



DNA Tracer HVAC Assessment Indoor Air Quality

Performance Verification for
Energy Efficient Infection Control

#0300 Astronomy Building
Spring 2022

Submitted by:
Integrating Green Technologies
IGT2030.COM



STUDENT SUSTAINABILITY COMMITTEE



UNIVERSITY OF
ILLINOIS
URBANA - CHAMPAIGN
Facilities & Services for Sustainability



Project Update Overview

- 01. Project Overview
- 02. Design Thinking / Illinois Clean Air in Buildings Challenge
- 03. Astronomy Building #0300 Field Characterization
- 04. Air Purification and Monitoring
- 05. Nest Steps



Collaborative Partners



Sean McCrady
 Director Assets & Sustainability
 Real Estate & Properties at UL



Erik Malmstrom
 Chief Executive Officer
 at SafeTraces, Inc.



Stephanie Scibilia
 Director of Client Engagement
 at SafeTraces, Inc.



Spring 2021



STUDENT SUSTAINABILITY COMMITTEE



UNIVERSITY OF
ILLINOIS
 URBANA - CHAMPAIGN
 Facilities & Services for Sustainability



Project Update Agenda

Astronomy Building report findings and potential corrective action

- **Indoor Air Quality Monitoring specific to IT Security**
- **UL 2905/UL 2906: Indoor Air Quality Sensor Performance/Sensor Deployment UL Verified IoT Security**
- **There is a newer building on campus that has CO2 sensors so we can discover what they did and follow that pathway**
- **Our ongoing collaborative discussion with the State of Illinois' new Building Infrastructure Fund (2nd qtr 2023) where our work with you under iCAP is considered one of the missing pieces of the puzzle.**

Their primary goal is to improve re-occupancy levels within existing buildings and cause new buildings (public and private) to design more effectively for IAQ/IEQ, especially where private development is receiving state funding and concessions.

Since it was UL Healthy Buildings (Primary Partner of SafeTraces) that introduced IGT to the UL/SafeTraces ecosystem, ULHB will be instrumental in providing the capacity needed for our efforts with the state led by Illinois Chief Investment Officer, Joe Aguilar.

- As discussed with Morgan at the end of our Design Thinking Session, Ikenberry Food Hall is being considered as our next project and UL Healthy Buildings ULHB is partnering with us on it since natural gas and hydrogen sulfide gas may be impacting IAQ/IEQ.





01. Project Overview

Our ability to verifiably measure indoor aerodynamics, ventilation, filtration and energy efficiency optimization to date, has been limited to static calculations and occupancy assumptions.

“Air required to be delivered to a given space by a Heating Ventilation and Air Conditioning (HVAC) system is based primarily on the number of people occupying the space, the type and amount of equipment, and the overall size of the space.”

The National Institute for Occupational Safety and Health (NIOSH)

The combination of our global pandemic and the daunting challenges associated with the unpredictable impacts of Climate Change, continues to fuel the need to identify scalable solutions to address these short, medium and long-term challenges.

Our project focuses on closing the healthy building knowledge gap by analyzing the impacts of:

- Indoor air changes and airflow dynamics
- Outdoor air supply/dilution
- Positive and negative pressurization impacts on infection control
- Current vs potential improvements to better optimize financial costs, human health and safety risks and Return-on-Investment (ROI) decisions.

This data informed audit of the existing HVAC system at the University of Illinois Urbana-Champaign - **Astronomy Building #0300**, will fully assess the practical application of the SafeTraces HVAC system performance diagnostic technology.

Our team, through the **Student Sustainability Committee/iCAP Plan** in collaboration with SafeTraces and its collaborative partner at Integrating Green Technologies, is respectfully submitting this project proposal for funding consideration.

Submitted by:

Dhruvaraj Gambhire and Ali Khan

Candidates: M Eng Energy Systems





DESIGN THINKING

EMPATHY
DEFINE
IDEATE
PROTOTYPE
TEST

Illinois Clean Air in Buildings Challenge



U.S. ENVIRONMENTAL PROTECTION AGENCY

MARCH 2022



1. **CREATE AN ACTION PLAN FOR CLEAN INDOOR AIR IN YOUR BUILDING(S)** that assesses IAQ, plans for upgrades and improvements, and includes HVAC inspections and maintenance.



2. **OPTIMIZE FRESH AIR VENTILATION** by bringing in and circulating clean outdoor air indoors.



3. **ENHANCE AIR FILTRATION AND CLEANING** using the central HVAC system and in-room air cleaning devices.



4. **GET YOUR COMMUNITY ENGAGED IN YOUR ACTION PLAN** by communicating with building occupants to increase awareness, commitment, and participation in improving indoor air quality and health outcomes.







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Integrating Green Technologies

Integrating Green Technologies

IGT Project Manager Mike Sheehan (404) 474-1395 mike@irt2030.com	Project Number	UIUC_300 - Astronomy Building	DATE: 11/14/2022
	Client Name :	U of I Urbana Champaign F&S Sustainability	SURVEY 08/03/2022
	Primary Contact:	Morgan White Associate Dir. of F&S Sustainability	ANALYSIS 08/25/2022
	Email:	mbwhite@illinois.edu	VERIFY 09/01/2022

Building Address: 1102 W Green St. Urbana IL 61801

Use: Faculty office / Classroom / Lab

Mailing Address: F&S | UIUC - 1501 S Oak Street (MC-800) | Champaign, IL 61820

This testing is based on the UL Verified Ventilation and Filtration standard an independent science- based marketing claim evaluation that helps building owners and operators manage and communicate performance for aerosol removal to improve air quality.



Testing Procedure

Indoor Air Quality Assessment (IAQ). Health and safety risk assessment for airflow, ventilation, and filtration performance. Provide a baseline survey for airborne pathogen mobility throughout the total test area. Provide dilution test for airborne pathogen mobility in specific spaces.

Narrative

HVAC Specification: (provided by UIUC facilities)

Original Air Handling Unit (AHU) from 1990, Trane Model 41A, Serial K89H24684. Original AHU equipment schedule attached. AHU controls were originally pneumatic, upgraded to DDC (Siemens) in 2016 to allow occupancy schedules to be implemented. Zone level (VAVs) are still pneumatic. I believe the fume hoods are only energized when in use. Heating in the building is hot water radiators and hot water VAV reheat (no heating coil at AHU) fed from hot water boilers. 30% glycol cooling coil in AHU, fed from the air-cooled chiller on site.

Goals

Measure and verify pathways to provide Energy-Efficient HVAC Infection Control in campus buildings. This includes but is not limited to; Indoor Air Purifier Device deployment to improve potential increases in the number of Effective Air Changes Per Hour (eACH), and overall air filtration capabilities.

Test data will be used to enhance safety and make better informed financial decisions (eg. energy use); increase trust among building inhabitants i.e., county employees and the public who benefit from the use of county facilities.

Observations

- Per UIUC facilities - Fan speeds are increased and MERV 13 filters are in use.
- The stairways and interior corridors on both levels lack HVAC supply & return air ducts



IRT Project Manager Mike Sheehan (404) 474-1395 mike@irt2030.com	Project Number	UIUC_300 - Astronomy Building	DATE: 11/14/2022
	BUILDING ID:	Domestic Violence Courthouse	SURVEY: 08/03/20222
	FLOOR LEVEL	First Floor	ANALYSIS: 08/25/2022
	TEST TYPE:	Filtration Verification	VERIFY: 09/

Analysis and Conclusions:

1. The University has adopted the recommendations of CDC and ASHRAE'S Epidemic Task Force & Covid-19 Guidance as part of their response to the SARS-CoV-2 pandemic.
2. Ambient interior temperature is between 68F and 75 F which is below recommendations by ASHRAE 62.1. (75 F to 80.5 F in the summer). Humidity levels measured between 46% and 59% which is within the 40% - 60% relative humidity recommended by ASHRAE 62.1.
3. All spaces that were tested showed in excess of 5.5 eACH (equivalent Air Changes per Hour).
 - a. First Floor Corridor - eACH and % reduction of DNA tagged aerosols cannot be accurately measured and the test is classified as **inconclusive**. 
 - b. Lecture 134 – achieved 99.86% aerosol reduction during the 60 minutes sampling event linked to **6.52 eACH** 
 - c. First Floor Corridor - eACH and % reduction of DNA tagged aerosols cannot be accurately measured and the test is classified as **inconclusive**. 
 - d. Break 222 - achieved – 99.55% aerosol reduction during the 60 minutes sampling event linked to **5.4 eACH**. 
4. Additional testing is needed to address inconclusive results in the corridor.
5. The building performance can be tuned to reduce the fan speeds to a level that effectively balances the safety and comfort of the occupants and reduces energy consumption and equipment wear and tear.
6. Combining properly sized portable HEPA air purifiers with controllers that monitors indoor air quality can further improve performance and help optimize operations and maintenance expenses. All controllers and monitors shall meet UL-2905 performance standard.



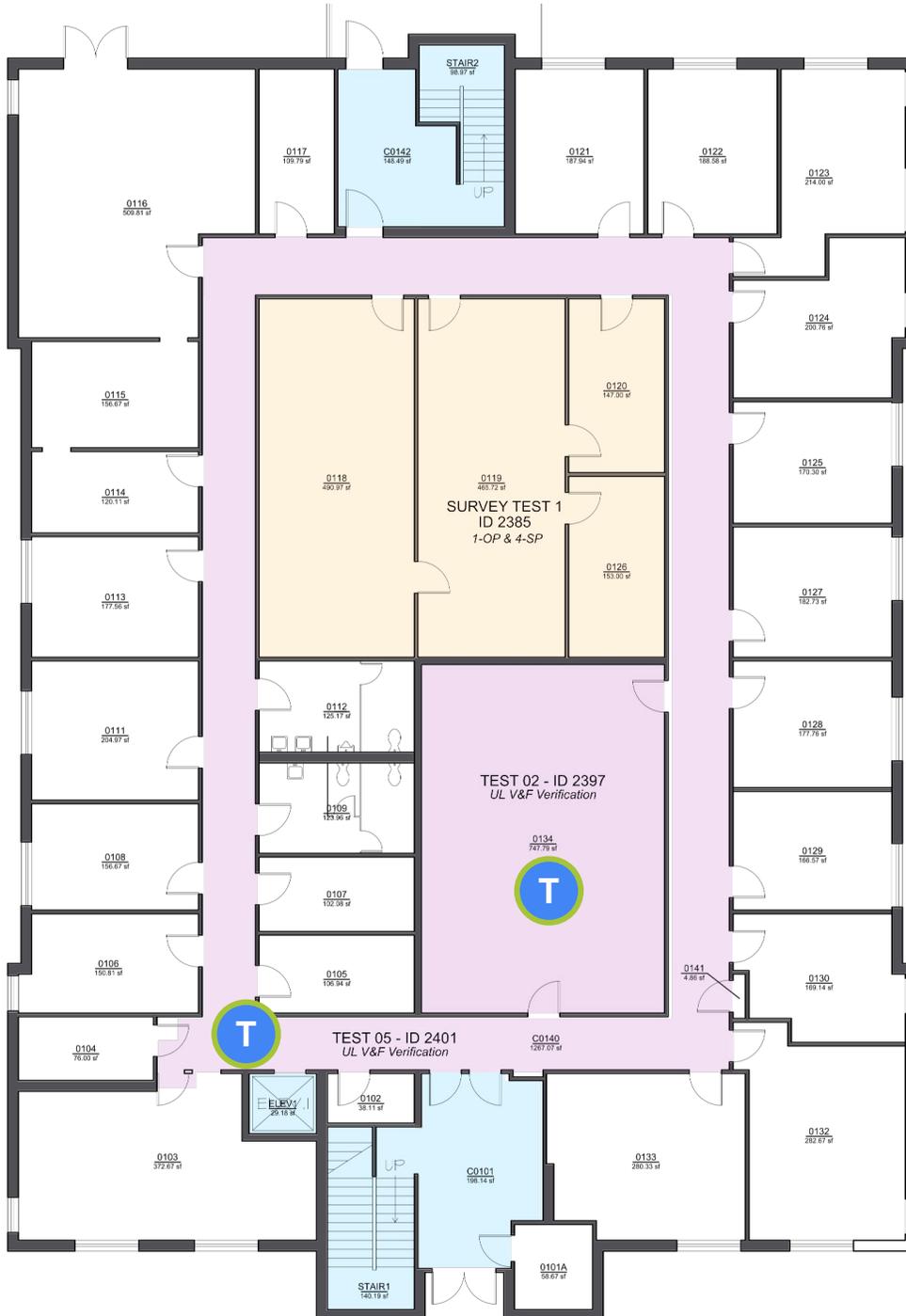
UL Verified Ventilation and Filtration

The first assessment and rating program based on labeled particles for real-world ventilation and filtration performance for aerosol removal in the built environment.



IGT Project Mgr. Mike Sheehan 404-474-1395 info@IGT2030.com	Project Number	UIUC_300 - Astronomy Building	DATE: 04/05/21
	BUILDING ID:	1102 W Green St. Urbana IL 61801	SURVEY: 07/23/2022
	FLOOR LEVEL	SECOND	ANALYSIS
	TEST TYPE:	Diffusion Baseline Testing	VERIFY
Building ID: 1002 W. Green Street, Urbana IL 61801		Stories: 2	Area: 18,000 GSF Approx

First Floor Testing Layout



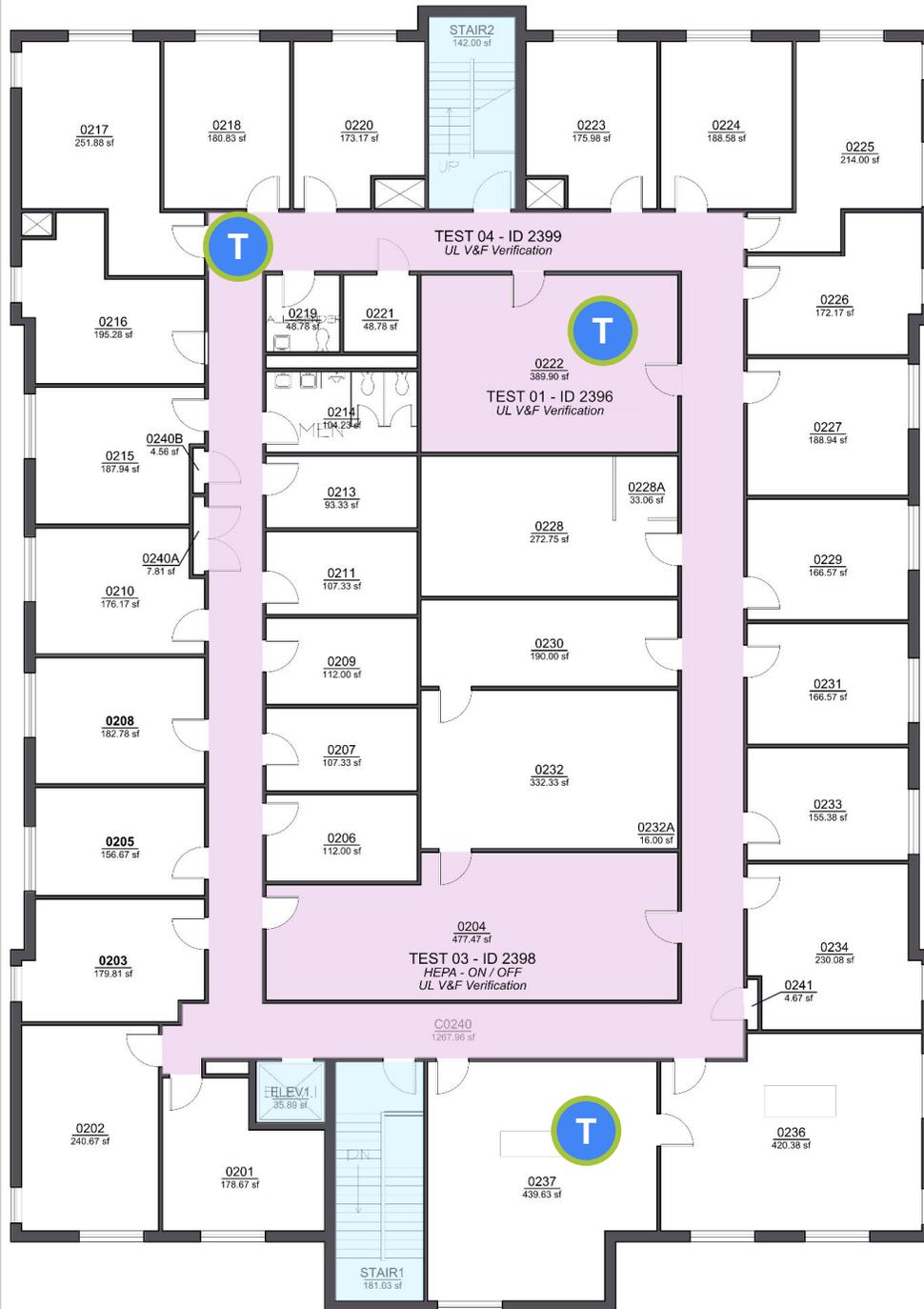
NOTES:

1st Floor Corridor - 68.7 DEG F
 57.5% HUMIDITY
 WITHIN COMFORT ZONE

Room 134 - 70.5 DEG F
 59% HUMIDITY
 WITHIN COMFORT ZONE

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	FLOOR LEVEL	SECOND	ANALYSIS
	TEST TYPE:	Diffusion Baseline Testing	VERIFY
Building ID: 1002 W. Green Street, Urbana IL 61801		Stories: 2	Area: 18,000 GSF Approx

Second Floor Testing Layout



NOTES:

**2nd Floor Corridor - 68.7 DEG F
57.5% HUMIDITY
WITHIN COMFORT ZONE**

**Room 222 - 75.3 DEG F
46.9% HUMIDITY
WITHIN COMFORT ZONE**

**Room 237 - 75.3 DEG F
46.9% HUMIDITY
WITHIN COMFORT ZONE**

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	FLOOR LEVEL		ANALYSIS
	TEST TYPE:		VERIFY

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Asses



IGT Team -Sterling, Kenyona, Carl | IUC Team, - Sarthak, Druv, Ali

Dhruv Gambhire - Project Leader



Ali Feroz Khan

IGT Project Mgr. Mike Sheehan 404-474-1395 info@IGT2030.com	Project Number	UIUC_300 - Astronomy Building	DATE: 04/05/21
	BUILDING ID:	1102 W Green St. Urbana IL 61801	SURVEY: 07/23/2022
	FLOOR LEVEL	FIRST - CORRIDOR	ANALYSIS 08/25/2022
	TEST TYPE:	Diffusion Baseline Testing	VERIFY
Building ID: 1002 W. Green Street, Urbana IL 61801		Stories: 2	Area: 18,000 GSF Approx

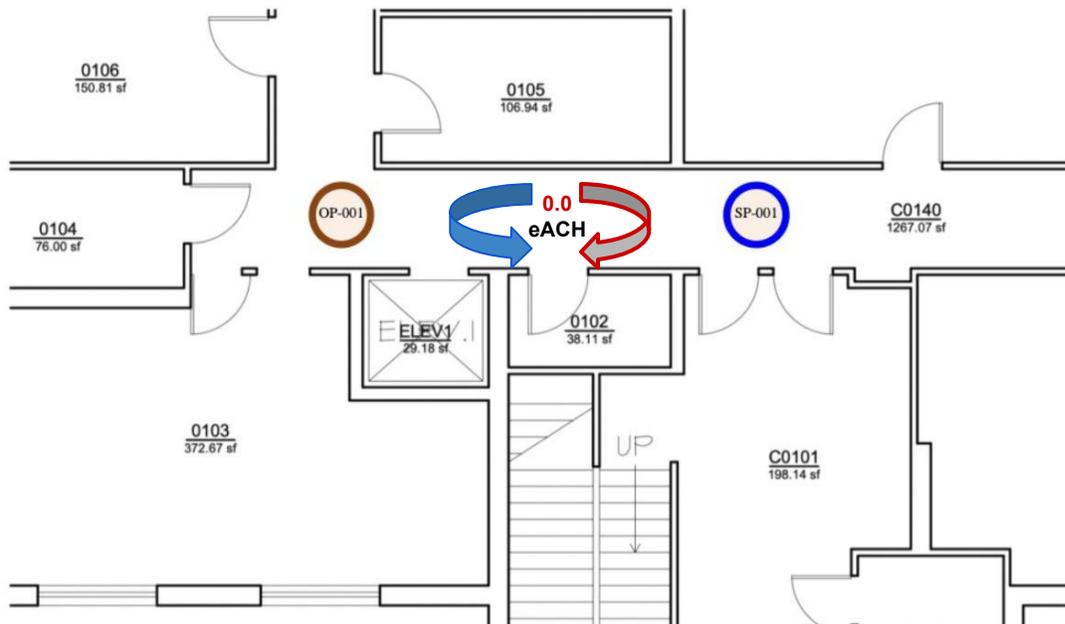
Commentary

The eACH and % reduction of DNA tagged aerosols cannot be accurately measured and the test is classified as **inconclusive.** ←

It appears that there is little to no mixing of air in the test location.

Test location conditions:

- No HVAC supply and returns
- Doorways were all closed



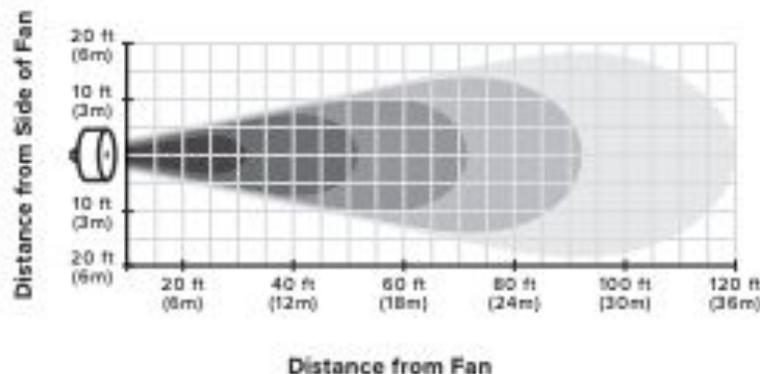
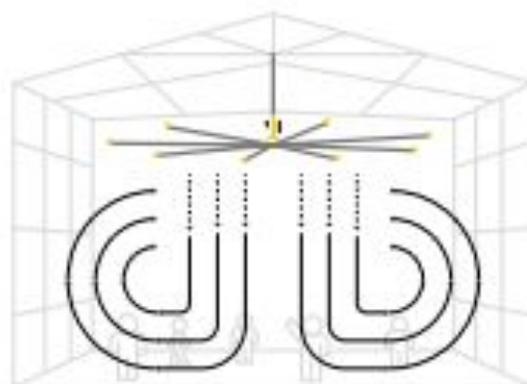


AIR QUALITY IN THE WORKPLACE

HOW BIG ASS FANS AFFECT EVERYDAY WORKING CONDITIONS IN YOUR SPACE

1. How does an overhead Big Ass fan affect airflow?

Using an overhead Big Ass fan's bi-directional airflow and elevated air speed is an incredibly powerful way to keep workers and guests comfortable in your space. Immediately underneath a Big Ass fan, airflow is pushed downward. Outside its diameter, the airflow transitions to horizontal air movement, providing comfortable airflow over a large area per ASHRAE Standard 55's thermal comfort calculations.



2. How does a directional Big Ass fan affect airflow?

Big Ass directional fans create a one-way airflow pattern that moves air to the area in front of the fan. Directional fans are most often used to cool workers in congested areas where overhead fans cannot be safely mounted. Additionally, most Big Ass directional fans feature variable speed control, allowing users to adjust airflow to provide the optimal desired cooling effect.

3. How can I use Big Ass fans to improve ventilation within my space?

Fresh air is not typically distributed uniformly throughout a space. For example, one of the most common air distribution configurations for HVAC systems is an overhead supply with overhead return. In common heating applications, this ceiling configuration can cause significant stratification of heated supply air and room air layers that prevents fresh air from circulating to occupant level. To compensate, ASHRAE 62.1 requires ventilation rates be increased by 20% to deliver the necessary amount of fresh air to the room's occupants.

In a room that has been destratified by a Big Ass overhead fan, however, the air layers are well mixed so that the supplied fresh air can reach occupant level.

In naturally ventilated spaces, fresh air is passively distributed throughout the space, so localized areas may have stagnant pockets that result in poor air quality and the buildup of pollutants. Overhead fans can be used to evenly distribute fresh air to all occupants in the space.

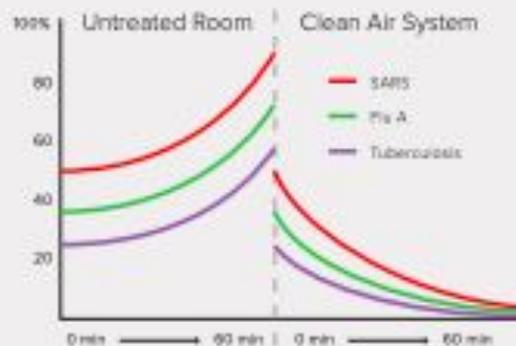
CLEAN AIR SYSTEM SAFELY KILLS 99.9% OF AIRBORNE PATHOGENS

PROVEN DISINFECTION

Independently tested and proven to achieve a 99.9% microbial reduction, Clean Air System dramatically lowers the risk of infection for all airborne pathogens. Our airflow experts use scientific modeling to illustrate how this powerful air disinfection will provide cleaner, safer conditions for your business.

RISK OF INFECTION FROM AN INFECTED PERSON IN YOUR SPACE

Parameter	Value
Microbial Reduction	99.9%
Pathogen Reduction (10 Minutes)	99.9%



Quick Facts

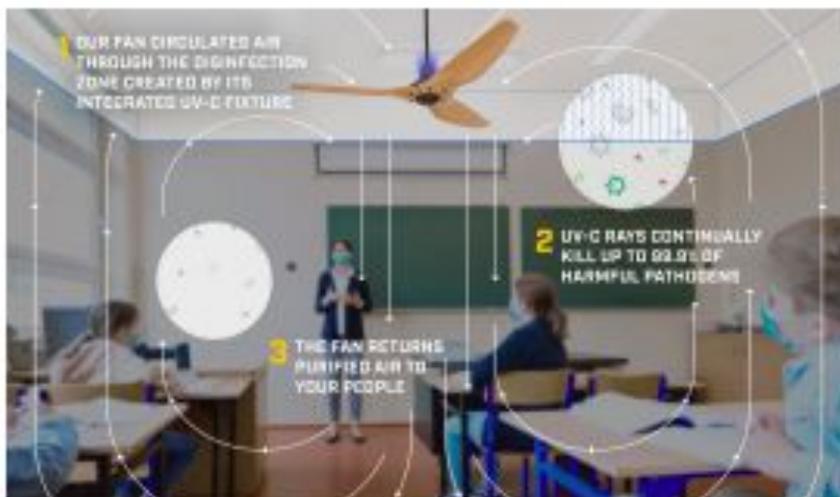
- ▶ "The number of UV fixtures, use of mixing fan, and air exchange rate significantly affected UV effectiveness."

Environ Health Perspect., PMID: PMC1240698
- ▶ Airflow creates active and continuous disinfection that fights new pathogens immediately when they enter the space through coughing, sneezing, or talking.
- ▶ "For effective interruption of transmission, air disinfection has to occur in the same room where transmission is occurring."

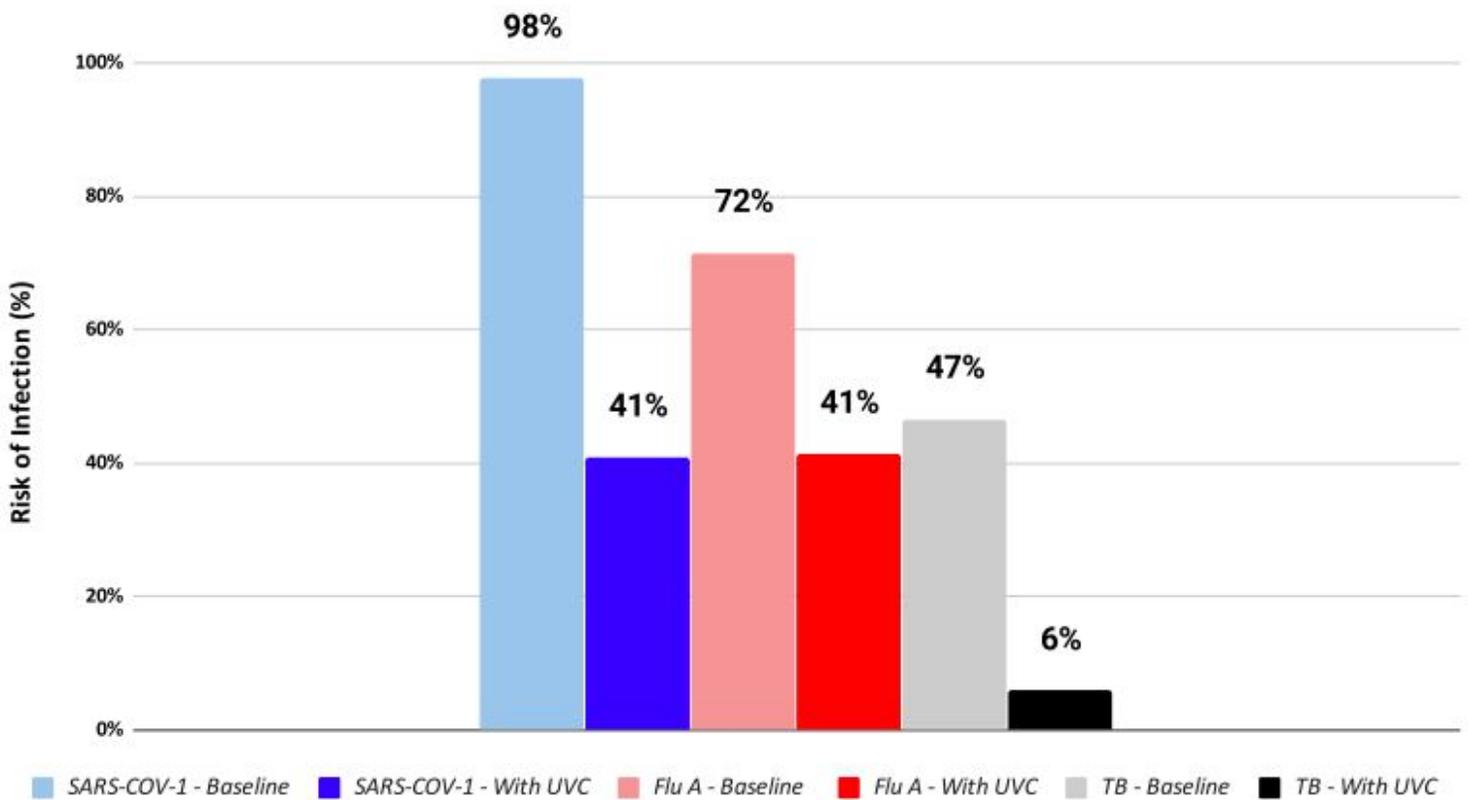
IES Committee Report, IES CR-2-20-V1
- ▶ UV-C technology has been a safe, successful air disinfection method for more than 70 years.
- ▶ "Upper-air GUUV is the safest, most effective application of UV-C."

IES Committee Report, Germicidal Ultraviolet (GUV)

HOW HAIKU WITH UV-C WORKS



Wells-Riley Infection Risk (Baseline and After Additive Effective Air Changes)

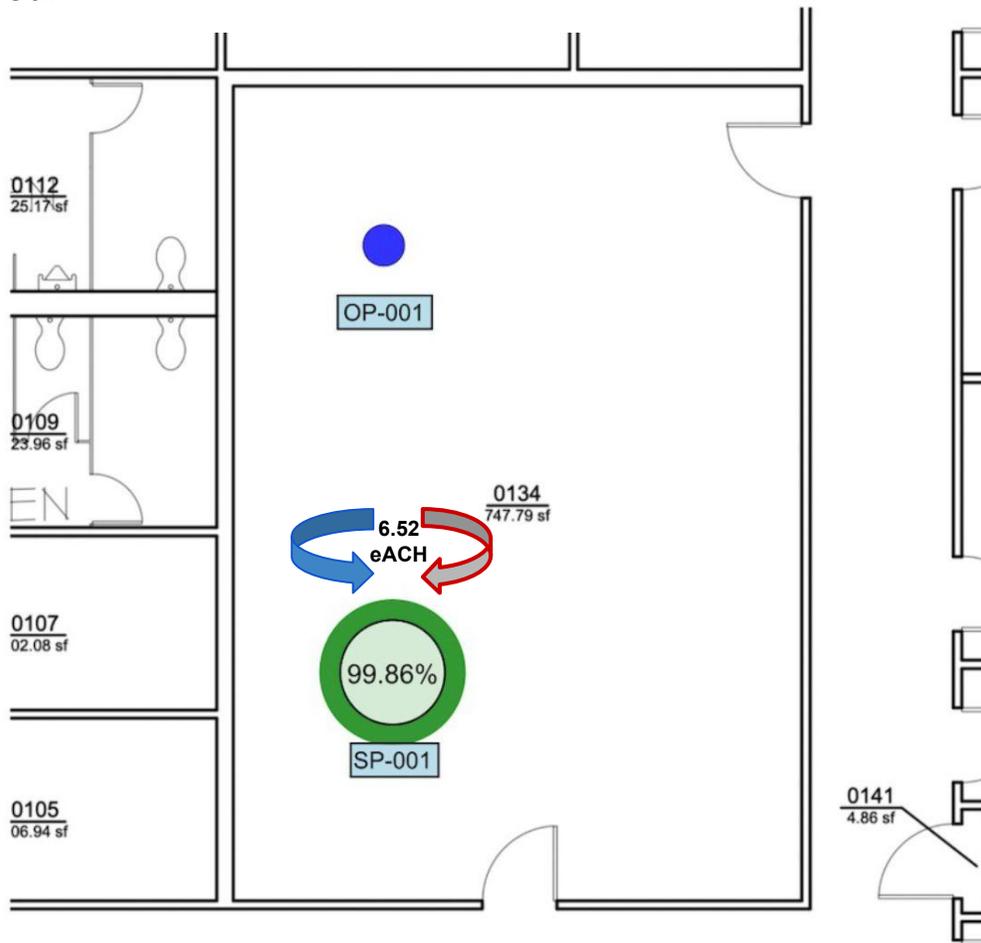
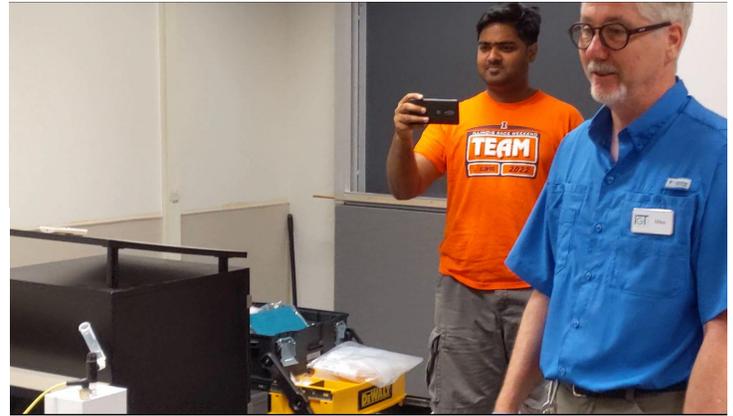


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	FLOOR LEVEL	FIRST - ROOM 134	ANALYSIS 08/25/2022
	TEST TYPE:	Diffusion Baseline Testing	VERIFY
Building ID: 1002 W. Green Street, Urbana IL 61801		Stories: 2	Area: 18,000 GSF Approx

Commentary

The sample location achieved **99.86%** aerosol reduction during the 60 minutes sampling event, linked to **6.52 eACH** ←

Test conditions: HVAC – on; Doors - closed.



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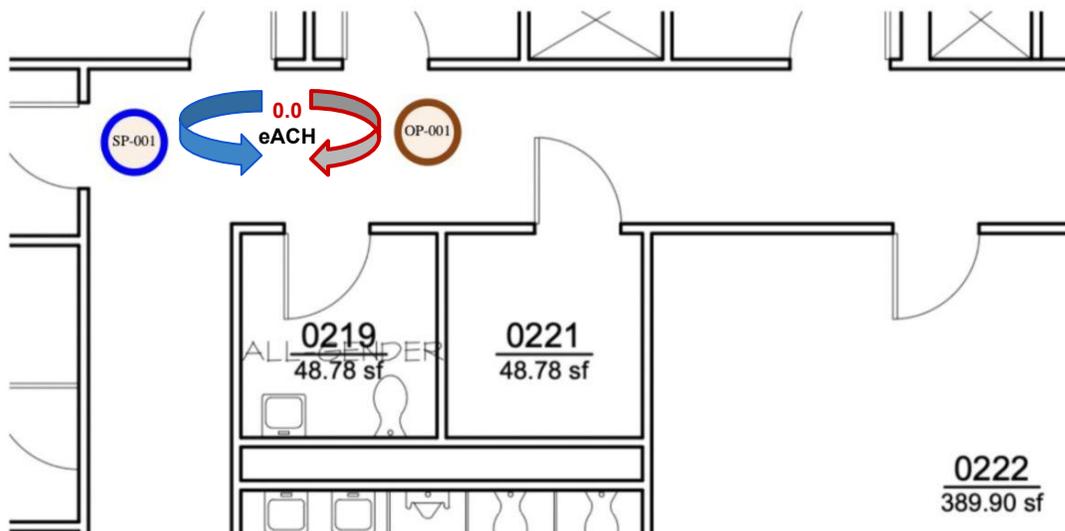
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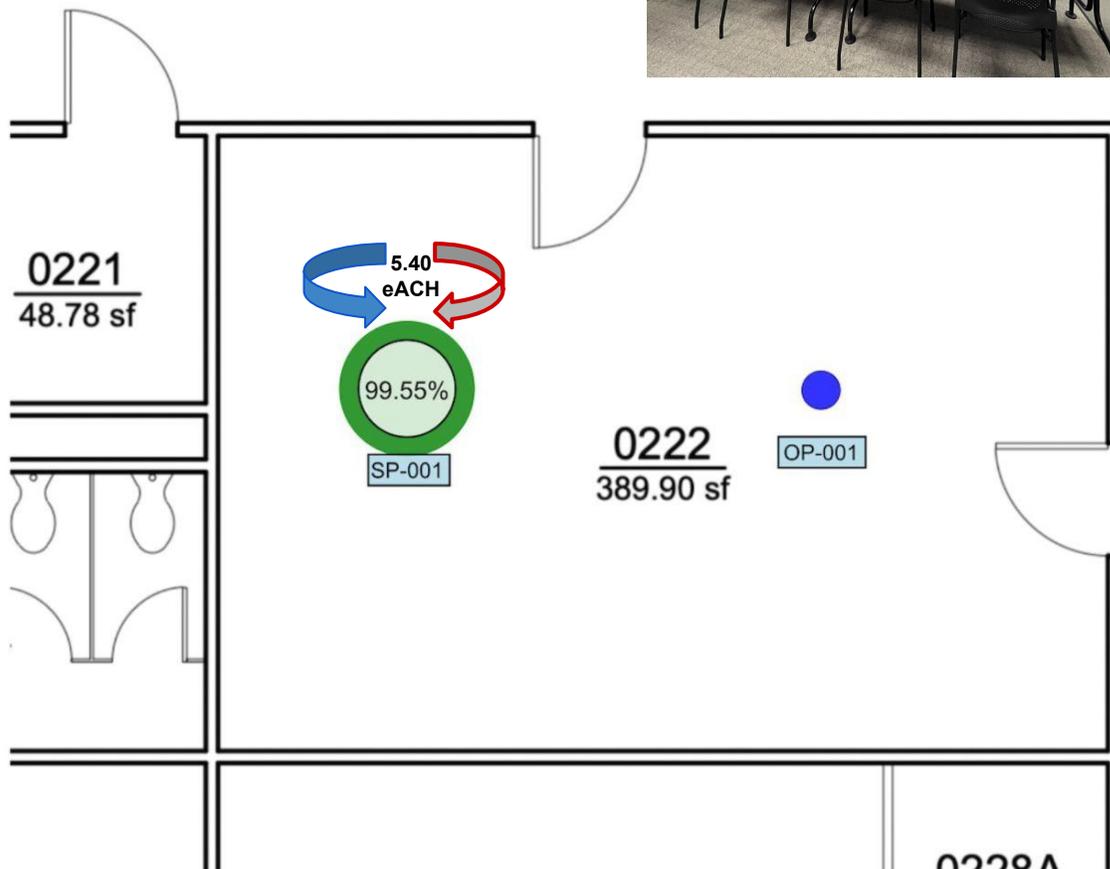


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Commentary

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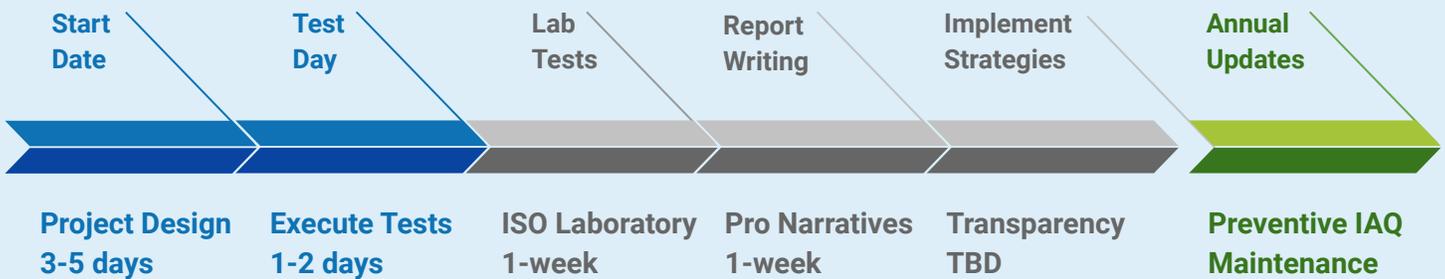
Test conditions: HVAC – on; Doors - closed.





Creating Safer Settings With Better Ventilation + Filtration Improving Indoor Air Quality :: IAQ

Project Timeline Example



**Verify Ventilation
& Filtration Controls**

Specific Spaces Will Need Air Purifiers But Not These!



Independently Tested.
Consumer Trusted.

AIR CLEANER SUGGESTED CLOSED ROOM SIZE
167 SQUARE FEET

**CLEAN AIR DELIVERY RATE
& ENERGY TESTED**

The higher the CADR numbers, the faster the units clean the air

TOBACCO SMOKE	DUST	POLLEN
 108	 >118	 >125

Portable air cleaners are most effective in rooms where all doors and windows are closed.

Classrooms & Lecture Halls, Corporate Offices & Conference Rooms



Performance Series Air Purifiers

Exceptional Performance and Operational Efficiency:

- Large area Clean Air Delivery Rate (CADR)
- Captures & destroys viruses, bacteria & VOCs
- Low cost to performance ratio: CADR per \$

Complete Room Coverage

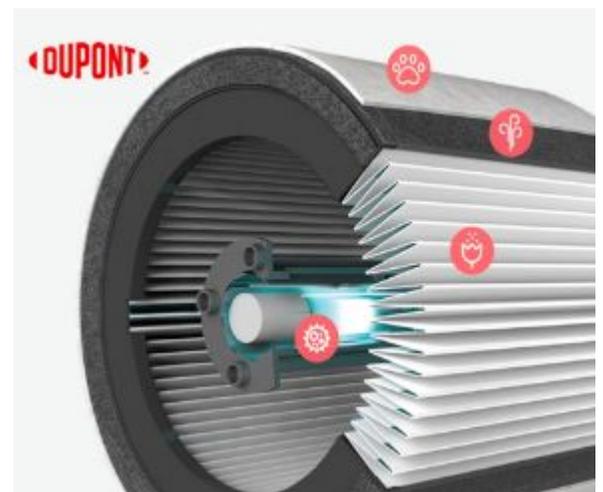
Reduce Airborne Virus Exposure

- TRU-BEAM™ UV-C Light System
- True HEPA filter captures airborne viruses and bacteria, including 99.99% of airborne coronavirus.*

Real-Time Remote SensorPod™:

- Measures pollutants across the room,

Digital AQI Monitor with Auto-Adjustment:



Classrooms & Lecture Halls, Corporate Offices & Conference Rooms



TRU-BEAM™ UV-C LED Light System

Inactivates viruses & bacteria trapped in the True HEPA filters. Lasts the life of the machine.

True HEPA Filters

Dual-sided, combination True HEPA filter captures airborne viruses and bacteria.

Activated Carbon Filters

Traps VOCs, smoke and odors

Washable Pre-Filters

Catches larger particulates – pet dander and other airborne particles



Smart Indoor Air Quality Sensing Controller Is First IAQ Sensor to Achieve Environmental Claim Validation to UL 2905

Sensor achieves A rating for temperature, relative humidity, carbon dioxide and particulate matter (PM2.5) monitoring and additionally evaluated to PM10, carbon monoxide, formaldehyde and TVOC



UL 2905: Environmental Standard Validation Procedure for Indoor Air Quality (IAQ) Sensor Performance

UL 2906: Guidance Use Integrated Indoor Air Quality Sensors



Levels of IoT Security Rating (UL MCV1376)



DIAMOND
Comprehensive security capabilities

- Hardware root of trust
- Unknown vulnerability testing
- Extensive interface and service documentation

PLATINUM
Extensive security capabilities

- Sophisticated runtime hardening
- Known vulnerability testing
- Strong input sanitization

GOLD
Advanced security capabilities

- Secure out-of-the-box settings
- Hardware design hardening
- Least privilege principle

SILVER
Enhanced security capabilities

- Password complexity enforcement
- Credential recovery
- Device safety considerations

BRONZE
Essential security capabilities

- No default passwords
- Secure update mechanism
- Secure reset
- Secure communications

These levels map to different Standards/guidelines, e.g.:

NIST8259A maps to Bronze Level

DLC maps to Silver Level

EN 303 645 maps to Gold Level

*For Gold+, products earn certification against EN 303 645. In the absence of a formal certification authority, a letter of attestation is issued.



Regulations, guidelines and compliance



Priority market standards:

U.S.: NIST/Global Acceptance: EN 303 645/EU: RED Article 3.3/Brazil ANATEL/UK: Code of Practice for Consumer IoT Security/Global: PSA IoT Security Framework and Certification





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NEXT STEPS

- 01. IAQ/IEQ Building Assessments and Corrective Action**
 - a. #0300 Astronomy Building**

- 02. Indoor Air Quality Monitoring and UL Verified IoT Security**
 - a. #0300 Astronomy Building**
 - b. Ikenberry Dining Hall**

- 03. UL Verified Healthy Buildings**
 - a. Ikenberry Dining Hall**
 - b. UIUC Student Library**
 - c. General Engineering Transportation Building**
 - d. Sidney Lu: Engineering Building**
 - e. UIUC Cancer Center Collaboration**



STUDENT SUSTAINABILITY COMMITTEE





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NEXT STEPS

Discuss items and next steps.

- **iCAP: University of Illinois Urbana-Champaign (UIUC)**
 - Opportunities for UL Healthy Buildings Mark on Campus
 - [Ikenberry Hall Facility Info Brief](#)
 - [UIUC Student Library \(New Construction\)](#)
 - [General Engineering Transportation Building](#)
 - [Sidney Lu: Mechanical Engineering Building](#)
 - [UIUC High School](#)
- **Worldwide Health & Wellness Symposium: Los Angeles**

Health Strategies for Climate Adaptation - Closing The Gap Between Public Health and Building Science

 - **Host:** Callison RTKL, Los Angeles Office
 - **Attendees:** Callison RTKL, Ginsler, Perkins & Will, ARUP, etc
 - **Tentative Date:** Thu-Fri April 6-7th 2023 (Complete)
 - **Event Overview:** [Symposium Invite and Details](#)
 - **Guest Speaker:** Morgan White, UIUC
- **Cook County Illinois: Energy Efficient HVAC Infection Control Pilot (Phase-2)**
 - County IAQ Ordinance: Healthy Buildings Assessments
 - UL 2906: Design Guidance and Use IAQ Sensors
 - UL 2905: UL Verified IoT Security Guidance Information



STUDENT SUSTAINABILITY COMMITTEE





Design Thinking



IGT2030.com

Integrating Green Technologies



Sessions To-Date

Nov 10, 2022:

University of Illinois Urbana-Champaign

April 6-7th 2023:

CallisonRTKL Sustainability Group Los Angeles



Design-Thinking AGENDA



Design Thinking Kickoff
Dr. William P. Bahnfleth
UIUC Distinguished Alumni

9:00am - 9:25am

9:30am - 11:00am

11:15am - 11:30am

12:30pm - 3:30pm

3:40pm - 5:00pm

WELCOME & HOUSEKEEPING: **Do's & Don'ts**

TOWN HALL: **Case Studies & Technologies**

BREAK 10 mins

DESIGN THINKING KICKOFF: **Live-stream**

Dr. William P. Bahnfleth

Chair ASHRAE Covid Epidemic Task Force

LUNCH

DESIGN THINKING SESSION

BREAK 10 mins

PRESENTATIONS & CLOSING REMARKS

Closing The Gap Between Public Health & Building Science



ENERGY EFFICIENT
HVAC INFECTION CONTROL

IGT2030.COM/iCAP

University of Illinois
Urbana-Champaign



IGT2030.com

Integrating Green Technologies



**Almost All University, K-12 Schools, and Other Buildings
Are Blindly Struggling To Have Enough Clean
Indoor Air For Us To Breathe!**

**The short-term solutions being provided can have
high energy costs while providing unwanted increases in
Green House Gas environmental pollution.**

**We have the technologies to deal with these challenges.
We simply have to want to do it!**

Come and help create:

The Clean Air In Buildings Challenge for Illinois.

**Join us this Thursday Nov 10th from 9:00am - 5:00pm
Lunch Will Be Served!**



Design-Thinking iCAP: UIUC Nov 2022





Apr 6

Health & Environmental Strategies for Climate Adaptation



Sales Ended

Details

Pandemic mortality experienced by Black Americans and other marginalized groups is the beginning of our true challenge - Climate Adaptation.



By 100 Build My Future: Social Determinants of Health

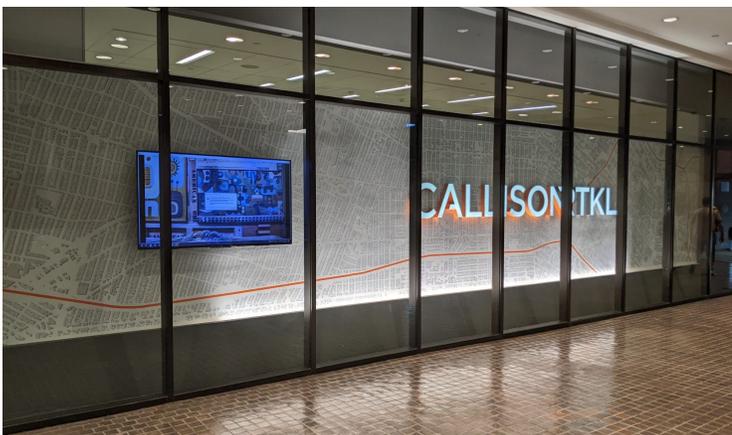
13 followers

Following

Closing The Gap Between Public Health and Building Science

There was a “significant gap” in the depth of knowledge necessary to better inform Americans about what we could and should know about indoor climate/air pollution, toxic cleaners/building materials, and the health impacts of poor indoor ventilation and filtration impacting public health professions and others, at home and in their work/educational environments.

These massive challenges cannot be solved by any one group; governments, private industry, or community groups are simply unable to tackle these life-altering issues alone. The key is to set-in-motion an organized, cross-disciplinary effort and today we're focused on doing that!



World Health and Wellness Committee

2023 Symposium

Health Strategies for Climate Adaptation
In African American Communities

100

BLACK MEN
OF AMERICA, INC.

Location: Callison RTKL, Bank of America Financial Center
333 S Hope St, Los Angeles, CA 90071

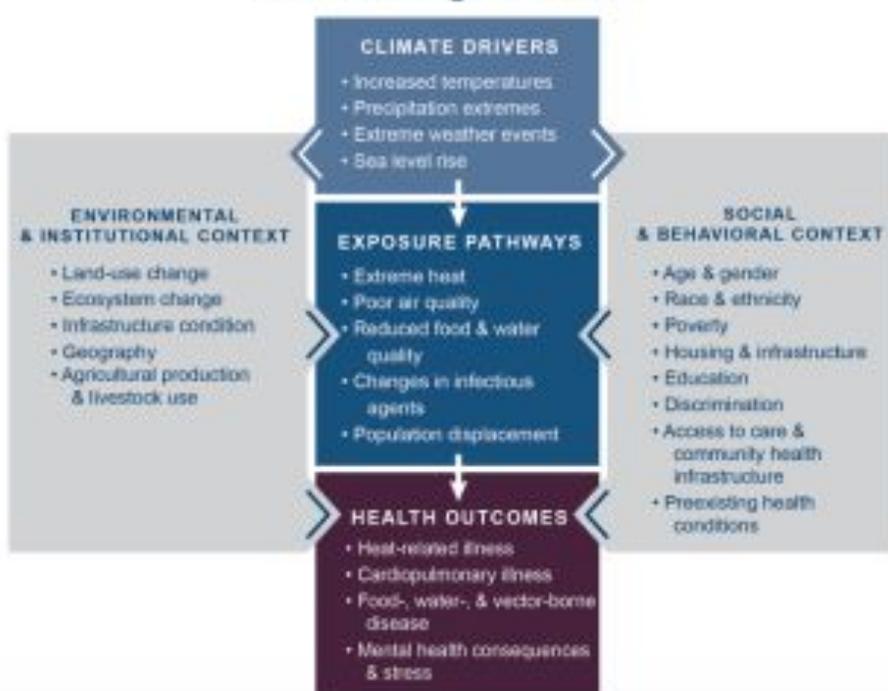
Date: Presentation Room 405: Thur Apr 6th 8:15am-4:30pm & Fri Apr 7th 8:15am-1:30pm

Health & Environmental Strategies for Climate Adaptation

a Collaborative Nexus: Closing The Gap Between Public Health and Building Science

- **Built Environment:** With rising rates of obesity and chronic disease linked to sedentary lifestyles, architects are thinking even more about the ways in which people physically interact with (and are impacted by) the built environment.
- **Master Planning:** Architects and urban planners are looking at new ways to enhance health and ensure that our environment enhances, rather than detracts, from physical wellbeing. Increasingly, medical professionals are working with architects to help communities to design individual buildings and entire neighborhoods that promote physical, mental, and social health.
- **Environmental Social & Governance:** Leveraging a health-focused lens is one way the real estate sector is beginning to focus its efforts across the Environmental, Social, and Governance pillars. Collaborative initiatives with leading healthcare influencers can improve impacts of the Social Determinants of Health using verifiable metrics that can validate the "E" and the "S" in ESG.
- **CRTKL Competitive Market Realities: Gensler** | "When examining our cities and real estate from a value framework, the places that do not support health and wellness lose value because people refuse to occupy them. This includes buildings that aren't sustainable."

Climate Change and Health



refuse to occupy them. This includes buildings that aren't sustainable."

Perkins and Will | "Too often, some of the design profession's most impactful decisions are made in the dark, with little material information available to anyone specifying a product. But designing healthy buildings means specifying healthier building products."

Stök | With ample opportunity to unlock a portion of the **\$369 billion Inflation Reduction Act** for those working in commercial real estate:

#1: EMBODIED CARBON

\$250M of funding for EPD

\$100M to identify and label low-carbon materials

#2: COMMERCIAL BLDGS

Tax deductions for energy efficient commercial buildings, expanded incentive for 10 years by increasing



Legislative Impact



Illinois General Assembly

HB 3713: K-12 Schools IAQ

HB3713 Engrossed LRB103 29805 RJT 56212 b

1 AN ACT concerning education.

2 **Be it enacted by the People of the State of Illinois,**

3 **represented in the General Assembly:**

4 Section 5. The School Code is amended by adding Section

5 2-3.196 as follows:

6 {105 ILCS 5/2-3.196 new}

7 Sec. 2-3.196. School ventilation.

8 (a) As used in this Section:

9 "Active classroom" means any room currently being used for

10 any duration of in-person instruction of 4 or more students at

11 a time.

12 "ASHRAE" means the American Society of Heating,

13 Refrigerating and Air-Conditioning Engineers.

14 "Certified assessor" means:

15 (1) a certified technician; or

16 (2) a person who is certified to perform ventilation

17 verification assessments of heating, ventilation, and air

18 conditioning systems through a certification body

19 accredited by the American National Standards Institute.

20 "CADR" means clean air delivery rate.

21 "Certified technician" means a person who is certified as

22 a Testing, Adjusting, and Balancing Bureau Technician by the

23 International Certification Board and accredited to comply

Bill Status of HB3713 103rd General Assembly

[Full Text](#) [Votes](#) [Witness Slips](#) [View All Actions](#) [Printer-Friendly Version](#)

Short Description: SCH CD-VENTILATION

House Sponsors

Rep. [Camille Y. Lilly](#) - [Laura Faver Dias](#) - [Stephanie A. Kifowit](#) - [Matt Hanson](#), [Will Guzzardi](#), [Lakesia Collins](#), [Nabeela Syed](#), [Joyce Mason](#), [Lilian Jiménez](#), [Michael J. Kelly](#), [Janet Yang Rohr](#), [Barbara Hernandez](#), [Abdelnasser Rashid](#) and [Hoan Huynh](#)

Senate Sponsors

(Sen. [Adriane Johnson](#) and [Laura Fine](#))

Last Action

Date	Chamber	Action
4/18/2023	Senate	Assigned to Appropriations- Education

Appropriations- Education - Members

103rd General Assembly

Members	Notice of Hearing	Bills
Role	Senator	Party
Chair :	Meg Loughran Cappel	D
Vice-Chair :	Kimberly A. Lightford	D
Member:	Paul Faraci	D
Member:	Michael W. Halpin	D
Member:	David Koehler	D
Member:	Cristina H. Pacione-Zayas	D
Member:	Doris Turner	D
Minority Spokesperson :	Tom Bennett	R
Member:	Terri Bryant	R
Member:	Chapin Rose	R
Member:	Jill Tracy	R
Member:	Sally J. Turner	R

Synopsis As Introduced

Amends the State Board of Education Article of the School Code. Provides that the State Board of Education shall require all school districts to undertake a ventilation verification assessment of all mechanical ventilation systems in the school district performed by a certified assessor or a mechanical engineer and shall be based on physical measurements made during the assessment. Provides that if an assessment is performed by a certified assessor, the assessment report shall be reviewed by a mechanical engineer. Provides that the ventilation verification assessment shall verify whether the existing mechanical ventilation system is operating in accordance with design parameters and meets the requirements of any applicable building codes.

Provides that the ventilation verification assessment for a heating, ventilation and air conditioning system shall follow specified standards. Provides that the verification assessment report from the mechanical engineer shall include appropriate corrective actions needed for the mechanical ventilation system or the heating, ventilation and air conditioning infrastructure, including installation of appropriate filters, installation of carbon dioxide sensors and additional maintenance, repairs, upgrades or replacement. Provides that the State Board shall require all school districts to make the appropriate corrective actions identified in the ventilation verification assessment. Sets forth requirements for corrective actions, standards, and verification of work.



Mr SL <asksterling@gmail.com>

School Air Quality Zoom Meeting

2 messages

Howard Ehrman <howardehrman@gmail.com> Tue, Apr 18, 2023 at 8:45 PM

To: Sterling Laylock Air Quality <sterling@igt2030.com>

Cc: Barbara Norman <normanb0167@sbcglobal.net>, Raoul Contreras <rcontrer@iun.edu>, Paul Siegel <pbsiege1714@sbcglobal.net>, Lonette Sims <bwopchicagochal@gmail.com>, Dulce Garduño <dulcegardunyo@gmail.com>, Erin Murphy <erin.catherine.murphy@gmail.com>, Bridgett White <bwhite.englewoodhero@gmail.com>, Wilma Pittman <wilmalpe@outlook.com>, Howard Ehrman <howardehrman@gmail.com>, Cheryl Watson <greenn.chatham@gmail.com>

Hello Sterling,

I saw Carl Tutt and you on an excellent live CTU/Raise your Hand Webinar on December 16, 2020 on CPS School Air Filtration/Air Quality and how to improve CPS air quality safety

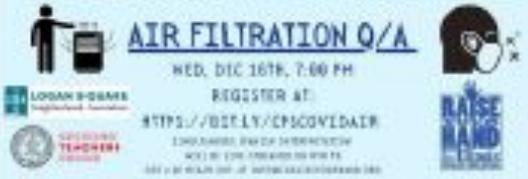
I hope you and your family and colleagues are doing well

Air Filtration Q/A | Join RYH, LBNA, and CTU in finding out more about the current CPS ventilation situation. | By IL Raise Your Hand | Facebook facebook.com



DIDNT THINK YOU WOULD NEED TO BE AN AIR FILTRATOR (SPRT 100 YEAR)

Hosted by Your Best Super Super Neighborhood Association and Chicago Parents Police for us



AIR FILTRATION Q/A
WED, DEC 16TH, 7:00 PM
REGISTER AT:
<https://bit.ly/cpsqvidair>

How does Sterling Laylock (Mechanical Engineer & Environmental Engineer) and Carl Tutt (CPS and the Facilities Operations & Maintenance) discuss the current CPS ventilation situation, and how to improve CPS air quality safety. Wednesday, December 16, 2020, 7:00 PM - 8:00 PM

Air Filtration Q & A, Dec 16, 2020 | Hosted by RYH, LBNA, and CTU youtube.com

It would be helpful to meet with both of you in the next week and any other concerned Indoor air quality experts about what I write below

If you could assist in this effort by emailing this message to Carl Tutt and any others you work with that would be helpful

On this email are the co-founders and activists of the People's Response Network (PRN) begun February, 2020, including several Chicago Public School Parents & grandparents including me

Dr. Barbara Norman and I were appointed by Mayor Harold Washington to be the Chicago Deputy and Assistant Health Commissioners respectively

As you know throughout the world, especially in the northern hemisphere western countries, hundreds of new groups have sprouted up calling for increased ventilation in their children's schools including some teacher unions and many parent led organizations including the Illinois Stakeholders for Air Quality in Schools ISAQS, whose school indoor air quality bill, Illinois House Bill 3713, has passed the Illinois House.

Illinois HB3713 | 2023-2024 | 103rd General Assembly legiscan.com



While this, like your work, has been overall positive, in the vast majority of cases these groups are led by mostly middle to upper middle class white parents, many of whom live in the suburbs, who are not thinking of the fact that the oldest schools, many of which have either no ventilation or poorly functioning HVAC systems, many without AC or non-functioning AC are concentrated in working class African American and Latino neighborhoods where there are high concentrations of outdoor air pollutants caused by both point and non-point sources: factories, freight train yards, expressways, busy truck routes, etc.

So while they correctly call for increased ventilation and measuring at least CO2 they do not always call for the type of filtration necessary to not concentrate the outdoor pollutants PM 2.5, PM10, NOx, SO2, Ozone, etc. inside the schools and measuring at least temperature and humidity/heat index in every room as well as climate change creates more frequent heat waves earlier in the spring, later in the fall with many older schools concentrated in BIPOC neighborhoods either without central AC or AC that does not function adequately to cool the schools.

And, as is the case in Illinois HB 3713, they prioritize measuring and controlling CO2 over PM 2.5, PM10, NOx, SO2, temperature and humidity.

When outdoor air pollution can easily be concentrated in school classrooms when ventilation is increased without adequate filtration

Instead they often call for portable air filtration of many types both HEPA and non-HEPA, both home made and commercial

Again while this is better than nothing it often is not sufficient and in many cases teachers turn off or turn down what the school systems have bought them due to noise or other factors, especially when you need more than 1 based on the size of the room

Then there are disaster decisions like NYC & Chicago spending \$millions on thousands of Intellipure "better than HEPA" with poor CADR, noisy air purifiers

Then there are the rapidly increasing climate change air quality, pollen/ragweed/allergen and heat index issues that are affecting more and more school systems earlier in the spring and later in the fall

At least 25 public schools in Chicago either had no AC or non-functioning AC in the earliest heat wave in history in the 2nd week of May, 2022 including the one our grandson was in where room temperatures reached more than 100 degrees based on some teachers bringing in their own thermometers including wet bulb thermometers

There were many more schools than the 25, but the school system did not report that publicly



A/C Meltdown: 25 Chicago Public Schools Went Without Air Conditioning Last Week Amid Heat Wave
blockclubchicago.org

Finally we became aware in October, 2022 of the Boston Public Schools Indoor Air Quality Monitoring Program which directly measures CO2, PM2.5, PM10, CO, temperature and humidity in real time in every single room, not just classroom and available in real time online all the time!

Boston Public Schools Indoor Air Quality
bostonpublicschools.org/iaq



It would be helpful if you and your colleagues have written about these dilemmas, especially in funding the oldest schools which are predominately in the poorest BIPOC neighborhoods or you know of others that have and/or any conferences you have had on these issues or are planning

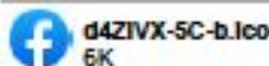
We look forward to meeting with you soon to develop an Ideal school indoor air quality movement and vastly improve legislation like HB 3713

My cell phone number is 312-835-3742

Thank you for considering my request

Sincerely,

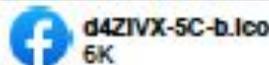
Howard Ehman, MD, MPH
Former Chicago Assistant Health Commissioner
Former University of Illinois Chicago (UIC) Assistant Professor of Family Medicine & Public Health
Co-Founder Little Village Environmental Justice Organization (LVEJO)
Co-Founder, Peoples Response Network (PRN)
Co-Founder, MI Villita Neighbors (MVN)



Sterling Laylock <sterling@lgt2030.com>
To: Carl Tutl <carl.tutl@100bmc.org>

Wed, Apr 19, 2023 at 10:59 AM

FYI!
(Quoted text hidden)





Capacity and Capital Building

TARGET 17-6



17 PARTNERSHIPS FOR THE GOALS
TECHNOLOGY

KNOWLEDGE SHARING AND COOPERATION FOR ACCESS TO SCIENCE, TECHNOLOGY AND INNOVATION

TARGET 11-3



11 SUSTAINABLE CITIES AND COMMUNITIES

INCLUSIVE AND SUSTAINABLE URBANIZATION



STUDENT SUSTAINABILITY COMMITTEE

UNIVERSITY TECHNICAL CAPACITY
Programs & events will gain hands-on planning & design

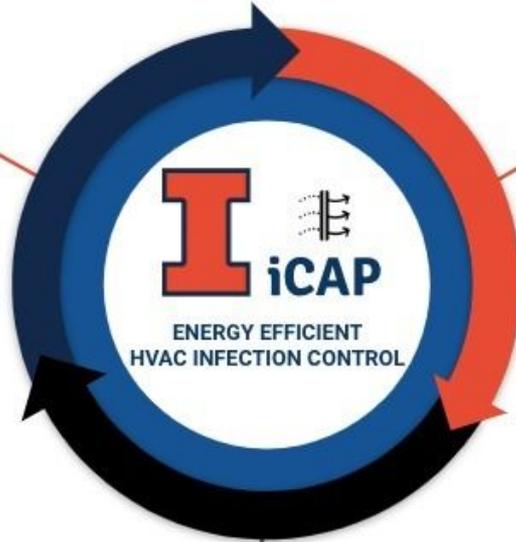
100 Build My Future 2030 Social Impact

Corporate ESG Partners

FINANCIAL CAPACITY + STRUCTURE
Administrative reporting, fiscal support & compliance assistance

100 Build My Future Fund Support

501c3 Nonprofit Partners



RELATIONAL SYMBOLIC CAPACITY
Productive relationships outreach & civic engagement

TARGET 4-3



4 QUALITY EDUCATION

EQUAL ACCESS TO AFFORDABLE TECHNICAL, VOCATIONAL AND HIGHER EDUCATION

TARGET 3-4



3 GOOD HEALTH AND WELL-BEING

REDUCE MORTALITY FROM NON-COMMUNICABLE DISEASES AND PROMOTE MENTAL HEALTH

Statewide Targeted Initiatives

WEI
WORKFORCE
EQUITY
INITIATIVE



MONITORING
INDOOR CLIMATE
VERIFICATION
& MEASUREMENT



STEM
PROFESSIONAL
+ VOCATIONAL
JOB SKILLS



AWARENESS
HEALTHY BUILDINGS
VERIFIED GHG
REDUCTION



Industry Sectors

TRANSPORTATION

BUILT ENVIRONMENT

SUSTAINABLE FINANCE

HEALTHCARE

GOVERNANCE

Policy Areas

MENTORING & EDUCATION

MENTAL HEALTH & WELLNESS

ECONOMIC EMPOWERMENT

VOTING + CIVIC ENGAGEMENT

Baseline of Current Programs and Initiatives

Direct mentoring improves students retention by building career skills while in college

Underserved youth aren't making intentional choices

Students can take full advantage of paid internships and lifestyles budgeted

Low graduation rates not always tied to academic performance

State provides college \$Millions in scholarships fast-sprint Votech can improve outcomes

Males forego college for short-term votech training

Engineering architecture and healthcare professions are underrepresented by Women and minority grads

Black males are only 3% of all medical doctors in the US

Expected Positive Outcomes: Year-1 of Our 8-Year Campaign

1.5x Increase in direct HS mentoring to impact grad rates & career awareness

Teach purpose driven choices to increase positive outcomes

Transform more restless students into purpose driven community leaders

Curtail violence thru paid industry sector training

Improve post high school & college expectations thru economic empowerment

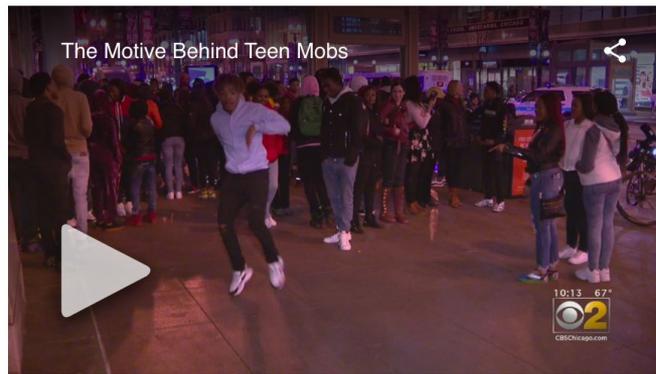
All of our students will match their skills with career passions

Offset state's 522 to 1 student to counselor ratio helps increase grad rates

Improves mental stress among youth and reduces violence

Expanding To Empower Teens Through Positive Action

Our Youth Are Exhibiting Unprecedented Anxiety Swirling Around Their Future



CHICAGO (CBS)—Hundreds of teenagers swarmed city streets for the second time in a week on Easter Sunday.

**YOUTH IMPROVING
THE BUILT ENVIRONMENT**

**YOUTH ELECTRIFYING EXISTING
TRANSPORTATION**



YVP
YOUTH
VIOLENCE
PREVENTION



WEI
WORKFORCE
EQUITY
INITIATIVE



STEM
PROFESSIONAL
+ VOCATIONAL
MENTORING



100 Build My Future: Budgeted Use of Funds

At the Community Level

Social Determinant of Health indicators are being similarly framed through multiple forms of **Capacity Building** to create quality of life and opportunities for equity that might otherwise be well beyond the reach of our 501c3 partners and our youth that need them most.

**Built Environment | Transportation
Sustainable Finance | Healthcare
Voting + Civic Engagement**

At the Organizational Level

Our Consortium will leverage **Capital Building** to serve as a financial and reporting tool to show the State of Illinois how it's support generates increasing returns and helps attract private capital by providing verifiable Environmental Social Governance (ESG) outcomes.

**100 Build My
Future 2030**
SOCIAL
DETERMINANTS
of HEALTH



Use of Funds

WEI
WORKFORCE
EQUITY
INITIATIVE



YVP
YOUTH
VIOLENCE
PREVENTION



VOTING
100 REASONS
BLACK MEN
BLACK YOUTH



STEM
STRATEGIC
RE-ENTRY
MENTORING



Capacity Building \$6,650,000
*Financial, Legal, Compliance, Events
Admin, Operations & Governance*

Fiscal Reporting \$250,000

Human Capital & Training \$2,850,000

Program Mgmt & Design \$1,350,000

IT Data Mapping & Analytics \$2,000,000

Accounting \$1,250,000

Voting + Community Outreach \$1,750,000

Research & Contractual Svcs \$2,250,000

Supplies \$1,150,000

Travel \$500,000

Contingency/Innovation \$1,500,000

Total \$21,500,000

Our 8-Year Campaign

Annual Spend Over 4-Years \$5,375,000

Government Stakeholders

IiCAP: HVAC Infection Control

The Grainger College of Engineering
Indoor Climate Research & Training



COOK COUNTY
GOVERNMENT



Michael W. Frerichs
ILLINOIS STATE TREASURER



ILLINOIS.gov
Department of Human Services
Violence Prevention Division

Nonprofit Stakeholders



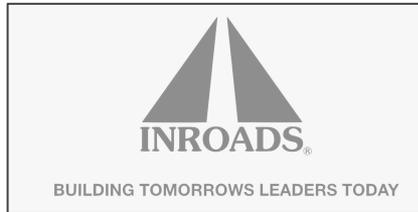
HONORING THE LEGACY

ADA S. MCKINLEY
COMMUNITY SERVICES, INC

100 Build My Future
Social Determinants of Health



COLLEGIATE
100



Pending Final Negotiations

Business Stakeholders



ESG

Assets To Exceed \$50T By 2050



CALLISON|RTKL
A DESIGN CONSULTANCY OF ARCADIS



Energy
Efficiency
Program

1 AN ACT concerning education.

2 **Be it enacted by the People of the State of Illinois,**
3 **represented in the General Assembly:**

4 Section 5. The School Code is amended by adding Section
5 2-3.196 as follows:

6 (105 ILCS 5/2-3.196 new)

7 Sec. 2-3.196. School ventilation.

8 (a) As used in this Section:

9 "Active classroom" means any room currently being used for
10 any duration of in-person instruction of 4 or more students at
11 a time.

12 "ASHRAE" means the American Society of Heating,
13 Refrigerating and Air-Conditioning Engineers.

14 "Certified assessor" means:

15 (1) a certified technician; or

16 (2) a person who is certified to perform ventilation
17 verification assessments of heating, ventilation, and air
18 conditioning systems through a certification body
19 accredited by the American National Standards Institute.

20 "CADR" means clean air delivery rate.

21 "Certified technician" means a person who is certified as
22 a Testing, Adjusting, and Balancing Bureau Technician by the
23 International Certification Board and accredited to comply

1 with ISO/IEC 17024, which is the conformity assessment
2 regarding general requirements for bodies operating
3 certification of persons, by the American National Standards
4 Institute in Testing Adjusting and Balancing or another
5 nationally recognized certifying body accredited to ISO/IEC
6 17024 in testing adjusting and balancing.

7 "CFM" means cubic feet per minute.

8 "dBa" means decibels.

9 "HEPA" means High Efficiency Particulate Air.

10 "HVAC" means Heating, Ventilation, and Air Conditioning.

11 "Mechanical engineer" means a professional engineer
12 licensed as a mechanical engineer by the Department of
13 Financial and Professional Regulation who has professional
14 experience with heating, ventilation, and air conditioning
15 systems.

16 "PM2.5" means particulate matter at 2.5 microns or less.

17 "PM10" means particulate matter at 10 microns or less.

18 "PPM" means parts per million.

19 "UV" means ultraviolet.

20 "Skilled and trained construction workforce" means a
21 workforce in which at least 40% of the workers are graduates of
22 or registered in and attending an apprenticeship program
23 registered with the workforce solutions department or an
24 apprenticeship program to which the department has granted
25 reciprocal approval for the applicable construction
26 occupation.

1 (b) The State Board shall require all school districts to
2 supply all active classroom instructors, all school staff and
3 administration, and district leadership with an educational
4 document, in a PDF and a physical format, explaining at a
5 minimum the values of good indoor air quality, including
6 peer-reviewed research demonstrating effects of poor and good
7 indoor air quality, an explanation of airborne transmission of
8 pathogens and other airborne substances, a basic explanation
9 of air changes per hour and relation to outdoor air and
10 filtered air, best practice recommendations for the portable
11 air cleaner and the air quality monitor, including guidance on
12 theory, function, placement, and operation of the monitor. The
13 document shall be developed with the assistance of a major
14 independent and nonpartisan approved organization recognized
15 as a subject matter expert in the field of air quality, such as
16 a local ASHRAE chapter. This document shall be created and
17 supplied to schools within 3 months of the effective date of
18 this amendatory Act of the 103rd General Assembly.

19 (c) Subject to appropriation, the State Board shall
20 require all school districts to ensure that all active
21 classrooms that are not mechanically ventilated have at least
22 2 properly functioning windows, or one window in situations
23 where only one is present, that can open and can safely stay
24 open. School districts must be in compliance with this Section
25 within 6 months of the effective date of this amendatory Act of
26 the 103rd General Assembly.

1 (d) Subject to appropriation, the State Board shall
2 require all school districts to ensure that all active
3 classrooms are equipped with an air quality monitor that:

4 (1) is installed and operating within one month
5 following delivery;

6 (2) remains in the active classroom until classroom is
7 no longer an active classroom;

8 (3) is an air quality monitor that has been determined
9 by the State Board to be suitable, by the State Board
10 seeking out and obtaining a written statement noting that
11 the capabilities of the monitor in question are sufficient
12 to serve the purposes described in this Section, from a
13 major independent and nonpartisan organization recognized
14 as a subject matter expert in the field of air quality,
15 such as a local ASHRAE chapter. The written statement
16 shall minimally address suitability of: the selected
17 monitor's measurement technology, calibration
18 specifications, and manufacturer stated accuracies and
19 ranges;

20 (4) measures, at a minimum, carbon dioxide and PM2.5.
21 Selected monitors are recommended to also measure carbon
22 monoxide, PM10, volatile organic compounds, temperature,
23 and humidity;

24 (5) displays, at a minimum, carbon dioxide readings
25 through a display on the device or other means, such as on
26 a computer or cellular phone application;

1 (6) is corded and does not rely solely on batteries
2 for power;

3 (7) is to be located between 3 and 6 feet above the
4 floor and at least 5 feet away from doors, operable
5 windows, or human occupants;

6 (8) connects via a wired or wireless connection to
7 other applicable monitors so as to permit recording of
8 data which includes at least the maximum carbon dioxide
9 concentrations for a period of at least one year, as well
10 as remote access to current air quality readings through a
11 computer or cellular phone application; and

12 (9) provides notification through a visual indicator
13 on the monitor, or other alert such as electronic mail,
14 text message or cellular phone application, when the
15 carbon dioxide levels in the classroom have exceeded a PPM
16 level recommended to the State Board in writing by a major
17 independent and nonpartisan organization recognized as a
18 subject matter expert in the field of air quality, such as
19 a local ASHRAE chapter.

20 Each school shall record all incidents where the
21 recommended PPM level was breached in a classroom and maintain
22 those records for at least 5 years.

23 Any supplied air quality monitor under this subsection may
24 not be shared between active classrooms.

25 If devices matching the criteria described in this
26 subsection are unavailable, the State Board shall contact a

1 major independent and nonpartisan organization recognized as a
2 subject matter expert in the field of air quality, such as a
3 local ASHRAE chapter, and request assistance in determining
4 suitable selection criteria for an air quality monitor that
5 will sufficiently accomplish the goals of: providing teachers
6 and staff with air quality information to facilitate managing
7 indoor air quality; storing a sufficient type and duration of
8 data to facilitate ventilation assessments; provide remote
9 access to current air quality readings; and generally align
10 with contemporary best practice recommendations.

11 (e) Subject to appropriation, the State Board shall
12 require all school districts to ensure that all active
13 classrooms are equipped with a portable air cleaner that:

14 (1) is installed and operating within one month
15 following delivery;

16 (2) remains in the active classroom until classroom is
17 no longer an active classroom;

18 (3) is a portable air cleaner the State Board has
19 determined to be suitable, by seeking out and obtaining a
20 written statement noting that the capabilities of the
21 portable air cleaner in question are sufficient to serve
22 the purposes described in this Section, from a major
23 independent and nonpartisan organization recognized as a
24 subject matter expert in the field of air quality, such as
25 a local ASHRAE chapter;

26 (4) utilizes a HEPA filter that captures 99.97% of 0.3

1 micron particles. A filter stated to be equal to or
2 superior to a HEPA may not be used;

3 (5) utilizes or has the option of utilizing a
4 secondary filter for gaseous pollutants, such as activated
5 carbon;

6 (6) only utilizes HEPA filtration, as opposed to
7 additional technologies such as ionization, chemical
8 processes, and UV. If such additional technologies are
9 present in the selected portable air cleaner they must be
10 able to be disabled;

11 (7) Produces 500 or more CFM as measured by CADR or
12 similar metric of filtered airflow;

13 (8) Produces 500 or more CFM of filtered airflow at
14 under 45 dBa of noise, according to manufacturer supplied
15 dBa test results measured at one meter in front of the
16 portable air cleaner;

17 (9) is Underwriters Laboratories certified or
18 certified to Underwriters Laboratories standards;

19 (10) has a manufacturer's warranty of at least one
20 year;

21 (11) shall be continuously operated during room
22 occupancy on at least low speed;

23 (12) shall be maintained according to manufacturer's
24 recommendation, written approval shall be obtained from
25 the manufacturer if deviation from standard
26 recommendations is being considered; and

1 (13) shall be replaced within one month if it becomes
2 inoperable.

3 If a single portable air cleaner on the market does not
4 meet the parameters of this subsection, then 2 or more
5 portable air cleaners per active classroom may be substituted
6 if they produce a combined 500 or more CFM, as measured by CADR
7 or similar metric, of filtered airflow at under 45 combined
8 dBa of noise according to manufacturer supplied dBa test
9 results measured at one meter in front of the portable air
10 cleaner.

11 Any supplied portable air cleaner may not be shared
12 between active classrooms.

13 (f) Subject to appropriation, the State Board shall
14 require all school districts to supply each school with 5
15 additional portable air cleaners and 5 additional air quality
16 monitors that meet the requirements of subsections (d) and (e)
17 to be used in school health offices, libraries, cafeterias,
18 and other similar spaces.

19 (g) Subject to appropriation, the State Board shall
20 require all school districts to undertake a ventilation
21 verification assessment of all mechanical ventilation systems
22 in the school district performed by a certified assessor or a
23 mechanical engineer and shall be based on physical
24 measurements made during the assessment. If an assessment is
25 performed by a certified assessor, the assessment report shall
26 be reviewed by a mechanical engineer. The ventilation

1 verification assessment shall verify whether the existing
2 mechanical ventilation system is operating in accordance with
3 design parameters and meets the requirements of any applicable
4 building codes. The ventilation verification assessment for a
5 heating, ventilation, and air conditioning system shall
6 include:

7 (1) testing for maximum filter efficiency;

8 (2) measurements of outside air rate;

9 (3) verification of operation of ventilation
10 components;

11 (4) measurement of all air distribution inlets and
12 outlets;

13 (5) verification of unit operation and that required
14 maintenance has been performed;

15 (6) verification of control sequences;

16 (7) verification or installation of carbon dioxide
17 sensors; and

18 (8) collection of field data for the installation of
19 mechanical ventilation if none exists.

20 (h) The verification assessment report from the mechanical
21 engineer shall include appropriate corrective actions needed
22 for the mechanical ventilation system or the heating,
23 ventilation, and air conditioning infrastructure, including
24 installation of appropriate filters, installation of carbon
25 dioxide sensors and additional maintenance, repairs, upgrades
26 or replacement.

1 (i) The school district shall have a ventilation
2 verification assessment performed on all mechanical
3 ventilation systems in the school district at least every 5
4 years. The ventilation verification assessment and the
5 ventilation verification reports are public documents and
6 shall be available to the public upon request.

7 (j) Each school's first ventilation verification
8 assessment shall occur between one and 6 months after the
9 school's air quality monitors have been installed and data has
10 started recording, and all measurements for this assessment,
11 and all following, shall be made in the same conditions in
12 which the building typically operates. The assessment plan
13 shall be developed with the assistance and approval of a major
14 independent and nonpartisan major organization recognized as a
15 subject matter expert in the field of air quality, such as a
16 local ASHRAE chapter, to ensure that the assessment results
17 are representative of indoor air quality conditions
18 experienced during normal occupancy.