

# Mitigating outdoor extreme heat: how schoolyard greening is critical for resilience



**Green  
Schoolyards  
America**



**LONG BEACH**  
UNIFIED • SCHOOL • DISTRICT

September 10, 2024



# Welcome



**Ingrid Roberson**

Senior Advisor,  
CCEE

- Recording & slides will be posted on [CCEE's website](#)
- Slides will be linked in the chat
- **Questions/Comments:** Please use the Q&A to elevate your questions and comments

# Meet the Presenters



**Mikaela Randolph**

Associate Director of Regional Programs  
Green Schoolyards America



**Ria Apodaca**

Director, Health Programs  
Pasadena Unified School District



**Ferdows Fazeli**

Senior Program Manager of Facilities  
Long Beach Unified School District



**Jill McArthur**

Farm-to-School Coordinator  
Pasadena Unified School District



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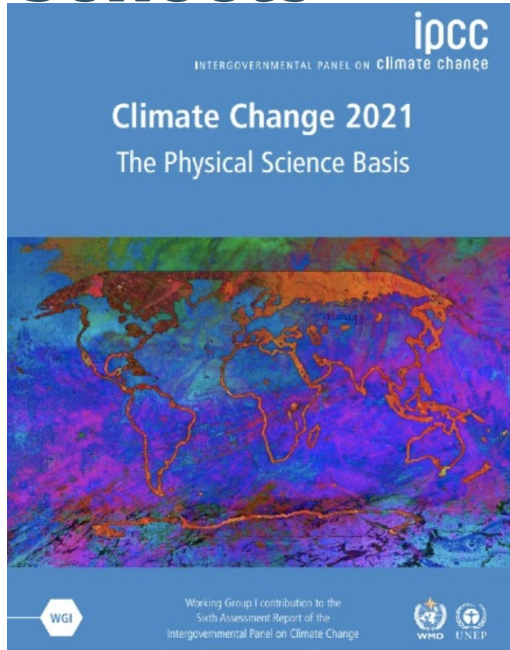


## Series Overview



**⚡ UNDAUNTED K12**

# Series Focus: Climate Impacts and Schools



Report Released  
August 2021

## Three Key Findings:

- **Global warming is unequivocally caused by humans**
- **The impacts of the Climate Crisis are already here**, and are disproportionately impacting low-income, Black, indigenous, and communities of color
- **Temperatures have already increased by 1.09°C since 1880, and will continue** to the 1.5°C mark in the next twenty years due to emissions from past decades.

## Two Clear Calls to Action:

- If humans **act urgently to mitigate climate change**, temperatures could peak at that 1.5°C and then decline - stabilizing the planet.
- Communities must begin to **adapt to climate impacts**

# Series Focus: Climate Impacts and Schools



## Climate Impacts:

- Threaten the Physical and Mental Health of Students and Staff
- Contribute to Lost Learning Time
- Are projected to increase in frequency and intensity throughout this decade and beyond

**CAL MATTERS**

# Series Features: Climate Impacts and Schools

## 1) Open Doors

- April: Prepare for a New Normal: Climate Emergencies and Their Impact on Schools
- May: Energy and Grid Resilience Adaptations
- September: High Heat and Schoolyard Adaptations



Ten Strands  
Connecting Education, Environment, and Community

## 2) Spotlights

- April: Climate Change and Emergency Management in San Mateo County
- May: Energy and Grid Resilience
- November: Stormwater Management



## 3) Summary Report and Toolkit

# Focus for Today's Open Door



- Mitigating outdoor extreme heat: how schoolyard greening is critical for resilience



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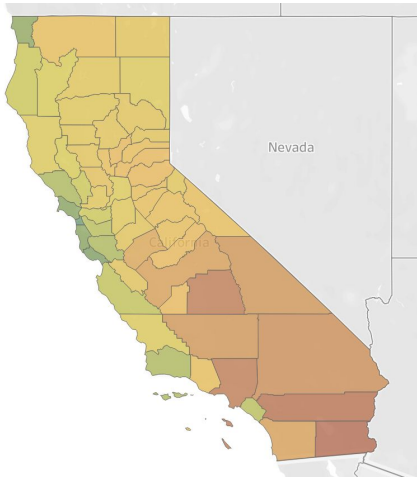
# Topic Introduction: High Heat



**⚡ UNDAUNTED K12**

# High Heat in Schools Data

**High Heat Definition:** High heat and temperatures are periods when heat and humidity rise above a certain temperature. The [National Weather Service's](#) heat index says that 87 degrees Fahrenheit (87° F) is the baseline of risk (both indoors and outdoors) as it can be the start of risk towards heat related health challenges.



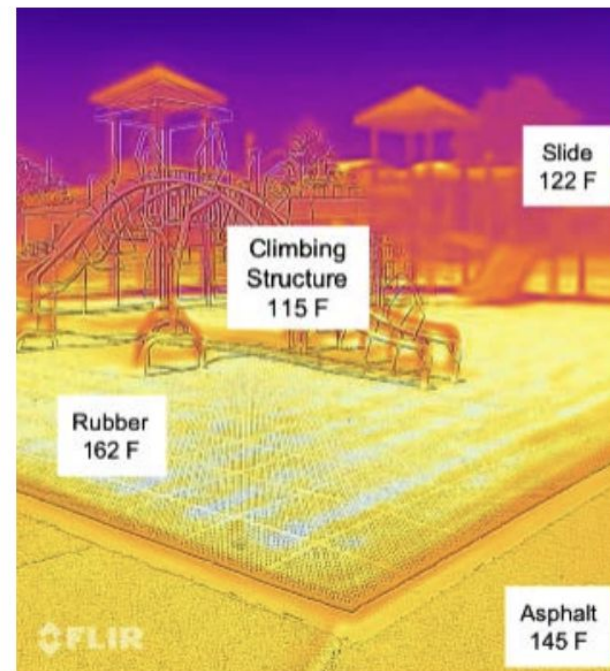
Projected # of Days above 87° F	Projected # of Counties to Experience in Each Decade			
	2025	2035	2045	2055
30 Days	50 (86.2%)	52 (89.7%)	52 (89.7%)	52 (89.7%)
60 Days	37 (63.8%)	47 (81%)	48 (82.8%)	47 (81%)
90 Days	26 (44.8%)	30 (51.7%)	36 (62.1%)	33 (56.9%)
120 Days	16 (27.6%)	17 (29.3%)	24 (41.4%)	20 (34.5%)

# High Heat is Challenging for Buildings and Grounds!

[www.tinyurl.com/HeatResilientSchools-2023](http://www.tinyurl.com/HeatResilientSchools-2023)



- No indoor or outdoor temperature limits in CA
- No air conditioning or cooling requirement in CA, and no database for tracking
- High heat contributes to learning loss







Virtual Policy Forum:  
**Protecting Student Health and Learning with Heat-Resilient Schools**  
 What California Policy Makers Can Do to Advance Equitable Access to Climate-Resilient School Infrastructure

December 12, 2023 | 11am-12pm PT  
 Register at: <https://tinyurl.com/HeatReadySchools>

  
Dr. Emily Turner  
UCA Loden Center  
SAC/Assistant

  
Anish Vignesh  
Ten Strands

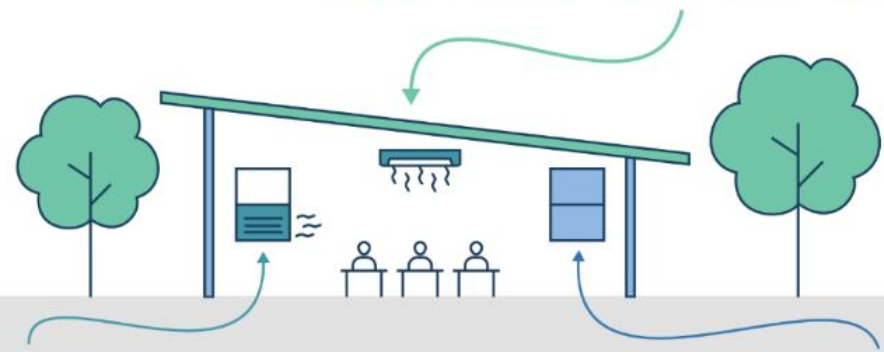
  
Jonathan Math  
UNDAUNTEDK12

  
Cara Bore  
UNDAUNTEDK12

# High Heat in Schools: Buildings Solutions

[www.tinyurl.com/HeatResilientSchools-2023](http://www.tinyurl.com/HeatResilientSchools-2023)

**PASSIVE COOLING** like cool roofs and shade can reduce heat absorbed by buildings



**COOLING EQUIPMENT** can help, but consider cost, efficiency, and emissions trade-offs between A/C and heat pumps

**BUILDING RETROFITS** like insulation, double-paned windows, and more help keep temperatures stable

Learn more about leveraging IRA funding for schools at: [www.undauntedk12.org/schools-and-the-ira](http://www.undauntedk12.org/schools-and-the-ira)

UCLA Luskin Center for Innovation | Ten Strands + UNDAUNTEDK12

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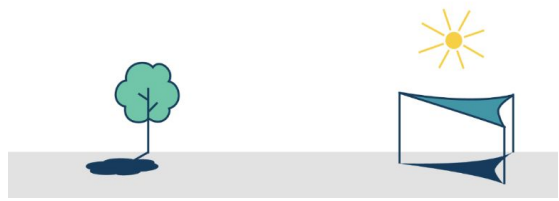
Jonathan Math  
UndauntedK12

Sara Biele  
UndauntedK12

# High Heat in Schools - Grounds: Solutions

[www.tinyurl.com/HeatResilientSchools-2023](http://www.tinyurl.com/HeatResilientSchools-2023)

**There are nature and infrastructure based solutions for shade**



**Greening Schoolyards can provide access to shade, and have a number of other health and wellness co-benefits!**

# High Heat in Schools - Grounds: Solutions

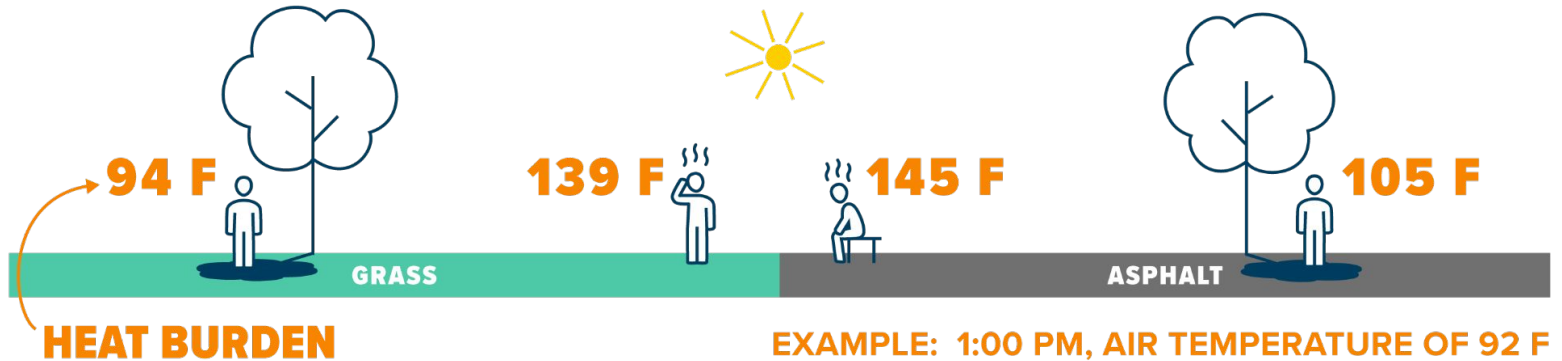
[www.tinyurl.com/HeatResilientSchools-2023](http://www.tinyurl.com/HeatResilientSchools-2023)



By blocking sun, shade  
can reduce heat burden  
by up to 70 F.

Grass stays cooler than  
asphalt with the same  
sun exposure...

...but shade can  
even cool down  
hot asphalt!



# High Heat in Schools - Grounds: Solutions

The California Schoolyard Forest System is a statewide initiative to increase tree canopy on public school grounds across California to directly shade and protect students from extreme heat and rising temperatures due to climate change.



**CALIFORNIA**  
**Schoolyard**  
**Forest System**<sup>SM</sup>





# Green Schoolyards America

**Mikaela Randolph**

Associate Director of  
Regional Programs



# Schoolyard Forests Systems

## Solutions for Health and Well-being, Learning, and Climate Resiliency

California Collaborative for  
Educational Excellence Open  
Door #3  
Tuesday, September 10, 2024



**Green  
Schoolyards  
America**

**Green Schoolyards America partners with public agencies and school districts across the U.S. to establish large-scale living schoolyard programs that transform school grounds into ecologically-rich, park-like green spaces. Our goal is to improve children's health, learning, and happiness while contributing to communities' ecological and climate resilience.**



**Green  
Schoolyards  
America**



**We are working to change the paradigm for school ground design, use, and management so all children will have access to the natural world in the places they visit every day.**

## THE PROBLEM



Across California, nearly **5.9 million students** attend school every day on over **131,000 acres of public land**. Most school grounds are paved and do not support the health and well-being of students, communities, or the environment—and they **exacerbate the impacts of the climate crisis on children**.

**School grounds reflect systemic inequities.** Communities with the lowest incomes and communities of color are most impacted by the climate crisis and have the least access to nature and trees—including on school grounds.



**School districts' land management choices matter** because they are one of the largest land managers in every city. Decisions they make impact their communities' environmental footprints and children's health.



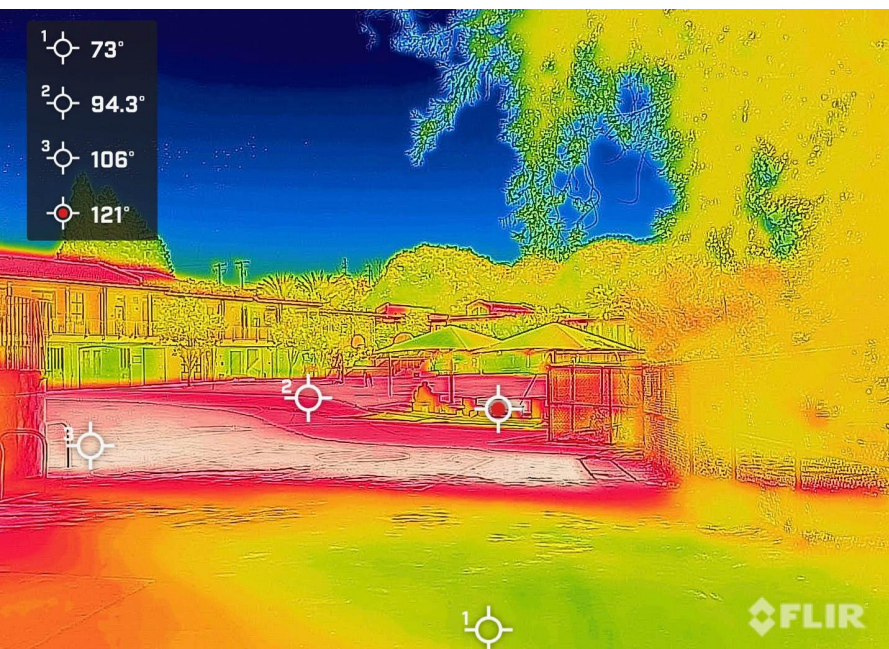
## America's school grounds are outdated.

Most were designed for 1940s educational practices. Today's curricula includes hands-on, place-based learning and requires updated environments and educational resources.



**Paved, barren schoolyards expose children to extreme heat** and offer little protection from the elements. When trees are onsite, they are often planted in places children cannot access them.

# Shade Matters



81°F Air Temperature  
September 3, 2022



Add shade trees to  
reduce surface  
temperatures where  
children are present.



## Asphalt Surface

33°F COOLER with shade from a tree canopy

## THE SOLUTION

**Schoolyard forests** are a scalable, nature-based solution that protects vulnerable children from the impacts of climate change while improving their health, learning, and environment.



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Schoolyards  
America



## What are Schoolyard Forests?

“Clusters of trees within a green schoolyard, planted in places that children regularly access during the school day.

Schoolyard forests are multi-use spaces for learning and play that also act as climate oases to shade and protect students from extreme heat.”

— Green Schoolyards America



# The California Schoolyard Forest System



**CALIFORNIA**  
**Schoolyard**  
**Forest System**™

The California Schoolyard Forest System is a statewide initiative to increase tree canopy on public school grounds across California to directly shade and protect students from extreme heat and rising temperatures due to climate change.



# The California Schoolyard Forest System

## Goal 1

**Plant enough trees** that when mature, will cover at least 30% of each school property, in the areas used by PreK-12 children and youth during the school day



## Goal 2

**Center equity** by prioritizing schools and districts in underserved communities with the highest poverty levels, fewest trees, and hottest climates



## Goal 3

**Use school grounds as PreK-12 learning laboratories** across the curriculum and grade levels



## Goal 4

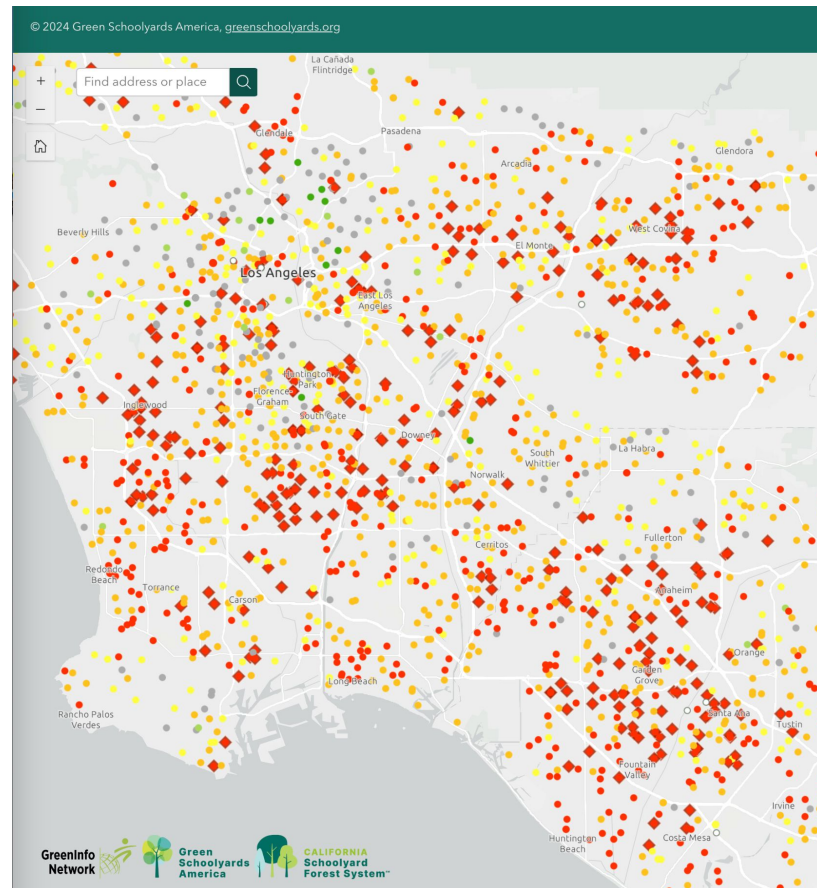
**Build environmental and climate literacy** by engaging students in the design, planting, and stewardship of their schoolyard forests, and in standards-based hands-on learning outdoors

# California Schoolyard Tree Canopy Equity Study and Map

## Purpose

- Map existing conditions and document where the trees are on California's public schools
- Establish a baseline from which to measure change over time
- Identify priority areas for in-depth support
- Communicate findings to government agencies to support decision-making
- Communicate with the public to build demand and action

[greenschoolyards.org/tree-canopy-equity](https://greenschoolyards.org/tree-canopy-equity)



# Statewide Schoolyard Tree Canopy in California



*In the 2022-23 school year,  
~5.68 million K-12 students<sup>1</sup>  
attended public schools in  
California on more than  
131,360 acres of  
public land.<sup>2</sup>*

## Student Zone Findings

Areas students access on campus during the school day

**6.4% tree canopy where kids are present**  
statewide median canopy coverage in “student zones”

**> 2,597,000 students** attend school on campuses  
with **5% tree canopy** or less in student zones

**> 4,148,000 students** attend school on campuses  
with **10% tree canopy** or less in student zones

Data sources for analyses:

<sup>1</sup> CDE / Ed-Data (enrollment, excluding students attending virtual schools)

<sup>2</sup> California School Campus Database, GreenInfo Network (acreage)

<sup>3</sup> Student Zone Boundaries, Green Schoolyards America and GreenInfo Network

<sup>4</sup> EarthDefine (tree canopy)



Tree canopy research conducted by Green Schoolyards America in collaboration with GreenInfo Network, 2022-24 (ongoing). The data above reflect our findings from 7,561 campuses studied.

# Analyzed Challenges and Opportunities for Going to Scale

- Interviewed school districts, tree planting organizations, and county offices of education
- Reviewed policies at state and local levels
- Gathered feedback at public meetings and through site visits



# Schoolyard Forest System<sup>SM</sup> Resource Library

## Resources for Schools and Districts

- Making the case
- Design, implementation, and maintenance
- Educator resources
- Case studies
- Funding links
- Webinar series
- Community of practice



MAKING THE CASE  
FOR SCHOOLYARD  
FORESTS

DESIGN  
IMPLEMENTATION  
MAINTENANCE

EDUCATOR  
RESOURCES

SCHOOLYARD FOREST  
CASE STUDIES

FUNDING FOR  
FORESTS

SCHOOLYARD FOREST  
DESIGN LECTURE  
SERIES

COMMUNITY OF  
PRACTICE

SCHOOLYARD  
FORESTS IN THE NEWS



**National  
Schoolyard  
Forest System<sup>SM</sup>**

[greenschoolyards.org/forest-resource-library](https://greenschoolyards.org/forest-resource-library)

# Please join us

**Sign up  
to receive updates**  
greenschoolyards.org

**Join our community  
of advocates**  
Participate in our online  
webinar series



**National  
Schoolyard  
Forest System**<sup>SM</sup>



GOLESTAN EDUCATION

[greenschoolyards.org/schoolyard-forest-system](https://greenschoolyards.org/schoolyard-forest-system)



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America**

**Mikaela Randolph**

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**Thank you!**





## **Pasadena USD**

**Ria Apodaca**  
Director, Health  
Programs

**Jill McArthur**  
Farm-to-School  
Coordinator

# Pasadena Unified School District

The PUSD serves students in Pasadena, Sierra Madre, and Altadena, as well as unincorporated areas of Los Angeles County.

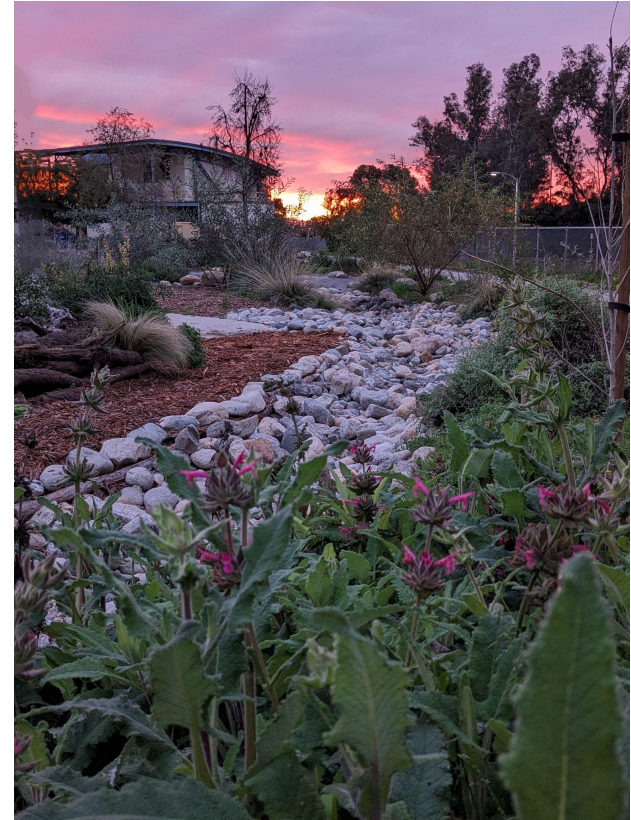
- 14,400 students
- 14 Elementary Schools
- 1 K- 8 School
- 3 Middle Schools
- 5 High Schools
- 1 Center for Independent Study (K - 12)

# John Muir High School Farm Lab

- Native Area
- Walking labyrinth
- Soil regeneration
- Agriculture



2016



2024

# Mary W. Jackson STEAM Multilingual Magnet Elementary

*Complete transformation from asphalt to  
natural green space*

- Community partners
- School community commitment
- PTA Garden Chair and Gardening Club
- Support from PUSD Departments



# Impact on Wellness and Learning

## Students and Staff

- Outdoor learning experiences
- Culinary Clubs and Cooking Lessons
- Student Garden Workers
- Agro Education: Sustainable Agriculture
- Youth are cooking at home



## District:

- Strategic Plan: Flexible spaces that connect students to the outdoors.
- Board of Education Adopted Resolution: Expansion of Immersive Outdoor Learning Opportunities

## Community:

- Green Clubs supporting the maintenance of the green spaces
- Corporate Volunteer/Work Days for special projects
- Bond Measure

# Reflections

- Highlighting the impact of the environment on health and wellness within all opportunities
- Community partnerships
- Grant-funded projects
- Interdepartmental approach
- Common vision demonstrating PUSD values of equity, diversity and inclusion



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## **Long Beach USD**

**Ferdows Fazeli**

Senior Program Manager  
Facilities Development & Planning



# Agenda

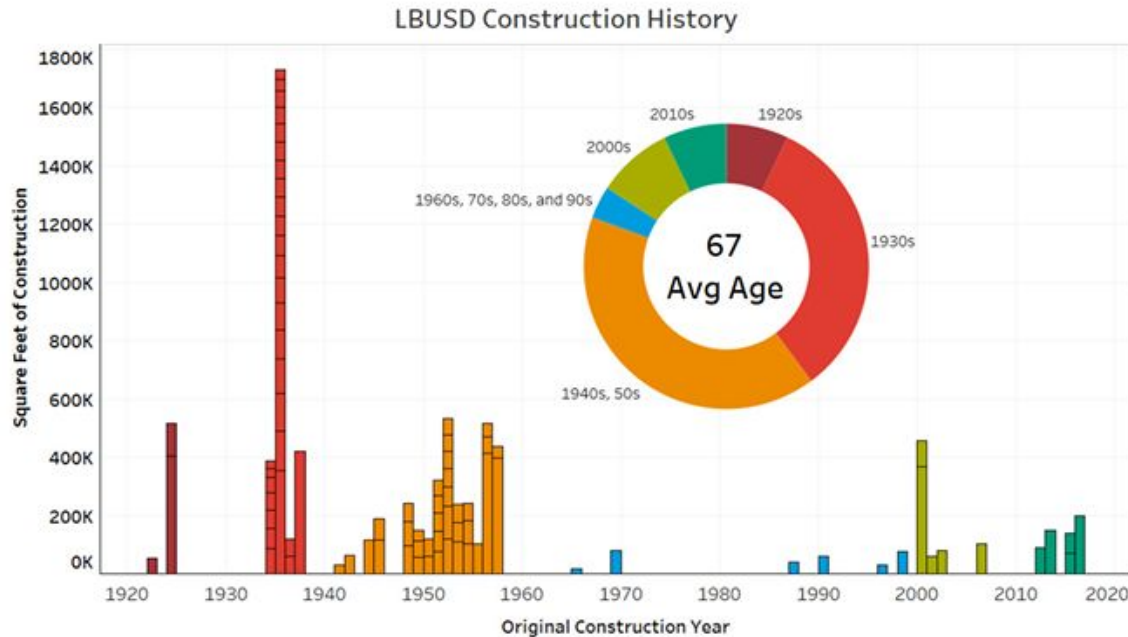
- LBUSD
- District-Wide Sustainability Plan
- Renewable Energy
- Measure Q Modernization
- Landscape Rehabilitation
- Interim Heat Mitigation Measures





# Long Beach Unified School District

## Fourth largest school system in CA





# LBUSD's Green Schools Operations Energy and Sustainability Policy 3510.1

*Adoption date: August 17, 2022*

Implementation Goals Include:

- Reduce energy & water use
- Ensure construction complies with green building standards, specifically ensuring all new and replacement machinery is zero-emissions
- Reduce vehicle emissions (active transportation, electric vehicles, idling, etc.)





# Facilities Master Plan



## Sustainability

*Preparing Long Beach students for a lasting, healthy world*



## Wellness & Green Spaces

*Offering spaces that improve cognitive development, mental well-being, and physical health*



## Health & Fitness

*Preparing LBUSD students for healthy lifestyles*



## Facility Enhancements

*Creating next generation learning environments where students can thrive*



## Instructional Technology

*Building a high-speed technology future that supports project-based learning, where instruction and collaboration can occur anywhere and everywhere*



## Pre-K/T-K Expansion

*Preparing lifelong learners for a brighter future in Long Beach*



## Community & Professional Development Space

*Heightened access, public service, and instructional preparation*



## Safe Campuses

*Protecting the well-being of LBUSD staff, students, and community*



## Career & Technical Education

*Develop technical skills, knowledge and training for students to succeed in future careers*



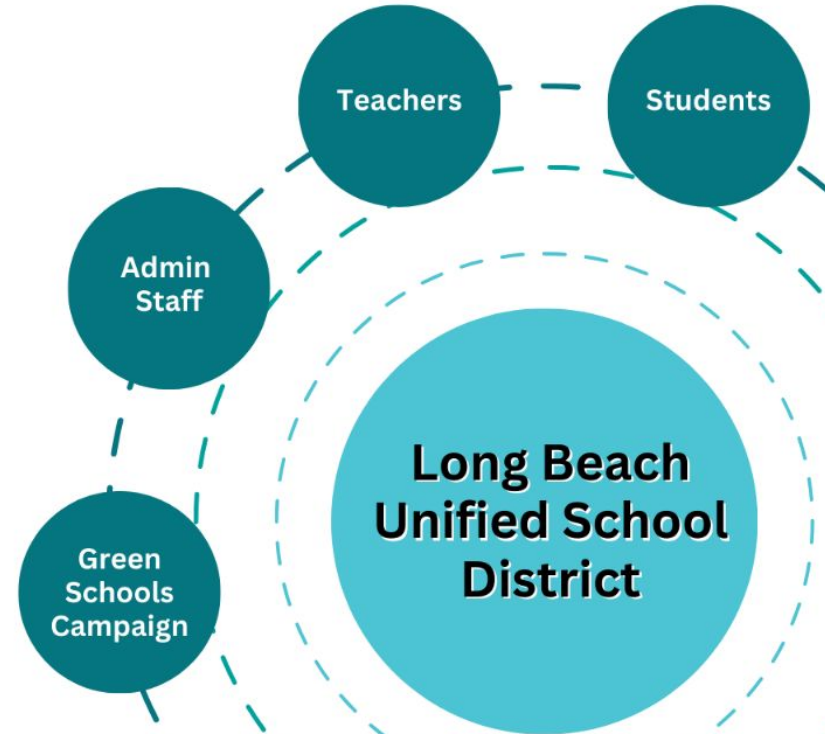
## Media Centers

*Reimagining LBUSD libraries as the campus hub of relationships and collaboration*



# Vision 2035 Planning Group

- Collaboration between students, staff, and other key stakeholders
- Multiple working groups held throughout 2023 to develop several strategies to support Vision 2035
- Communal effort to develop Strategy #9, specific to sustainability





# Draft Sustainability Plan



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# Solar Canopies





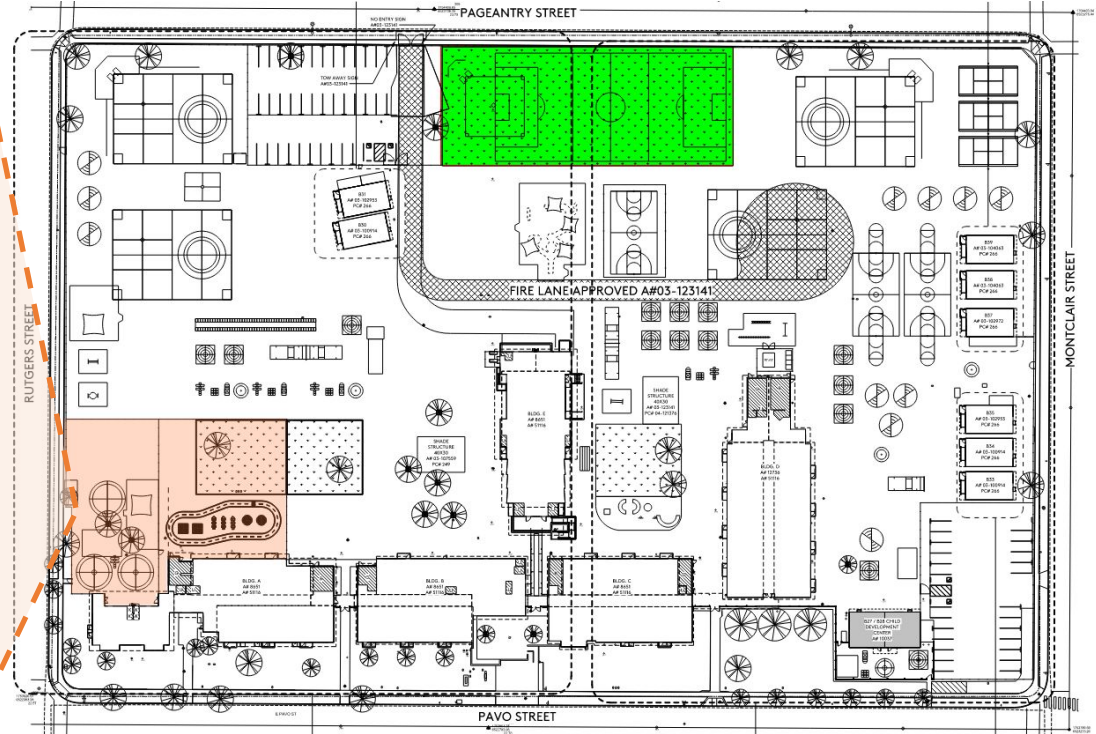
# Measure Q Modernization

Pre-K / T-K Expansion  
Wellness and Green Spaces  
Indoor/Outdoor Learning  
Shade Structures





# Wellness and Green Spaces / Health and Fitness







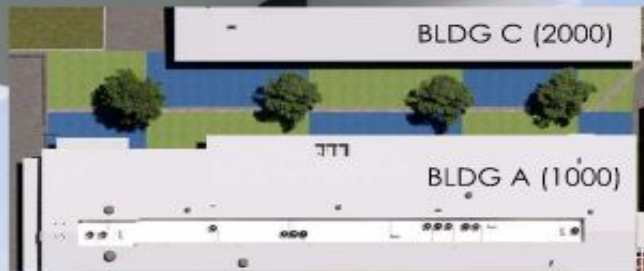
WASHINGTON MS - CENTRAL COURTYARD (LIBRARY VIEW)



POLY HS – OUTDOOR LEARNING COMMONS



POLY HS – PARKING



BLDG C (2000)

BLDG A (1000)

reduces heat island effect

ENHANCED PAVING



OUTDOOR LEARNING SPACES

# Landscape Rehabilitation

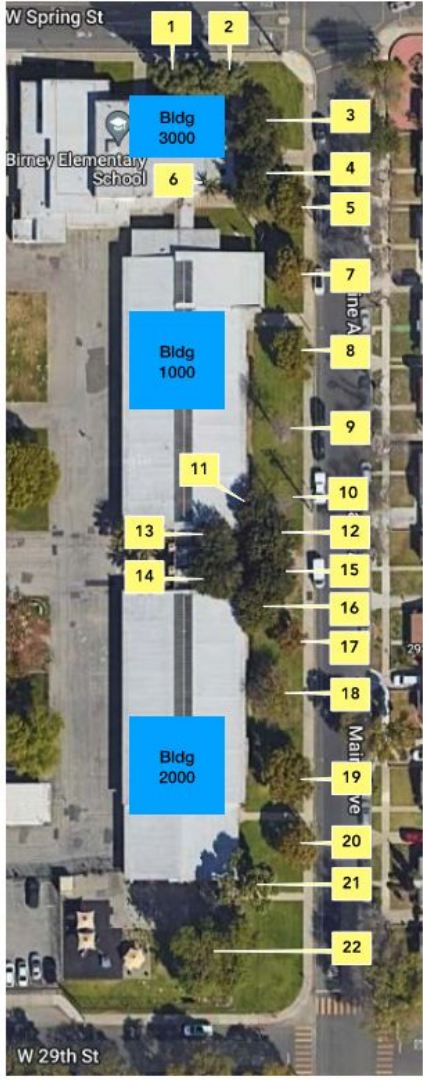


**BEFORE**



**AFTER**

# Preserving Existing Tree Canopies





# Interim Heat Mitigation Measures

- Chilled Water Dispensers
- Classroom and Hallway Fans
- Classroom Window Coverings
- Main Entry Window Tinting
- Bottle Filling Stations
- Accelerated HVAC Installation
- Reflective Paint on Blacktop





# Discussion: Question and Answer

# Question and Answer

- **Questions/Comments:** Please use the Q&A or “Raise Hand” features
- **Questions:** Specify if your question is for one of the guest speaker or all of the guest speakers



# Closing and Follow-Up

# Series Features: Climate Impacts and Schools

## 1) Open Doors

- April: Prepare for a New Normal: Climate Emergencies and Their Impact on Schools
- May: Energy and Grid Resilience Adaptations
- Summer: High Heat and Schoolyard Adaptations



Ten Strands  
Connecting Education, Environment, and Community

## 2) Spotlights

- April: Climate Change and Emergency Management in San Mateo County
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## 3) Summary Report and Toolkit

# Thank You

## Contact

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### **Stephanie Seidmon**

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stephanie.seidmon@undauntedk12.org

## Feedback Survey

