Indoor Air Quality & Thermal Comfort Pilot

OUSD Measures B, J, and Y Independent Citizens' School Facilities Bond Oversight Committee

February 12, 2024

OAKLAND UNIFIED SCHOOL DISTRICT

Community Schools, Thriving Students

AGENDA

1. Purpose
2. Introduction
3. Importance of monitoring and data collection
4. Site selection criteria
5. What has been done to date
6. Comparison of mitigation method
7. Next Steps

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PURPOSE

The purpose of this presentation is to present findings from the Indoor Air Quality (IAQ) Pilot that was intended:

1. To identify and analyze deficiencies regarding thermal comfort and indoor air quality;
2. Suggest improvements; and
3. Analyze proposed retrofits for cost-benefit ratio.

INTRODUCTION

- In the context of public school classrooms, where students and teachers spend a significant portion of their day, IAQ and thermal comfort are critical factors.
- The air we breathe within these learning environments can directly affect student performance, concentration, and the health of both students and staff.

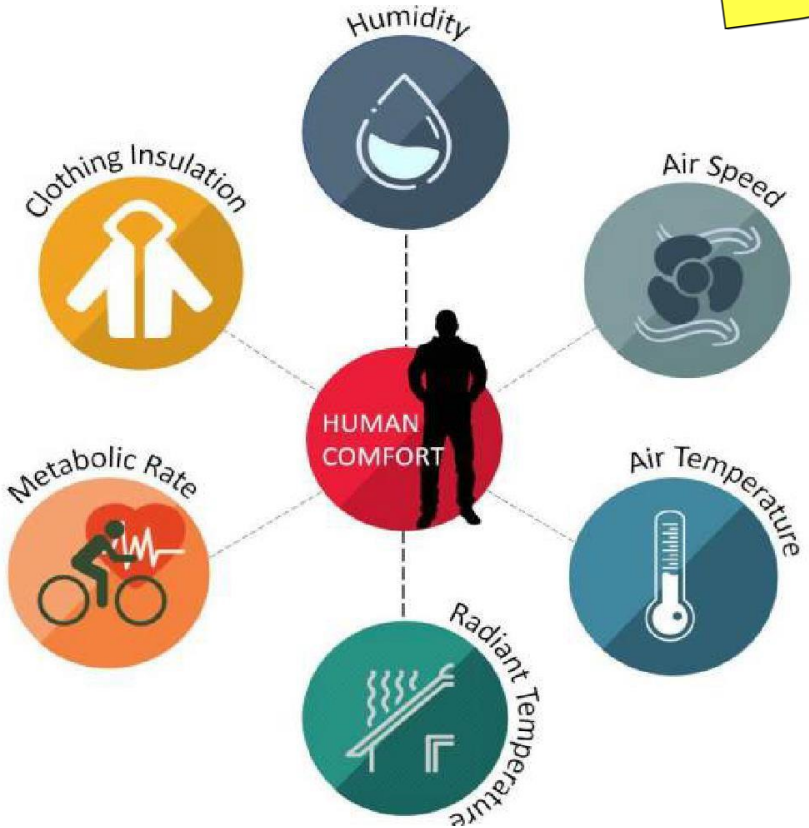

Figure:1 Variables which affect thermal comfort

IMPORTANCE OF MONITORING/DATA COLLECTION

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Monitoring

1. Supports student health and well-being
2. Supports teacher and staff productivity
3. Supports academic performance
4. Supports allergen and asthma management
5. Implementation of contaminant controls
6. Ensures compliance with safe schools regulations
7. Creates parent and community trust

Data Collection

1. Allows facilities to baseline assessments of school sites
2. Allows early detection of IAQ issues
3. Provides risk mitigation
4. Provides insight to what areas are affected and how we can improve IAQ/comfort in those spaces
5. Creates adaptive management – high dust level detection = implementation of dust control measures
6. Creates communication and transparency

SITE SELECTION CRITERIA

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Age of campus/buildings

Climate zones as shown in the diagrams which allow us to compare other climates around the District in the future

Volume of work orders received by OUSD Buildings and Grounds that are related to IAQ and comfortability of spaces

SITE SELECTION

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1. **West Oakland Middle School**
   a. **Grades:** 6th - 8th
   b. **Enrollment:** School Year (SY) 2023-24 = 160
   c. **Age of building:** 28 - 97 years

2. **Manzanita SEED; Manzanita Community School**
   a. **Grades:** TK - 5th
   b. **Enrollment:** SY 2023-24 = 413; 338
   c. **Age of building:** 47 - 58 years

3. **Laurel Elementary School**
   a. **Grades:** TK - 5th
   b. **Enrollment:** SY 2023-24 = 412
   c. **Age of building:** 48 - 65 years

Notes:
1) Enrollment based on the numbers reported to the California Department of Education and is yet to be certified, October 2023.
2) Age of buildings vary due to varying construction projects on the same site, over a period of time.

WHAT'S BEEN DONE TO DATE

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Existing Conditions Assessment

1. Selected spaces at each campus that were representative of typical classrooms or multipurpose and/or non-instructional rooms;
2. Conducted site visits at each campus to document the state of existing mechanical and architectural systems. These conditions included items that affect the efficiency of the building, such as single-pane glazing, heat gain from adjacent surfaces, and unshaded south-facing glazing.

Energy Modeling

1. Conducted an analysis of the IAQ & Thermal comfort.

Mitigation Methods & Cost Benefits

1. Identified four mitigation strategies & estimated costs associated with implementation for each entire school facility/campus.

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COMPUTER MODELING MITIGATION METHOD

01 Basic Mitigation

- Remove and replace the existing windows and frames with dual-glazed, low-E window systems that will maximize operable vents

02 Passive Mitigation

- Basic mitigation plus actuators tied to an Energy Management System
- Ceiling fans
- Natural night flush
- Security screens at operable windows
- R-30 roof insulation

03 Air Conditioning Retrofit

- Modify existing mechanical systems to include air conditioning

04 Air Conditioning Retrofit PLUS

- Basic Mitigation plus Air Conditioning Retrofit

COMPARISON OF MITIGATION METHOD

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	Laurel Elementary School				Manzanita Elementary School				West Oakland Middle School			
	Implementation Cost	Normalized Initial Cost[1]	Lifecycle Cost	% Increased Comfort Hours (ICH)	Implementation Cost	Normalized Initial Cost[1]	Lifecycle Cost	% Increased Comfort Hours (ICH)	Implementation Cost	Normalized Initial Cost[1]	Lifecycle Cost	% Increased Comfort Hours (ICH)
Basic Mitigation	$883,388	$149,174	$414,670	47%	$1,758,813	$151,531	$242,531	59%	$2,963,031	$349,203	$481,606	55%
Passive Mitigation	$1,724,910	$543,966	$803,865	90%	$3,519,724	$303,243	$393,052	91%	$4,427,024	$999,654	$1,109,487	91%
Air Conditioning Retrofit	$4,844,206	$1,527,664	$1,985,908	91%	$5,628,678	$484,941	$622,637	99%	$8,702,931	$1,965,185	$2,099,633	68%
Air Conditioning Retrofit PLUS	$5,727,594	$1,639,151	$2,096,121	100%	$7,387,492	$636,473	$765,432	100%	$12,615,308	$2,279,310	$2,411,247	97%

Notes:
1) Normalized Initial Cost = cost per square feet of area studied.
2) Implementation cost indicates the estimated total cost for the entire school facility/campus.
3) Costs above does not include building envelope and additional work that may be required per DSA and other California state codes.

SUMMARY & NEXT STEPS

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1. Installation of IAQ sensors at the three sites.
2. Determine potential implementation for future projects along with funding sources.
3. Review implementation and how that aligns with other district wide initiatives.

Laurel Elementary School Exterior

Manzanita Community School Exterior

West Oakland Middle School Courtyard

THANK YOU

Any Questions?

Additionally, for more information, please reach out:

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