



NATIONAL COUNCIL OF SCHOOL FACILITIES
culture, climate, crisis + curriculum:

2:35 -3:15 ET
December 10, 2020

Introductions

Pam Loeffelman
K-12 Educational Leader
DLR Group



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Chief Operations Officer
Virgin Islands Department of Education



Setting the Stage: Sustainability

Design & Sustainability

Our design choices have an impact at all levels.

Our design choices impact all categories.

Environment is everything around us including us while the ecology describes how all those work.

Ecology looks at the interaction between everything.



Setting the Stage: Resilience

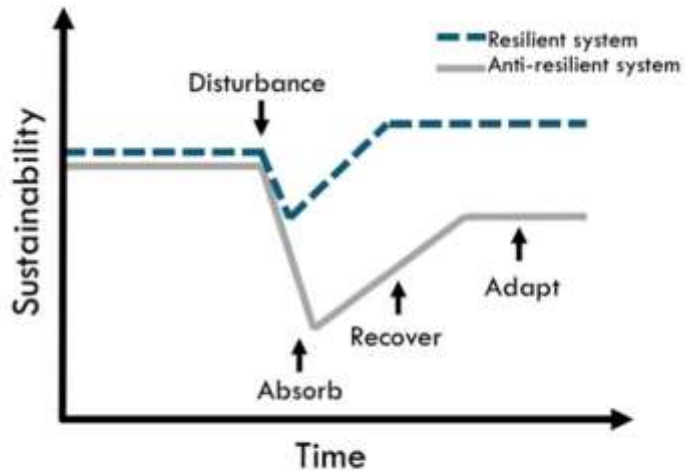


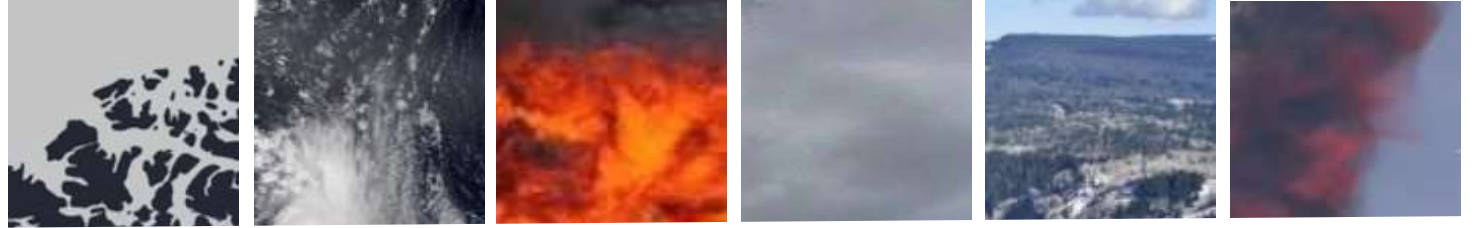
Fig. 1. Resilience as a component of sustainability. Proponents of this organization structure assert that systems that are more resilient can better achieve and maintain sustainable operation.

building capacity to recover quickly from difficulties

increasing the resilience of a system makes that system more sustainable but increasing the sustainability of a system does not necessarily make it more resilient.

https://www.researchgate.net/publication/320149863_Resilience_and_sustainability_Similarities_and_differences_in_environmental_management_applications#pf3

people



buildings



businesses



infrastructure



pandemic

hurricanes

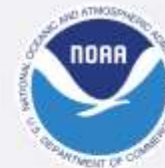
fires

tsunami

landslides

volcanos

U.S. 2020 Billion-Dollar Weather and Climate Disasters



This map denotes the approximate location for each of the 16 separate billion-dollar weather and climate disasters that impacted the United States from January–September 2020.

A Framework: how can we better prepare our students for the now, near and far



- ECOLOGICAL HEALTH
- COMMUNITY HEALTH
- HUMAN HEALTH
- RESOURCE CONSERVATION

NET ZERO WATER APPROACH

- respect hydrology
- reduce need
- assess quality
- clarify perception
- localize closed loop
- address demand

generation and delivery of energy and water

- renewables and storage
- demand and controls
- HVAC systems
- lighting
- envelope
- programming

NET ZERO ENERGY APPROACH

building and neighborhood scale

EMBODIED RESOURCE FLOW

- assess life cycle
- prioritize high volume
- avoid high impact

material innovation

- carbon sequestration
- downstream upcycling
- design for disassembly

EMBODIED RESOURCE FLOW

regional and global scale

HEALTHY MATERIALS

- assess exposure & vulnerability
- prioritize high volume
- avoid high impact

holistic human development

- design for inclusion and universal design
- intellectual & vocational resilience
- social, emotional & spiritual resilience

HUMAN HEALTH

building and neighborhood scale

COMMUNITY HEALTH

- food
- education
- healthcare systems

socially just and culturally rich

- community & social context
- economic stability
- neighborhood and physical environment

COMMUNITY HEALTH

building and neighborhood scale

ECOSYSTEM HEALTH

- assess exposure & vulnerability
- assess interconnectedness
- build capacity to reconcile

ecological resilience

- physical and environmental resilience
- financial resilience

ECOSYSTEM HEALTH

regional and global scale

A Framework: how can we better prepare our students for the now, near and far

A framework of FOUR **drivers** for building engaged learning through a better understanding of the need for equitable and resilient 21st century schools and curriculum ?

- learning environments that enable
- responsive building systems
- student empowered learning environments and curricula
- community/not for profits role in operating costs and return-on-investments



US VIRGIN ISLANDS
DEPARTMENT OF EDUCATION (VIDE)
a case study: context, culture, climate, crisis
+ curriculum

Design Solutions: Applying a framework for curricula



socially just,
culturally rich,
healthy and
resilient
community

understanding
vulnerabilities

defining
equity

aligning
VALUES

developing
interventions

- ECOLOGICAL HEALTH
- COMMUNITY HEALTH
- HUMAN HEALTH
- RESOURCE CONSERVATION

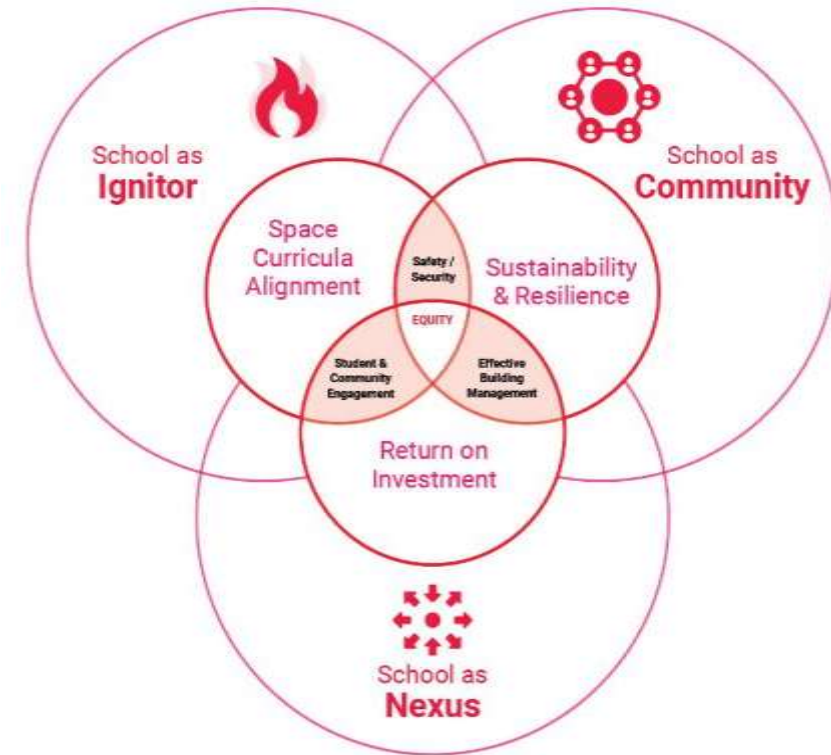


how do we envision a socially just, culturally rich, healthy and resilient community?



Setting the Context: VIDE Schools

-  **Whole Child**
-  **Equity**
-  **Addressing the Needs of All Students & Integrating Technology**
-  **Using Technology to Assess the Impact of Practices**
-  **Health, Safety & Security**
-  **Cultural, Local & Economic Competence and Resilience**
-  **Integrated Design, Assessment, Operation & Management**



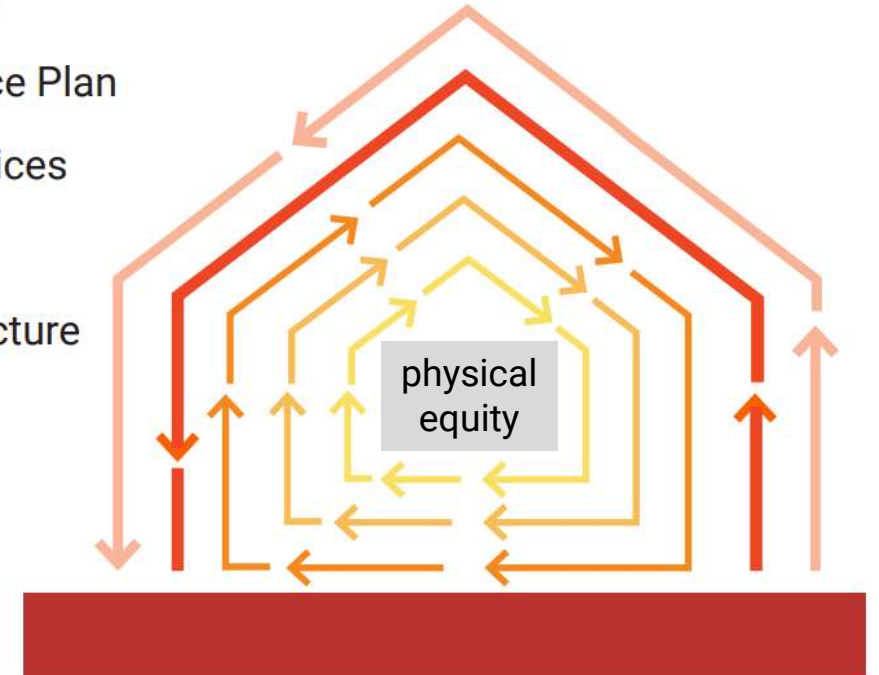
“The Virgin Islands Department of Education embraces ALL students and empowers them to achieve their fullest potential.”

VIDE Vision Statement

Setting the Context: Addressing equity through architecture and curriculum



- 6 Stuff
- 5 Space Plan
- 4 Services
- 3 Skin
- 2 Structure
- 1 Site



¹Original Idea: Architect Frank Duffy, Further Definition: Stewart Brand [How Buildings Learn](#)

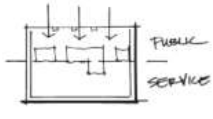
²Shearing Layers

<https://shearinglayers.com/focus/the-very-next-step/>

Setting the Context: A Historic Vernacular



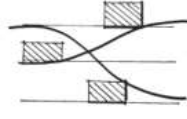
1. Topography & Site Orientation



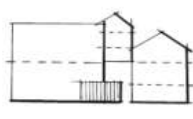
2. A Civic Presence



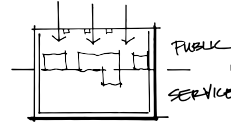
3. An Arrival Sequence



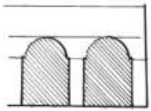
4. Pathways, Patios & Courtyards



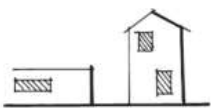
5. Volumes & Forms



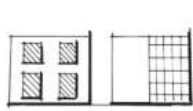
A Civic Presence



6. Solids & Voids



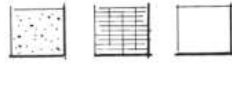
7. Horizontals & Verticals



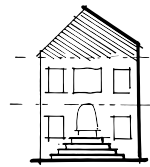
8. Punched Openings, Shutters & Curtain Walls



9. Light & Shadow



10. Scale, Materials, Texture & Color



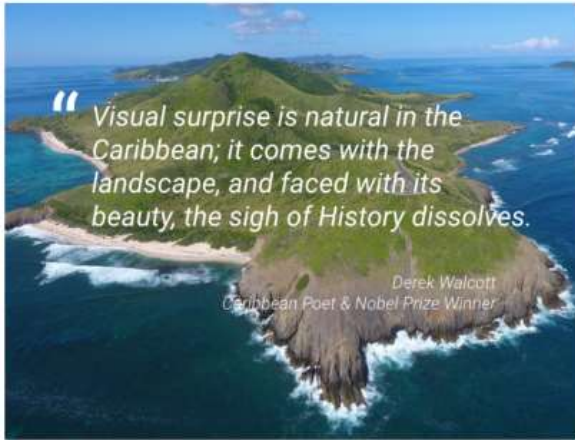
Arrival Sequence



Punched Openings, Shutters & Curtain Walls

Design Solutions: Design Interventions

Colors and textures of St. Croix – Arthur A. Richards PreK-8 School

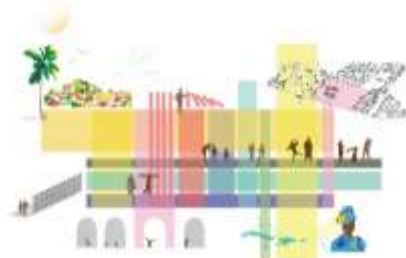


Design Solutions: Design Interventions

Site: Outdoor Learning

Rooted in its place and studied through the user experience.

- 1 Tapestry Walk
- 2 Outdoor Learning Classrooms
- 3 Permaculture Gardens
- 4 Amphitheater/Community Asset
- 5 Outdoor Play



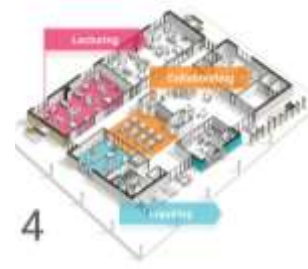
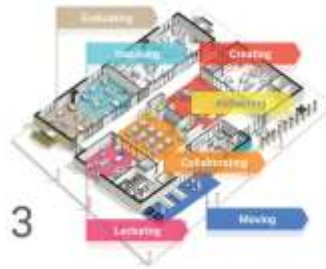
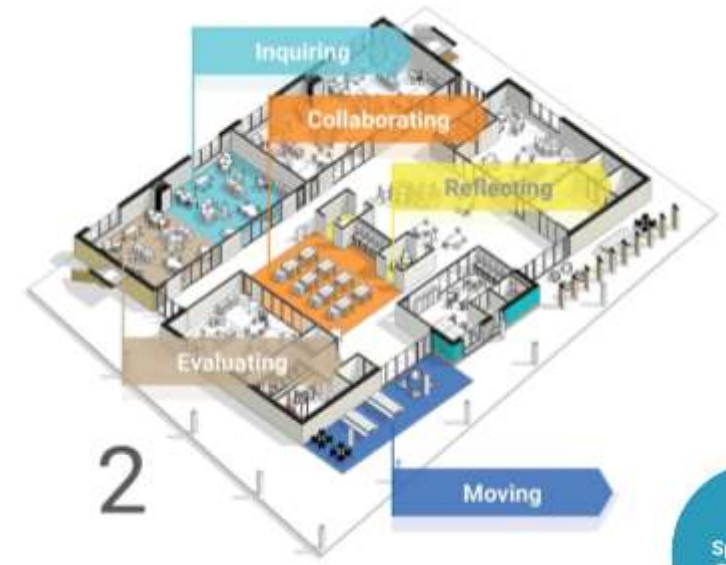
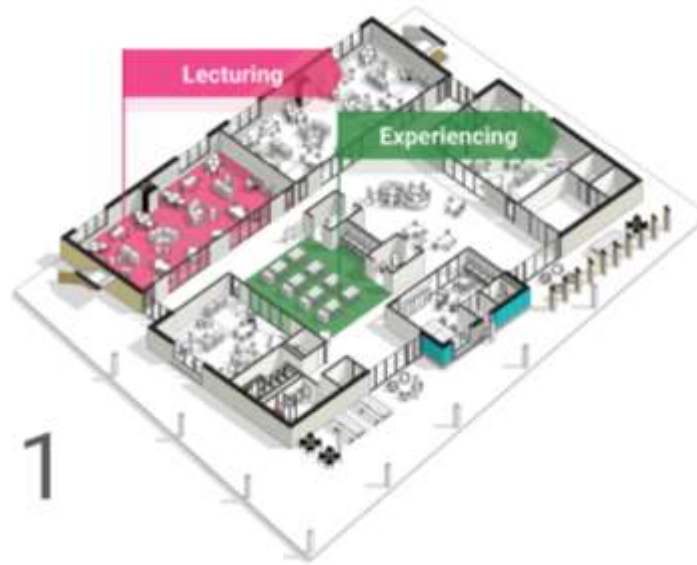
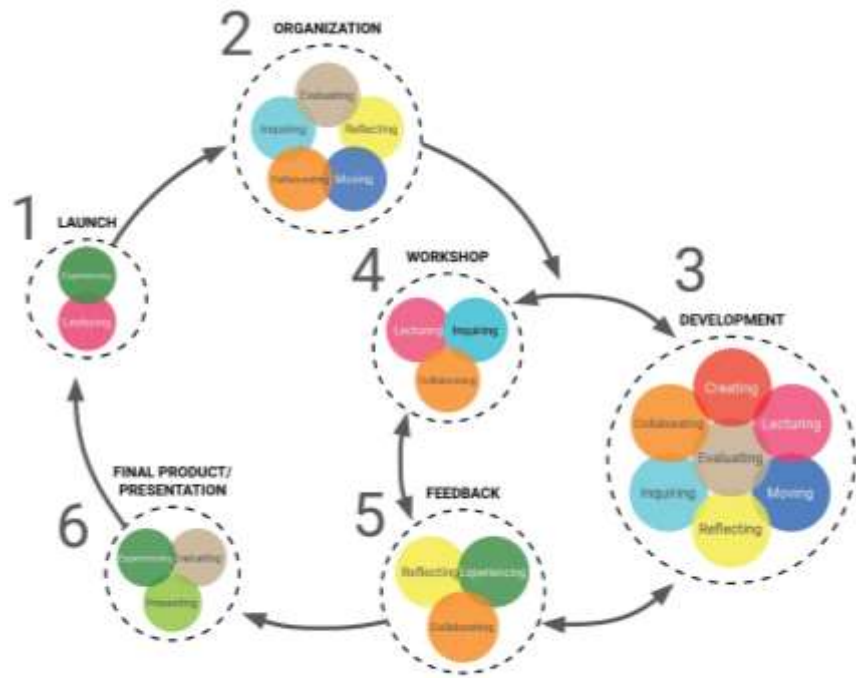
Resiliency and Systems

Health and Comfort

Spaces and Resources

Equity and Inclusion

Design Solutions: Applying a framework for curricula Thru Inquiry-based learning



Spaces and Resources

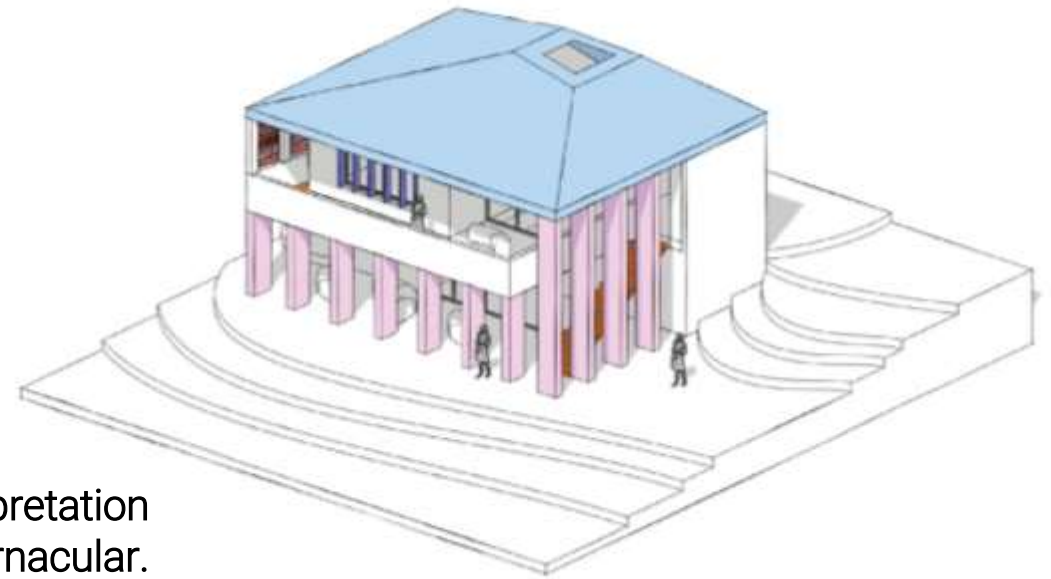
Equity and Inclusion

Design Solutions: Design Interventions

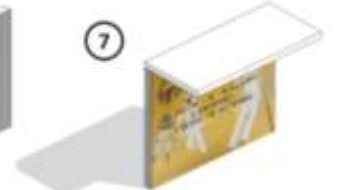
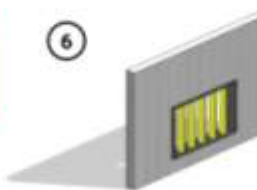
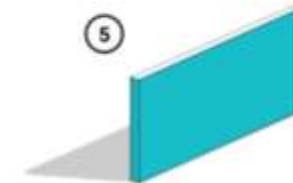
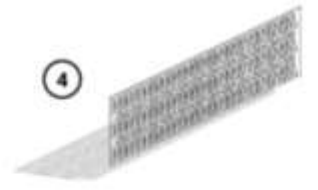
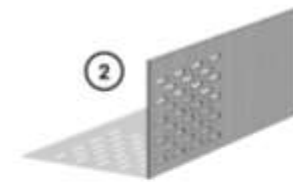
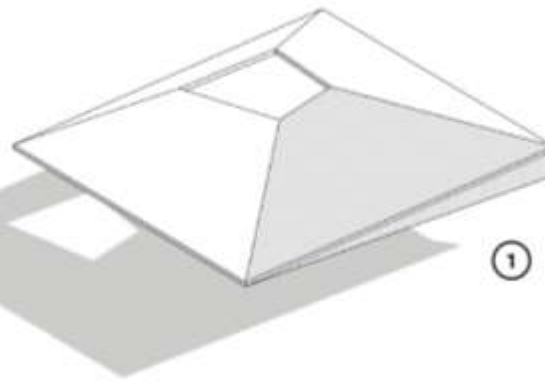
Concept – Kit of Parts

Establishing a kit of parts rooted in the vernacular of the U.S. Virgin Islands:

- 1 Oculus within Traditional Hip Roof
- 2 Breeze Block Patterns
- 3 Brise Soleil Shading Fins
- 4 Perforated Metal Guardrail
- 5 Color Accent
- 6 Punched Opening (With Shading)
- 7 Custom Wall Murals

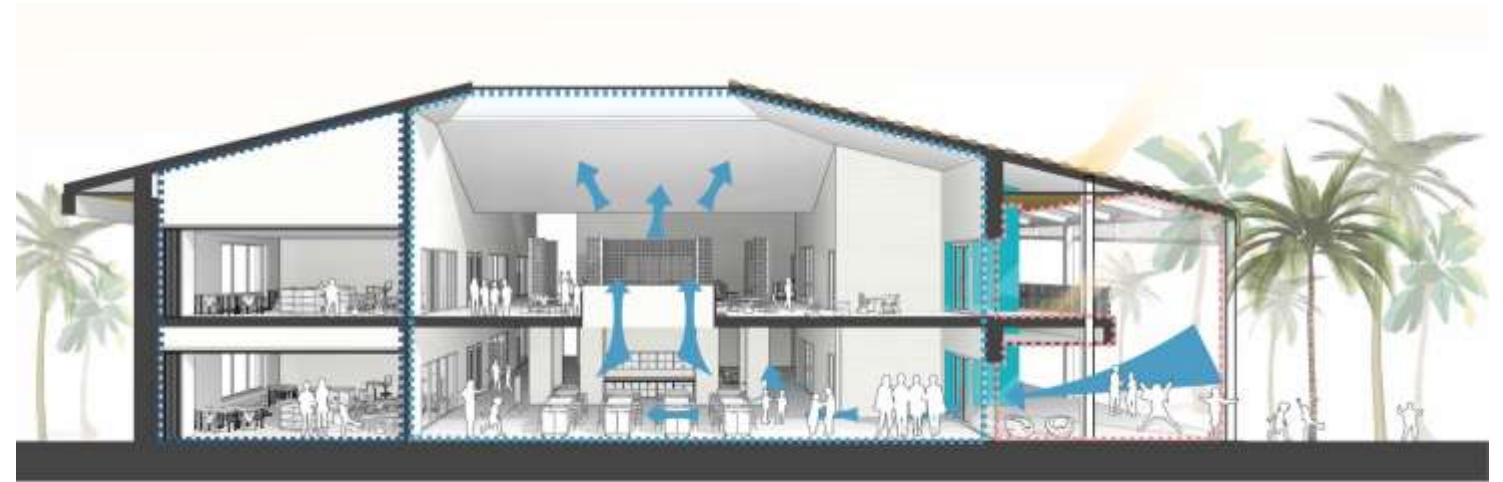
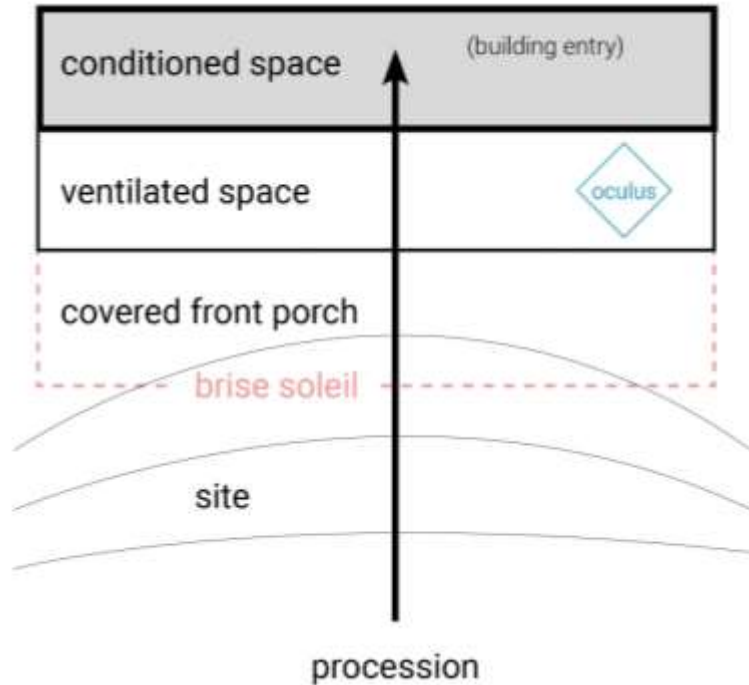


Early design interpretation of architectural vernacular.

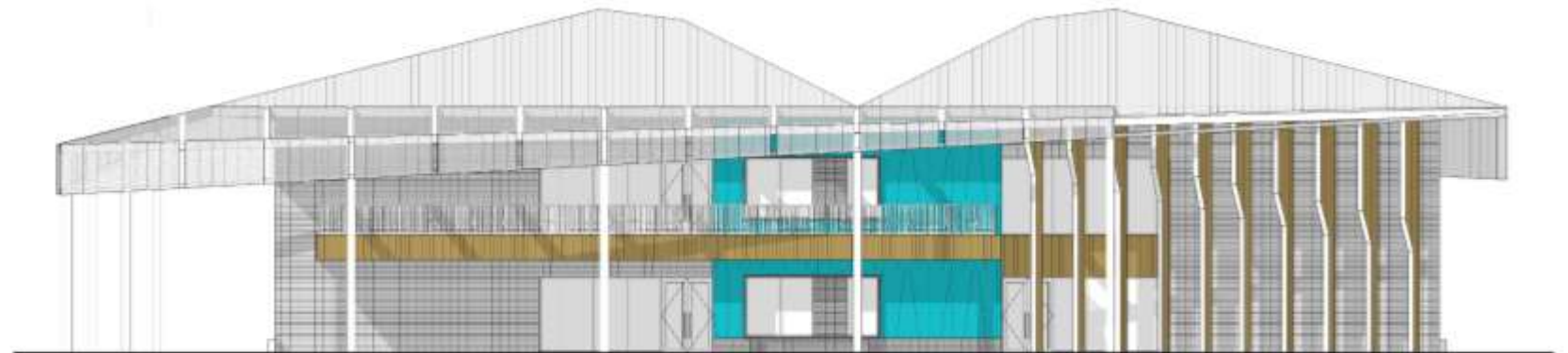


Design Solutions: Design Interventions

Concept – Campus/Building/Program procession experience



K5 Building Elevation



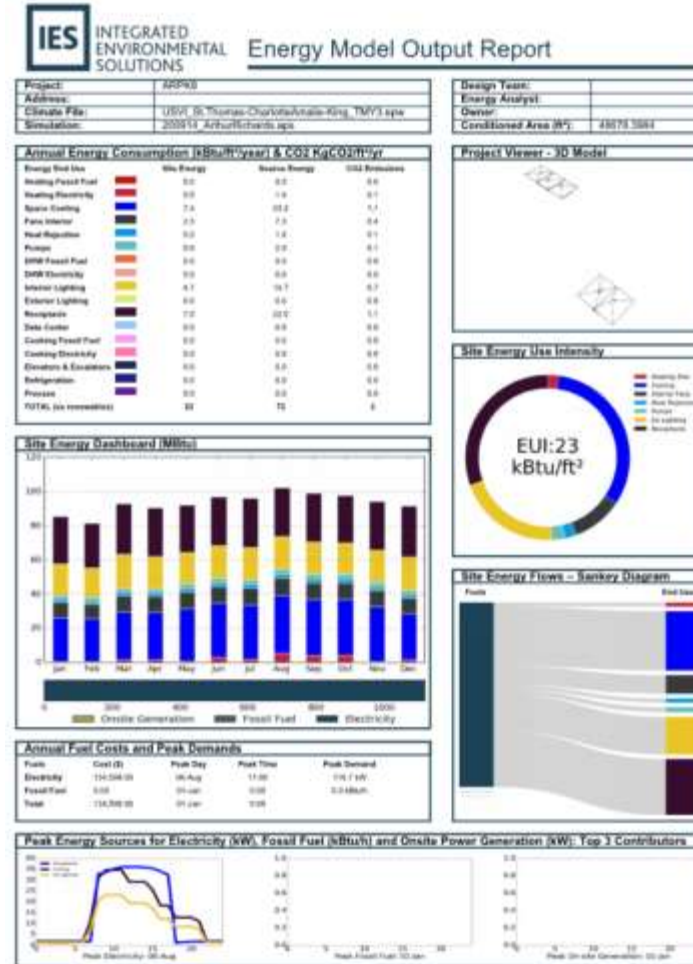
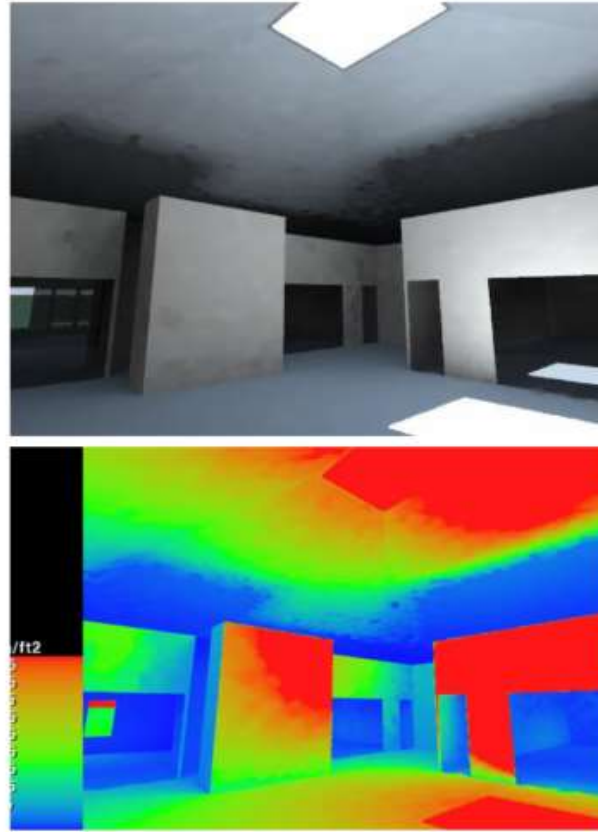
Design Solutions: Design Interventions

Resilient – net-zero energy ready

Summary of Shading and Daylight Summaries:

Detailed shading and daylight studies demonstrate the oculi will allow for 100% daylight spaces in the learning areas.

Below: Shading and daylight study at ARPKB learning suite.
Right: Left: Illuminance in learning suite via oculi.



Resiliency and Systems

Health and Comfort

Design Solutions: Developing a framework for curricula Thru connected networks



10 Ways to Celebrate Parks to Kids Day
Saturday, May 16, 2020

1. Download the list of 10 ways to celebrate parks to kids day
 2. Build your own list
 3. Do the thing: Lights, Camera, Action!
 4. Post a picture
 5. Play Family Fun's Board Game
 6. Make a park drawing
 7. Learn about the story of a tree
 8. Volunteer to help with a park project
 9. Complete a park scavenger hunt
 10. Design a future park
- All activities are available at www.lbstparks.org

KAISER PERMANENTE
THRIVING SCHOOLS
a partnership for healthy students, staff & teachers



THE CENTER FOR GREEN SCHOOLS



IMPROVED QUALITY OF LIFE

NOAA CORAL REEF CONSERVATION PROGRAM

EPA "Tools For Schools" Indoor Air Quality Program

IAQ Design Tools for Schools

ecoRise

RDI RESILIENT DESIGN INSTITUTE

School-Based Social and Emotional Learning Interventions

CLIMATE RESILIENT SCHOOLS

Health and wellness committee initiatives

Facility management protocols for post-disaster clean-up and reentry

EPA School Siting guidelines

School Siting Guidelines

SCHOOL LEVEL

School siting policy adopted by School board

Farm to school lunch program to support local foodshed

High Performance Schools & Healthy School Network, Inc organizations

DISTRICT LEVEL

National initiatives and non-profits that champion healthy schools

Cost sharing funding arrangement to incentivize schools to reduce hazards

REGIONAL/NATIONAL LEVEL

ECO-SCHOOLS

Green Schools National Netw

NATIONAL WILDLIFE FEDERATION

RELi 2.0 Rating Guidelines for Resilient Design + Construction

PEHSU Pediatric Environmental Health Specialty Units

PEHSU post-flooding in school and childcare resources

Weekly local lunch in NYC schools



FEMA Hazard Mitigation Grant Program: 75% costs FEMA, 25% costs non-federal contribution



LIVING COMMUNITY CHALLENGE

The Cloud Institute
Education for Sustainability Framework



International Journal of Environmental Research and Public Health



BILL & MELINDA GATES FOUNDATION

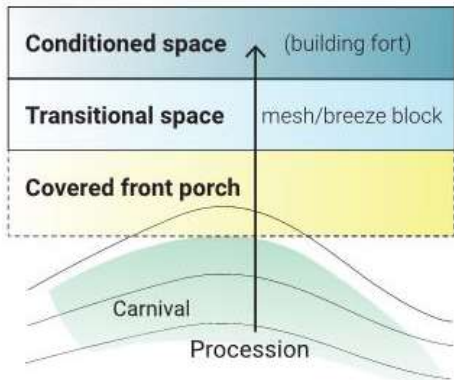


Design Solutions: Design Interventions

Concept – Kit of Parts

campus / building / program procession experience

create defined experience based on vernacular architecture rules. architectural elements to define program / activity types and boundaries.



Conditioned spaces include only the programmed spaces which rely on full climate control. These form the interior 'heart' of learning spaces while the Carnival forms the exterior 'spine' of learning

Transitional spaces are covered within the main building massing which form a gradual connection between fully air conditioned interior spaces to outdoor learning spaces

Transitional spaces are programmed flexible learning environments that allow open connection to the outdoor front porches weather permitting

Covered front porches are located to maximize views and natural trade winds while remaining accessible to all of campus

Deep Overhangs cover the front porches to provide protection from the sun and rain while also creating relief in building massing with views into the transitional spaces

The Carnival forms the exterior 'spine' of campus connecting all building entries via accessible routes and celebrating the unique landscape and culture of the islands.



Resiliency and Systems

Health and Comfort

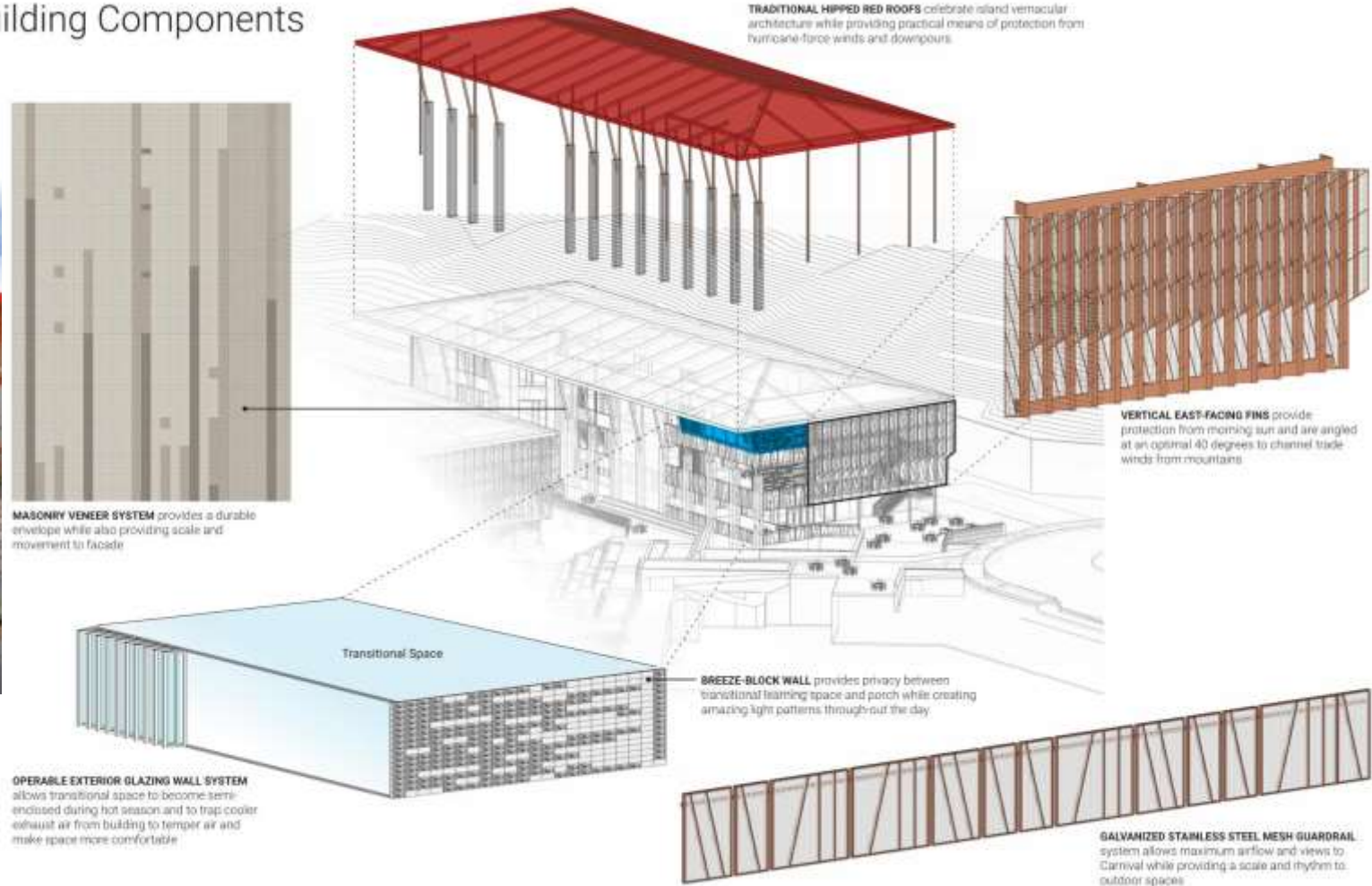
Spaces and Resources

Equity and Inclusion

Design Solutions: Design Interventions

Concept – Kit of Parts

Building Components



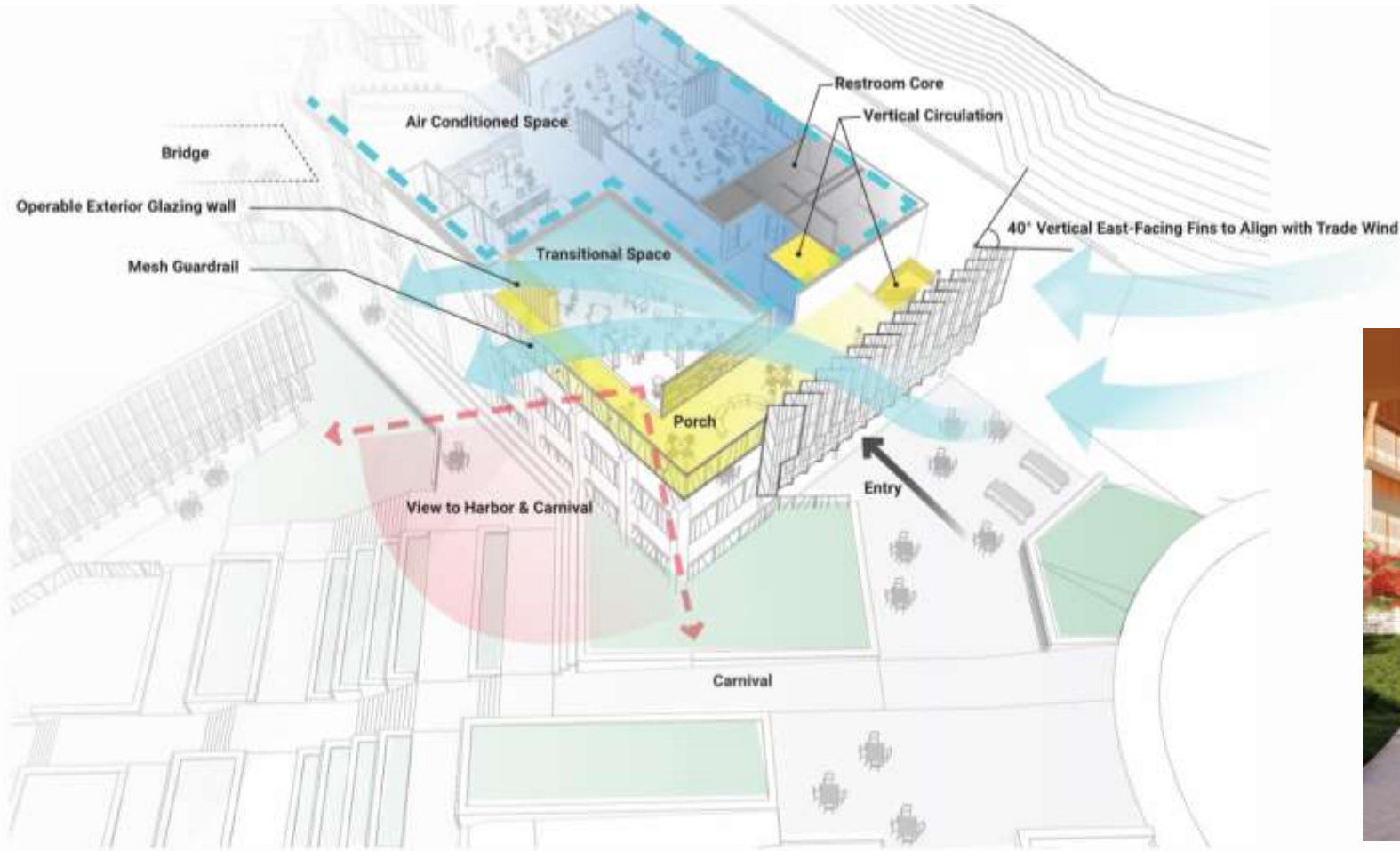
Resiliency and Systems

Health and Comfort

Spaces and Resources

Design Solutions: Design Interventions

Procession – unconditioned to conditioned



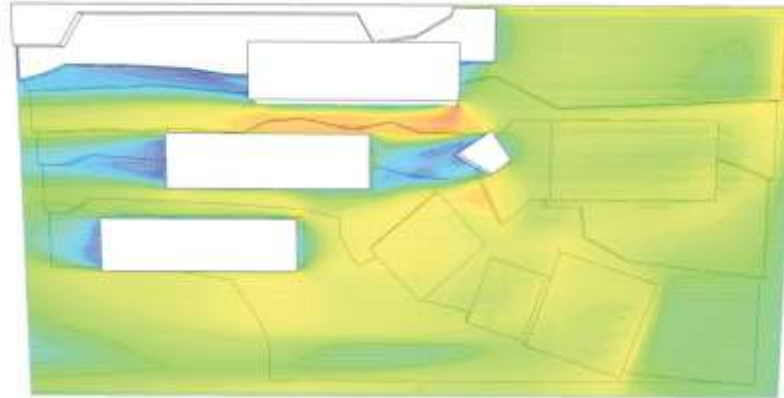
Resiliency and Systems

Health and Comfort

Design Solutions: Design Interventions Procession – unconditioned to conditioned

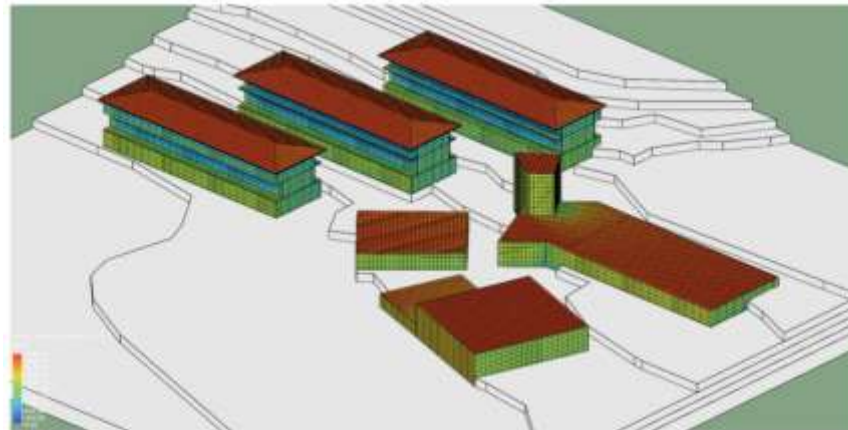


Thermal Comfort Studies



Not to Scale

Solar Shading Studies



Not to Scale

IES INTEGRATED ENVIRONMENTAL SOLUTIONS Energy Model Output Report

Project: Charlotte Annals High School
Address: USVI, St. Thomas-Charlotte Annals King, TMY3.apx
Climate File: USVI-St.Thomas-CharlotteAnnals.apx
Simulation:

Design Team:
Energy Analyst:
Owner: VICE
Conditioned Area (ft²): 233171.6734

Annual Energy Consumption (kBtu/ft²/year) & CO2 Kg/CO2/ft²/yr

Energy End Use	Site Energy	Source Energy	CO2 Emissions
Heating Fossil Fuel	0.0	0.0	0.0
Heating Electricity	0.0	3.8	0.1
Space Cooling	12.2	38.4	1.8
Fans Interior	2.8	8.8	0.4
Heat Rejection	0.8	2.8	0.1
Pumps	1.0	0.0	0.0
DHW Fossil Fuel	0.0	0.0	0.0
DHW Electricity	0.0	2.8	0.1
Interior Lighting	5.2	16.5	0.8
Exterior Lighting	0.5	0.0	0.0
Receptacles	0.2	0.0	0.0
Data Center	0.0	0.0	0.0
Cooking Fossil Fuel	0.0	0.0	0.0
Cooking Electricity	1.9	0.7	0.0
Refrigeration & Freezers	0.0	0.0	0.0
Refrigeration	0.0	0.0	0.0
Process	0.0	0.0	0.0
TOTAL (as normalized)	31	96	4

Project Viewer - 3D Model

Site Energy Use Intensity

EUI: 31 kBtu/ft²

Site Energy Dashboard (MWh)

Annual Fuel Costs and Peak Demands

Fuels	Cost (\$)	Peak Day	Peak Flow	Peak Demand
Electricity	\$62,881.00	10-Jun	12.02	700.1 kW
Fossil Fuel	\$0.0	31-Jan	0.0	0.0 MMBtu/h
Total	\$62,881.00	01-Jan	0.00	

Peak Energy Sources for Electricity (kW), Fossil Fuel (MMBtu/h) and Onsite Power Generation (kW). Top 3 Contributors

Resiliency and Systems

Health and Comfort

Applied Learning: Career Technical Education

Enhanced Career Preparedness in the VI: Potential Pathways for All Students

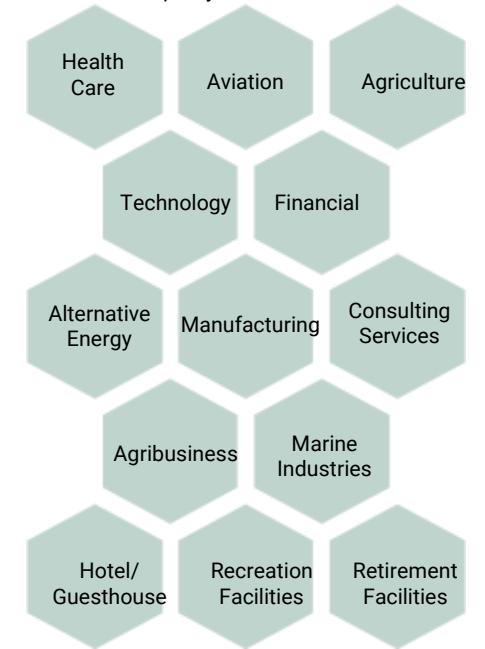
- **Business Services**
Entrepreneurship
- **IT & STEAM**
- **Infrastructure Engineering**
Carpentry, Masonry, HVAC, Electrical
- **Energy & Industrial Technology**
Energy, Renewables, Agriculture
- **Hospitality & Tourism**
Culinary, Hotel Management, Eco Tourism
- **Health & Wellness**
CNA, Behavioral, Cosmetology
- **Welding Technologies**
- **Education**
- **Performing Arts**



Industries in the US Virgin Islands



A Place of Promise, Opportunity and Prosperity



Pathways and Curriculum



Advanced
Manufacturing



Business
Services



Infrastructure
Engineering



I.T. and STEAM



Hospitality and
Tourism



Health and Wellness



Transportation
(Automotive)



Transportation
(Aviation)



Design Solutions: Design Interventions

The Colors and textures of St. John – Sprauve PreK-12



New Build Recommendation: St. John Sprauve Prek-12

New Building 108,463 SF

New Capacity 460 Students (Additional 331)



GOAL- To create a learner centered, inquiry based, future ready school that is off the grid and can support its own needs for energy, water, fire protection and sewage while maintaining as much of the natural environment as possible and touching lightly upon the land so as not to disrupt the native ecology and hydrology.





K-4

Drivers of the Need: for social and emotional resiliency in the Virgin Islands



hurricanes

earthquakes

droughts

crisis

2020 IBC special wind zones

bi-partisan budget act



vernacular architecture

innovative use of natural light

creation of mini-eco systems

introduction of passive systems

architecture that enables

outdoor learning places

definition of FEMA industry standards



building systems

thermal envelope that is mold resistant

net zero ready

cisterns

photo voltaic

building systems dashboard

mildew and mold



curricula

food and water as a resource

water resource institute, uvi

storm strong program, uvi



marine + environmental studies, uvi



community

an engaging master plan process

501c's

FEMA Shelter

CTE/industry partners

A Framework: How can we better prepare our students for the now, near and far



- ECOLOGICAL HEALTH
- COMMUNITY HEALTH
- HUMAN HEALTH
- RESOURCE CONSERVATION

NET ZERO WATER APPROACH	EMBODIED RESOURCE FLOW	HEALTHY MATERIALS	COMMUNITY HEALTH	ECOSYSTEM HEALTH
respect hydrology reduce need assess quality clarify perception localize closed loop address demand	assess life cycle prioritize high volume avoid high impact	assess exposure & vulnerability prioritize high volume avoid high impact	food education healthcare systems	assess exposure & vulnerability assess interconnectedness build capacity to reconcile
generation and delivery of energy and water	material innovation	holistic human development	socially just and culturally rich	ecological resilience
renewables and storage demand and controls HVAC systems lighting envelope programming	carbon sequestration downstream upcycling design for disassembly	design for inclusion and universal design intellectual & vocational resilience social, emotional & spiritual resilience	community & social context economic stability neighborhood and physical environment	physical and environmental resilience financial resilience
NET ZERO ENERGY APPROACH	EMBODIED RESOURCE FLOW	HUMAN HEALTH	COMMUNITY HEALTH	ECOSYSTEM HEALTH
building and neighborhood scale	regional and global scale	building and neighborhood scale	building and neighborhood scale	regional and global scale

Drivers of the Need: for social and emotional resiliency

Alabama

Alaska

California

Colorado

Connecticut

DODEA

Florida

Georgia

Idaho

Iowa

Maine

Massachusetts



crisis



architecture that enables



building Systems



curricula



community engagement

Drivers of the Need: For social and emotional resiliency

Maryland N. Dakota New Hamp. New Jersey New Mexico Ohio Oregon Rhode Island USVI Vermont Washington Other



crisis



architecture that enables



building Systems



curricula



community engagement

Policy and Practice: Resiliency for social and emotional resilience

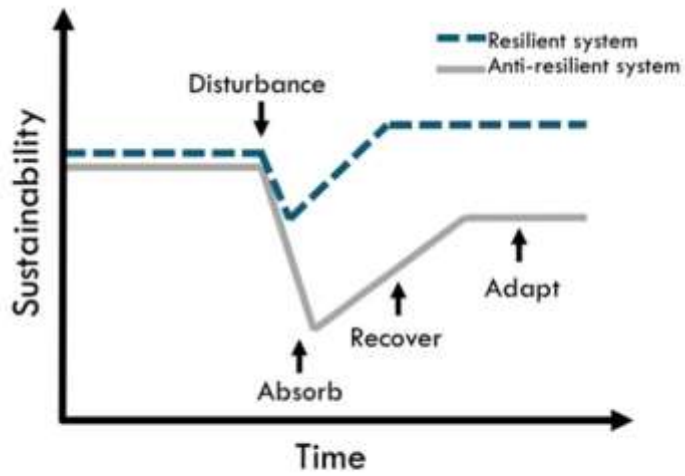


Fig. 1. Resilience as a component of sustainability. Proponents of this organization structure assert that systems that are more resilient can better achieve and maintain sustainable operation.

people



buildings



businesses



infrastructure



reTHINKING
K-12 EDUCATION



pandemic

hurricanes

fires

tsunami

landslides

volcanos