

Supporting Student and Faculty Wellness in Existing Facilities

May 4, 2023

9:10am - 10:10am

Illinois ASBO 2023 Annual Conference

Peoria, Illinois

Learn how school districts can significantly impact health and wellness — from modest HVAC system upgrades to strategic student support space initiatives.

Discover how simple operational Interventions and design philosophies can be incorporated into existing procedures and projects in order to improve the bottom line, promote social-emotional learning and provide foundational building blocks for students.



Sustainability and
Environmental Health

Introductions

Angela Smith, Moderator

- *Asst. Supt of Operations, West Aurora School District 129*



Lyndl Schuster, Speaker

- *Asst. Supt for Business Services, River Trails School District 26*



Ron Richardson, Speaker

- *Vice President, FGM Architects*



Stuart, Brodsky, AIA: Speaker

- *Principal, PK-12 Education, Wight & Company*



Brian Scully, AIA, Speaker

- *Associate Principal, DLA Architects, Ltd.*



Dean Romano, CSBO, Speaker

- *Asst. Supt for Business & Operations, Lake Zurich Community Unit School District 95*



Agenda:

- 9:10- 9:15- Introductions
- 9:15- 9:25- River Trails SD 26 Case Study
 - Planning, then getting board support for HVAC systems that support student and faculty wellness
- 9:25- 9:35- North Shore 112 Case Study
 - Sustainable Food Service Environments
- 9:35-9:45- Lake Zurich CUSD 95 Case Study
 - Design considerations that benefit student mental health
- 9:45- 10:10- Panel Questions

River Trails School District 26 Case Study

HVAC systems that support student and faculty wellness

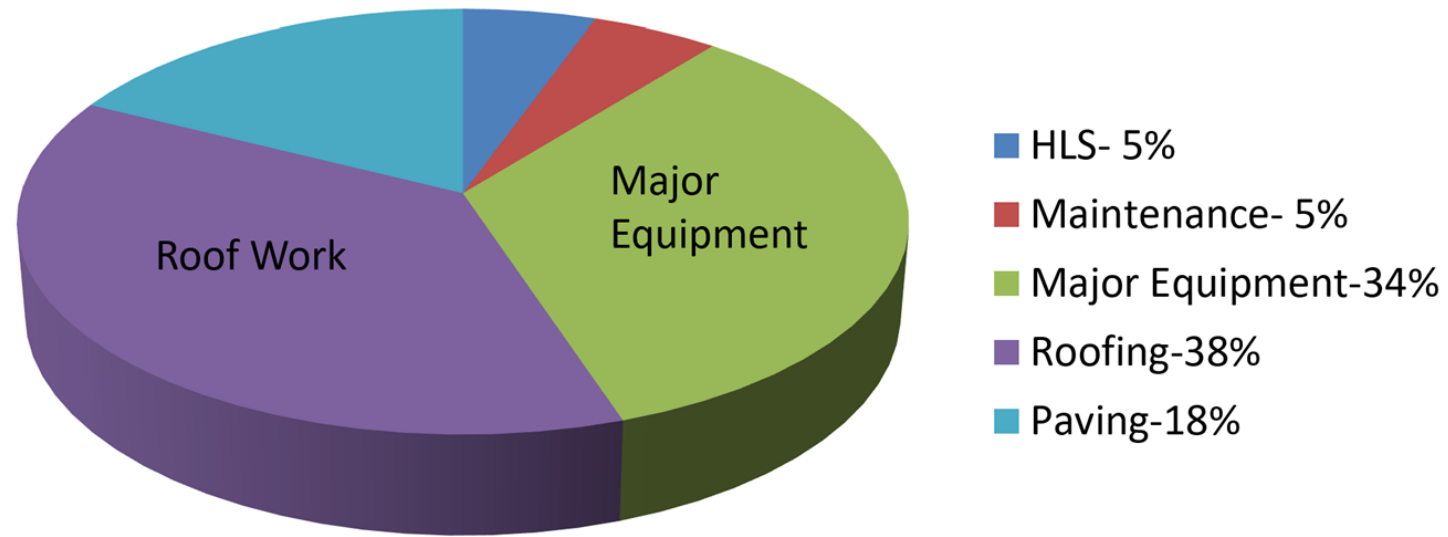


Process- Planning

2017-2026 Cost Breakdown

Euclid - Hard cost only

2017-2026: \$4,822,155.75



2017 Presentation

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Process- Model/evaluate

Euclid Elementary School

System/Plant	EUI		CO2	
	(kBtu/sqft/yr)	% Savings	(metric tons)	% Savings
Baseline UV/Boiler/Chiller	51	-	328	-
VRF Air Cooled with DOAS	37	28%	312	5%
FCU with DOAS/Boiler/Chiller	45	11%	292	11%
Hybrid Geo/VRF	32	37%	274	16%

First Cost from 11.16.21
\$2,350,000
\$3,020,000
\$2,960,000
\$3,630,000

Indian Grove Elementary School

System/Plant	EUI		CO2	
	(kBtu/sqft/yr)	% Savings	(metric tons)	% Savings
Baseline UV/Boiler/Chiller	72	-	388	-
VRF Air Cooled with DOAS	42	42%	340	12%
FCU with DOAS/Boiler/Chiller	65	10%	346	11%
Hybrid Geo/VRF	35	51%	292	25%

First Cost from 11.16.21
\$2,250,000
\$2,890,000
\$2,840,000
\$3,480,000

2022 System Model by IMEG

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Process- Value discussion

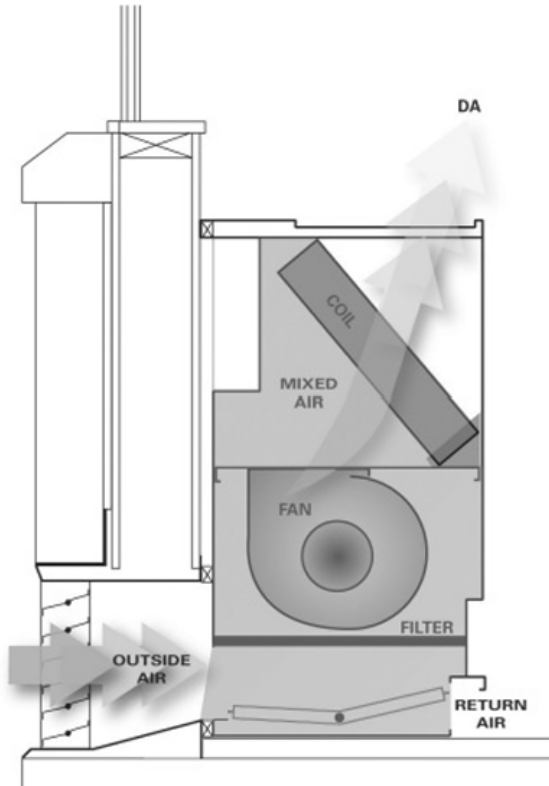


Figure 8: Unit ventilator economizer

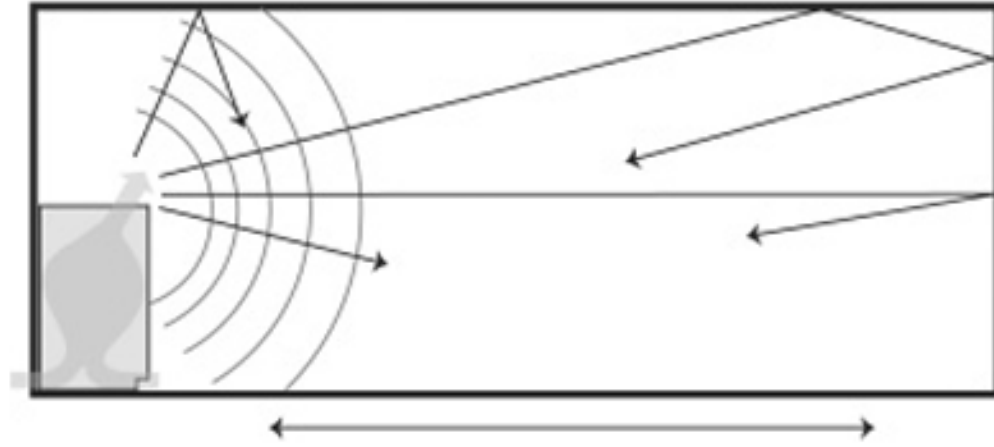


Figure 10: Equipment placement

Existing- **poor distribution, acoustics**

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From May 2006 TRANE Classroom Unit Ventilator information

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Process- Value discussion

New DOAS coupled with VRF System. Benefits:

- Installing a new DOAS/VRF system will give the classroom additional floor area
- Better Air distribution
 - Unit ventilators pull in outside air through the wall, conditions the air then pushes it across the room. Poor air distribution.
 - The proposed VRF system will evenly distribute air around the room through new ductwork.
- Better acoustics
 - Unit ventilators must increase velocity to push the air across the room. This creates excessive noise.
- Increase air changes
- MERV filtration
- Energy Efficiency

An acoustical study, performed by Soundscape Engineering, found that the unit ventilator HVAC system at Euclid is approximately **4 times louder** than the new DOAS system at Prairie Trails

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Process- Value discussion

Air Source
Condensing Unit

Dedicated Outside Air
System (DOAS)



New

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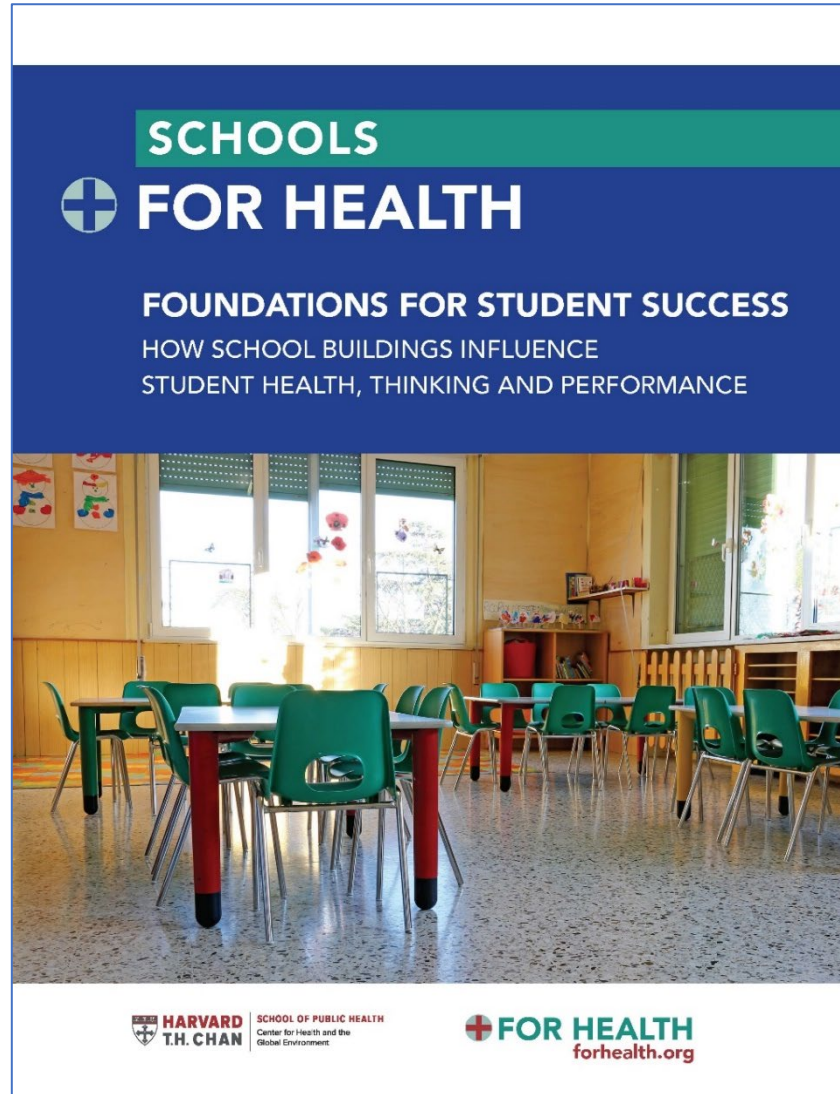
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Process- Value discussion

Harvard T.H. Chan
School of Public
Health



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Process- Value discussion

In the decade after the release of the landmark National Research Council report *Green Schools: Attributes for Health and Learning* (National Research Council, 2007), the global research community has gathered extensive information and evidence to demonstrate that the school building is foundational to student success — enough evidence to know that we can not afford to neglect the conditions of our schools. In recent years, numerous studies have emerged that show that the school environment can adversely or positively affect students' well-being in multifaceted ways, both in the short term and over the course of their academic career. This report, *Schools for Health: Foundations for Student Success*, reviews findings from more than 200 scientific studies and identifies more than 70 Health Performance Indicators.

These findings provide robust public health evidence that environmental exposures in school buildings can impact student health, student thinking and student performance. Studies show that environmental factors within and around the school building can interact with each other in complex ways. Thus, the school building itself, where students spend a significant portion of their childhood, represents a prime opportunity to intervene and protect the health of children, our most vulnerable citizens.



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Process- Value discussion

Despite growing recognition of the importance of environmental health in schools, the national investment in public school facilities in the United States continues to fall short by \$46 billion a year. Consequently, many schools are left underfunded and unable to make much-needed upgrades to deteriorating buildings. Millions of K–12 students in America spend several hours a day learning in schools that are more than 50 years old and in need of extensive repair and where children may be exposed to mold, poor ventilation, uncomfortable temperatures, inadequate lighting, and overcrowded, excessively noisy conditions. These adverse circumstances can disadvantage students who already struggle on a daily basis.

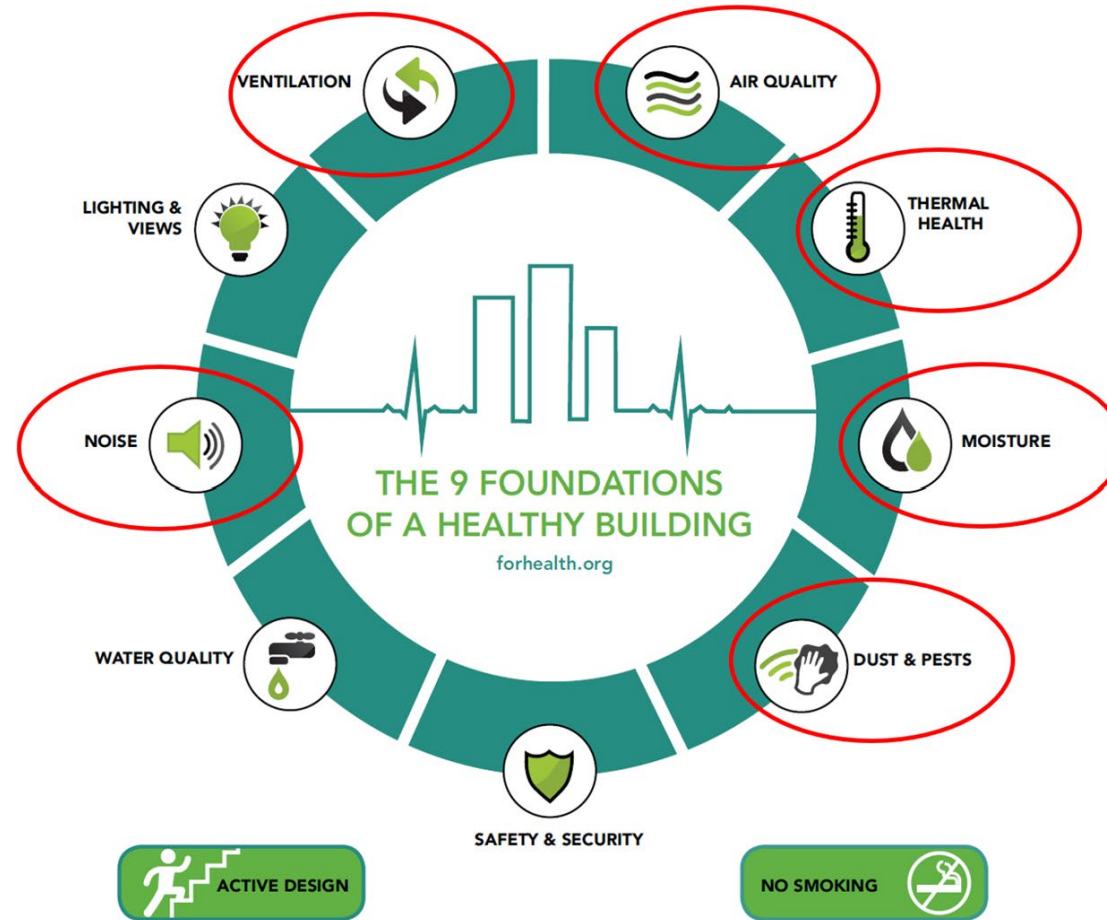
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Process- Value discussion



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THE 9 FOUNDATIONS OF A HEALTHY BUILDING

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Board Support - HVAC Systems that Improve Student/Faculty Wellness

- Strategic Plan
- Equipment Ages
- Ventilation & MERV Filtration
 - Improve Student Performance
 - Mitigate Virus spread
- Acoustics
- Temperature and humidity control
- Increased classroom floor space
- Long term cost
 - Upfront investment
 - Offset with energy and maintenance savings
- How do we finance?
 - 5 year projection

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Board Support - Strategic Plan

COMMUNITY

*Prioritize social, emotional and **physical well-being** of the school community by providing a nurturing environment and equipping all with the skills, knowledge and understanding to thrive in a complex world.*

PATHWAYS

- *Empower students to be **stewards to their environment** and community.*
- *Maintain an intentional and regular focus on **wellness and wellness strategies**.*
- *Sustain a safe, healthy learning environment.*

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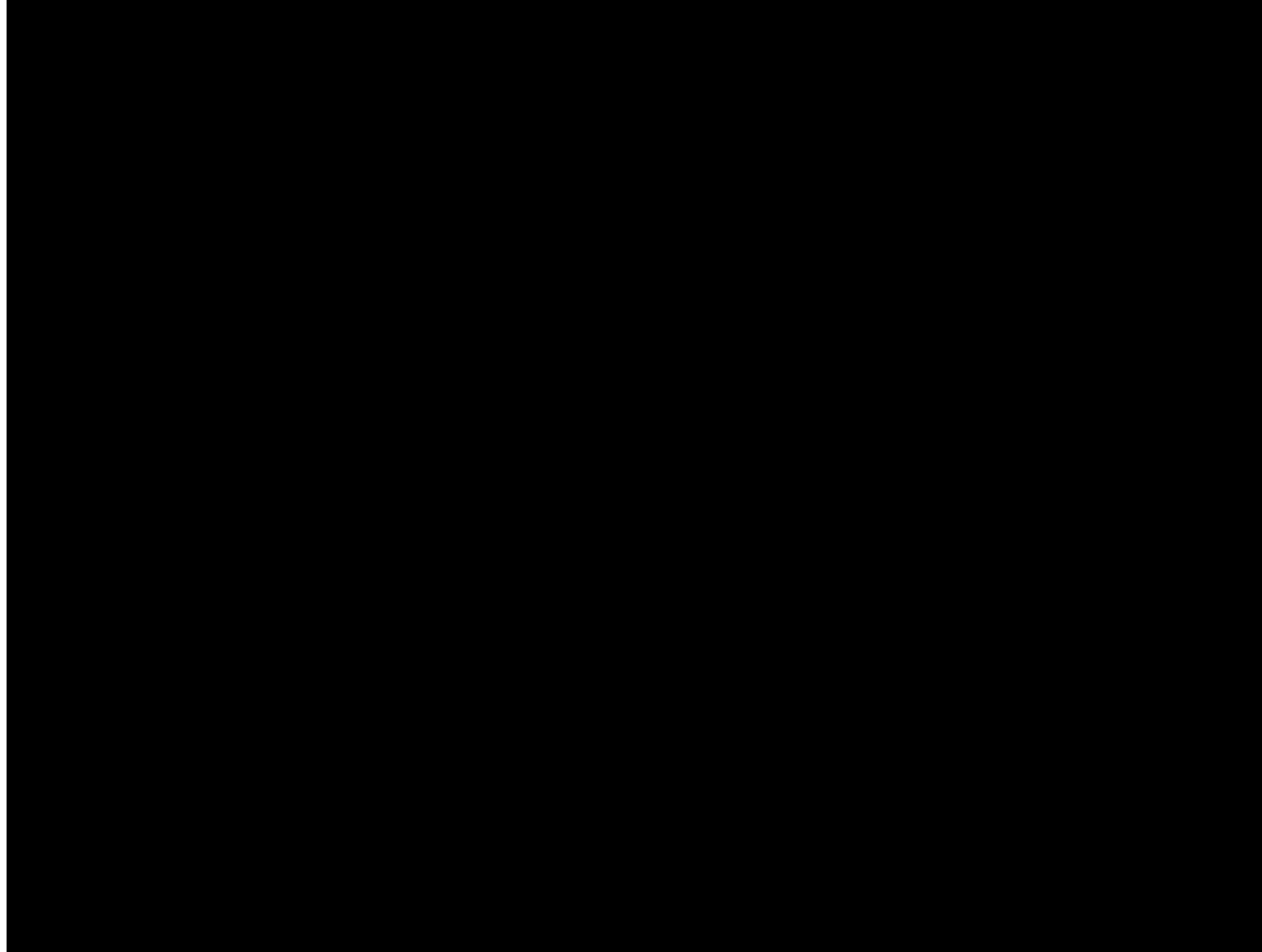
Board Support - Equipment Ages

	Expected Lifespan	Euclid	IG	RTMS
Life Safety		Dead end corridors		Electrical Panel Replacement
		Interior door replacements	Interior door replacements	Interior door replacements
		Fire Separation		
Mechanical				
Univents	15 Years	25 years old*	25 years old*	25 years old*
Boilers	30-40 years	41 years old	41 years old	41 years old
Chillers	15-20 years	25 years old	25 years old	25 years old
Air Handlers	20-25 years	Gyms 35 years old	Gyms 35 years old	
Stand Alone RTU Roof top AC units	15-20 years	Teachers Lounge Kitchen/Nurse > 20 years old		Teachers Lounge > 20 years old, LRC - 25 years old
Pumps	25 years	25 years old	25 years old	25 years old
Infrastructure Piping for boilers and univents		43 to 59 years (original)	43 to 59 years (original)	43 to 59 years (original)
Roofs	20 years	20 years old	15-20 years old	20 years old
Floor Tile	20 to 30 years	18 years old	18 years old	18 years old
Windows	20 to 30 years	25 years old	25 years old	25 years old
Paving/Sidewalks	15 to 20 years		Bus lane	Far back parking lot
Security Cameras	10 years	17 years old	17 years old	17 years old
Intercom/Phone System	10 years	Replaced in 2021	Replaced in 2021	Replaced in 2021
Servers/Network	5 years			4 years old
Wireless Access	8 years	Replaced in 2019	Replaced 2018	Replaced in 2019
Electrical infrastructure/technology wiring upgrades/replacements		As needed	As needed	As needed
* maintenance has extended life by additional 5 years				



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Board Support - Physical Environment



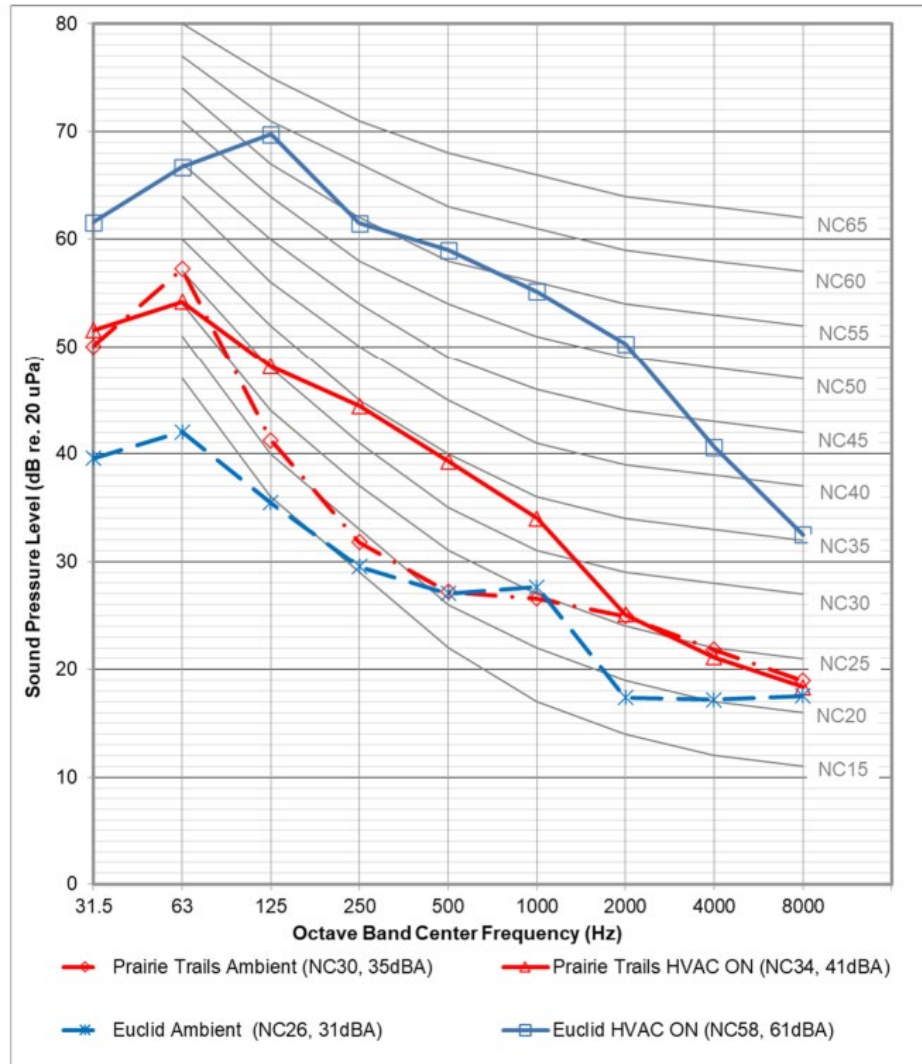
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Board Support - Acoustics



Prairie Trails Elementary – HVAC OFF
Prairie Trails Elementary – HVAC ON

35 dB(A) L_{eq}
41 dB(A) L_{eq}

Euclid Elementary – HVAC OFF
Euclid Elementary – HVAC ON

31 dB(A) L_{eq}
61 dB(A) L_{eq}

Figure 2: Measured Sound Levels



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Board Support - Life Cycle Cost

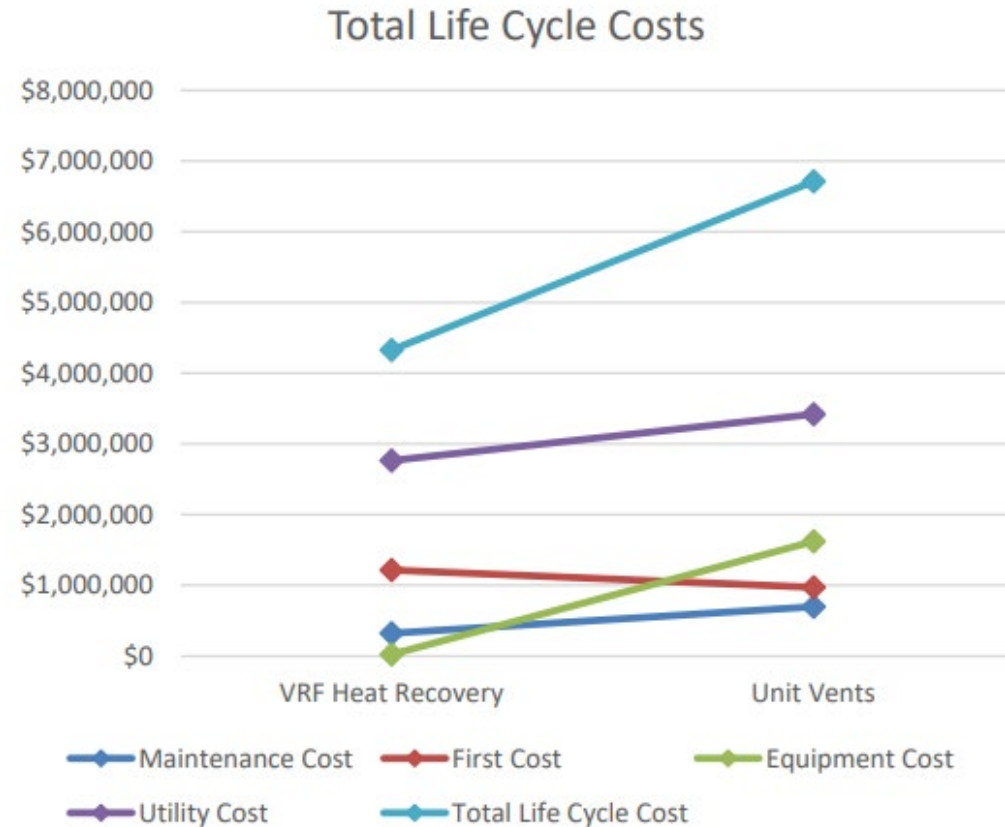
VRF Heat Recovery Savings vs Unit Vent Up to \$2.4 million

20% increase in First Cost

98% decrease in Equipment Cost

54% decrease in Maintenance Costs

19% decrease in Utility Costs



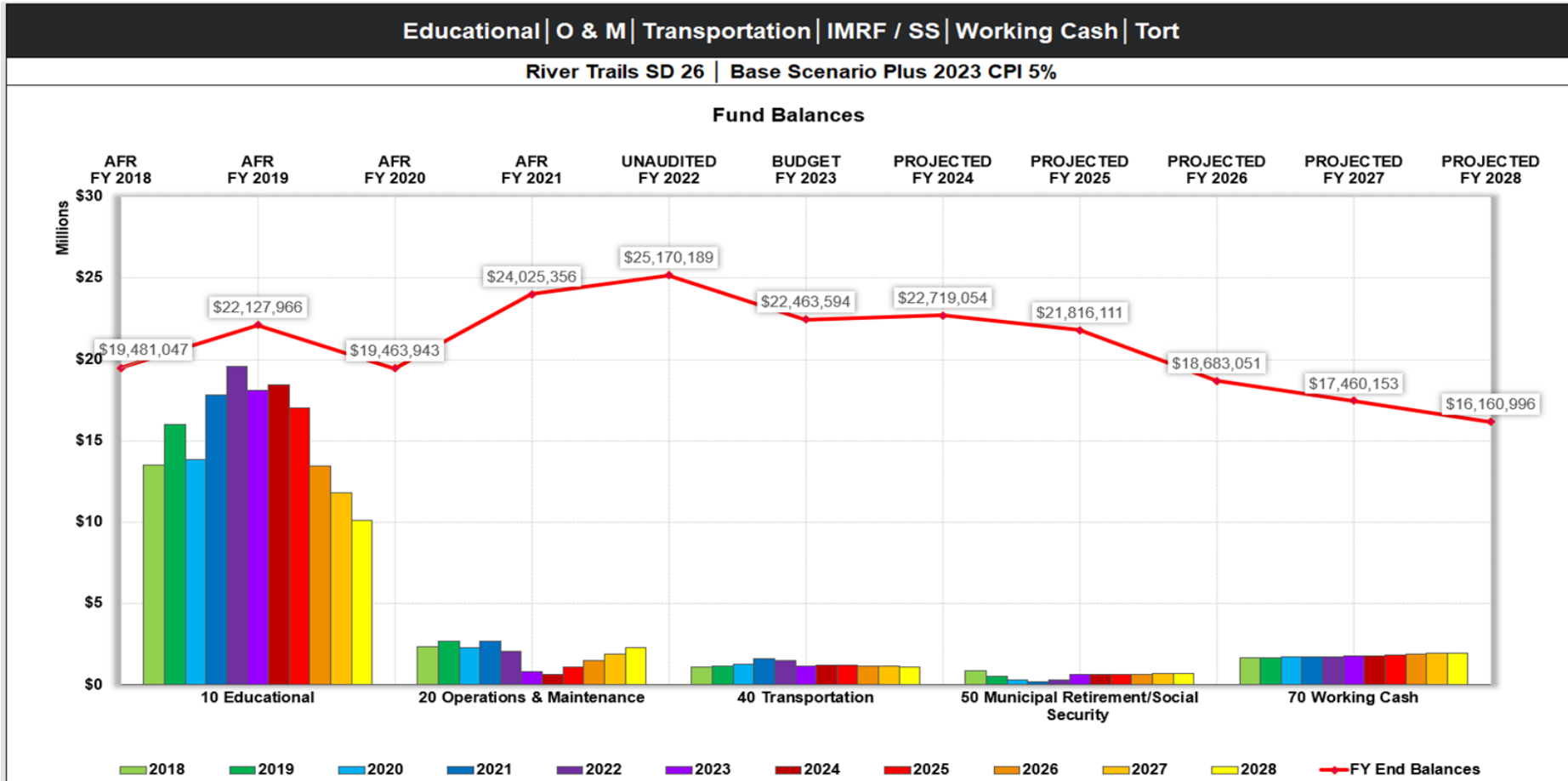
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Board Support - Funding

- Fund Balances
- Alternate Bonds



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Sustainable Food Service Environments

Supporting Student and Faculty Wellness in
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May 2023 - Peoria

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Introductions

Stuart, Brodsky, AIA: Speaker
- Principal, PK-12 Education, Wight & Company



Michael Lubelfeld, Ed.D.: Contributor
- Superintendent of Schools, North Shore School District 112



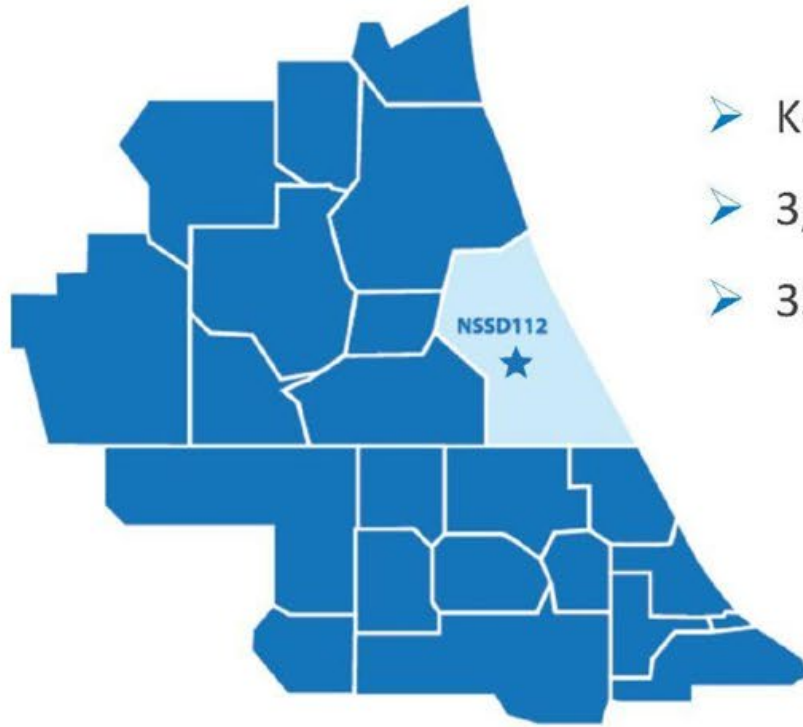
Jeremy Davis: Contributor
- Assistant Superintendent for Finance & Operations, North Shore School District 112



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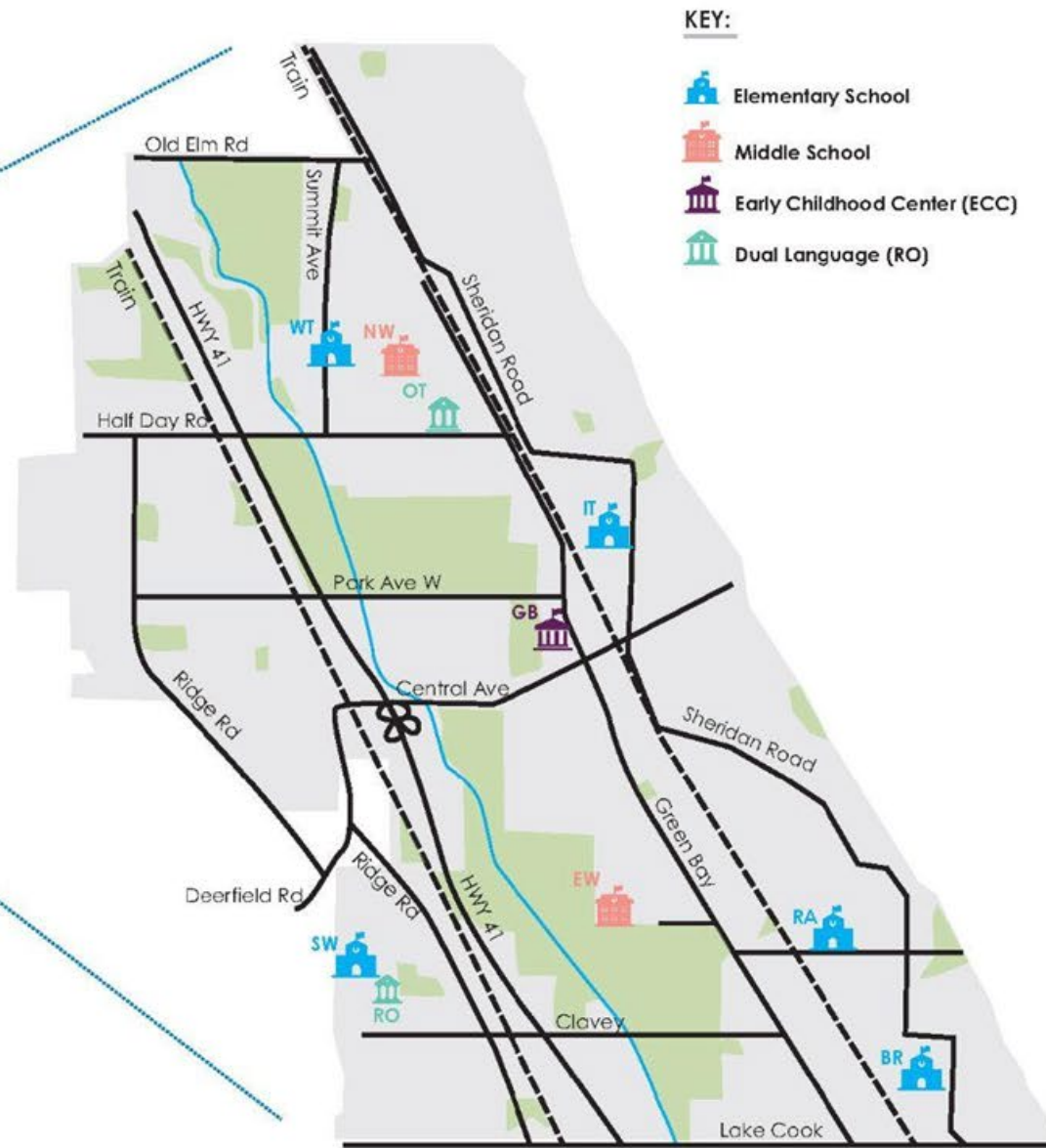
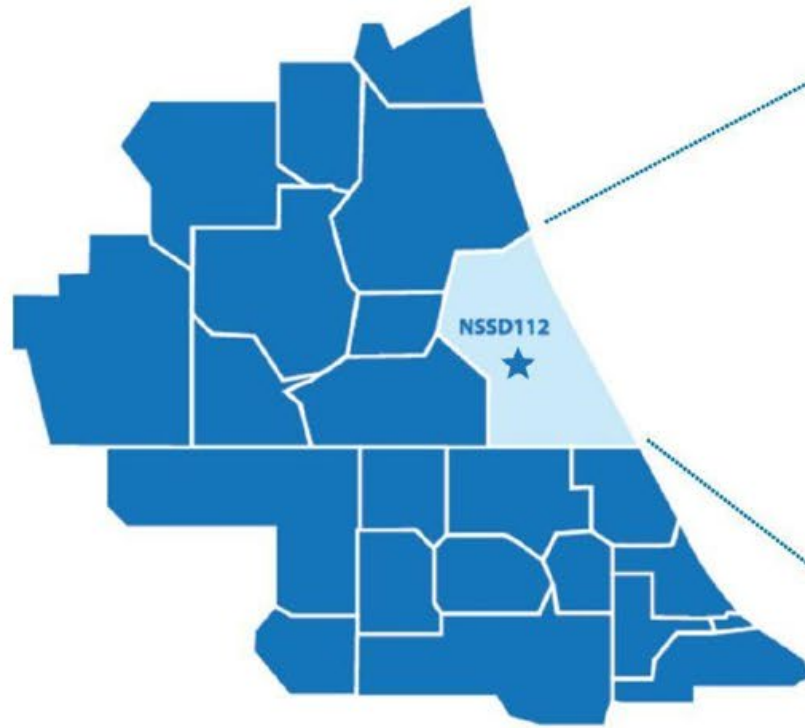
District Boundaries & Quick Facts



- K-8, Public School District
- 3,786 Students
- 336 Teachers

- 1 Early Childhood Center
- 7 Elementary Schools
- 2 Middle Schools (Phase 1 Program Renovated)
- 2022 Referendum Passed, Phase 2, \$125M Capital Program

District Boundaries



HOW STUDENTS CONSUME

Connecting stewardship, education, and health



HEALTHY FOOD CHOICES

Prevent certain health conditions like heart disease and diabetes and can lower cholesterol. **Provide more energy, help you focus, and improve your mood.**



ENVIRONMENTAL LITERACY

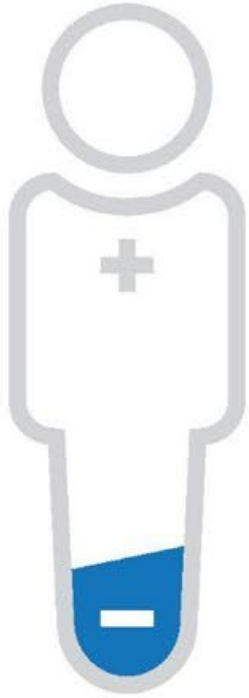
*understanding, skills and motivation to **make responsible decisions** that considers their relationship to natural systems, communities and future generations*



WASTE REDUCTION

Waste reduction efforts usually start in the lunchroom - **reduce costs and environmental impact, and engage the students**

Nutrition Impact on Academic Performance



Poor nutrition, obesity, & hunger

Over one-third of U.S. children are overweight or obese

Nutritional deficiencies negatively affect cognitive development

High trans/saturated fats negatively impact learning & memory

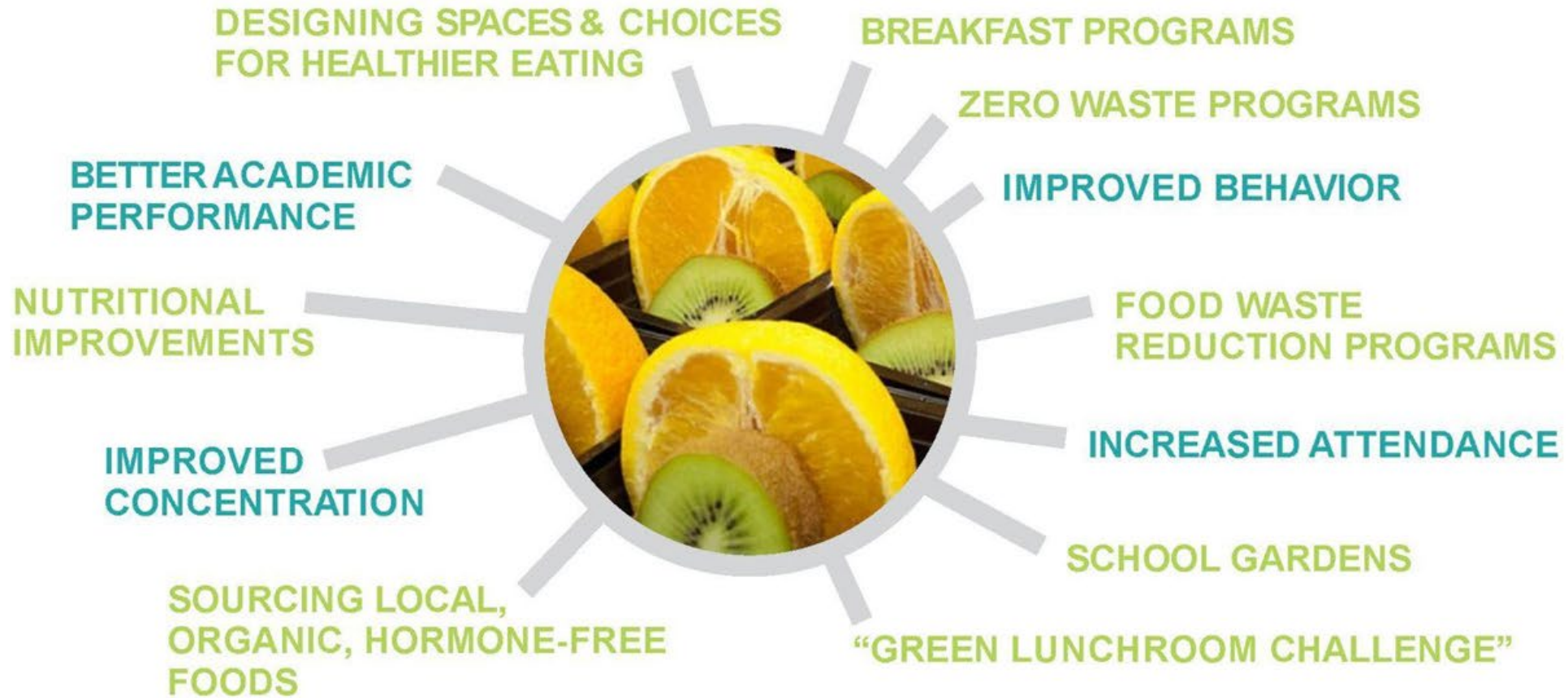
Access to proper nutrition improves student's cognition, concentration, and energy.



source: Wilder Research, 2014

Nutrition Impact on Academic Performance

Improve nutrition, reduce obesity, & improve access to lunch and breakfast programs.





Ravinia Greenhouse



Indian Trail Garden Learning Center



Seven
Generations
Ahead



Farm to School Network

Farm to school is a people-powered movement that seeks to strengthen the connection communities have with fresh, healthy food and local food producers. There are three basic elements to farm to school:

- Local Food Procurement
 - Local foods are purchased, promoted and served in the cafeteria, as snacks or taste-test
- Food & Nutrition Education
 - Students participate in experiential education activities related to agriculture, food, health or nutrition
- Edible Gardens
 - Students engage in hands-on learning through gardening



The **lunchroom** is one of the areas of greatest waste in a school and, therefore, **waste reduction initiatives** can have the most impact.

Source: Seven Generations Ahead

Zero Waste Hierarchy



Eliminate Individual Condiment Packets



Reusable Food Ware



Share Tables



Unbundle spork packets



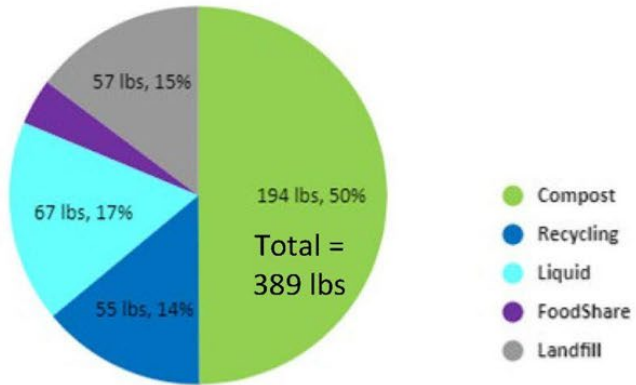
Reusable Trays

Source: Seven Generations Ahead

Stuart

Commercial composting and recycling

Composting and recycling in the lunchroom can divert up to 90% of materials from the landfill



Source: Seven Generations Ahead



Waste Station Examples

New

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Zero Waste Schools Program

SGA works with school staff and students to shift operations and minds towards generating zero waste through **source reduction, recycling, composting, and food recovery.**

- Help schools plan effective waste reduction strategies
 - Zero waste kitchens
 - Reusable food ware
 - Minimize plastic use
 - Minimize food waste
- Create a Zero Waste Plan for the district
- Provide on-the-ground support for operational changes
- Educate students and staff about the How and Why of going zero waste

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INTRODUCTION
FOOD SERVICE STUDY - DECENTRALIZED PRODUCTION KITCHENS



New

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INTRODUCTION

FOOD SERVICE STUDY - DECENTRALIZED PRODUCTION KITCHENS



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INTRODUCTION
FOOD SERVICE STUDY - CENTRAL KITCHEN MODEL



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Lake Zurich CUSD 95 Case Study

Design considerations that benefit student mental health



Student Mental Health

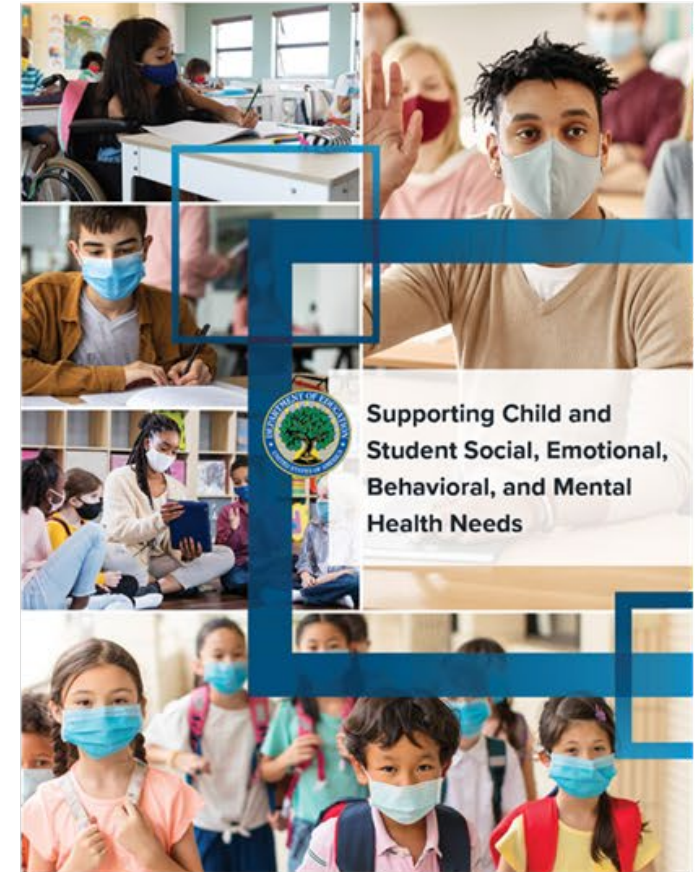
“Prior to the COVID-19 pandemic, 13–22% of school-aged youth experienced a mental health challenge at a level associated with formal diagnoses (NCSMHI, 2016; Maag, & Katsiyannis, 2010). Researchers estimate that 80% of those children and youth have unmet treatment needs (McCance-Katz, & Lynch, 2019). Unmet needs may result in social, emotional, or behavioral challenges.”

“Between March and June of 2020, more than 25% of American parents reported that their child experienced declines in mental health and 14% reported increases in behavior problems (Patrick et al., 2020).”

“In a survey conducted in April and May 2020, one in four youth (ages 13–19) reported an increase in sleep loss due to worry, feeling unhappy or depressed, feeling constantly under strain, and loss of confidence in themselves (Margolius et al., 2020)

- Supporting Child and Student Social, Emotional, Behavioral, and Mental Health Needs

– U.S. Department of Education



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What is Social-Emotional Learning

Social-Emotional Learning:

Social and emotional learning (SEL) involves the processes through which children and adults acquire and effectively apply the knowledge, attitudes, and skills necessary to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions.



– U.S. Department of Education

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Designing for Social-Emotional Learning

PHYSICAL HEALTH

A known cause and effect between physical activity and educational design is the release of endorphins that can relieve stress and pain. Creating spaces that promote physical wellness needs to be equal and available to all students. Specific ways to do this are by incorporating exercise facilities with equipment, active corridors, and sensory paths.

MENTAL HEALTH

Schools are a home away from home for most students. To reduce anxiety, children must feel safe, secure, and relaxed. Students must have a sense of control within their environments that meet their needs personally. Architecture can create spaces that offer quiet rooms to relax before and after classes, including reading nooks or private enclaves.

SOCIAL WELL-BEING

Community spaces encourage students to socialize with their peers and teachers. Designing to facilitate community will aid in the sharing, developing, and sustaining influential relationships with others. By creating walkways, breakout spaces, flexible furniture, and zoned learning, students can generate autonomy for their education.

CREATE REGENERATIVE ENVIRONMENTS

Wellness and architecture ensure that each building benefits and transforms the surrounding socioeconomic and ecological systems. By using the built environment as a tool, we can enable larger living systems to thrive.

SUPPORT EMOTIONAL DEVELOPMENT

Students in an environment that encourages wellness demonstrate problem solving skills, collaboration, understanding how to manage emotions, and build loving and responsive relationships.

PROMOTE POSITIVE STUDENT INTERACTION

Providing educational design that is more transparent and considers visual interconnectivity enables educators to seek students while students maintain their sense of autonomy and safety among peers.

Can architecture promote social-emotional learning?

Design considerations:

- Lighting
- Color
- Acoustics
- Biophilia
- Movement
- Agency
 - Choice
 - Comfort
 - Transparency

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Lighting

Natural Light

“Lighting cues from the environment signal the body to suppress levels of the sleep-related hormone melatonin to increase our feelings of alertness.”

– Harvard School of Public Health

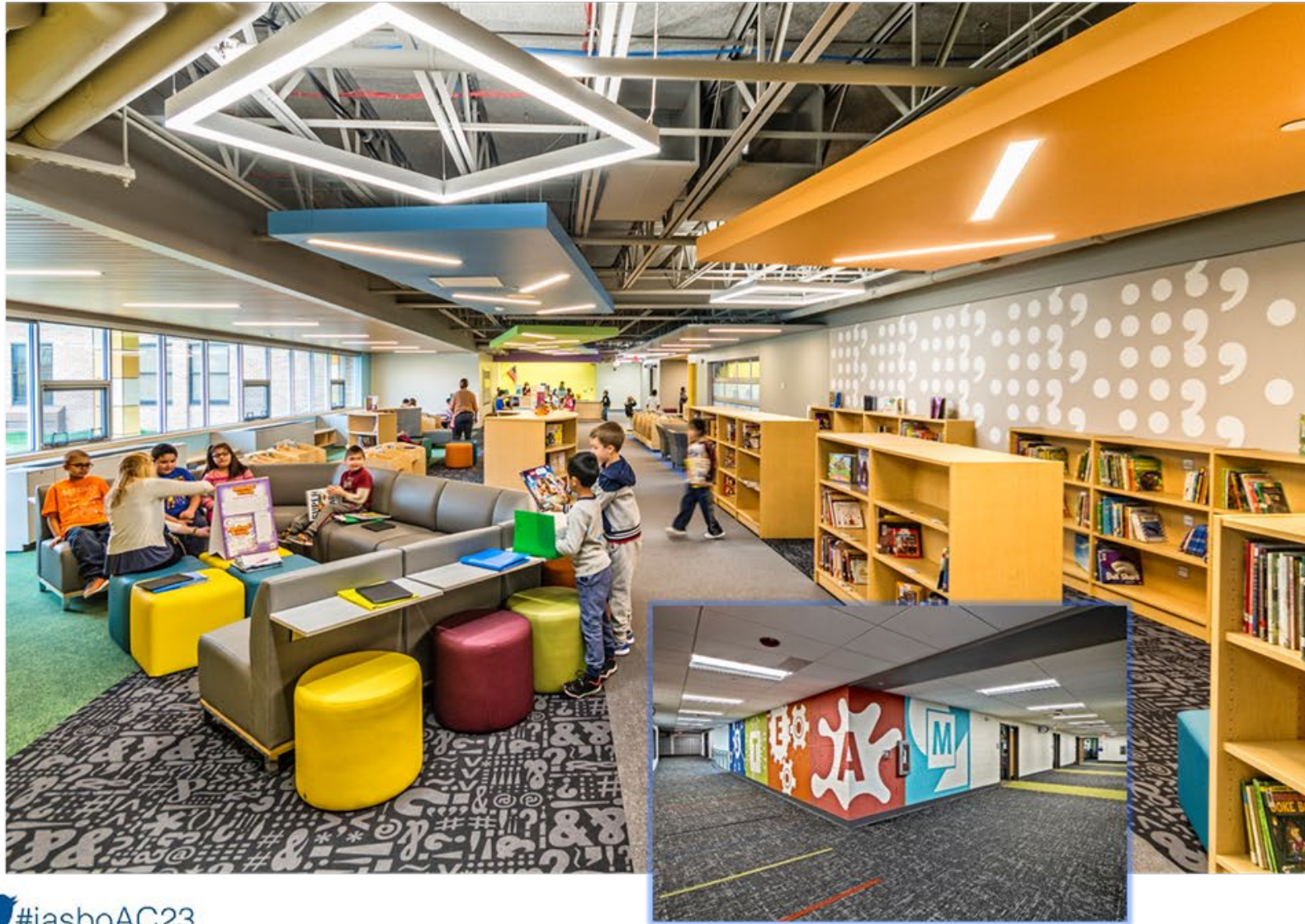


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Color – Finishes & Furniture



“Colors carry very different implications. In the built environment, white walls can be devoid of character... ..Studies show that, left in an environment devoid of color, animals and humans had increased anxiety, distress, and fear, and that this lack of stimulation from color resulted in irritation, restlessness, difficulty concentrating, and excessive emotional responses. Conversely, color can create a calm and soothing environment for the student to study and contemplate, or it can create excitement where it is desired such as in an activity area or a gymnasium. In an educational setting, it is advisable to incorporate a balance of all colors in the spectrum for optimum emotional and physiological responses.”

– *Functional Color and Design in Education Environments*

– CE Center,
A. Starkweather

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Color - Lighting



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Acoustics



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Biophilia

“Humans hold a biological need for physical, mental, and social connection with nature. This connection affects our personal well-being, productivity, and societal relationships.”

– Terrapin Bright Green



Biophilic Design:

A concept used to increase occupant connectivity to the natural environment through the use of direct nature, indirect nature, and space and place conditions.

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Biophilia



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Movement



“Physical movement increases oxygen supply and is essential for stimulating cognition. When students are physically engaged, specific hormones are released that have a positive influence on brain activity. As a result, attention spans grow longer, and the ability to concentrate improves. Research proves that this relationship between movement and brain activity leads to better academic results.”

– *Bodies in Motion, Brains in Motion*
- Dr. Dieter Beithecker / VS



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“In order to reduce anxiety, it’s important children feel safe, secure, and relaxed. This is never truer than at school, which is like a home away from home for children. Adults and children alike feel most relaxed when in control, so to promote wellness, it’s important to integrate architectural and interior design features that allow students to make spaces their own.”

– *School Architecture and Wellness: 7 Steps to Improve Student Health*
- LAN Associates



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Choice

- Hard vs. Soft
- Open vs. Constrained
- Dark vs. Light vs. Color
- Solo vs. Group

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Lake Zurich Community Unit School District 95



May
Whitney
Elementary
School

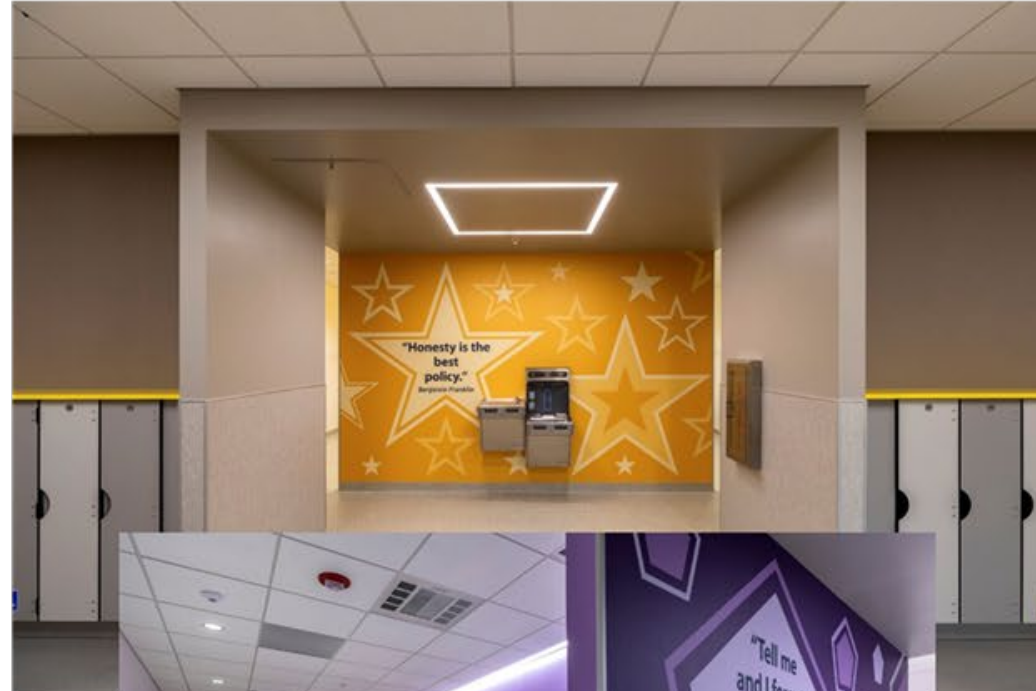
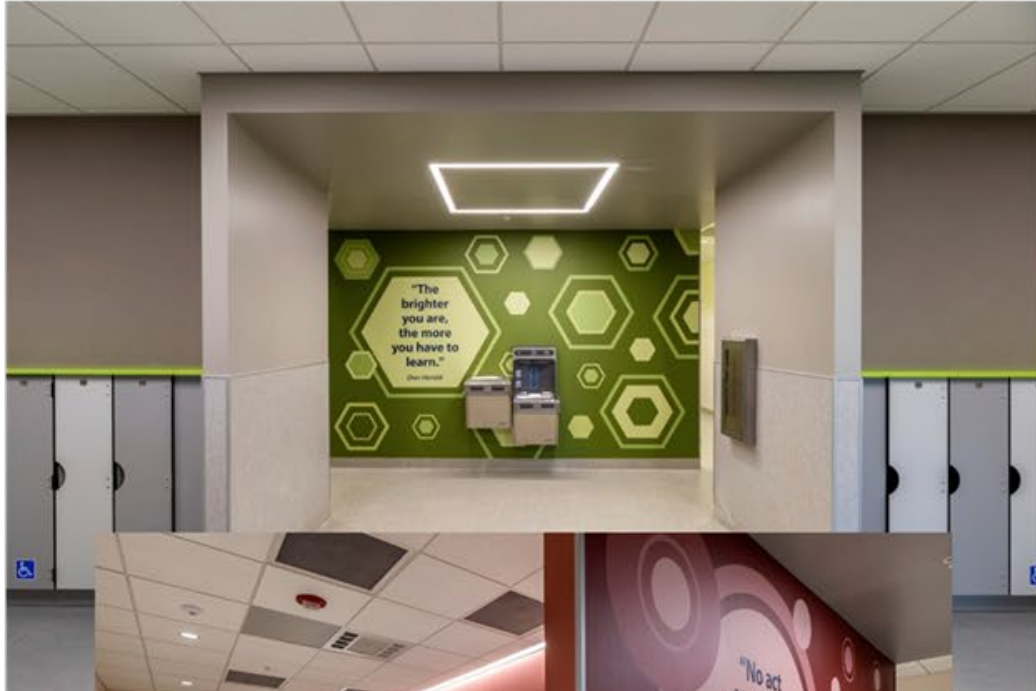


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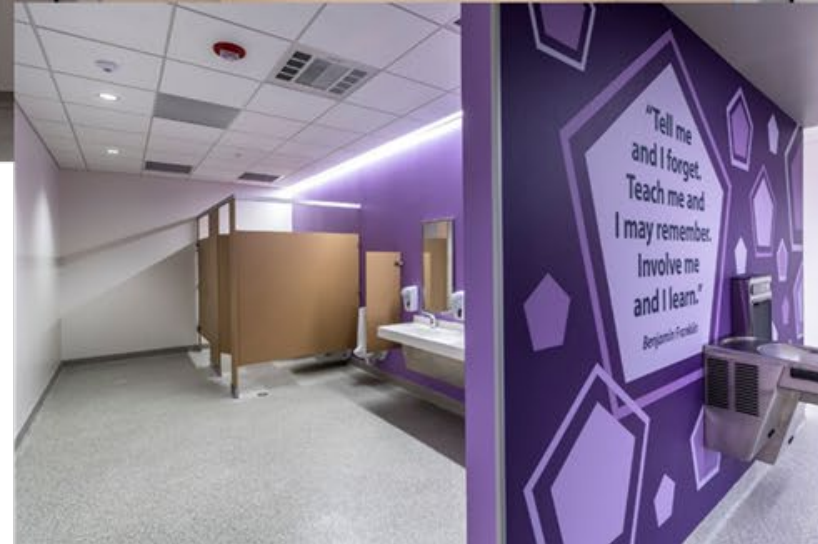
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May
Whitney
Elementary
School



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Seth
Paine
Elementary
School

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Lake Zurich Community Unit School District 95



Lake Zurich High School
Studio C



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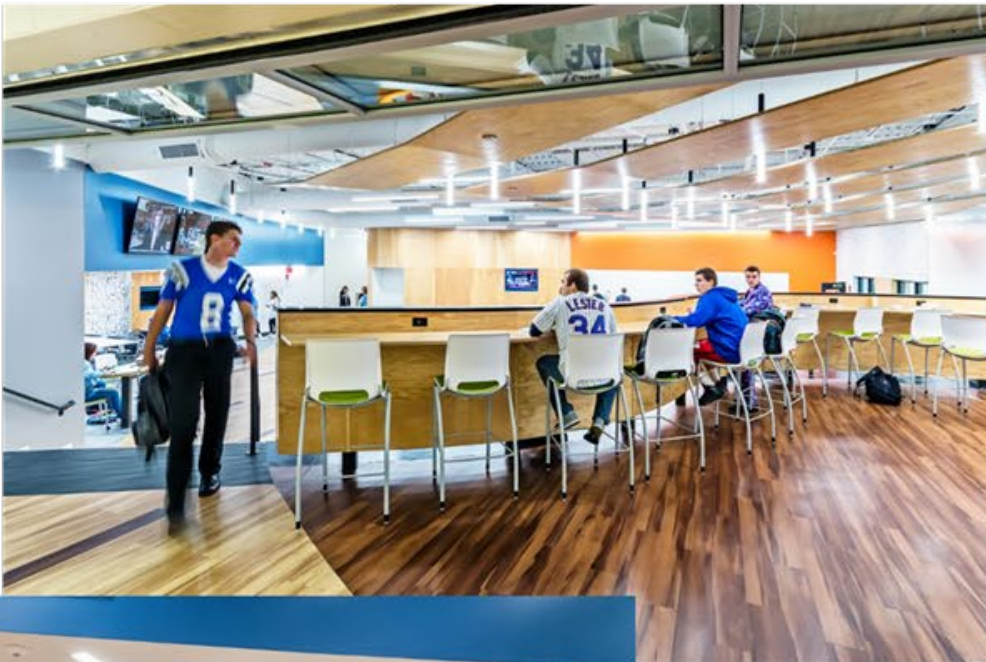
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Lake Zurich Community Unit School District 95



Lake Zurich High School
Studio C



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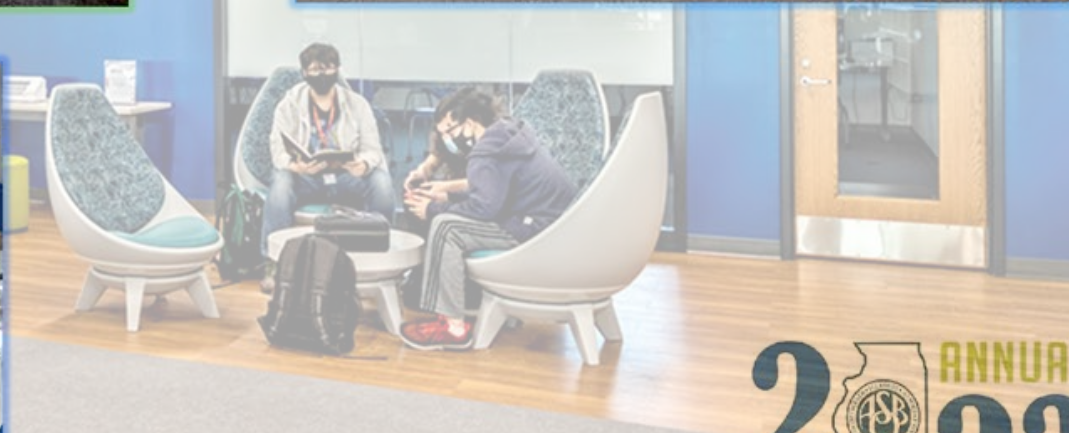
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Lake Zurich
High School



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Panel Discussion

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Questions and Answers

We thank you for your time!

Mission: The Sustainability and Environmental Health PDC will provide information empowering school communities to create an environmentally, socially and fiscally sustainable future.



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 Do Today **Right!**

Presenters:

MODERATOR INFO:

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