Healthcare Infection Control &
Engineering Quality Improvement

Fairmount Homes

Environmental Quality and Infection Cross Contamination
Risk Assessment Testing

10/22/2021

Testing Statistical Methods

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- Maintain normal working room conditions
  - Normal room occupancy with additional occupants to perform testing
  - Normal mechanical systems function except disabling UV air treatment during UV Off permutations and addition of an in-room filter unit for Genesis On/Off permutations
  - UV On/Off permutations refer to Fresh Air DuctwoRx™ by EcoQuest Manufacturing
  - Genesis On/Off permutations refer to Genesis Air RGS III in-room filter unit
- Data not normally distributed as assessed by Shapiro-Wilk and Kolmogorov-Smirnov normality tests
- Multiple comparison for Microbial Assay by Tukey range test
- Pairwise comparison for Microbial Assay by Kolmogorov-Smirnov test
- Pairwise comparison for Particle Counts by Kolmogorov-Smirnov test
- $P<0.05$ significant

Sample Room Cross-Contamination Prevention Risk Picture

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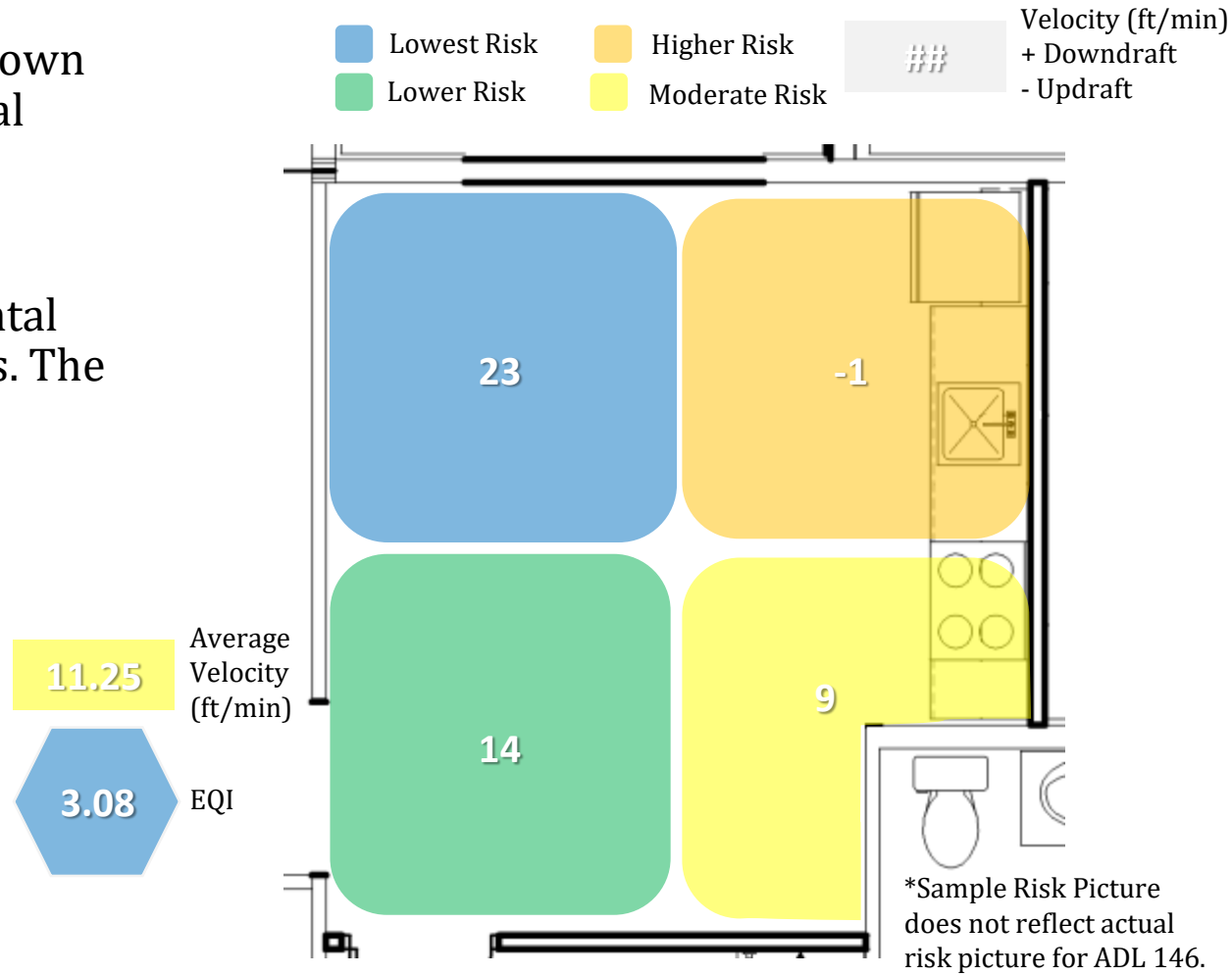
Definition of Risk Picture: Occupants in a certain area (shown by sector) will have an increased **relative** risk of microbial contamination by risk color.

Definition of EQI: Consolidated calculation of environmental qualities and their deviation from ideal or best conditions. The higher the score, the further away the space is from ideal conditions.



EcoQuest Fresh Air DuctwoRx – Current Intervention Labeled “UV” in this Report

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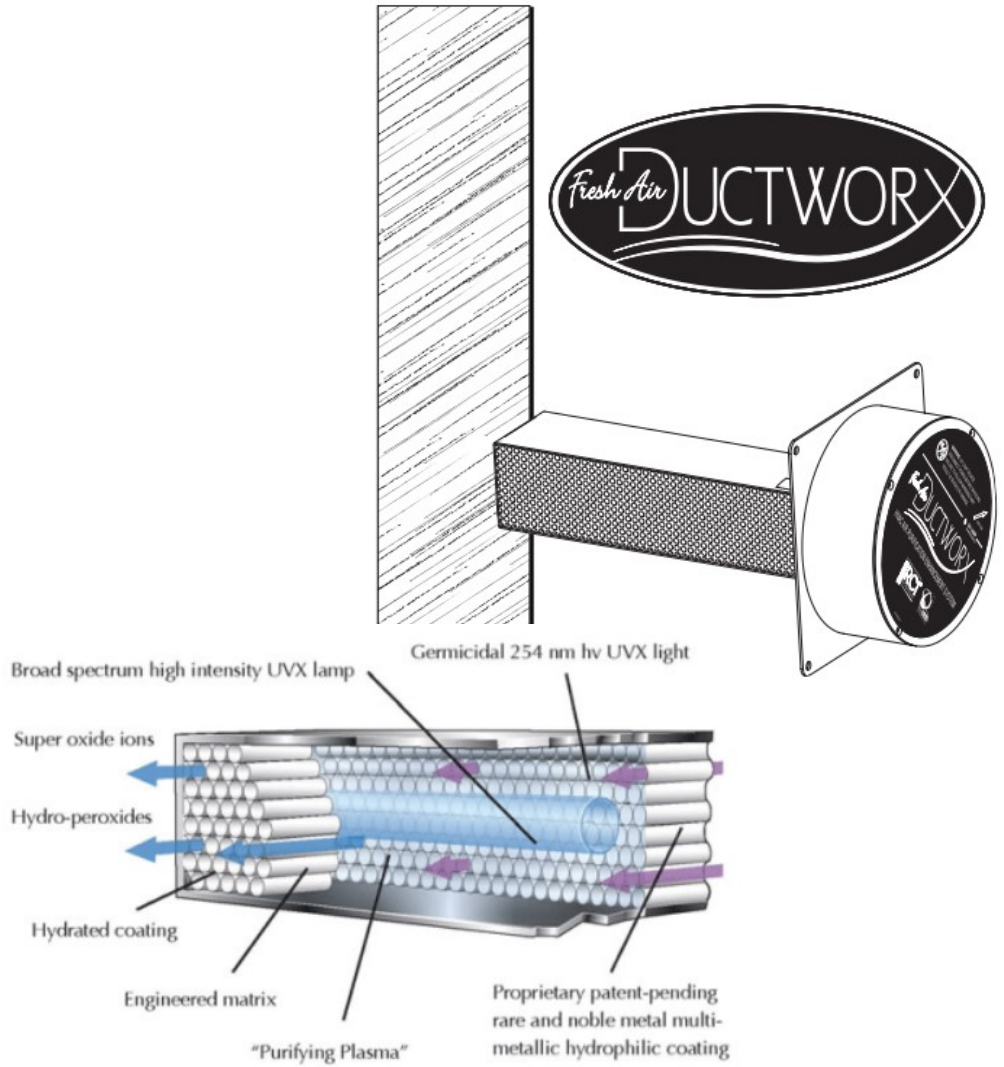
“When the HVAC system is in operation, DuctwoRx™ creates an Advanced Oxidation Process consisting of hydro-peroxides, super-oxide ions, and safe low levels ozone - all friendly oxidizers that revert back to oxygen and hydrogen after the oxidation of a pollutant” – DuctwoRx operating manual

Specifications list a level of 0.04 ppm of Ozone. Specifications do not list ppm levels for other oxidizers.

Particulate matter including smoke, pollen, and dust, are agglomerated by air ions including hydro-peroxides, super-oxide ions, and ozone.



Genesis Air RGS III – Potential Intervention labeled “Genesis” in this Report

OnSite
Healthcare Infection Control & Engineering Quality Improvement

Based on a revolutionary technology to clean, deodorize and disinfect the air

GENESIS AIR Photocatalysis Center Point PCO™

Improves Health and Productivity:

- Reduces Smoke and Odors
- Reduces Airborne Biologics IE: Mold Spores, Bacteria, VOCs and many other Irritants.
- Reduces Carbon Monoxide
- Continuous Protection

Genesis Air's* GAP™** technology (*patent pending*) often eliminates the need for costly HEPA and carbon filtration. ***Genesis Air™ units do not produce ozone.

GAP ™

Special Features:

- 2 Non-ozone producing lamps
- Variable speed
- Merv 13 Filter: 12” x 24” x 2”
- 1- 6” commerical duty catalyst
- Voltage: 115 60 hertz
- Amps: 3.4
- Airflow: 200 -650 cfm
- Size: 15” x 16.25” x 33.25”
- Weight 58.2 lbs
- Available in three colors (Black, Gray and Light Ivory)

EQI Analysis Table – To be completed

OnSite
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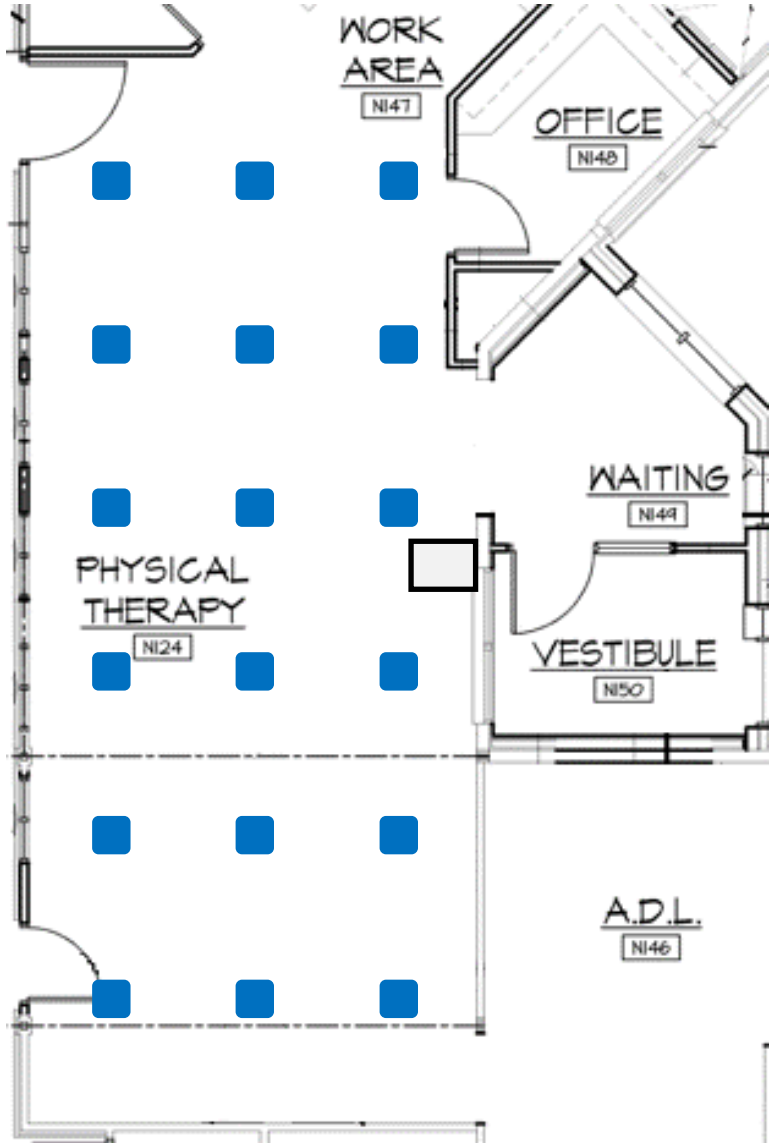
Room Name	EQI Score
N109A Lounge	
N109B Dining	
N119 Lounge	
N124 Physical Therapy Genesis Off	
N124 Physical Therapy Genesis On	
N146 ADL	
N221 Dining	
N226 Lounge	
N227 Lounge	

N124 Risk Pictures – Test Locations



Tests (permutations):

N124 Physical Therapy

1. Baseline Genesis Off (18 locations),
2. Genesis On (18 locations)

Genesis Unit

Sample Location

N124 Risk Picture – Genesis Off

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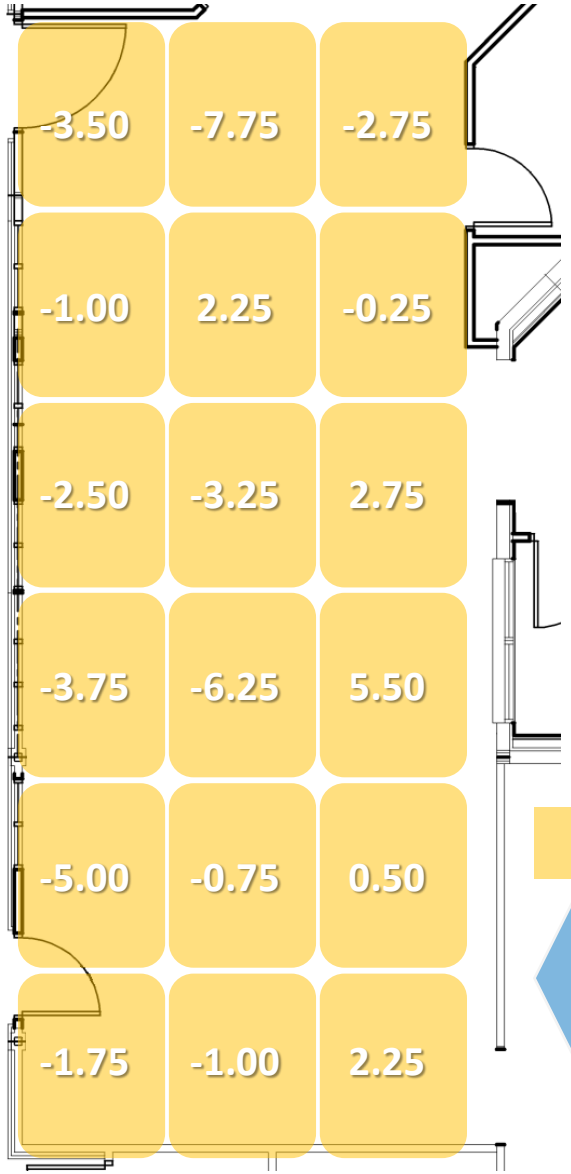
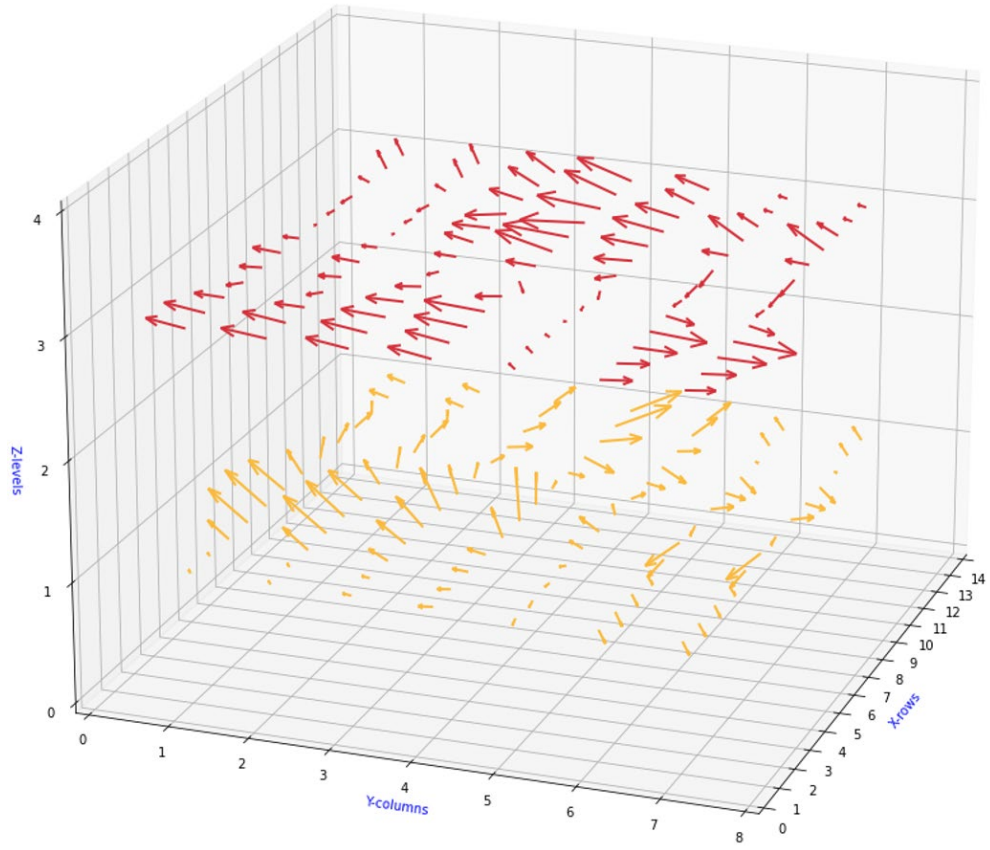
Engineering Quality Improvement



-1.46 Average Velocity (ft/min)

? EQI

Lowest Risk
Lower Risk
Higher Risk
Moderate Risk
Velocity (ft/min)
+ Downdraft
- Updraft



N124 Risk Picture – Genesis On

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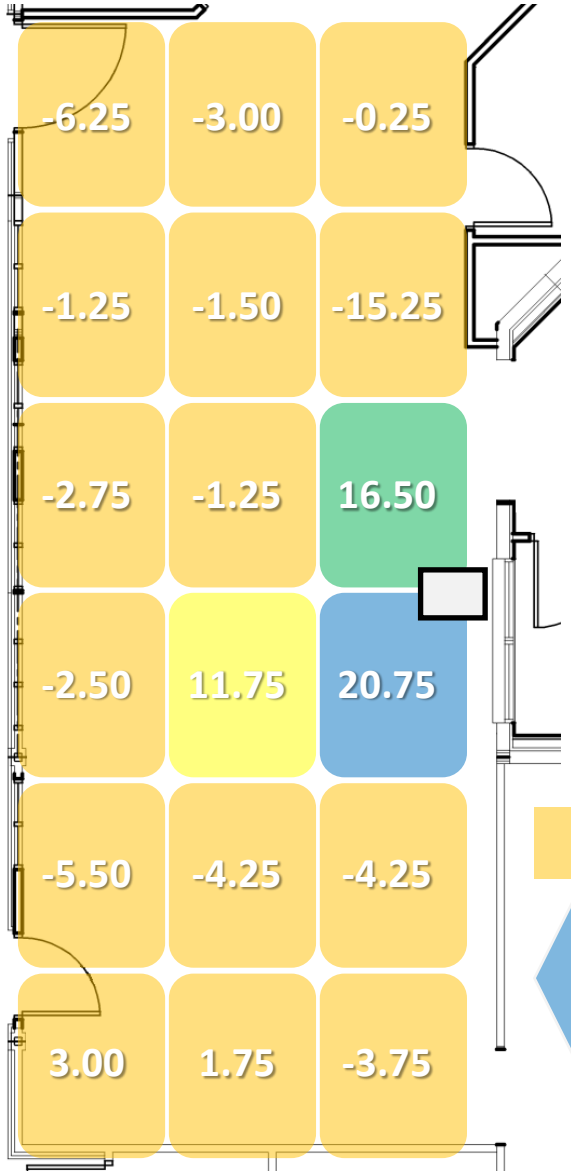
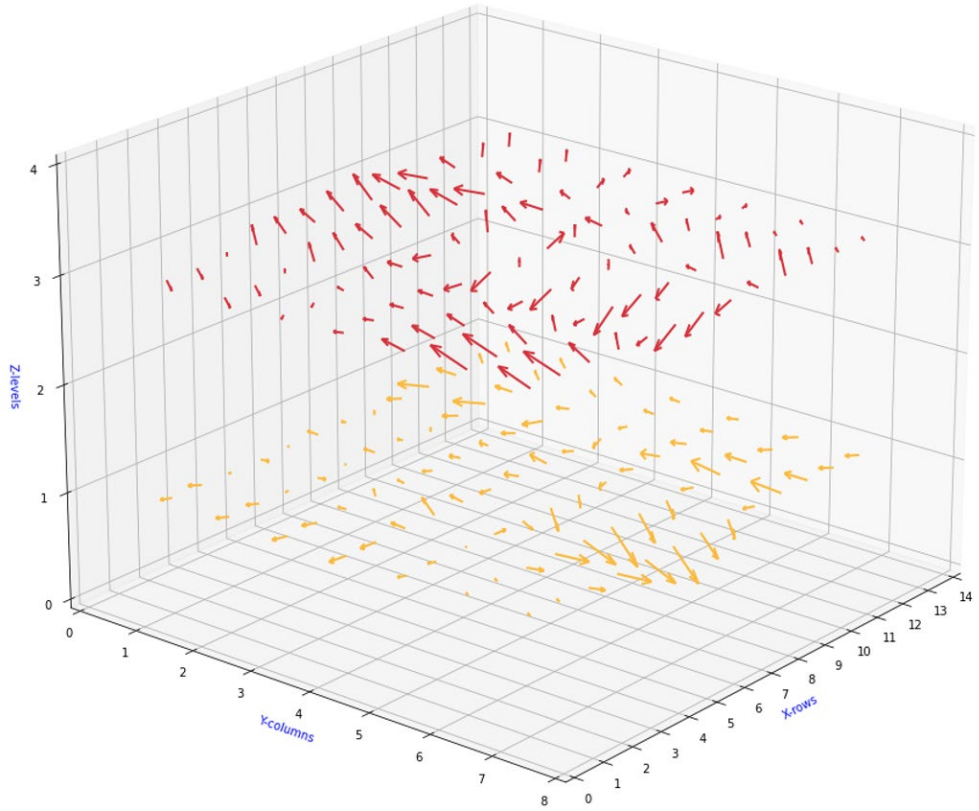


Lowest Risk
Lower Risk
Higher Risk
Moderate Risk
Genesis Unit

Velocity (ft/min)
+ Downdraft
- Updraft

0.11 Average Velocity (ft/min)

? EQI



N124 Risk of Infection Transmission by Room Use Factors (Sample below, to be completed)

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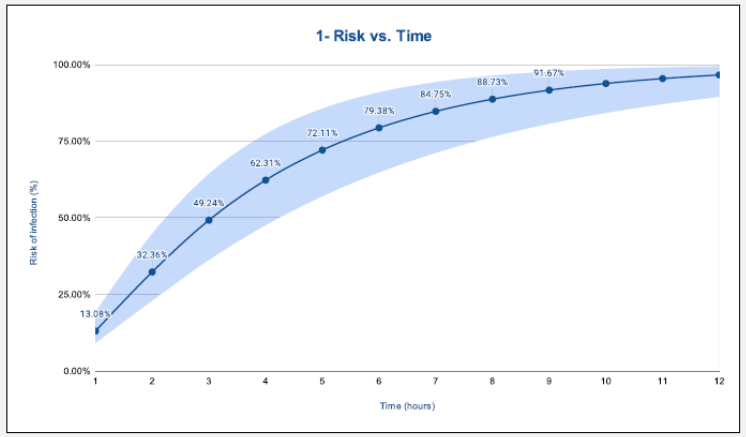
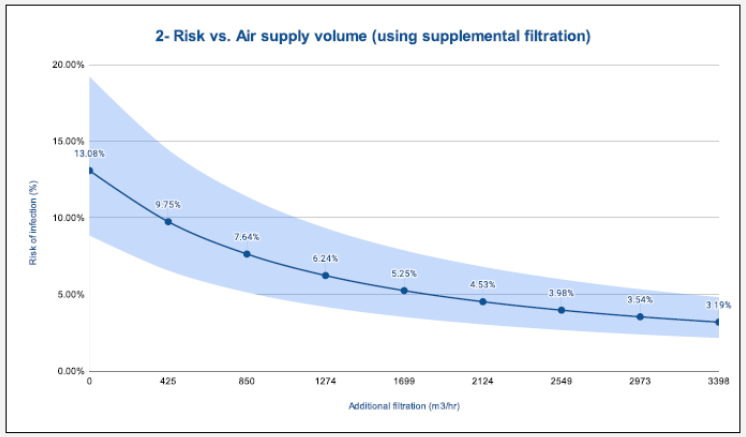
Current Risk of Infection	13%	Time of exposure	1 h	**CA2711**	Current ACH	1.22 1/h	R0 min	3.00
							R0	3.35
							R0 max	3.70

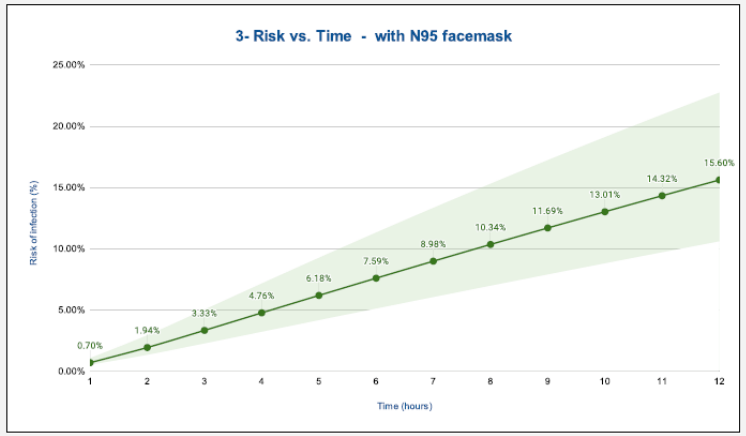
Risk of infection (%) based on time of exposure



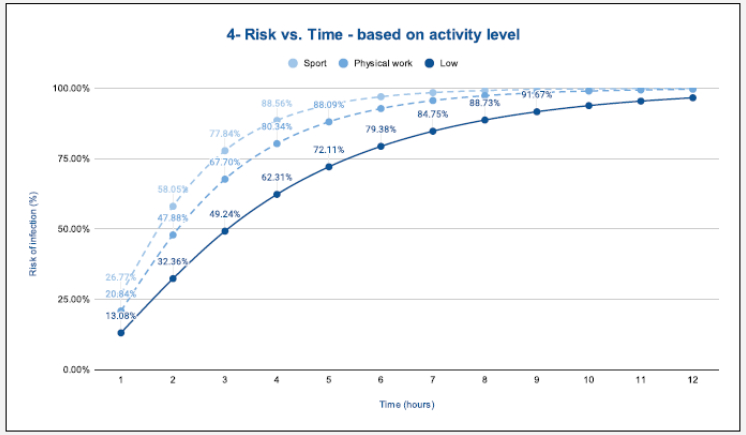
Risk of infection for different ACH conditions. Current ACH = 1.22 1/h



Risk of infection (%) based on time of exposure, with facemasks



Risk of infection (%) based on time of exposure and activity level



Microbial Assay – Test Locations

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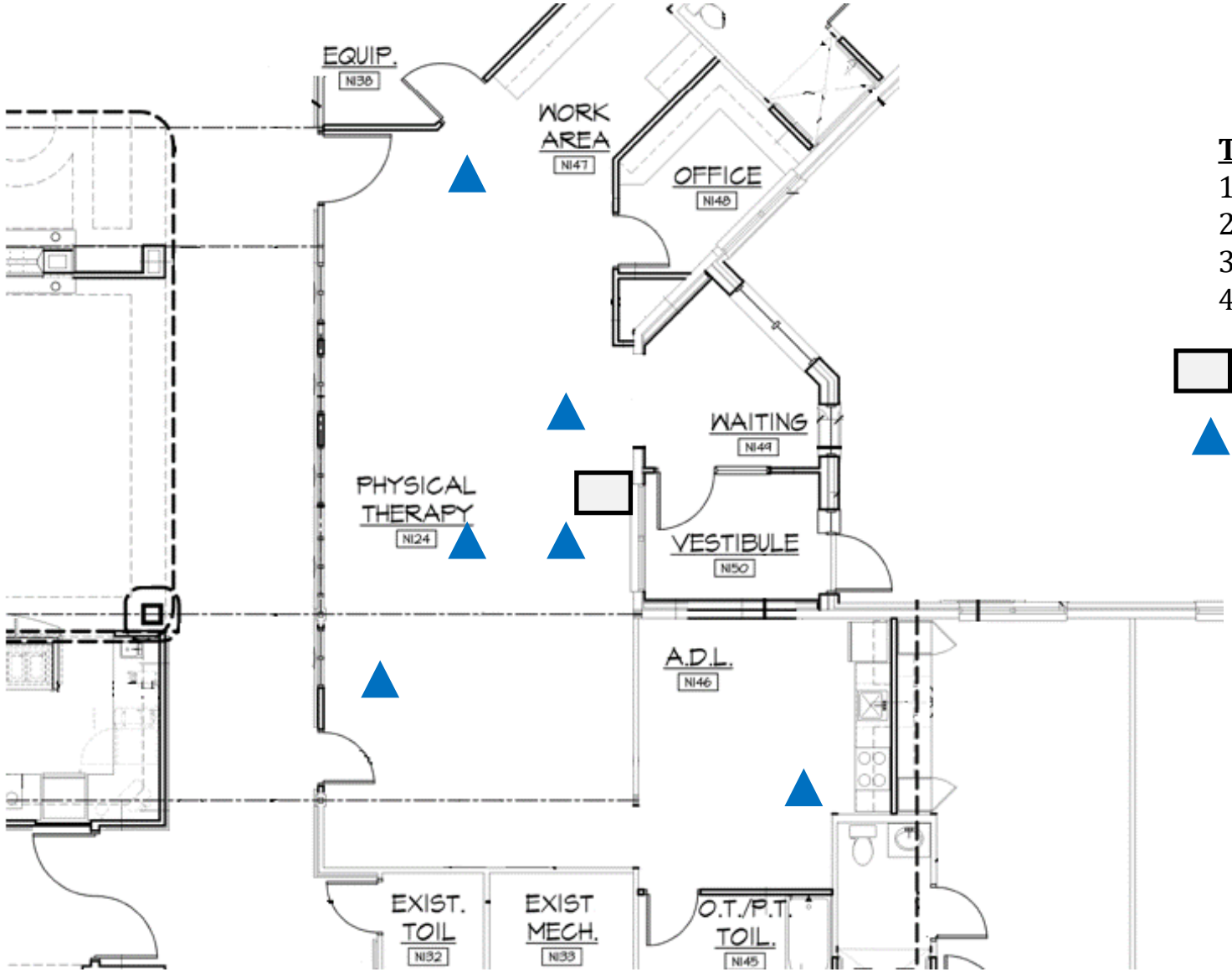

Tests (permutations):

1. UV On/Genesis Off (3 tests @ 4 locations)
2. UV Off/Genesis Off (3 tests @ 6 locations)
3. UV Off/Genesis On (3 tests @ 6 locations)
4. UV On/Genesis On (3 tests @ 6 locations)

Genesis Unit

Sample Location

Microbial Assay Analysis - Multiple comparison test

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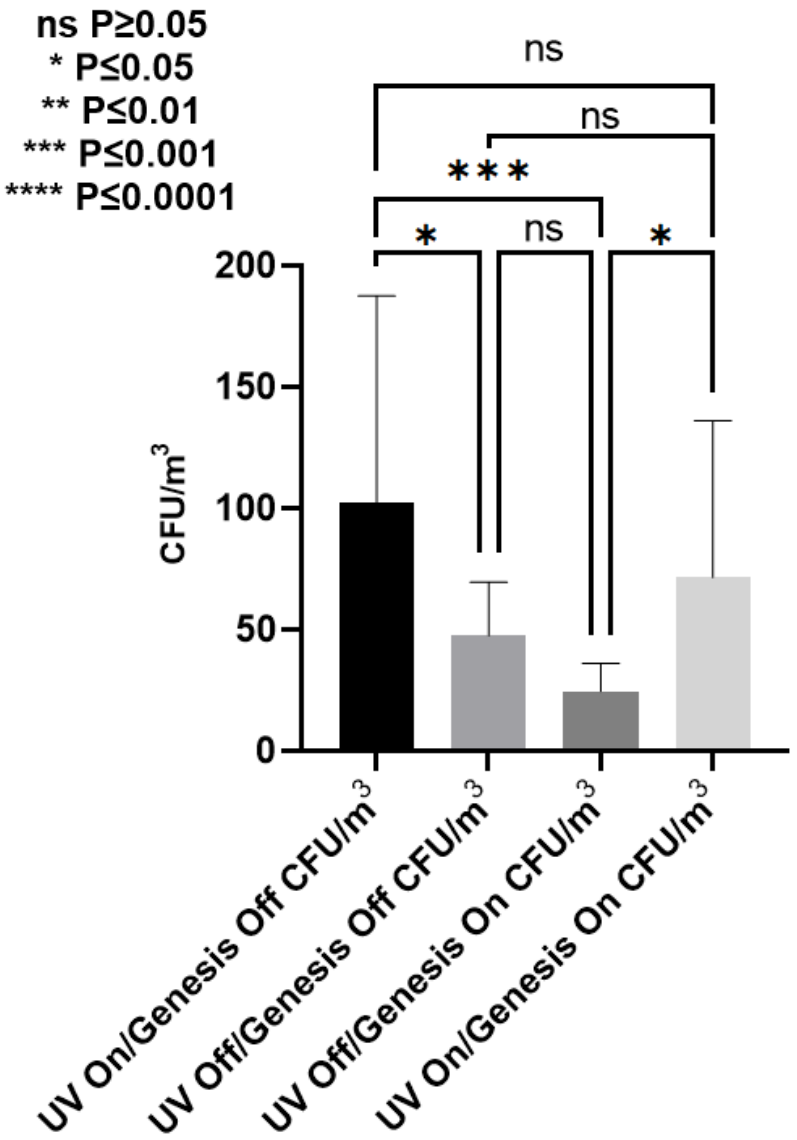

- UV On/Genesis Off had significantly higher CFU/m^3 than UV Off/Genesis Off and UV Off/Genesis On
- UV On/Genesis On had significantly higher CFU/m^3 than UV Off/Genesis On

Microbial Assay Analysis – Pairwise Comparison Tests

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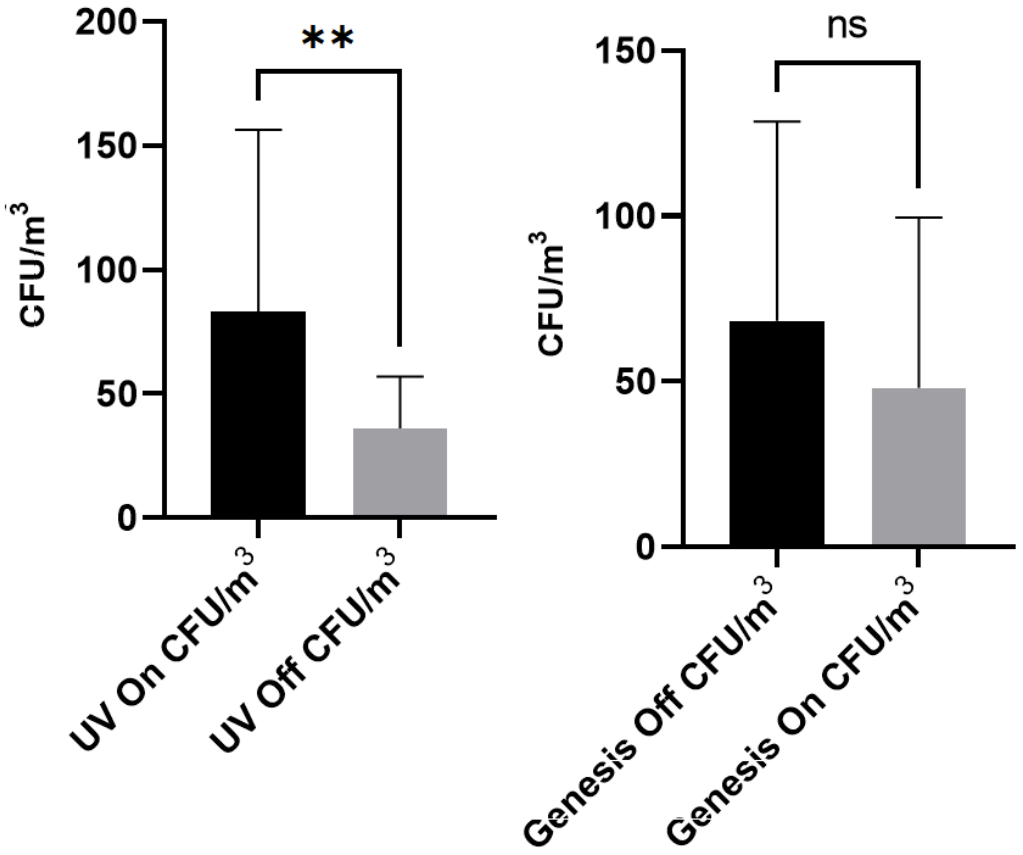
ns P≥0.05
*** P≤0.05**
**** P≤0.01**
***** P≤0.001**
****** P≤0.0001**



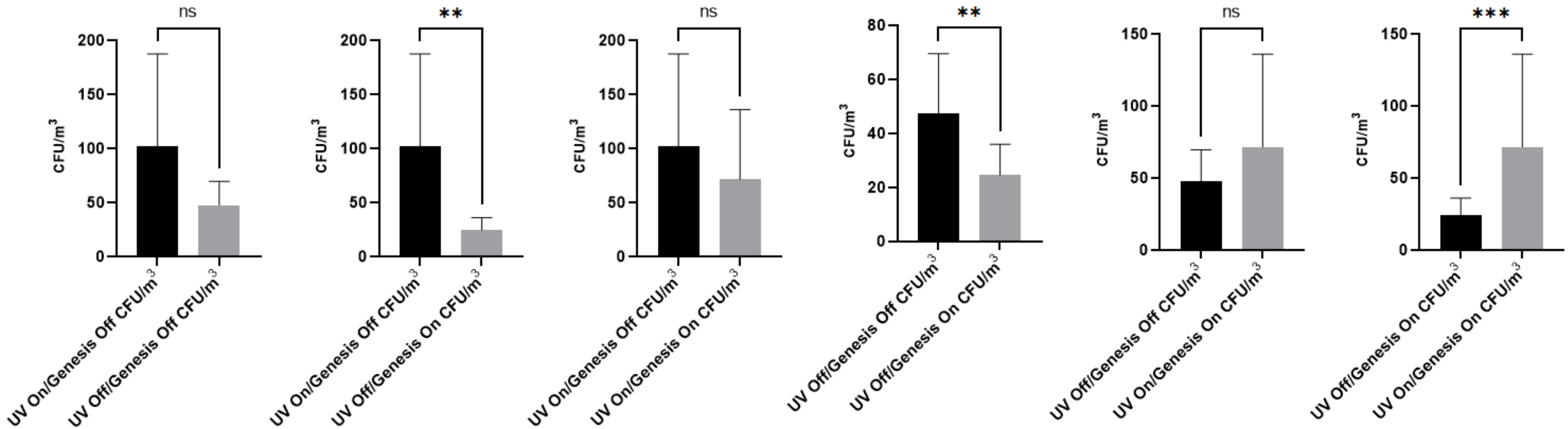
- UV On had significantly higher CFU/m^3 than UV Off
- Difference between Genesis Off and Genesis On CFU/m^3 was not significant.

Microbial Assay Analysis – Pairwise Comparison Tests

Healthcare Infection Control & Engineering Quality Improvement

ns P≥0.05
*** P≤0.05**
**** P≤0.01**
***** P≤0.001**
****** P≤0.0001**

- UV On/Genesis Off had significantly higher CFU/m^3 than UV Off/Genesis On
- UV Off/Genesis Off had significantly higher CFU/m^3 than UV Off/Genesis On
- UV On/Genesis On had significantly higher CFU/m^3 than UV Off/Genesis On



Microbial Assay Analysis – UV Off Floorplans

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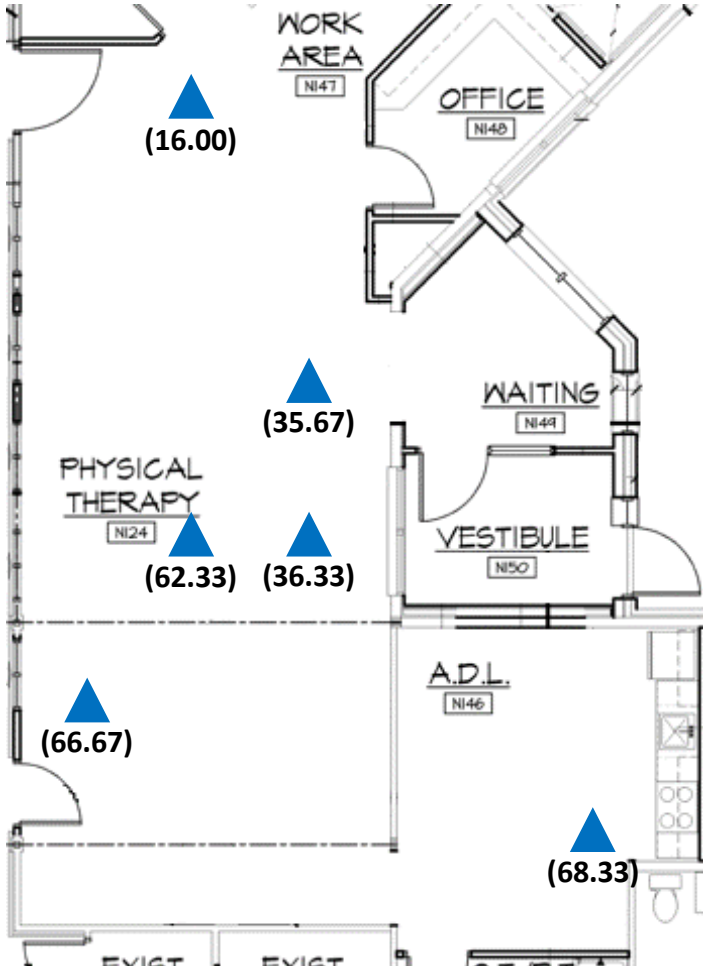
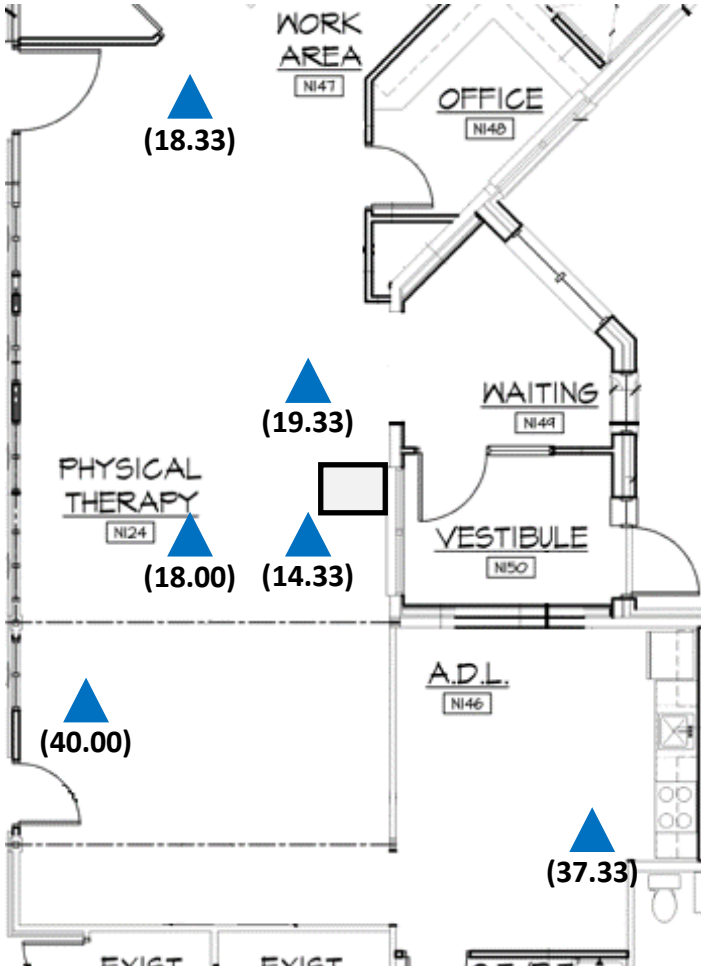
Genesis Off, UV Off



Genesis On, UV Off



Genesis Unit

(Average CFU/m³)

Microbial Assay Analysis – UV On Floorplans

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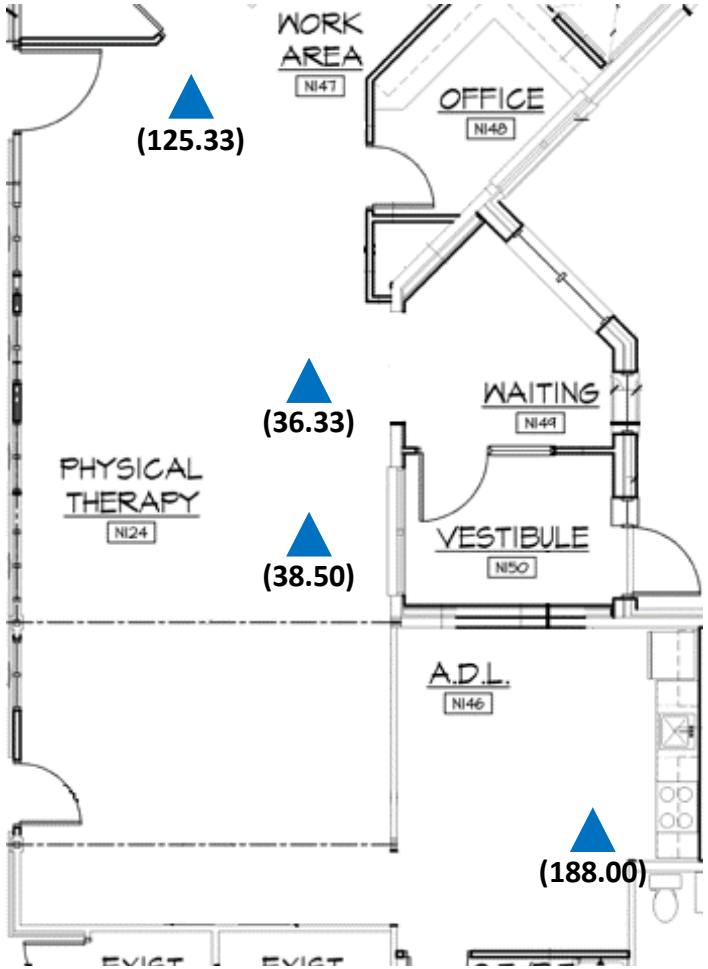
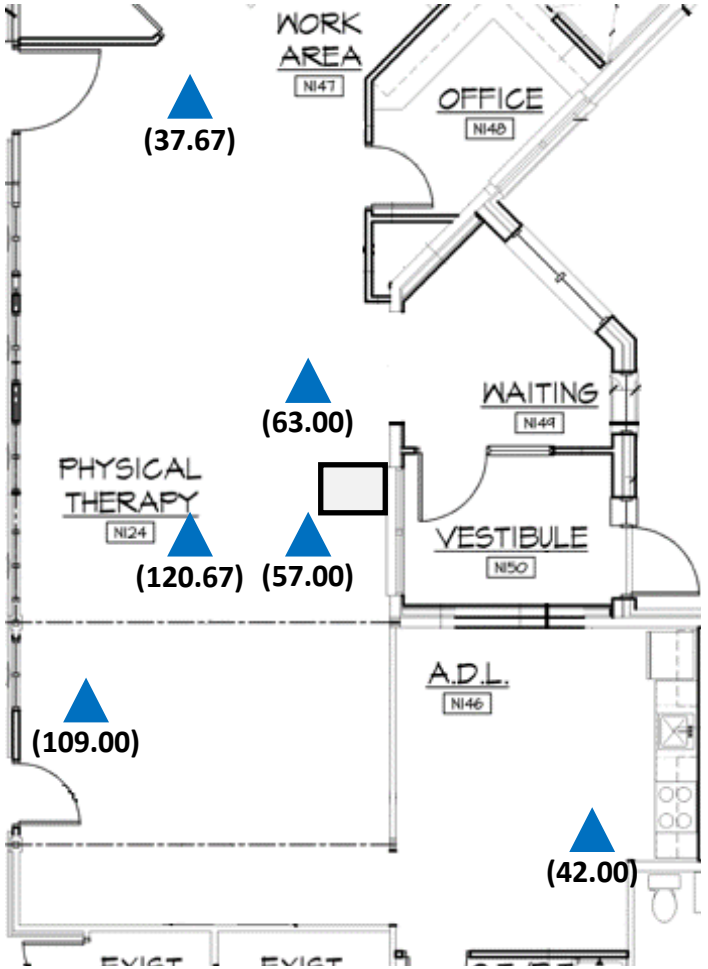
Genesis Off, UV On



Genesis On, UV On



Genesis Unit

(Average CFU/m³)

Microbial Assay Analysis – Combined Floorplans

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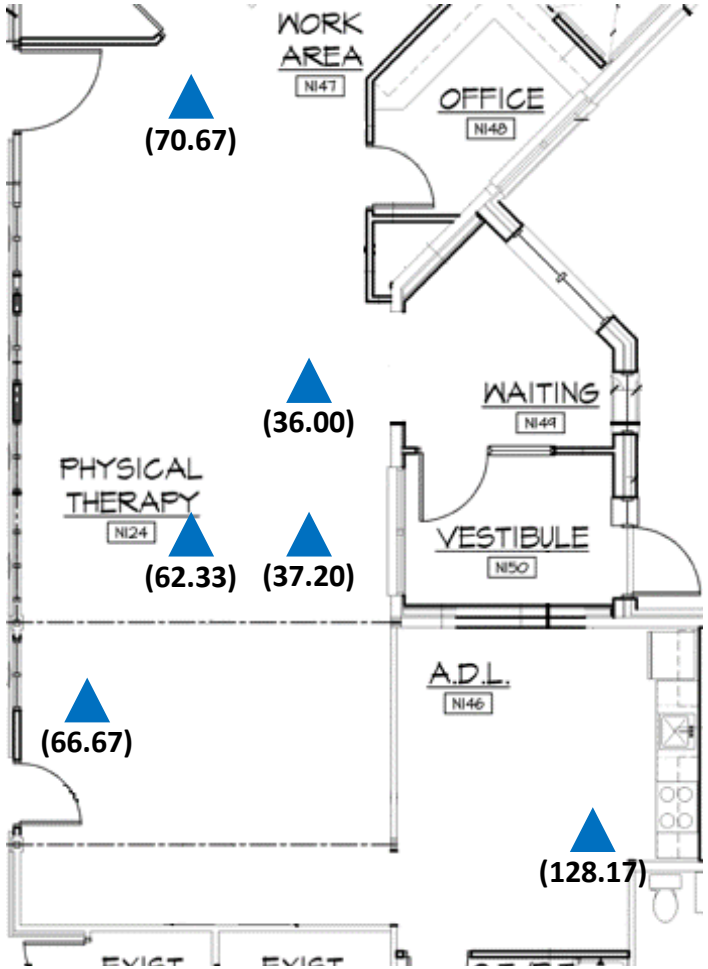
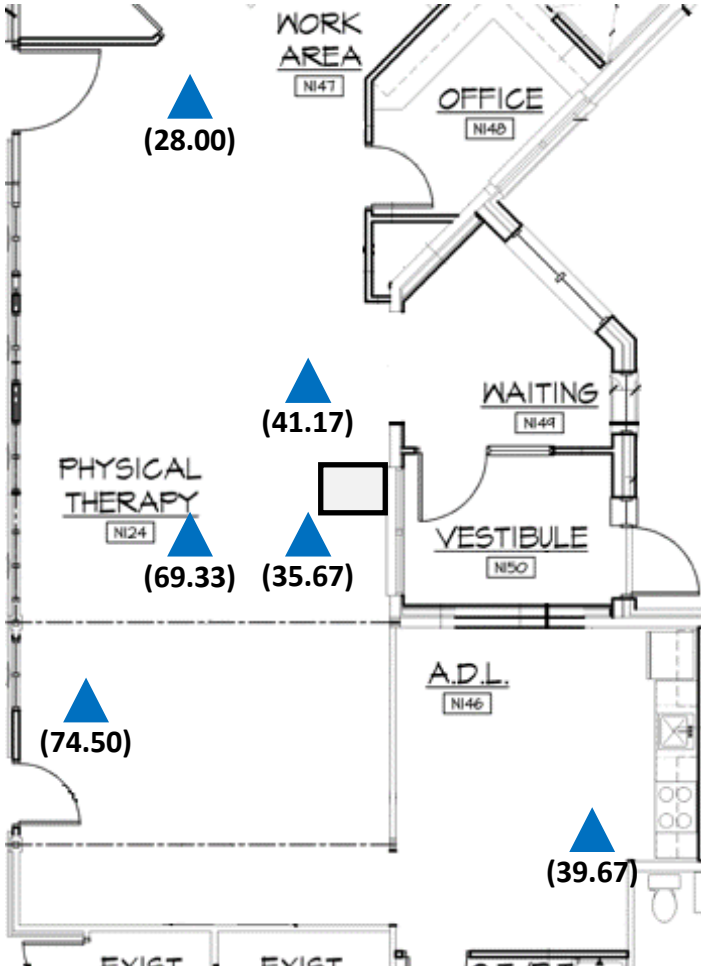
Genesis Off (Combined UV On, UV Off)



Genesis On (Combined UV On, UV Off)



Genesis Unit

(Average CFU/m³)

Particle Count – Test Locations

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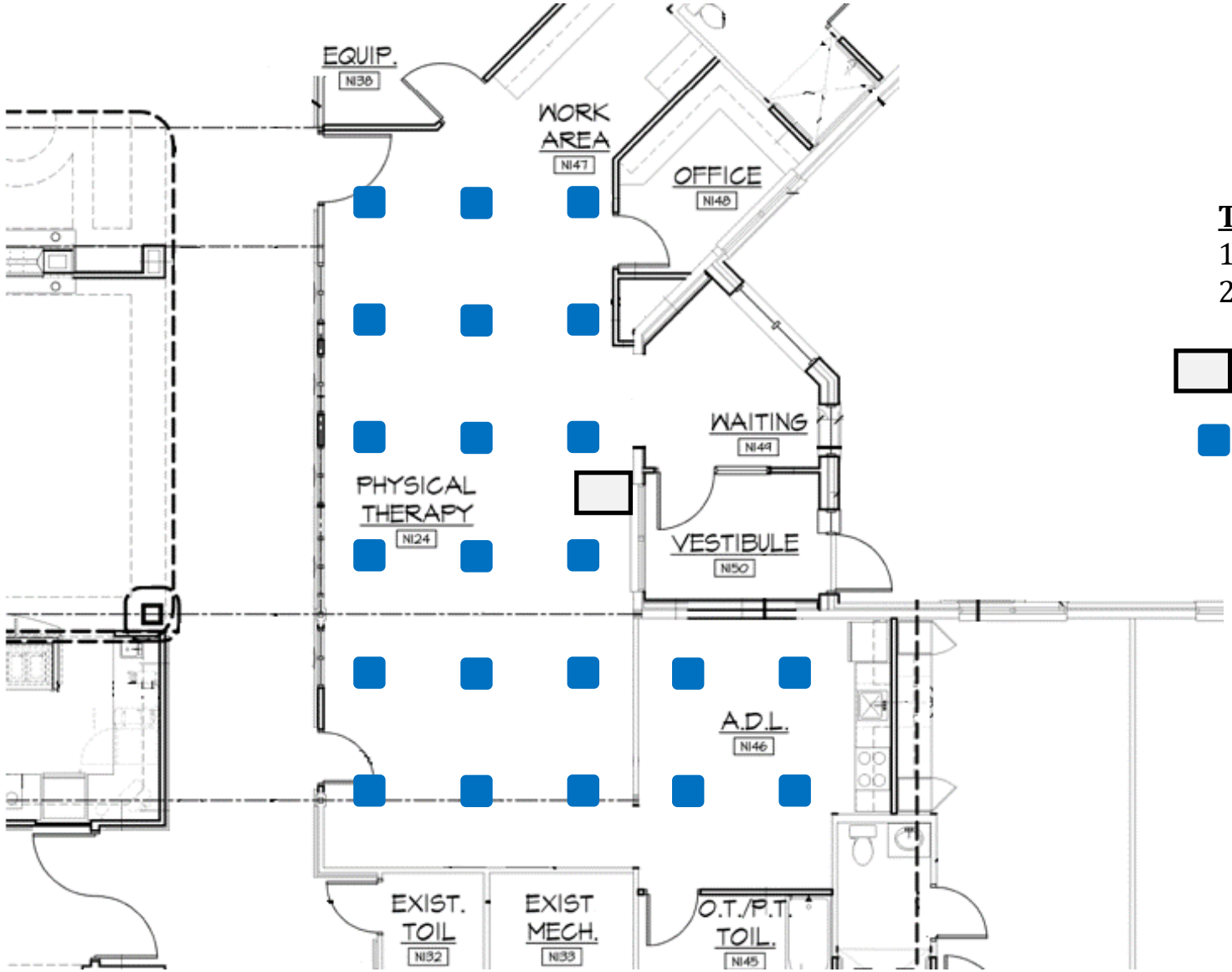

Tests (permutations):

1. Baseline Genesis Off (1 test @ 22 locations)
2. Genesis On (1 test @ 18 locations)

Genesis Unit

Sample Location

Particle Count Analysis – Pairwise Comparison Tests

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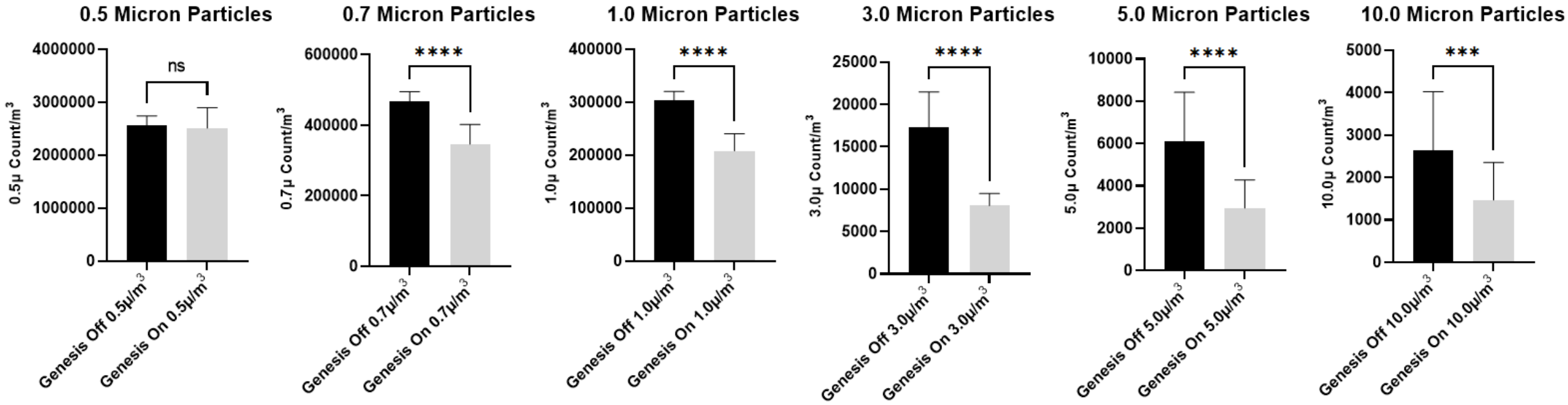
ns P≥0.05
*** P≤0.05**
**** P≤0.01**
***** P≤0.001**
****** P≤0.0001**

- Genesis Off had significantly higher particles counts for particles 0.7 Micron and larger



Particle Count Analysis – 0.5µ Floorplans

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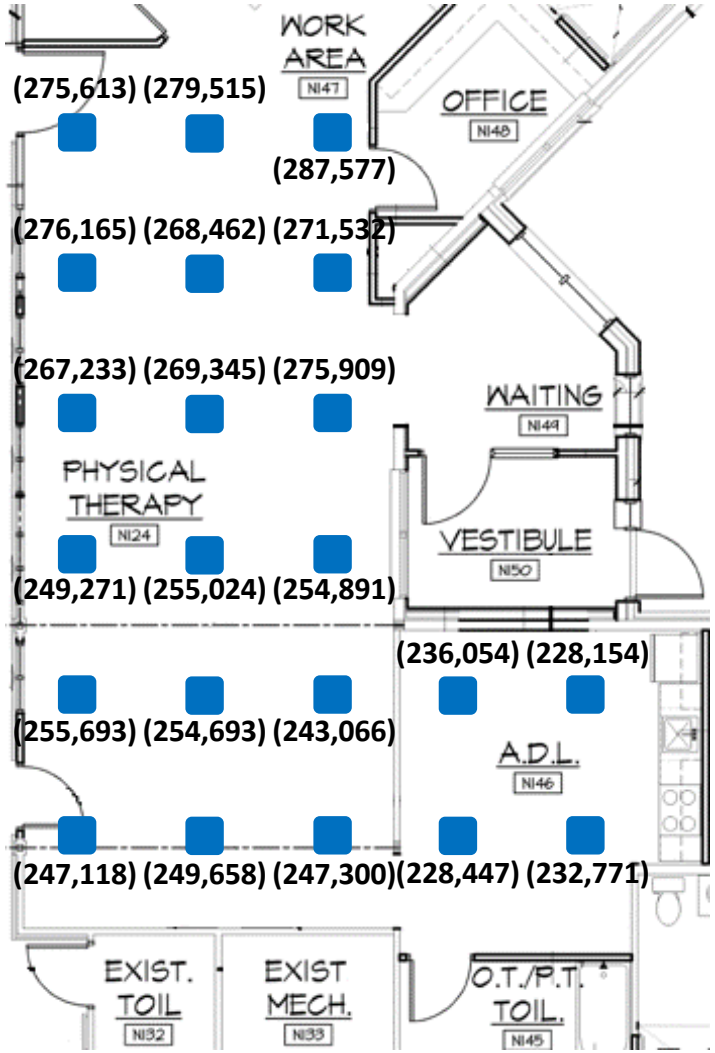
Genesis Off

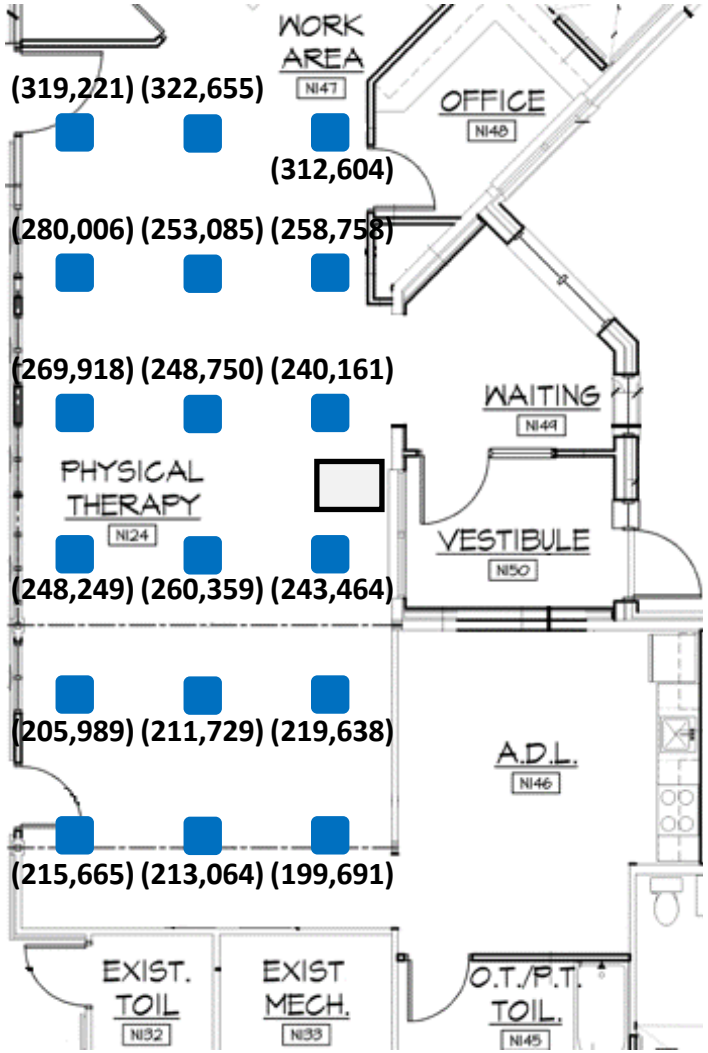


N124 Particle Count p/m³	
Mean	2,626,703
High	2,875,770
Low	2,430,660
St. Dev	130,150
95% UCL	2,711,734
ISO Class	8

N146 Particle Count p/m³	
Mean	2,313,565
High	2,360,540
Low	2,281,540
St. Dev	32,706
95% UCL	2,334,933
ISO Class	8

(0.5µ Particle Count)

Genesis On



Genesis Unit

Particle Count p/m³	
Mean	2,512,781
High	3,226,550
Low	1,996,910
St. Dev	372,623
95% UCL	2,756,228
ISO Class	8

Particle Count Analysis – 5.0µ Floorplans

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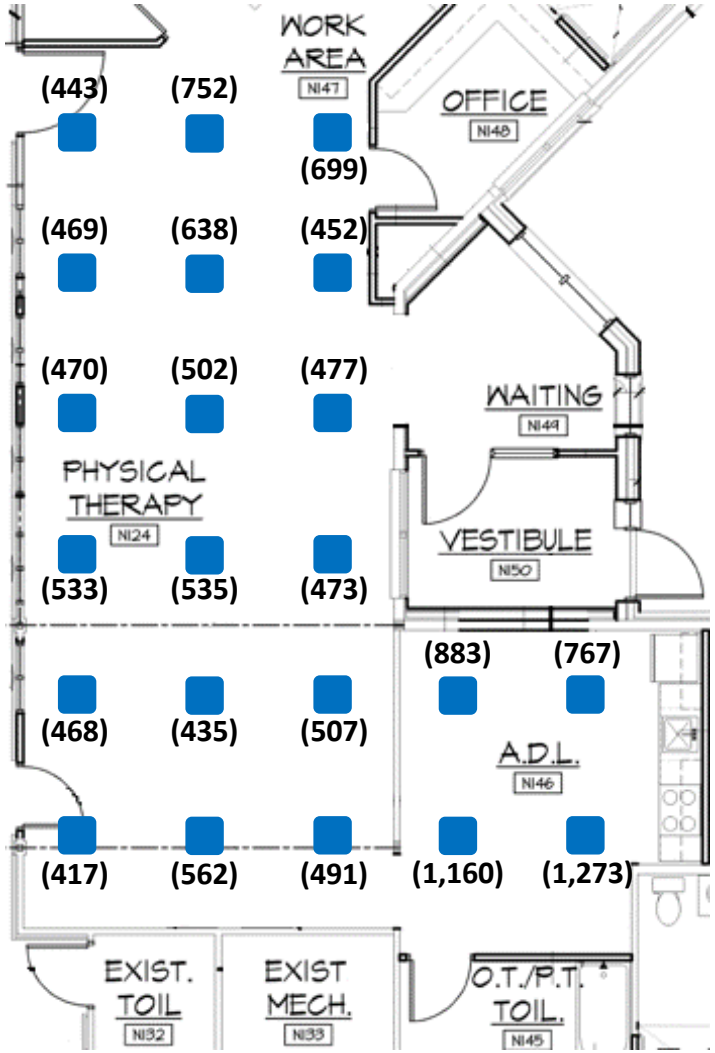
Genesis Off

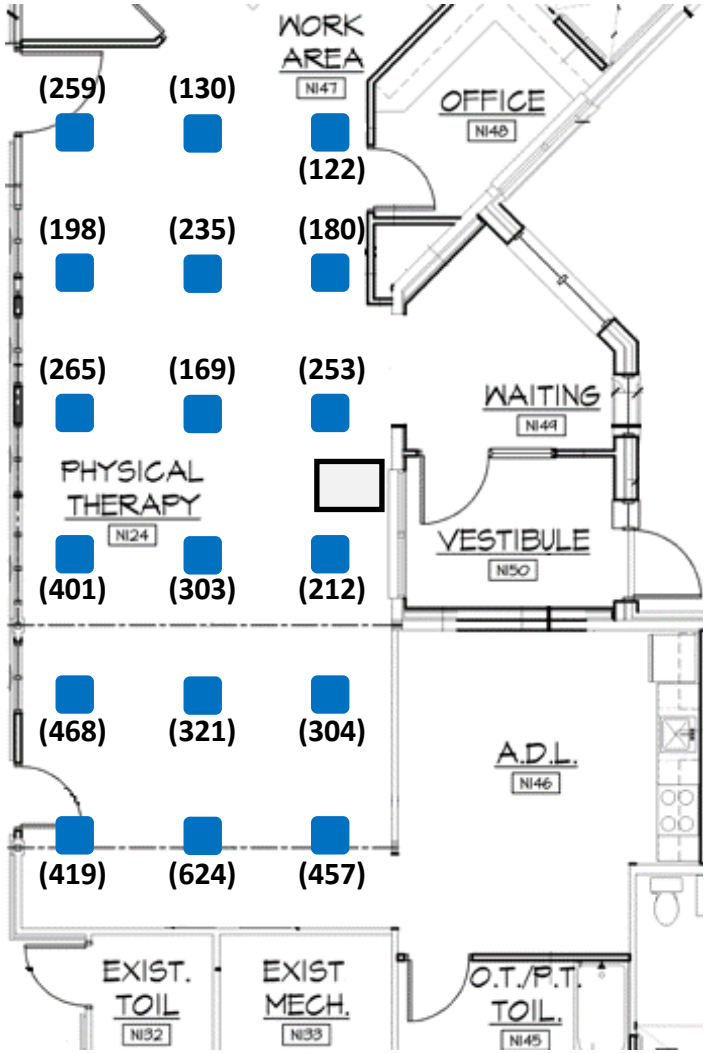


N124 Particle Count p/m³	
Mean	5,179
High	7,520
Low	4,170
St. Dev	893
95% UCL	5,763
ISO Class	8

N146 Particle Count p/m³	
Mean	10,208
High	12,730
Low	7,670
St. Dev	2,040
95% UCL	11,540
ISO Class	8

(5.0µ Particle Count)

Genesis On



Genesis Unit

Particle Count p/m³	
Mean	2,956
High	6,240
Low	1,220
St. Dev	1,295
95% UCL	3,802
ISO Class	8

Fungal Assay Analysis

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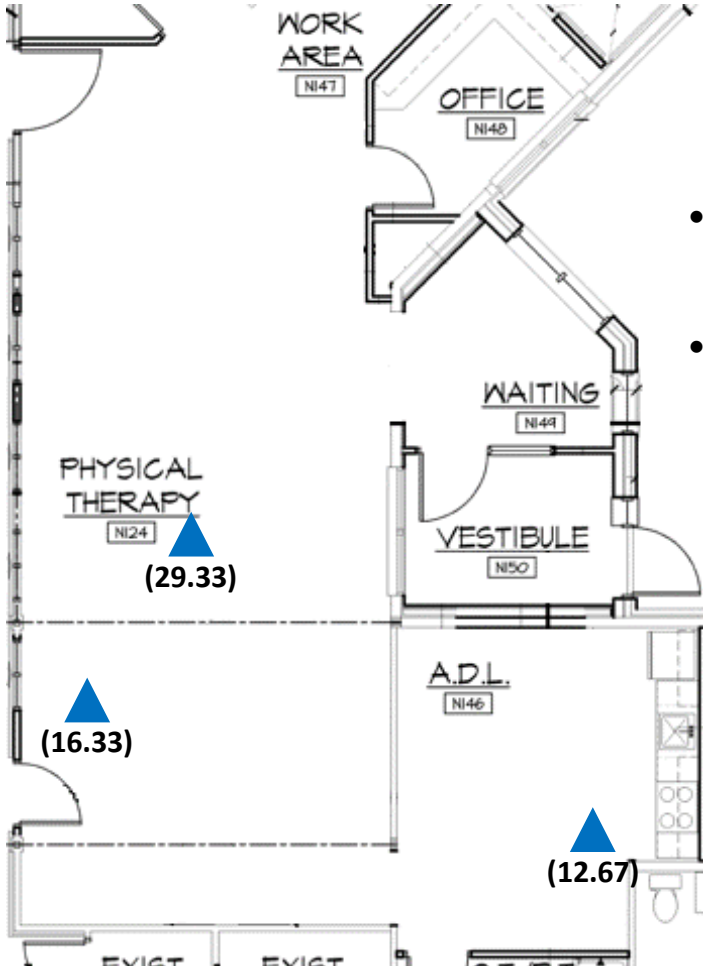

- Nine samples across three locations provided an average CFU/m^3 of 19.4
- Previous testing of 291 samples from a hospital environment had an average CFU/m^3 of 13.02.

▲ **(Average CFU/m^3)**

Approach to Improve Ventilation Effectiveness

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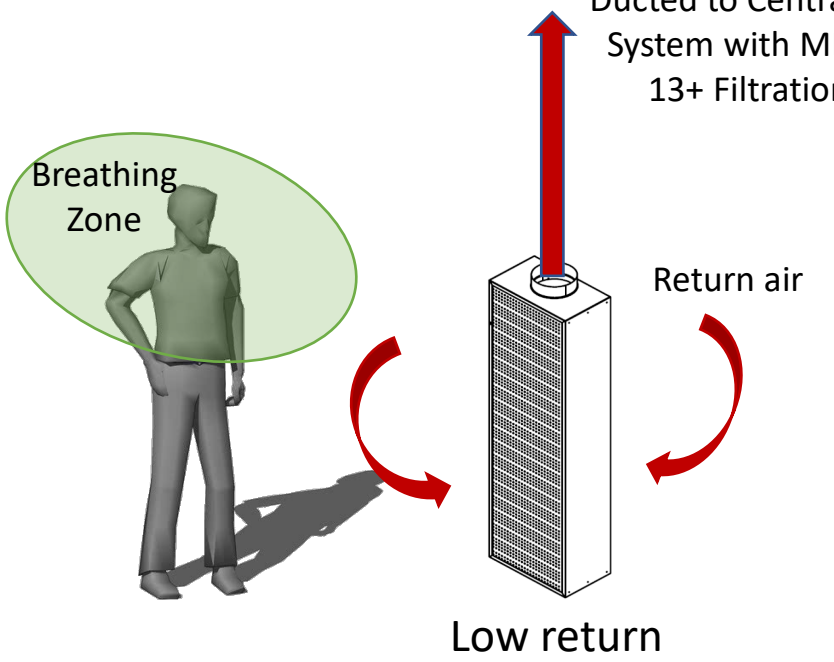
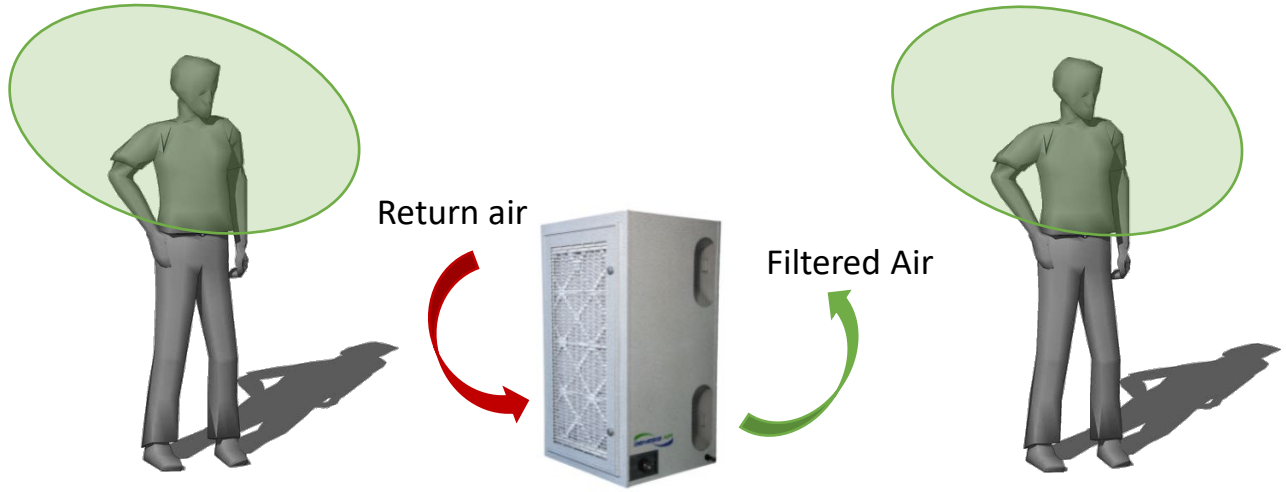
Place return or in-space air cleaner such that contaminated air (air dispelled from adjacent occupants within 2 meters) is NOT drawn into another occupants breathing zone.

Vertical flow supply

Note: in-space air cleaners do not provide cooling or outdoor air ventilation and thus should not be used to meet ventilation code requirements. They do add minimal heat load due to internal fans.



Low return



In-Space Air Cleaning

Additional Testing

Test Locations – First Floor Risk Pictures

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Tests (permutations):

N109A Lounge

1. Baseline (11 locations)

N109B Dining

1. Baseline (18 locations)

N119 Lounge

1. Baseline (12 locations)

N146 ADL

1. Baseline (4 locations)

N109A Lounge – Risk Map

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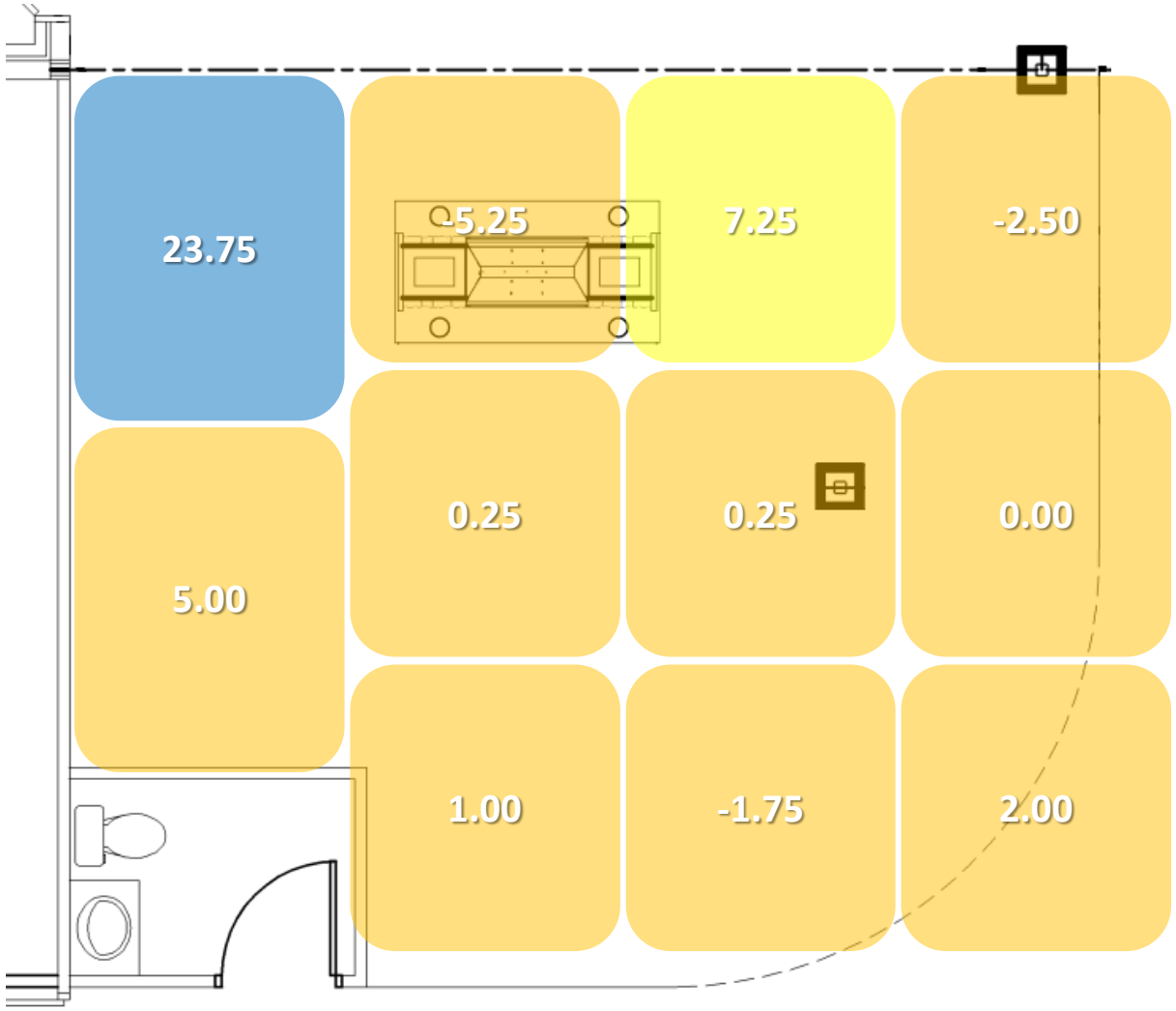

Lowest Risk
Lower Risk
Higher Risk
Moderate Risk
Velocity (ft/min)
+ Downdraft
- Updraft

2.73 Average Velocity (ft/min)

? EQI

N109B Dining – Risk Map

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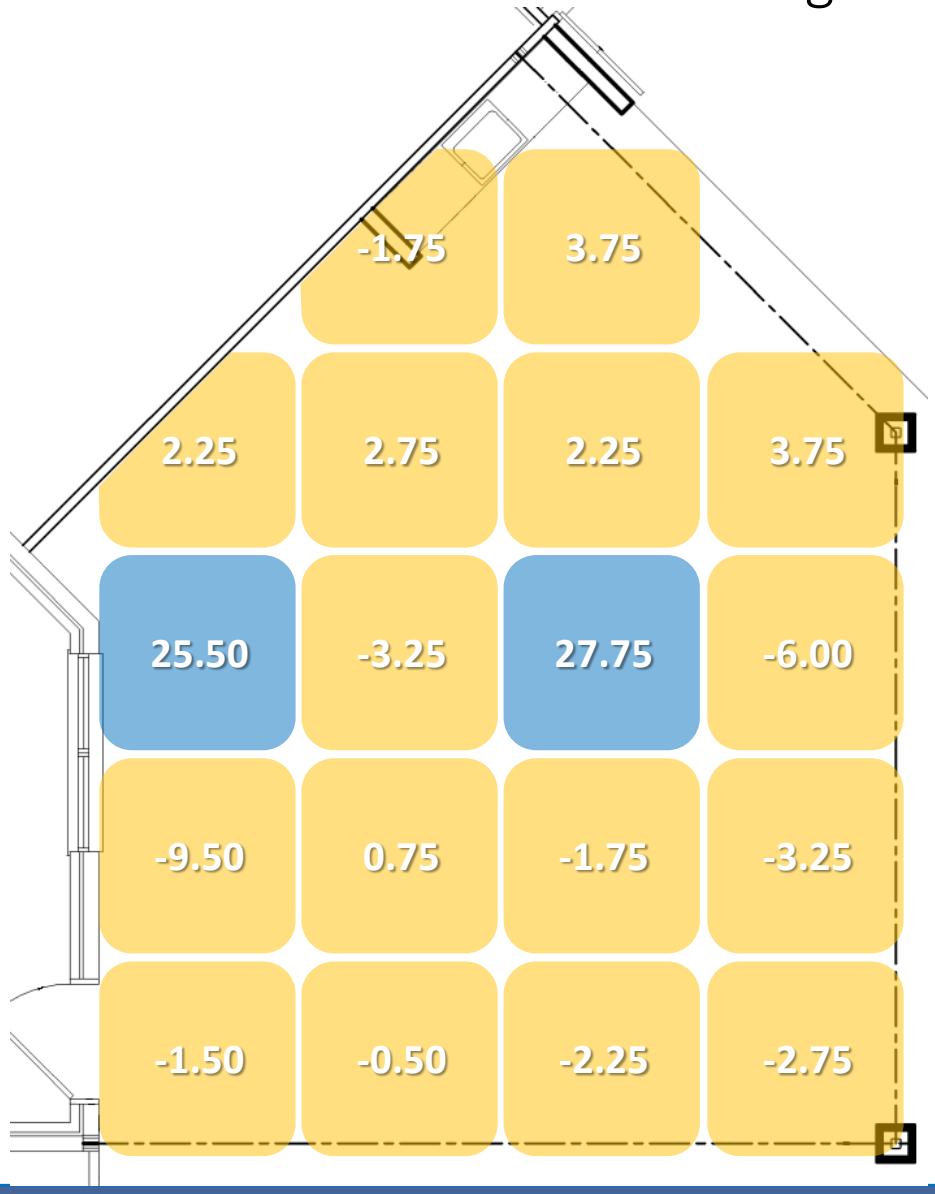

Lowest Risk
Lower Risk
Higher Risk
Moderate Risk
Velocity (ft/min)
+ Downdraft
- Updraft

2.05 Average Velocity (ft/min)

? EQI

N119 Lounge – Risk Map

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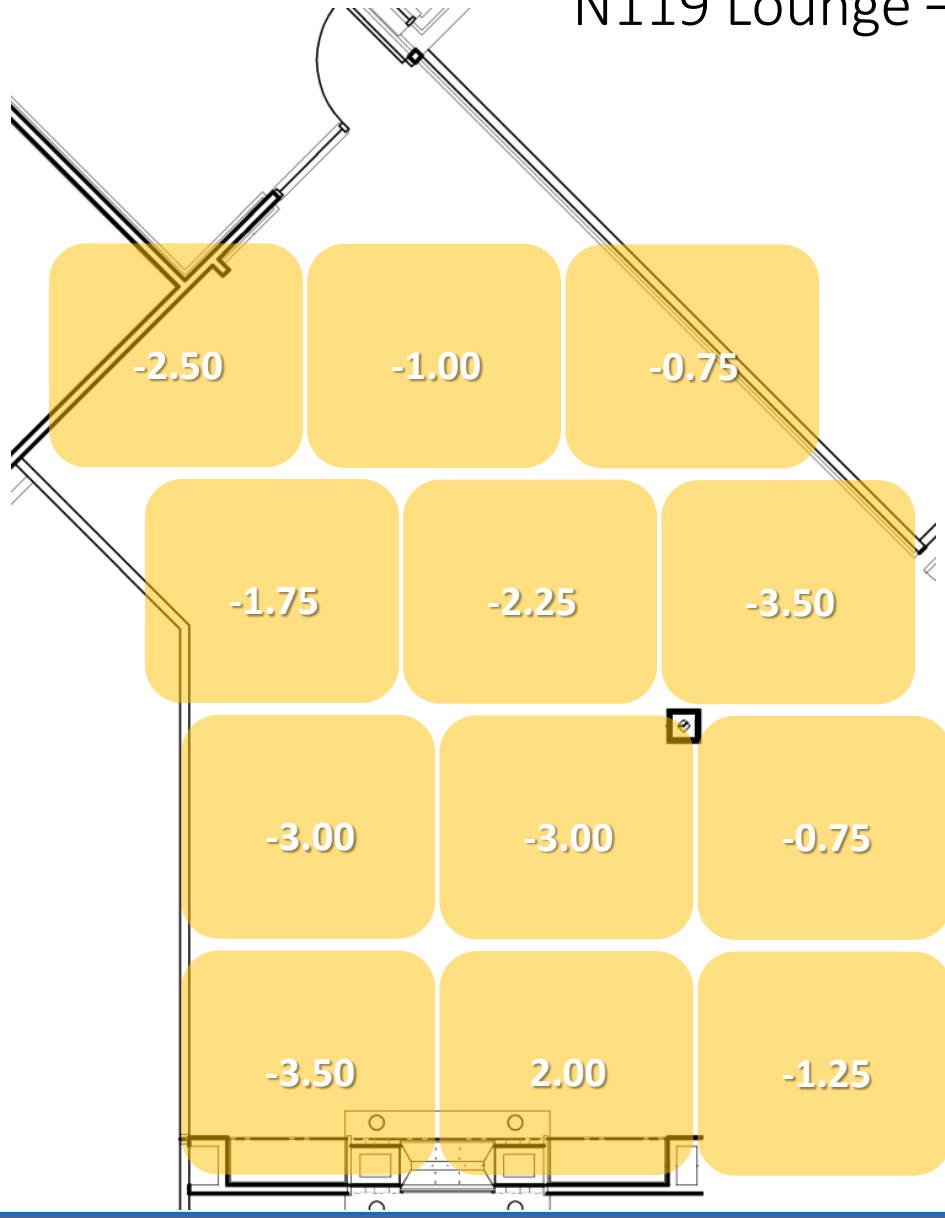

Lowest Risk
Lower Risk
Higher Risk
Moderate Risk
Velocity (ft/min)
+ Downdraft
- Updraft

-1.77 Average Velocity (ft/min)

? EQI

N146 ADL – Risk Map

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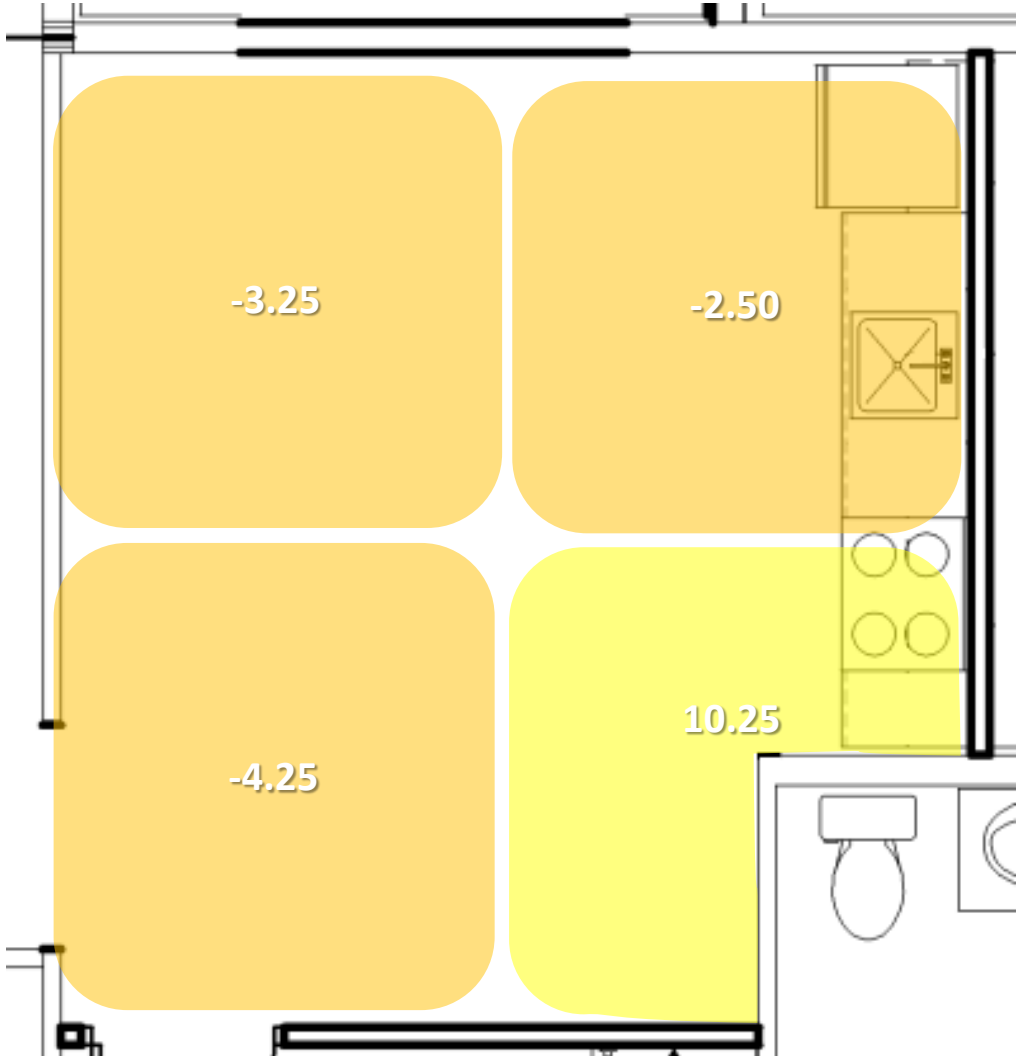
Engineering Quality Improvement



Lowest Risk
Lower Risk
Higher Risk
Moderate Risk
Velocity (ft/min)
+ Downdraft
- Updraft

0.06 Average Velocity (ft/min)

? EQI

Test Locations – Second Floor Risk Pictures

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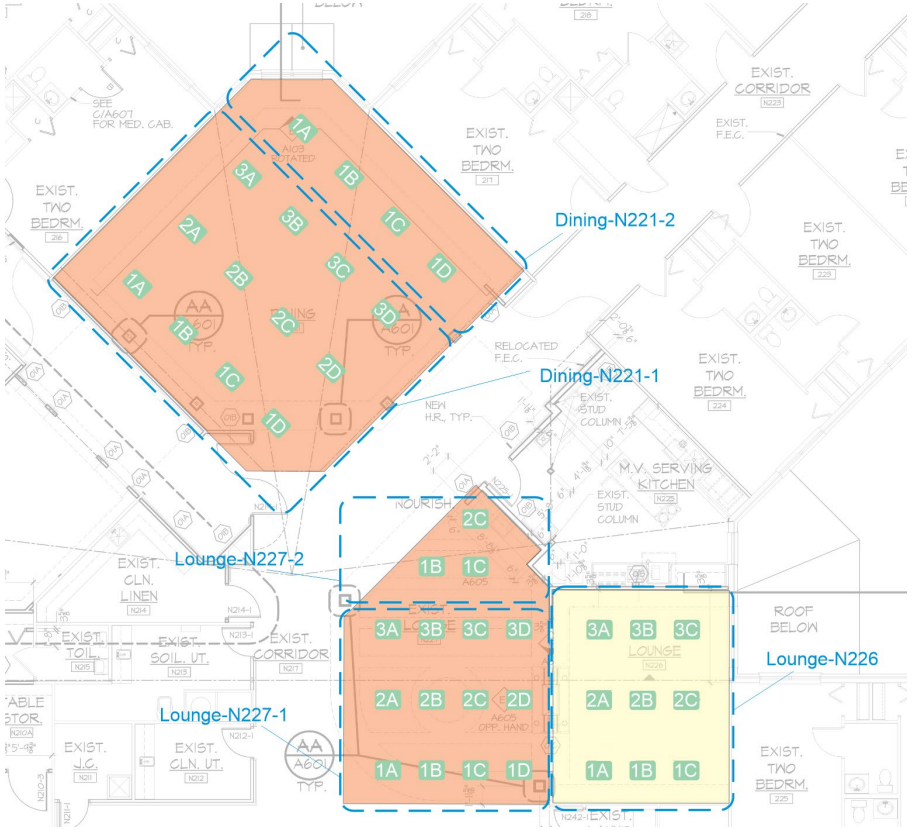


Tests (permutations):

N221 Dining

1. Baseline (16 locations)

N226 Lounge

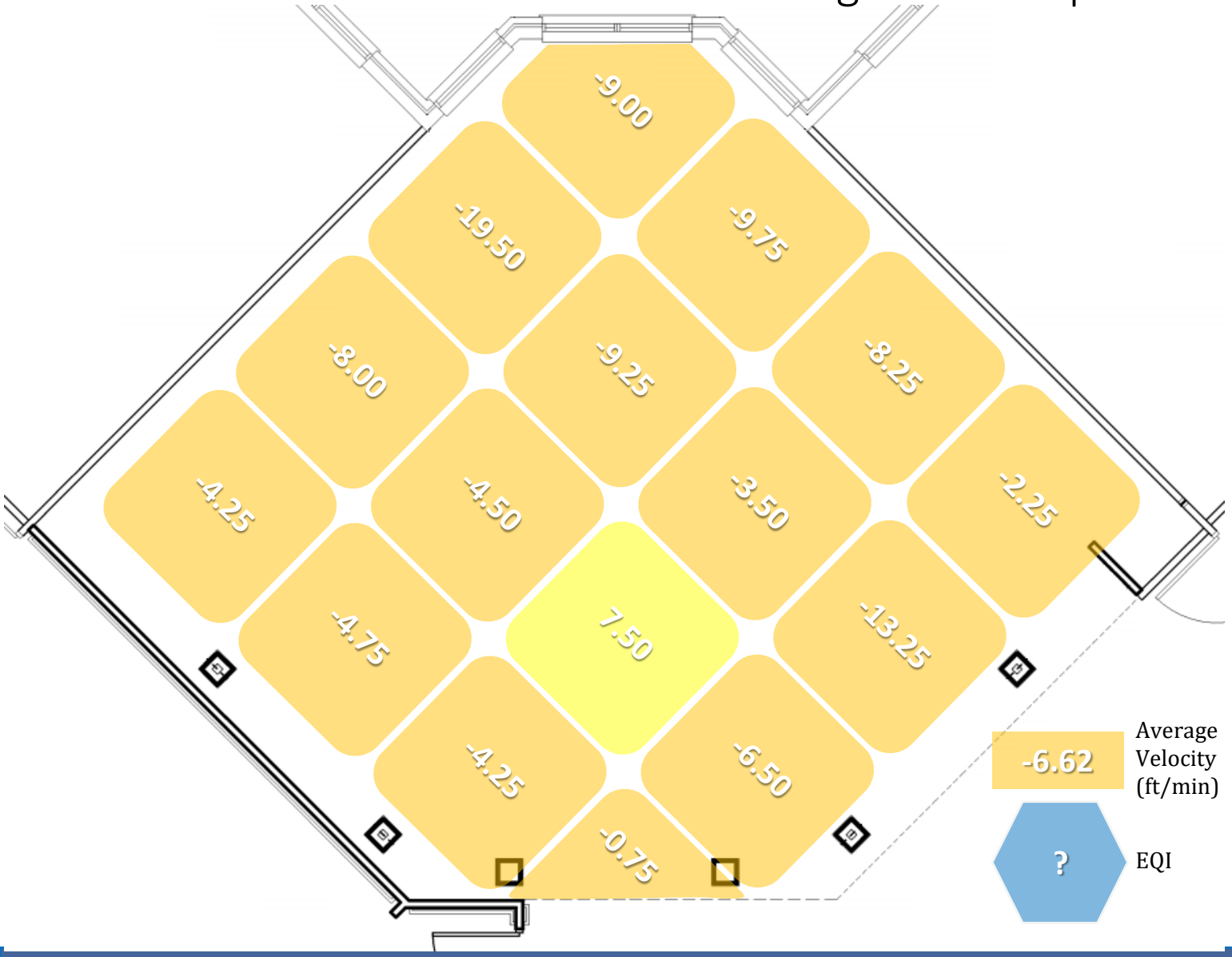
1. Baseline (9 locations)

N227 Lounge

1. Baseline (12 locations)

N221 Dining – Risk Map

Healthcare Infection Control & Engineering Quality Improvement



Lowest Risk
Lower Risk
Higher Risk
Moderate Risk
Velocity (ft/min)
+ Downdraft
- Updraft

-6.62 Average Velocity (ft/min)

? EQI

N226 Lounge – Risk Map

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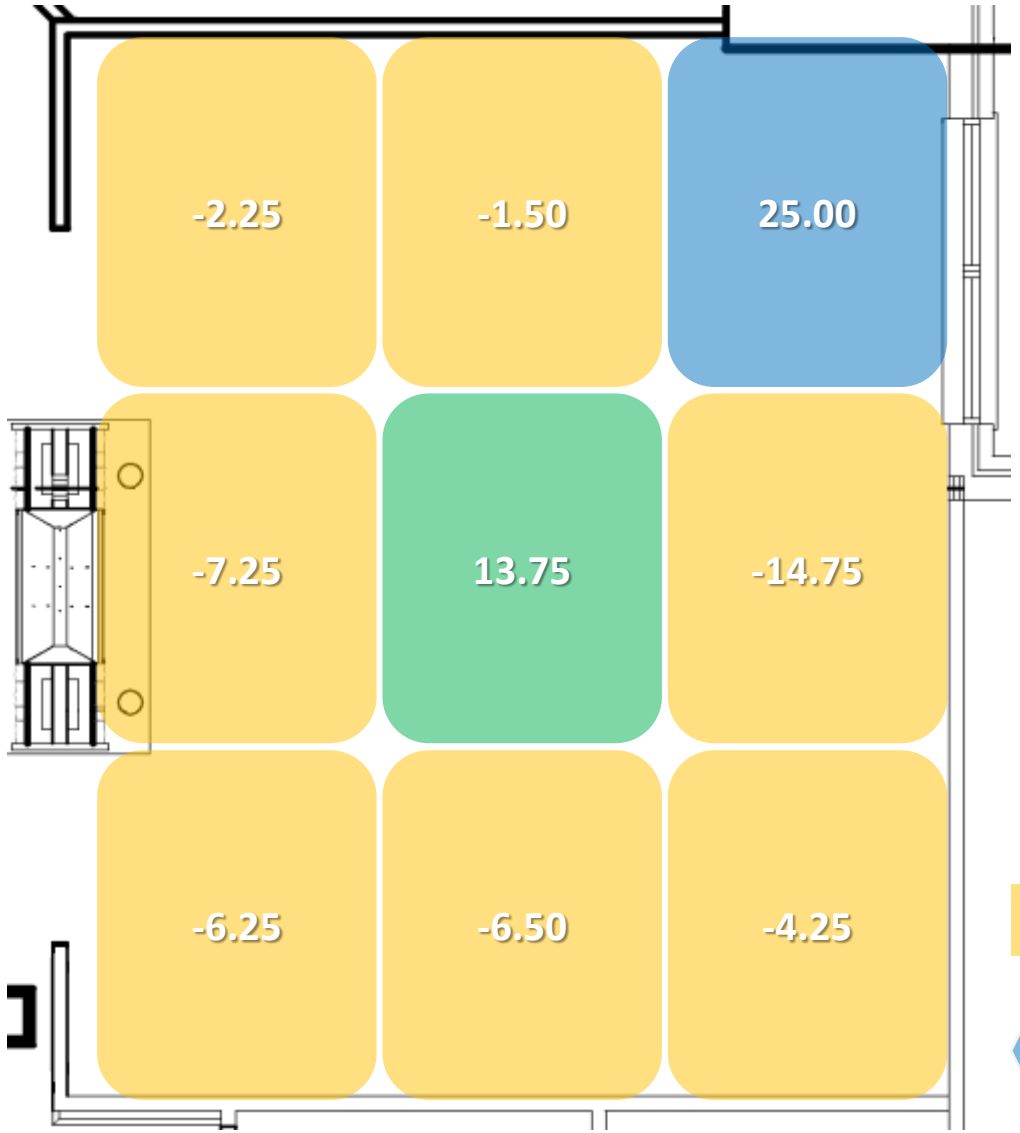
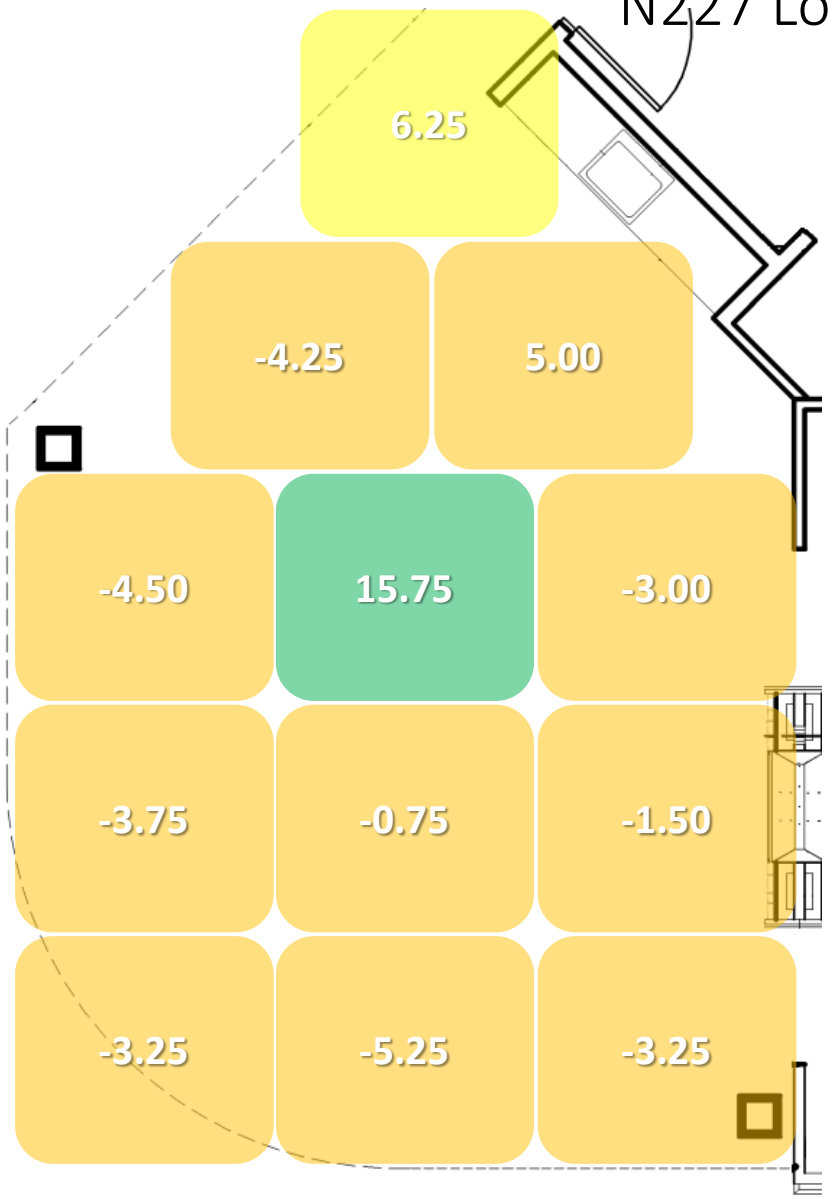


Lowest Risk
Lower Risk
Higher Risk
Moderate Risk
Velocity (ft/min)
+ Downdraft
- Updraft

-0.45 Average Velocity (ft/min)

? EQI

N227 Lounge – Risk Map



Healthcare Infection Control &
Engineering Quality Improvement

Lowest Risk
Lower Risk
Higher Risk
Moderate Risk
Velocity (ft/min)
+ Downdraft
- Updraft

0.64 Average Velocity (ft/min)

? EQI

Questions?

Healthcare Infection Control &
Engineering Quality Improvement

Thank You on Behalf of the OnSite Team!