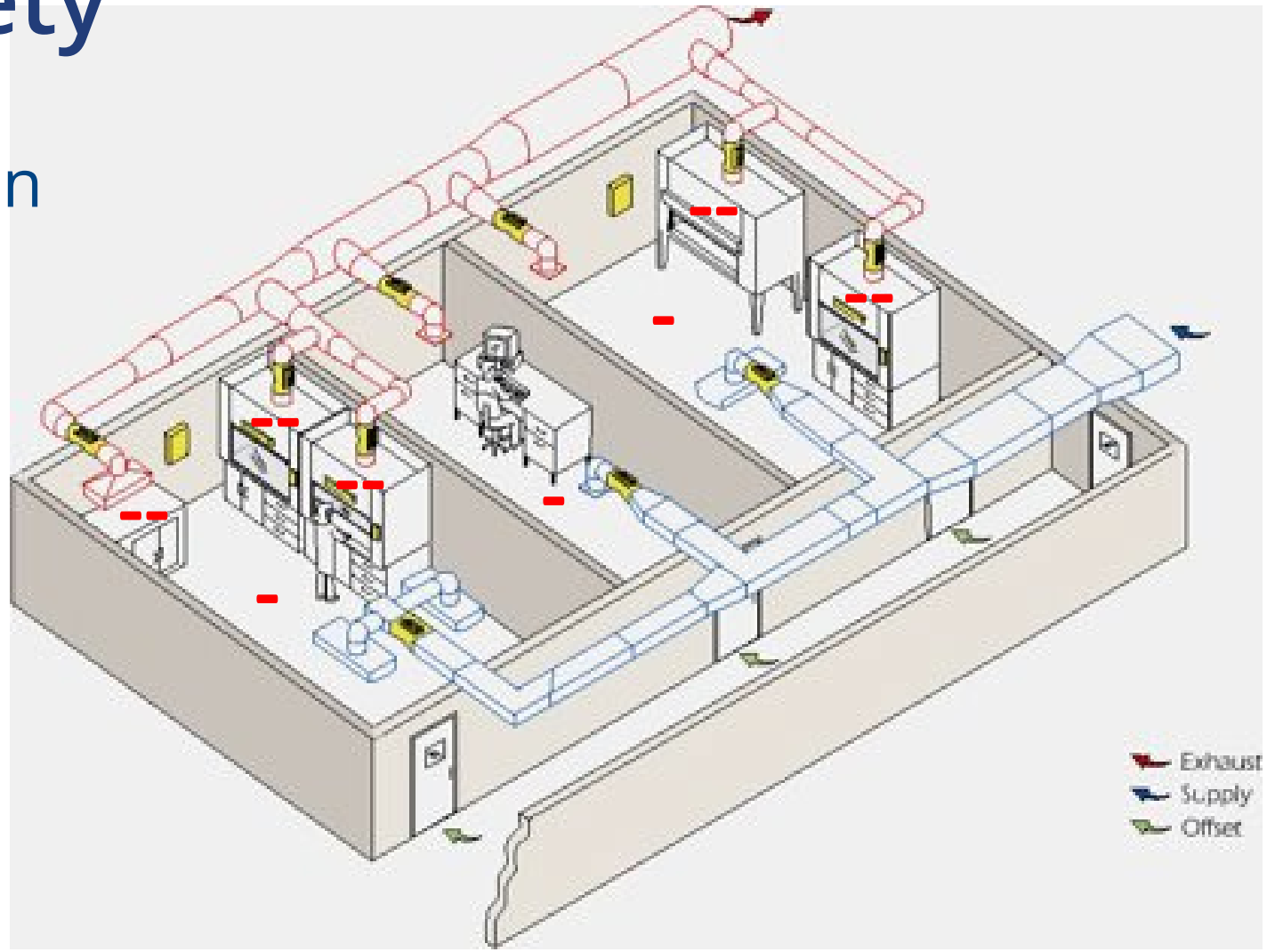

Occupant
Integrity
Comfort
Safety
O + M
Costs
Facility
Owner
Flexibility
Energy
Efficiency
Regulators

Occupant Safety

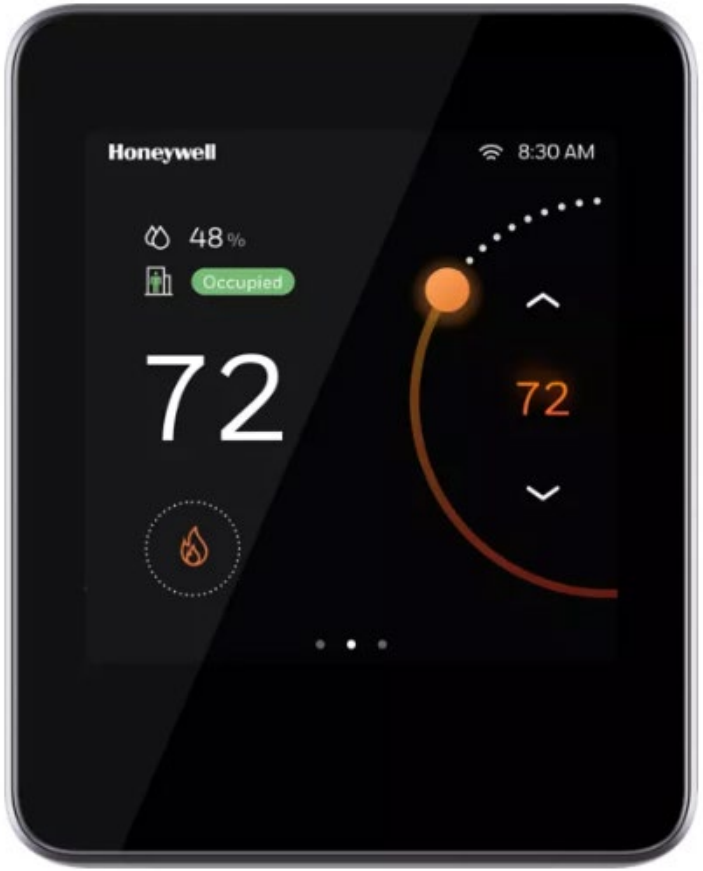
ANSI Z9.5 – 2022 Section 3.8 *Excessive airflow with no demonstrable safety benefit other than meeting an arbitrary air change rate can waste considerable energy.*

Occupant Safety

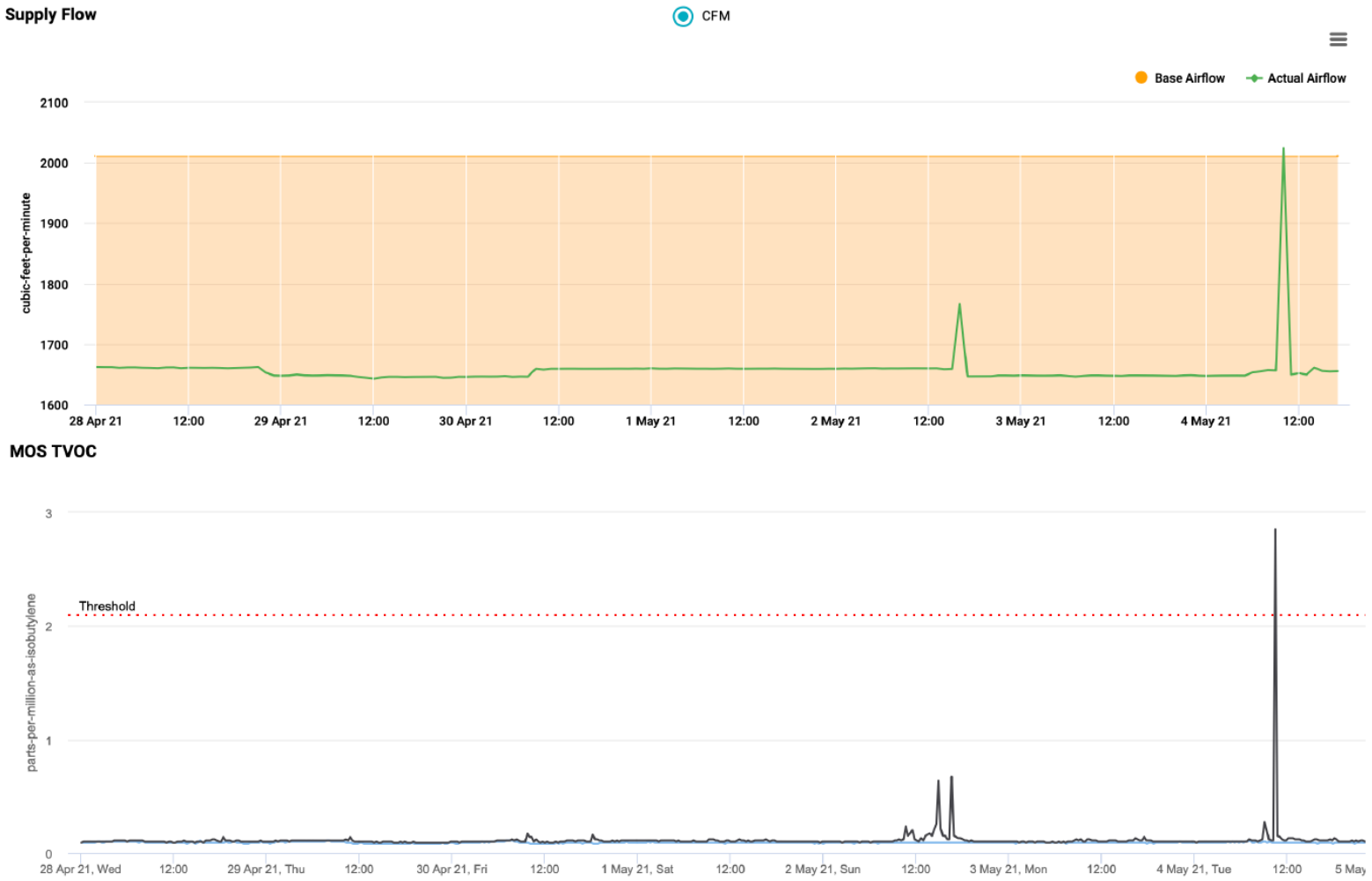
- Space Pressurization



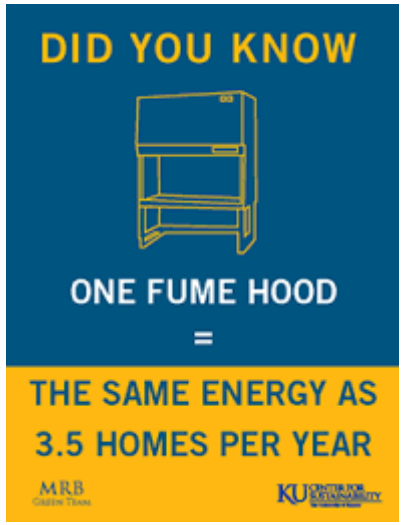
Occupant Comfort



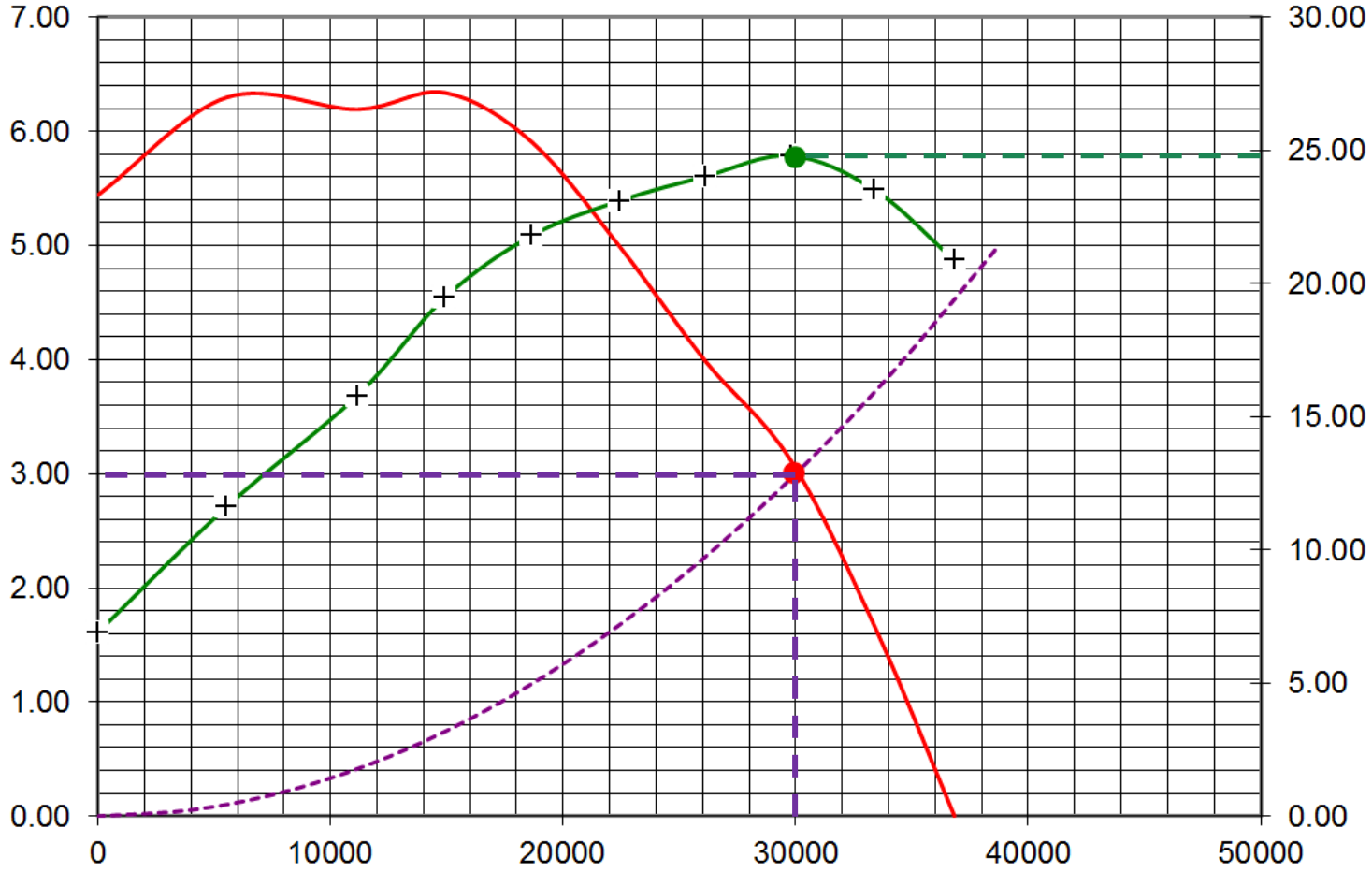
Demand Controlled Ventilation



Operating Costs



Duct Static Pressure

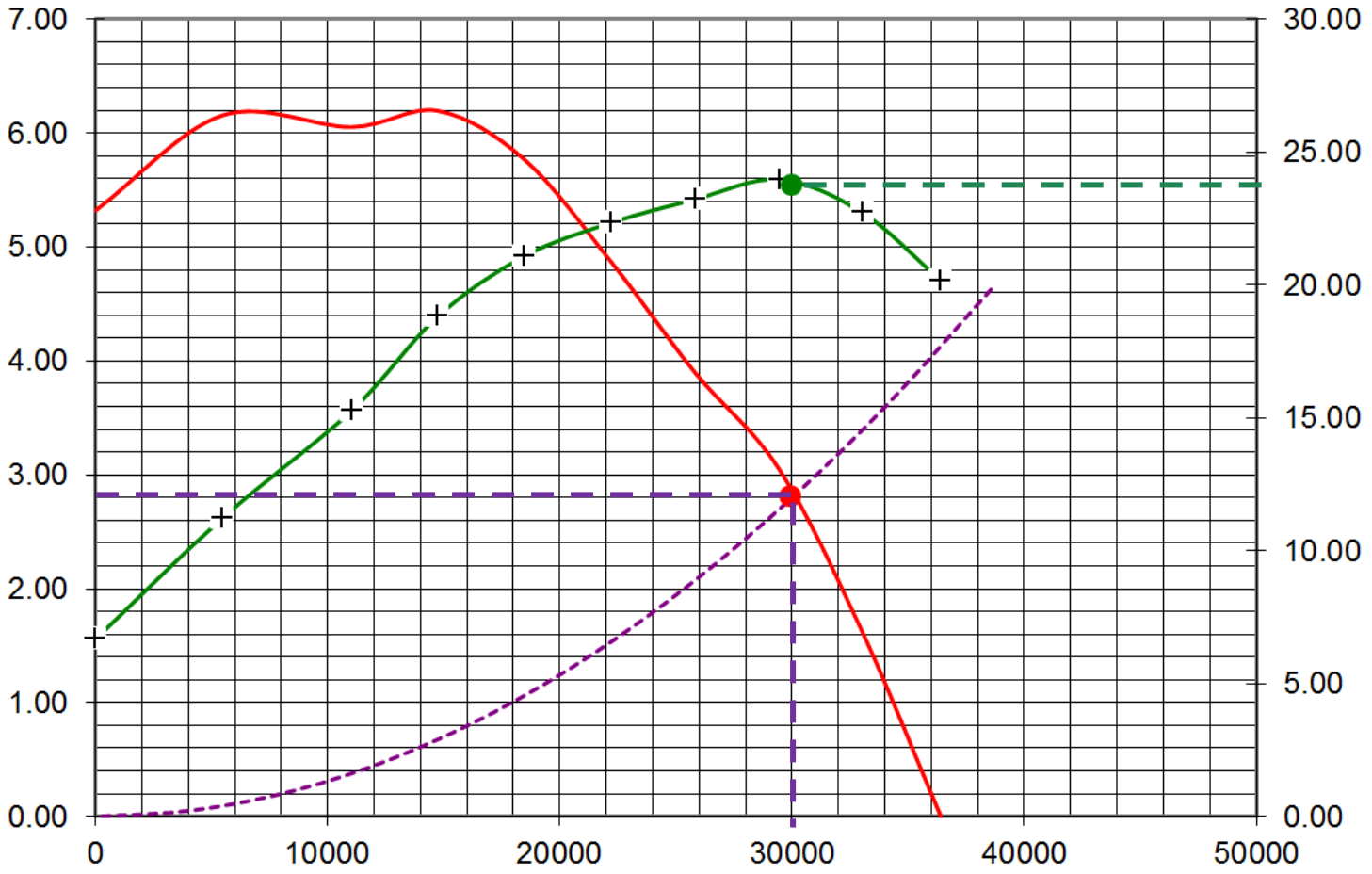


30,000 CFM

3.0” s.p.

24.73 BHP

Duct Static Pressure – 10% s.p. reduction



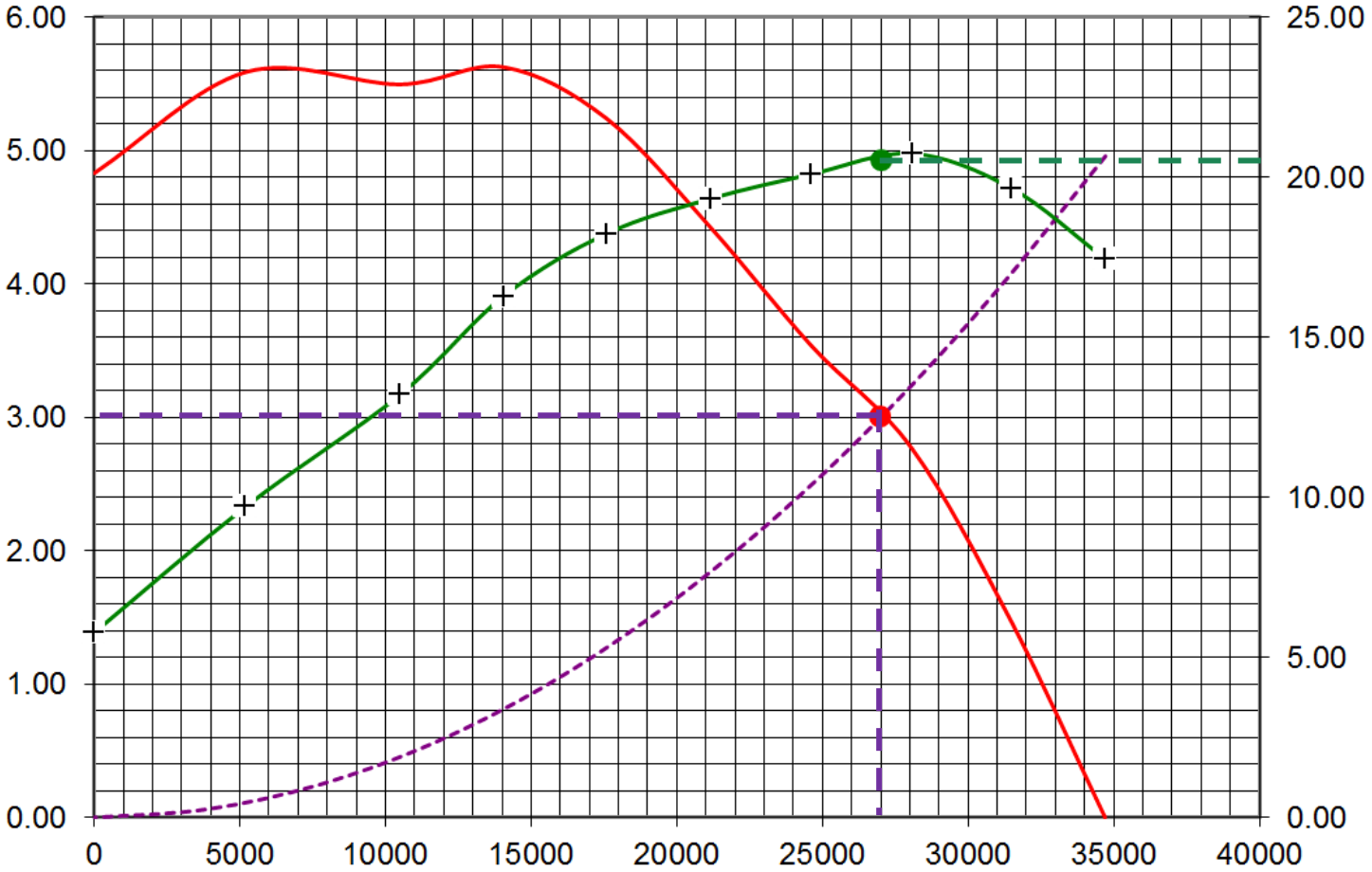
30,000 CFM

2.7” s.p.

23.78 BHP

3.8%
Fan Energy Savings

Duct Static Pressure – 10% flow reduction



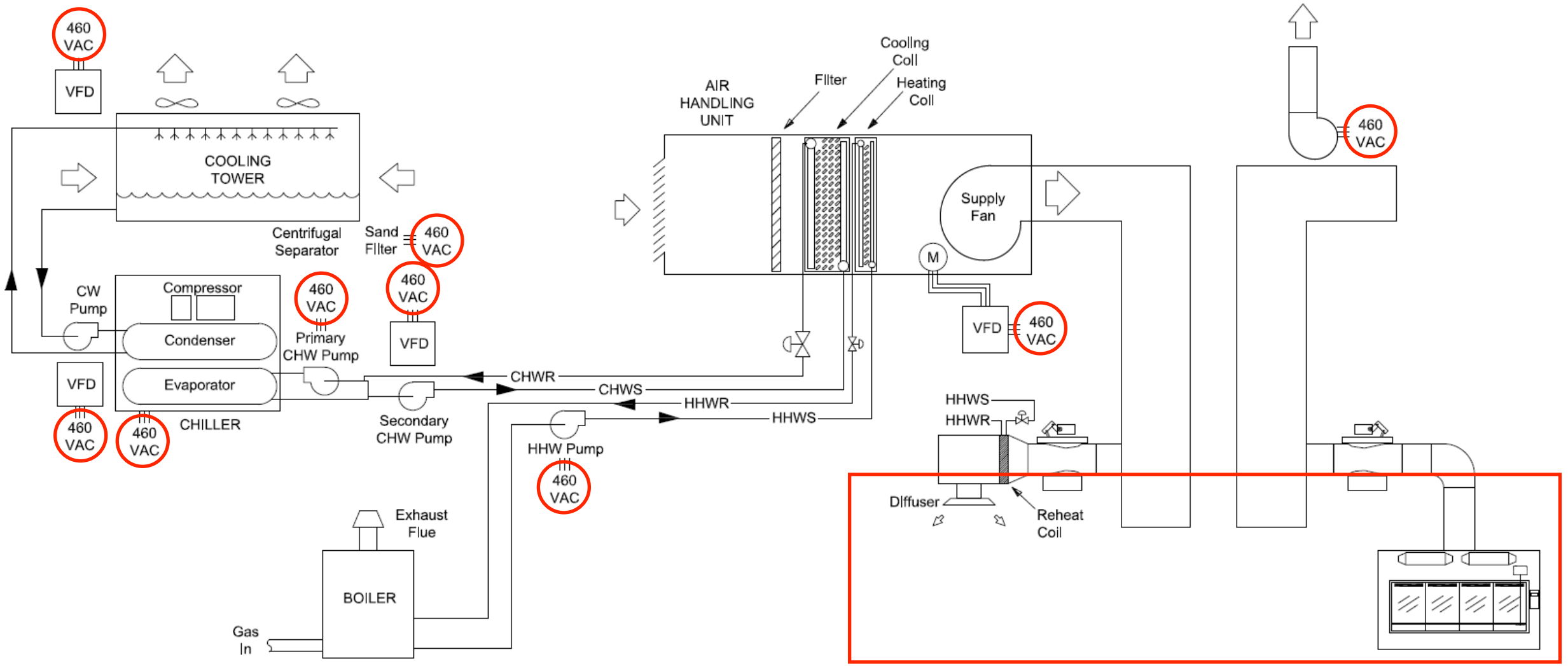
27,000 CFM

3.0” s.p.

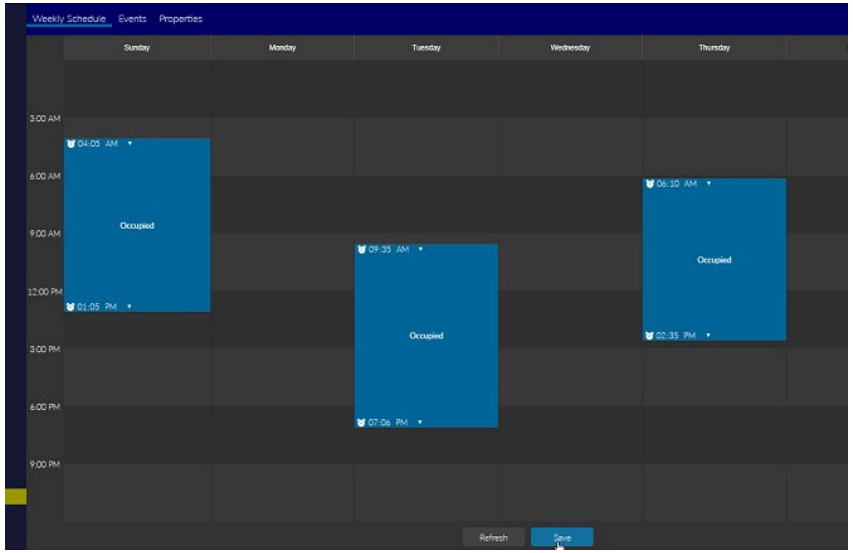
20.55 BHP

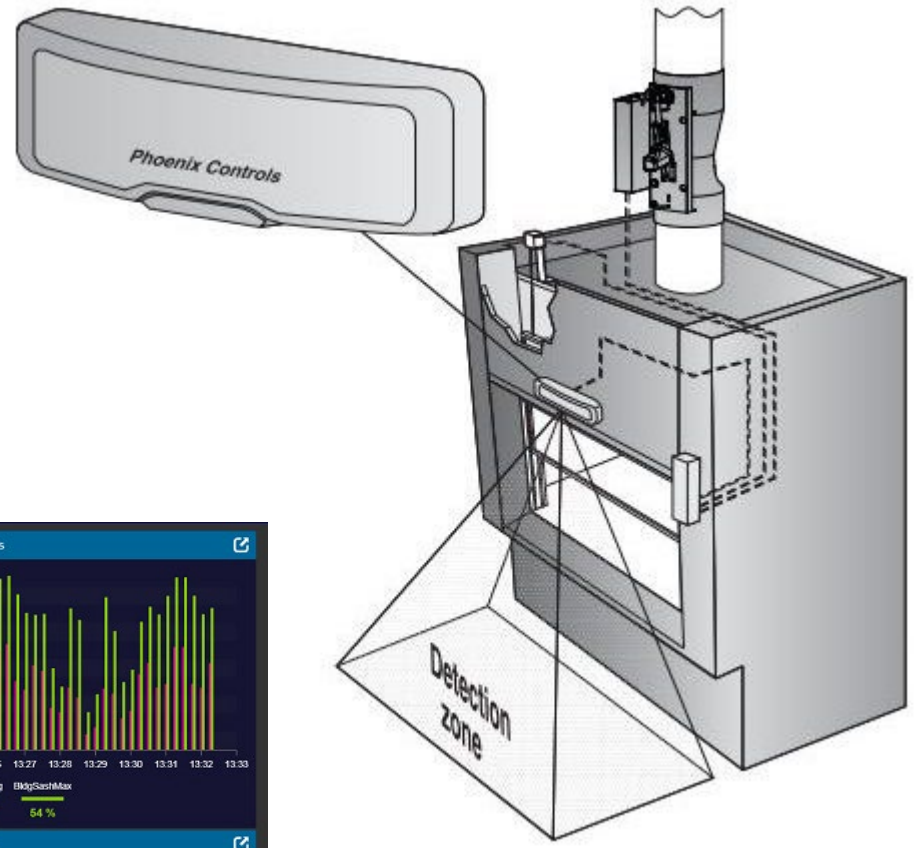
16.9% Fan Energy Savings

HVAC Energy


460 VAC
VFD
COOLING TOWER
Centrifugal Separator
Sand Filter
460 VAC
CW Pump
Compressor
Condenser
Evaporator
CHILLER
460 VAC
Primary CHW Pump
VFD
Secondary CHW Pump
CHWR
CHWS
HHWR
HHWS
HHW Pump
BOILER
Exhaust Flue
Gas In
AIR HANDLING UNIT
Filter
Cooling Coil
Heating Coil
Supply Fan
M
Diffuser
Reheat Coil

Setback

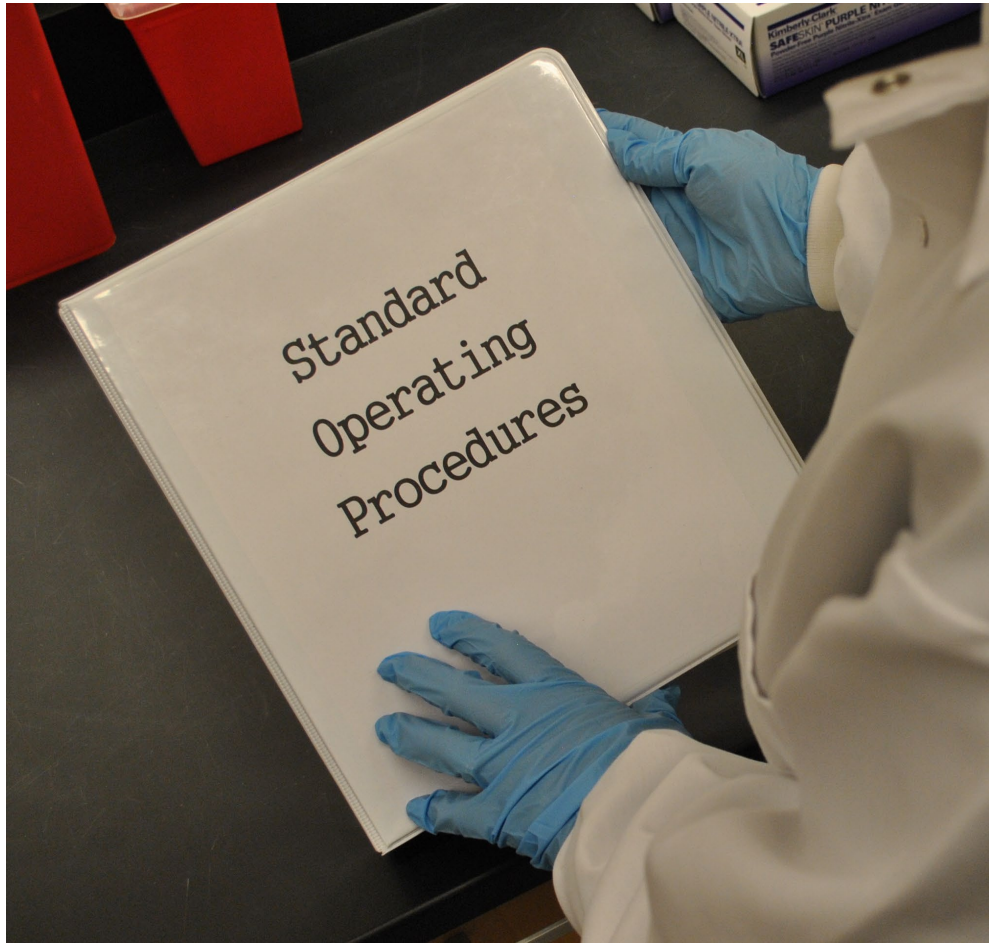

Weekly Schedule
Events
Properties
Sunday
Monday
Tuesday
Wednesday
Thursday
3:00 AM
6:00 AM
9:00 AM
12:00 PM
3:00 PM
6:00 PM
9:00 PM
04:03 AM
Occupied
01:05 PM
09:35 AM
Occupied
07:06 PM
06:10 AM
Occupied
02:35 PM
Refresh
Save


Phoenix Controls
Detection zone

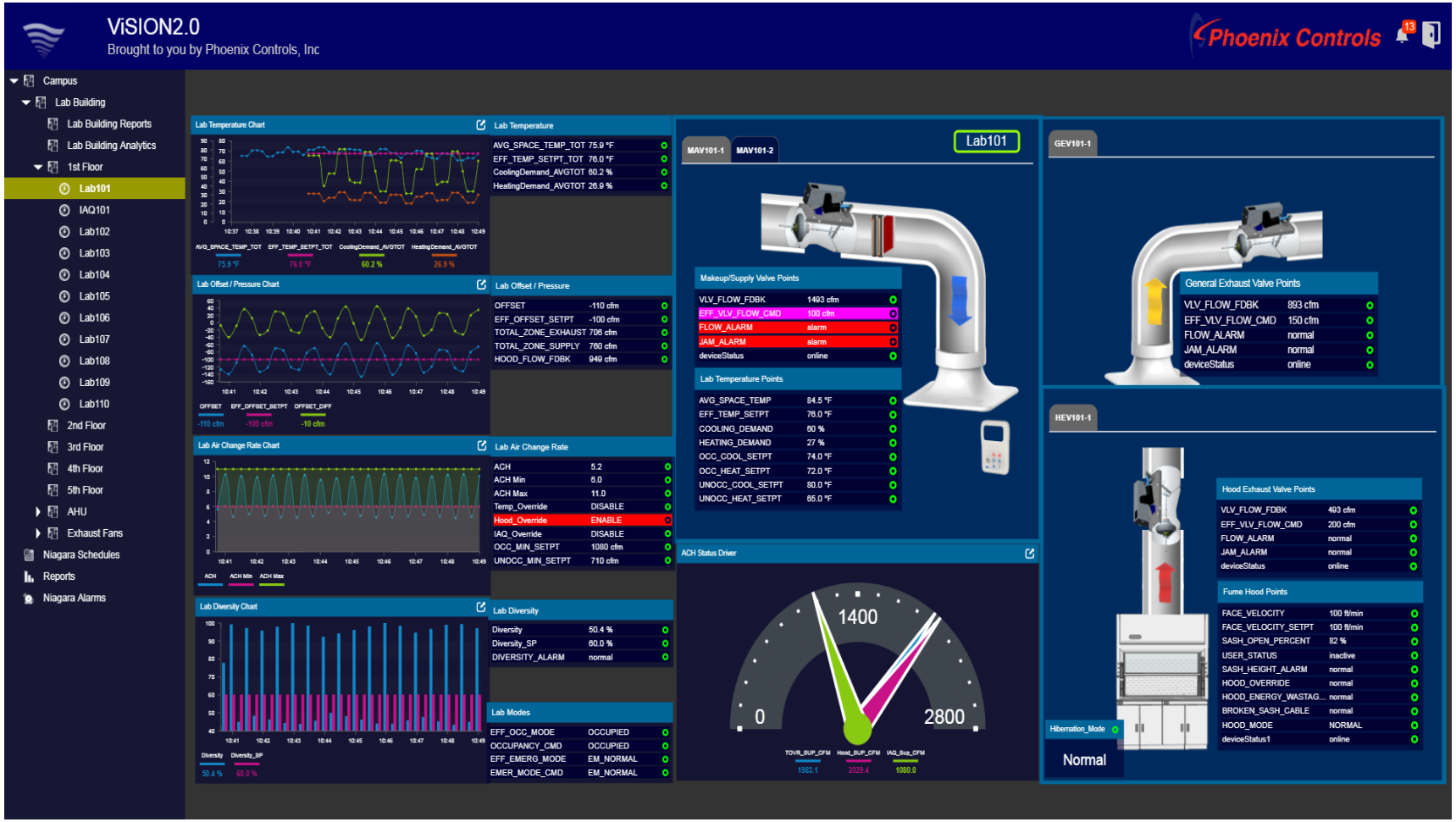

Building CFM Totals
BldgTotSup
BldgTotHood
BldgTotExh
60171 cfm
30342 cfm
60171 cfm
Building SASH Averages
BldgSashMin
BldgSashAvg
BldgSashMax
0 %
35 %
54 %
Building TEMP Averages
BldgRmTmpAvg
Bldg%CoolAvg
Bldg%HeatAvg
75.1 °F
55.8 °F
28.5 °F
Building ACH Averages
BldgACHMin
BldgACHMax
BldgACHAvg
Building Diversity Averages
12/5/18
BldgDivMin
BldgDivMax
BldgDivAvg
51 %
54 %
53 %

Maintenance Costs

- System Maintenance
  - Cleaning
  - Calibration
  - Filter Changeouts



System Visualization



System Visualization

Success Story – GradLabs

Success Story - CRADL