

SYSKA HENNESSY GROUP

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Preliminary Findings Report No. 1

NYSERDA Energy Efficient Indoor Air Quality Analysis

July 24th, 2020

Progress Summary

Study 1 – Commercial Office Tenant – 186,000 GSF (Manhattan, NY)	Study 2 – Large Commercial Office Facility – 627,000 GSF (Westchester, NY)
<ul style="list-style-type: none">• Collected full data set of utility usage for pre-COVID baseline period• Reviewed ASHRAE and industry guidance and performed additional research regarding energy efficient IAQ measures• Collected full set of MEP & Arch Drawings• Initial Site Survey performed on 7/23/20	<ul style="list-style-type: none">• Collected full data set of utility usage for pre-COVID baseline period• Reviewed ASHRAE and industry guidance and performed additional research regarding energy efficient IAQ measures• Collected all available MEP drawings from recent renovations (only partial set, full building plans not available digitally)• Collected BMS outputs for all central AHUs• Initial Site Survey performed on 7/23/20

Findings to Date

Study 1 – Manhattan Commercial Office Tenant	Study 2 – Westchester Commercial Office Facility
<ul style="list-style-type: none">• All floors with the exemption of Floor 38 have been renovated in the past few years and have newer HVAC zone equipment that is compatible with additional digital controls or devices. Client plans to renovate the 38th floor in the near future.• Existing fan powered boxes on floors 42-44 and 35-36 are equipped with a filter box and have available room to retrofit higher efficiency filters, with a handful of exemptions due to space constraints in the FPB install location.• The fan powered boxes on the older 38th floor are equipped with pneumatic control dampers and there is no capability to add filters.• Modifying base-building mechanical equipment controls will be a challenge due to access and control boundary issues	<ul style="list-style-type: none">• Property has already enacted several IAQ improvement measures on their own based on public guidance:<ul style="list-style-type: none">○ Installed MERV 15 in return of 60+ fan-powered boxes throughout the building○ Installed air-scrubbers in select FPBs to remove CO2○ A full-building purge is performed for 1 hour every morning (run all exhaust and OA supply fans at max CFM)• Existing AHUs have ample room for UVGI or increased filtration, but overall large size may pose an outsized capital and operational burden given the relative benefit to IAQ, so a focus on in-room and local air-scrubbing recirculating solutions at each zone may be more cost effective.



As part of the research review, we have found that according to recent studies on SARS-CoV-2¹²³, the likelihood of transmission via airborne particles (aerosol & droplets) is higher than transmissions via surfaces (formite) and therefore airborne is likely to be the primary method of transmission for COVID-19. Thus in our evaluation of measures we will be focusing on strategies that address disinfecting and improving the quality of the air in the occupied spaces directly while occupants are present, over strategies that address primarily surfaces or airflow when occupants are not present.

Below is preliminary ranking of the additional IAQ measures beyond ASHRAE recommendations for each project, ranked from most to least favourable, based on the mechanical and financial feasibility, as well as presumed effectiveness of air quality.

Additional IAQ Improvement Measure Favourability

Study 1 – Manhattan Commercial Office Tenant	Study 2 – Westchester Commercial Office Facility
<ol style="list-style-type: none"> 1. UVGI in ductwork (local existing units or in-zone supplemental units) 2. Increased MERV/HEPA filtration (local existing units or in-zone supplemental units) 3. Overhead, in-room UVGI Systems 4. Reduced occupancy and operation optimization 5. IAQ-focused HVAC control operation (sensors, revised setpoints) 6. HEPA filtration in air handler 7. UVGI at air handler cooling coils 8. Energy/Heat Recovery Ventilation 9. Zone isolation/pressurization 	<ol style="list-style-type: none"> 1. UVGI in ductwork (local existing units or in-zone supplemental units) 2. UVGI at air handler cooling coils 3. Increased MERV/HEPA filtration (local existing units or in-zone supplemental units) 4. IAQ-focused HVAC control operation (sensors, revised setpoints) 5. Reduced occupancy and operation optimization 6. Overhead, in-room UVGI Systems 7. Zone isolation/pressurization 8. HEPA filtration in air handler 9. Energy/Heat Recovery Ventilation

Barriers Encountered

Study 1 – Manhattan Commercial Office Tenant	Study 2 – Westchester Commercial Office Facility
<ul style="list-style-type: none"> • Field Engineer denied access to base building mechanical floors and equipment upon initial visit 	<ul style="list-style-type: none"> • Nameplates are painted over for central AHUs, will need to reach out to manufacturer for equipment data

¹ https://wwwnc.cdc.gov/eid/article/26/7/20-0885_article#r3

² <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7293495/>

³ [https://www.thelancet.com/pdfs/journals/laninf/PIIS1473-3099\(20\)30561-2.pdf](https://www.thelancet.com/pdfs/journals/laninf/PIIS1473-3099(20)30561-2.pdf)



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Lessons Learned

Study 1 – Manhattan Commercial Office Tenant

Study 2 – Westchester Commercial Office Facility

- Additional on-site measurements of interior conditions (Temp, RH) and air quality metrics (CO2, PM2.5) would greatly inform a proposed package of energy optimized and effective IAQ solutions

Proposed Work Plan Adjustments

Study 1 – Manhattan Commercial Office Tenant

Study 2 – Westchester Commercial Office Facility

- Include IAQ sensor-based operation and HVAC controls in proposed measures studied

Next Steps

Study 1 – Manhattan Commercial Office Tenant

Study 2 – Westchester Commercial Office Facility

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| <ul style="list-style-type: none">• Analyze initial survey information• Analyze utility data for anomalies or missing data• Schedule follow up site visit as needed• Narrow down IAQ opportunities and select sample specs for feasibility evaluation | <ul style="list-style-type: none">• Analyze initial survey information, hold follow Q&A with building engineering• Analyze utility data for anomalies or missing data• Collect time series of BMS output reports• Collect sample IAQ reports• Schedule follow up site visit as needed• Narrow down IAQ opportunities and select sample specs for feasibility evaluation |
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