



WILMINGTON PUBLIC SCHOOLS

Wildwood Early Childhood Center Project

School Building Committee Meeting #27

January 29, 2025



smma **dw**
DORE & WHITTIER



Massachusetts School Building Authority



Agenda

1. Call to Order
2. Approval of Minutes
3. Design Update
 - Site Plan
 - Floor Plans
 - Project Aesthetics
 - Building Systems Update
4. CM at Risk Update
5. Working Group Updates
 - Public Relations WG
 - Sustainability WG
 - Site / Landscape Working Group
6. Discussion/Correspondence/New Items
7. Committee Questions
8. Public Comments
9. Next Meeting: Wednesday Feb 5, 2025
10. Adjourn

Approval of Minutes



FOR APPROVAL

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SMMA
1000 Massachusetts Ave.
Cambridge, MA 02138

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Minutes

Project Name:Wilmington Wildwood Early Childhood Center

Project Number:22127

RE:School Building Committee

Meeting Date:12/17/2024

Prepared by:Sarah A. Tranter

Meeting No:25

Location:Hybrid In-Person at Wilmington High School,
159 Church Street, Wilmington, and
Remote Participation via Zoom

(recorded posted on Wildwood Building Project website, WCTV and YouTube)

Distribution:School Building Committee

Attendees

Wildwood School Building Committee

Doree M. Allan
Absent
Gregory B. Beisdel
Present
Kate Bissell
Present
Dr. Glenn Brand, Chair
Present
Kevin A. Carly
Absent
Michael Connolly
Remote
Justin Gace
Present
Marianne Gelfozz
Present
Nicholas Golden
Remote
Christine Hubertson
Absent
John C. Hultway
Absent

Deirdre Kelley
Present
Craig Miner
Present
Christine Murray
Absent
Justin O'Connell
Absent
Christine Prendergast
Present
Paul J. Melaragni
Present
David A. Ragdale
Present
Paul Ruggiero
Present
Stacey Scott
Present
R. Eric Siegel
Present
Stephen Turner
Present
Vivien Varbedian, Vice Chair
Remote

SMMA OPM

Rick Linder, Director OPM Services and
Project Manager
Sarah Tranter, Assistant Project Manager

Dore-Whittier Architects

Lois P. Dink, Principal Designer
Roni Philip, Project Manager

Item No.	Action	Discussion
25.01	Record	Chair, Glenn Brand, called the meeting to order at 6:34 PM. Roll Call of the School Building Committee was performed to account for all of those who are present through remote participation on Zoom. The attendance based on the roll call can be found on page 1 of these minutes. The majority were present in person with a handful of members through remote access on Zoom Webinar. Remote and absent members are noted above.
25.02	Record	Approval of Minutes G. Brand advised that the draft minutes of the December 17, 2024 School Building Committee Meeting were distributed for review and approval. - D. Allan advised that she was not present for the December 17, 2024 School Building Committee Meeting, minutes will be corrected. V. Varbedian motioned to approve the revised meeting minutes from the December 17, 2024 School Building

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Discussion

Committee meeting, with a second motion by S. Turner.

- **Approval of Minutes Roll Call Vote:** Affirmatively responded, passed unanimously. D. Allan, J. O'Connell and D. Ragdale abstained due to absence from meeting.

Approval of Invoices

A. Leduc advised that there are two Warrants for approval, Warrant 20A in the amount of \$3,750 for SMMA's Basic OPM Services - Schematic Design and Warrant 20B for the total of \$95,054.50 that includes invoices for Dore-Whittier Architect's Architectural Design Services - Schematic Design in the amount of \$53,900, Site Survey Services under Designer Amendment No. 3 in the amount of \$5,087.50, Geotechnical Engineering Services under Designer Amendment No. 3 in the amount of \$22,242.00 and Traffic Study Services under Designer Amendment No. 3 in the amount of \$13,200 and Reimbursement to Michael Camoscio for Payment of Printing, Cutting and Shrink Wrapped Flyers for the Water Bill Inserts which was approved by the Town Leadership for distribution and produced in color by Shawshen Valley Technical High School for \$625.00.

- D. Kelley motioned to approve both Warrant 20A and Warrant 20B on behalf of the Finance Working Group having met prior to the meeting to review these invoices. Motion seconded by S. Turner.

- P. Melaragni noted that he was not comfortable with this payment being made by a Committee Member to Shawshen Valley Technical High School as a check should have been cut from another entity to issue payment.

- **Approval of Invoices Roll Call Vote:** Affirmatively responded, passed unanimously.

Design Update

R. Philip provided Floor Plan update to the School Building Committee relating Teacher Collaboration Spaces moving to a centralized location on each floor for larger space while moving art classroom to third floor. 2 Staff additions in literacy and administrative coordination. Reduction of wellness rooms to 1 per floor due to their being non-reimbursable by the MSBA.

- Floor plan and some changes to center corridor with teacher collaboration spaces and flexible art classroom near STEM classroom so Health classroom was moved adjacent to the stair. Still are making smaller changes.

- D. Allan asked about staffing at Town Hall that are not moving from Town Hall to the schools. They are staying the same.

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Discussion

- R. Philip walked through the Design Aesthetics and the inspiration being to connect back to the Wilmington community through the Baldwin Apple Tree which dates back to 1740 with its sprawling branches providing shelter and shade.

- **Aesthetics - Stages of Growth**

- Roots = Strong Foundation
- Trunk = Pillar of Learning
- Branches = Canopy of Growth
- Leaves = Individual Potential
- Shade = A place for all to experience shade, light and unity

- R. Philip walked through the massing of the building including the large gathering places for students to gather. Displayed the precedent images that were opened upon by the SBC during prior sessions reviewing the interior and exterior precedents for characteristics that appealed and were desired for the new school.

- D. Kelley mentioned Wilmington has a more classic look and the wood did not strike as what represents Wilmington and asked Dore-Whittier if the wood will stand the test of time since the District keeps its schools for more than 50 years. L. Dore advised that the wood that has been used on prior school projects is designed to weather over time. Others mentioned that the wood appeared like construction staging. There are concerns about the wood and longevity and P. Melaragni has concerns about potential vandalism where the wood can be carved into and ruin the design intent. D. Allan does not like the wood columns. Looks too modern. A uniform brick along both is preferred with some random blue with a ribbon along the top which is the Wildcat's color.
- C. Prendergast advised that Team Timber enjoys that natural material of the wood in the portico, canopy and its very functional but also is aware of the maintenance. The canopy aesthetics and on the facade of the building it needs to look like an elementary school and not like a high school or higher.
- Canopies lowered reduces the amount of light that is brought into the school. Area over the lobby is the library which will be opened up for more use. The height of the canopy will be

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Discussion

modified so it feels like a smaller building to the students coming in.

- N. Golden advised that the design appears comforting.
- S. Turner likes the overhangs to be added with materials holding up the overhang/canopy.

Construction Management at Risk

Virtual walkthrough of the project was conducted with the Construction Management firms that were planning on submitting their qualifications.

There were 7 submissions from the firms of Connors Builders, Consigli Construction, Dimeo Construction, Fontaine Bros., Gilbane Building Company, Shawmut Design & Construction, and W.T. Rich Company.

The CM Prequalification and Selection Working Group reviewed their qualifications to formulate the shortlist that will be invited to submit proposals and interview.

- Interviews will be conducted the week of February 10, 2025.
- The shortlist has been made: Consigli Construction, Fontaine Bros., Shawmut Design & Construction, and W.T. Rich Company.

This committee appreciates all of the firms and their efforts that made their firms credentials stand out. The Procurement Officer can distribute the qualifications to the SBC as requested when they are available.

- Feedback will be provided and recommended to the SBC at the meeting that will be scheduled virtually for February 13, 2025.
- The interviews are recorded and not open to the public.
- E. Siegel will consult with Town Counsel if the interviews must be a posted meeting of the SBC. A transparent process is desired. The SBC vote will be conducted and recorded by WCTV.
- Videos of the interviews occurring will be provided to the SBC members for their review and reference to assist in their providing a vote. These will be shared on February 12, 2025.
- The CM interviews will be conducted in Town Hall, Room 9.

This CM decision is an important one as the CM needs to be onboard to understand and have knowledge of the assumed materials that will be utilized on the project to help set the budget, set in motion any advance procurement that needs to occur and ensure they get the most amount of information to this Committee, MSBA and the Town of Wilmington to set the budget for the project that will be what the Town will vote upon at Town Meeting and Ballot Vote in September 2025.

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Discussion

- N. Golden made motion to approve the 4 Construction Managers that were recommended as the shortlisted firms by the Construction Manager at Risk Prequalification and Selection Working Group and D. Ragdale seconded the motion.
- C. Miner abstained from voting. S. Turner had left the meeting and did not participate in roll call.
- Approval of CM Firm Shortlist Roll Call Vote: Affirmatively responded, passed unanimously.

Working Group Updates

- Public Relations Working Group** Flyer water bill mailers went to the Town for distribution, after approval by the Leadership Working Group. Shawshen Valley Tech for produced, see invoice in Warrant 20B. Flyer will be further shared with outreach to school and community groups. Outreach will be initiated with PAWS and PAC to provide information and other activities to provide informational updates on the project.
- M. Gelfozz asked that a copy of the water bill flyer be sent to the SBC after the meeting. This was sent on 12/18/2025 by S. Tranter and resent by V. Varbedian during the meeting to refresh in email.
- Sustainability Working Group** - Life Cost Analysis will be ready within the next 2 week and will be explained in greater detail in a conversation for this working group for boilers and building systems. D. Kelley would like to hear more and have more explained to the SBC about the options with respect to Geothermal so there is a better understanding of how it compares with the others and what will best benefit this school and the community once it is built and be able to be maintained by the Town. A lot of decisions are being made in this SD phase and within the next 4 weeks heating and cooling system will need to be selected or get closer to being nailed down once there is a greater understanding.
- Geothermal System is most expensive and being priced to cover all systems right now as of the 4 options it costs the most. Pricing for each of the systems in the SD phase will be compared back to the pricing obtained in the PSR phase.
- Picking the system is important.
- How much cost upfront and how much is the Return on Investment (ROI)?

Discussion

- Site and Landscape Working Group** - Went through discussion points for the site plans and working through ideas.

Public Comments

- Haley Stewart attended the meeting and encouraged having children at Town Meeting as it would be ideal so parents can participate fully without distraction. Lots of great ideas to share and enthusiasm in support of the project and would like to join in outreach to the community. G. Brand will connect H. Stewart with the appropriate people she will need to connect with.

Discussion and Committee Questions

- PreConstruction Services, the CMs are going to get the estimating for the systems based on the fee set. In the interim, they will use the most expensive of the 4 heating/cooling systems as the placeholder for the cost.
- PSR estimate had geothermal in it.
- Abutters Meeting will be at North Intermediate School on January 29, 2025 at 6pm immediately before the SBC Meeting at 7pm in the Cafeteria and will be important to listen to the surrounding community and their concerns and thoughts regarding the new school. Mailing will be distributed to abutters inviting them to the Abutters Meeting.
- Town Meeting will be held on Saturday, September 13, 2025
- Ballot Vote will be Tuesday, September 16, 2025.

Correspondence

- None

Next Meeting: January 29, 2024 at 7:00pm
North Intermediate School Cafeteria and Remote Participation via Zoom

Adjourn

G. Brand thanked the committee for their efforts and invited a motion to adjourn.

- N. Golden motioned to adjourn. C. Prendergast seconded the motion. Roll call vote, motion carried by unanimous vote.

understanding reached. Please contact the author if you have any of these Project Minutes.

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Design Update



Site Plan Update

- 1** ACCESSIBLE PATH
MOTOR CORTEX (PHYSICAL)
CIRCUITOUS CAMPUS PATH
CONNECTING PROGRAMS



- 2A** OPEN PLAY
MOTOR CORTEX (PHYSICAL)



- 2B** ACTIVE PLAY: PLAYGROUND
MOTOR CORTEX (PHYSICAL)



- 3** RAISED GARDEN BEDS
SENSORY CORTEX



- 4** SENSORY GARDEN: EDUCATIONAL
SENSORY CORTEX
STORMWATER MITIGATION
HANDS-ON OBSERVATION



- 5** OUTDOOR CLASSROOM / INTERACTIVE /
PASSIVE / INCLUSIVE
FRONTAL CORTEX



- 6** OUTDOOR DISCOVERY LAB
SENSORY CORTEX

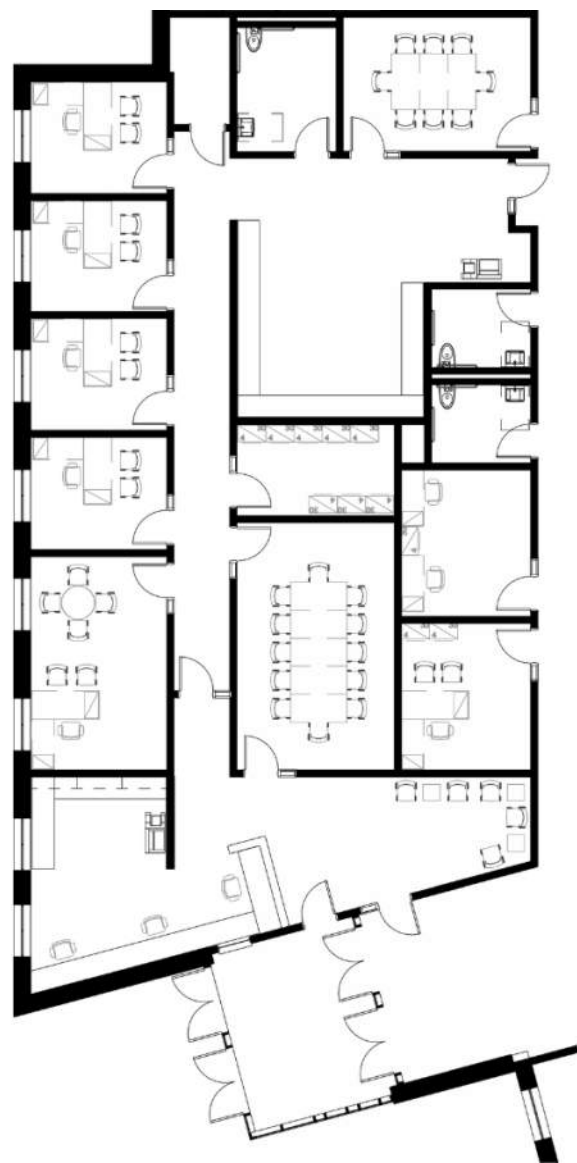
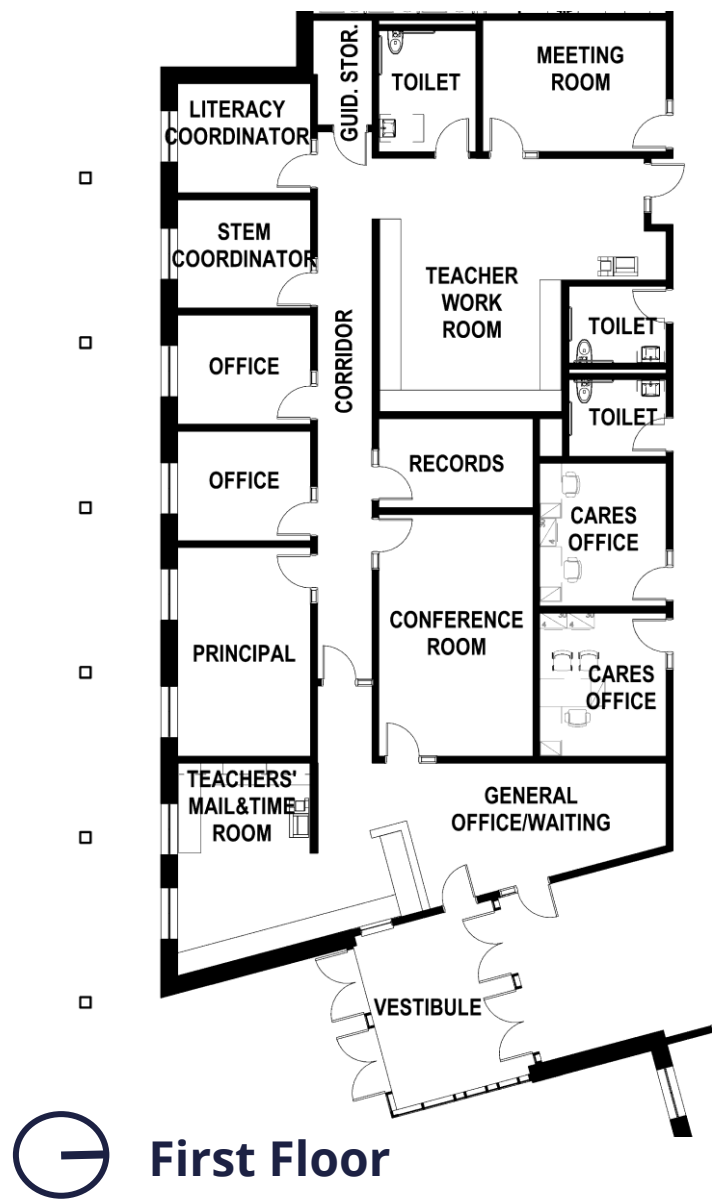


- 7** DINING & GATHERING
SOCIAL / EMOTIONAL / INTERACTIVE

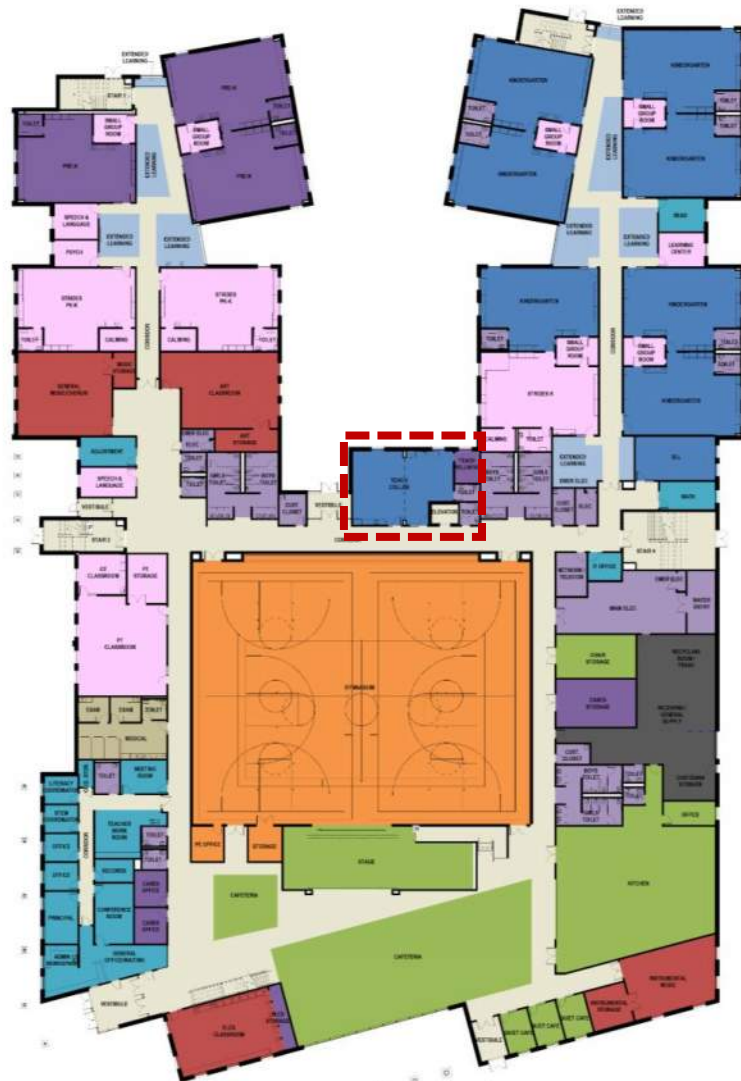


Floor Plan Update

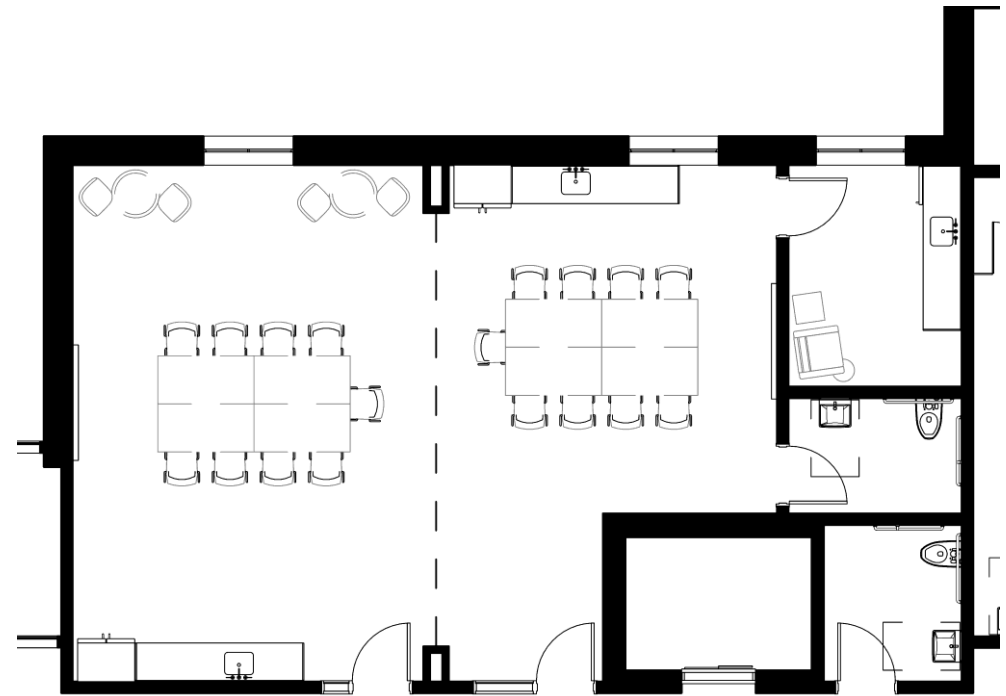
Floor Plan Review: Administration Suite



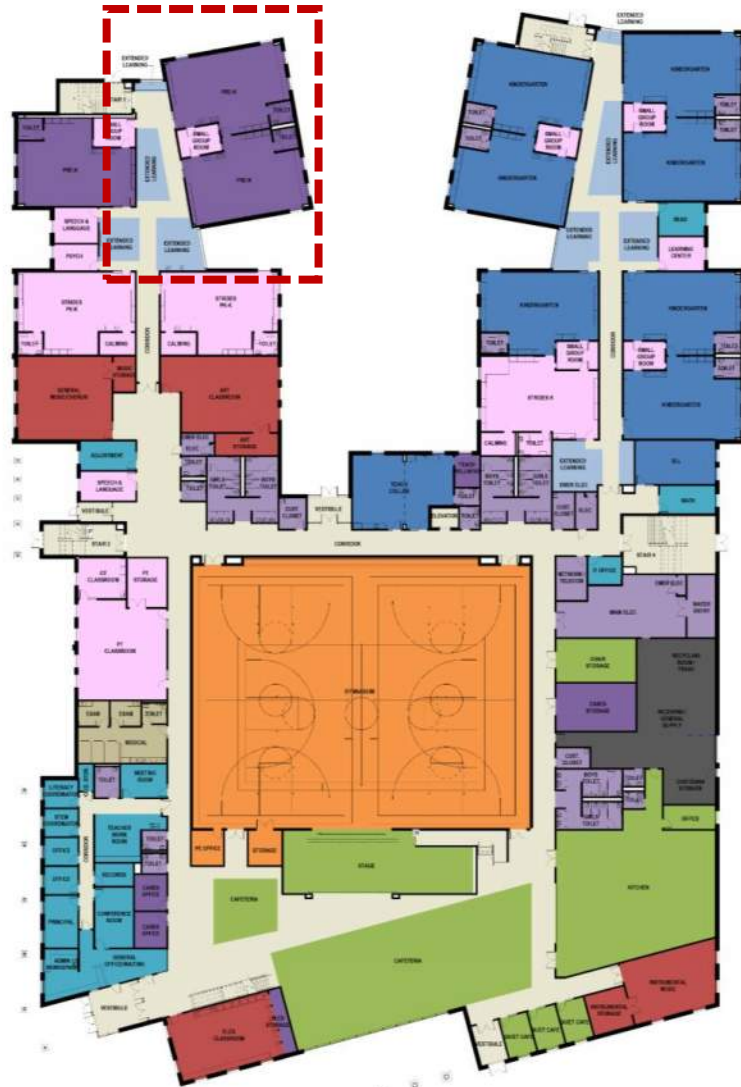
Floor Plan Review: Teacher Collaboration



First Floor



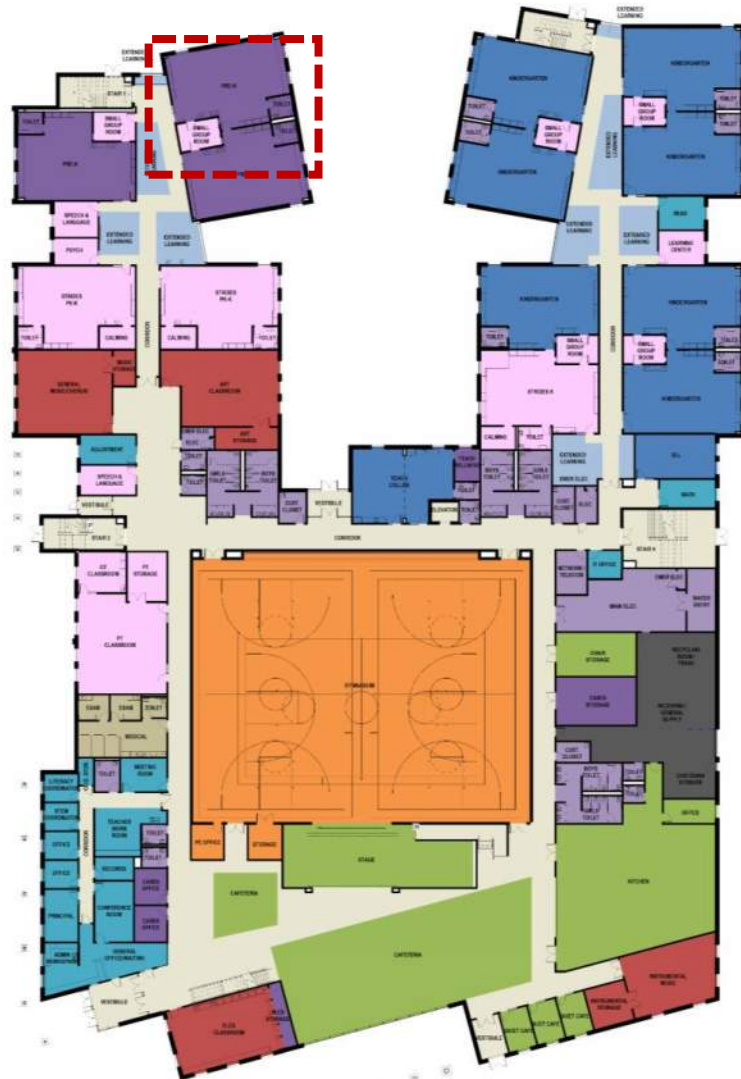
Floor Plan Review: PreK Wing



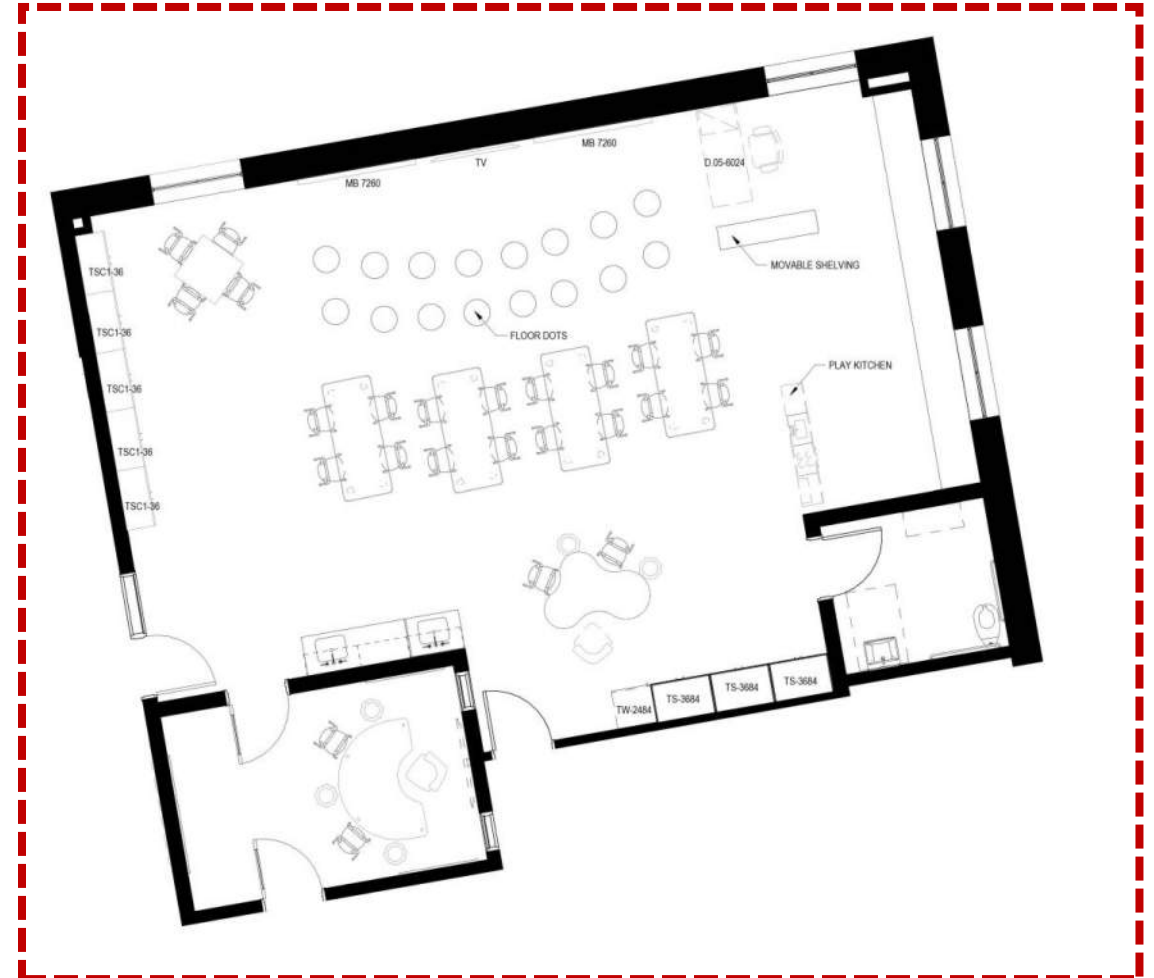
First Floor



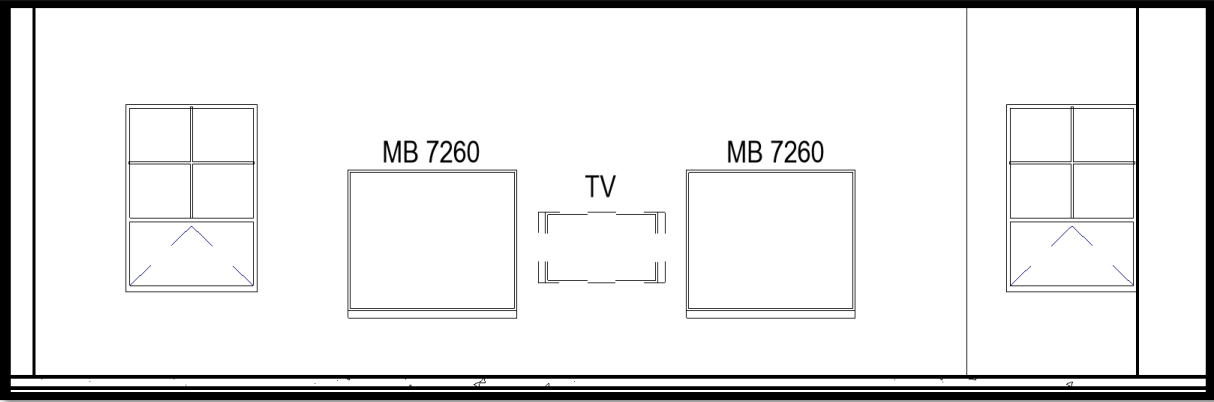
Floor Plan Review: PreK Classroom



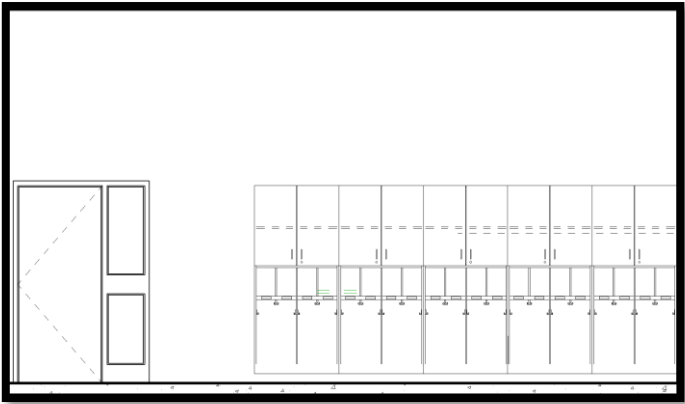
First Floor



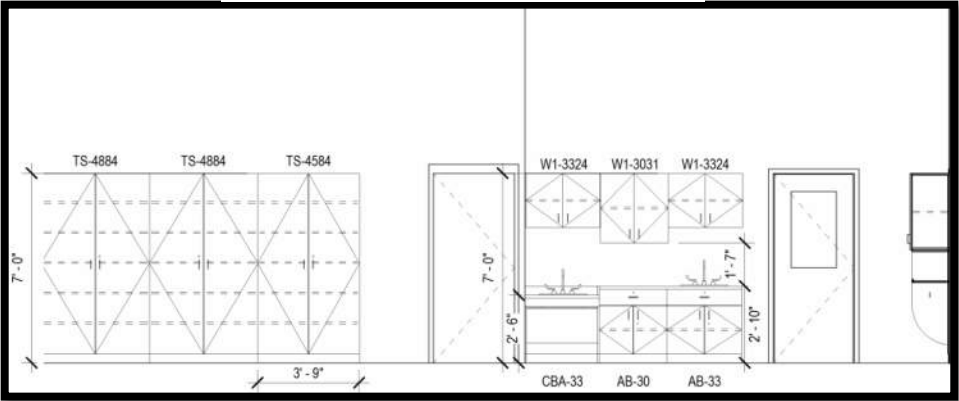
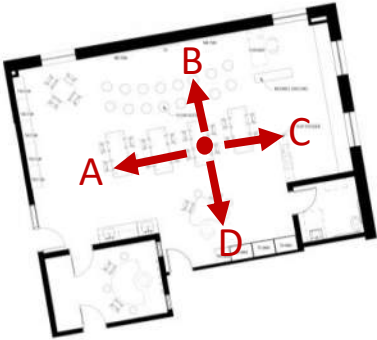
Floor Plan Review: PreK Classroom



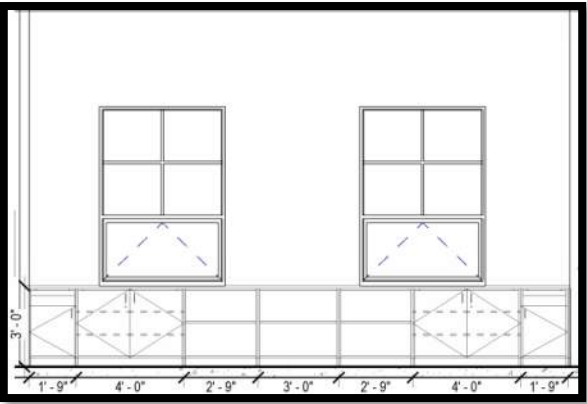
B



A



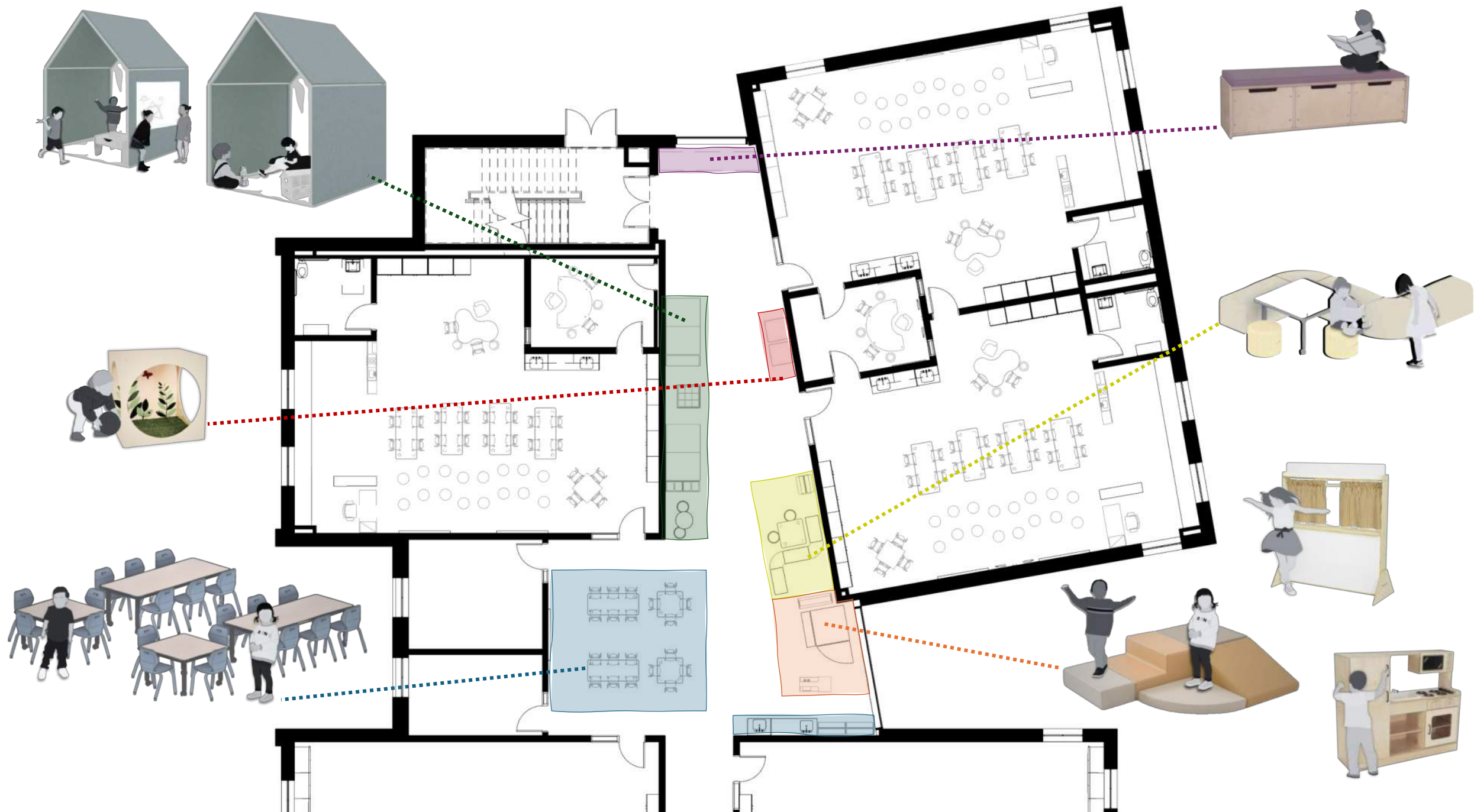
D



C

Extended Learning Area

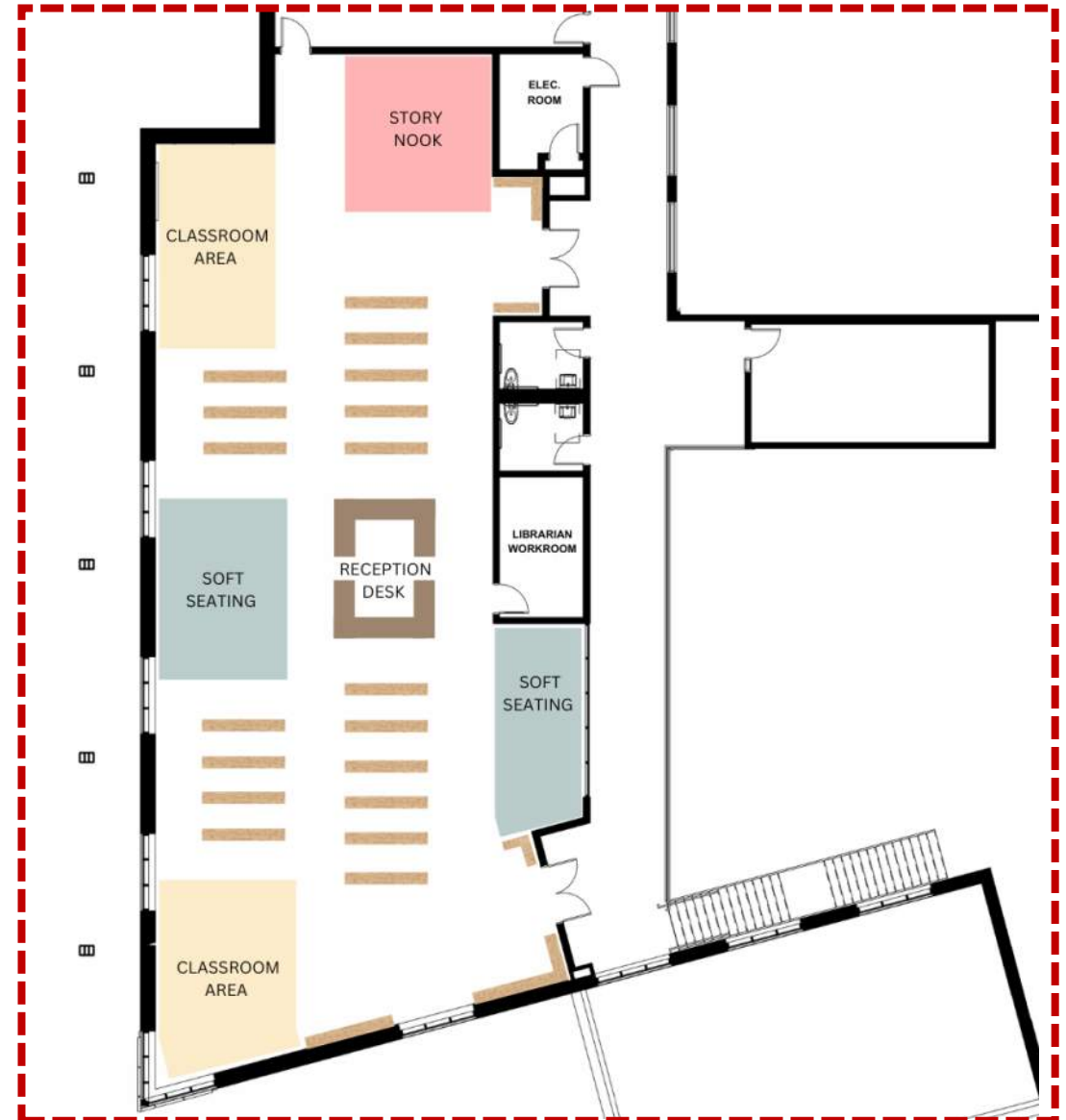




Floor Plan Review: Media Center / Library



Second Floor

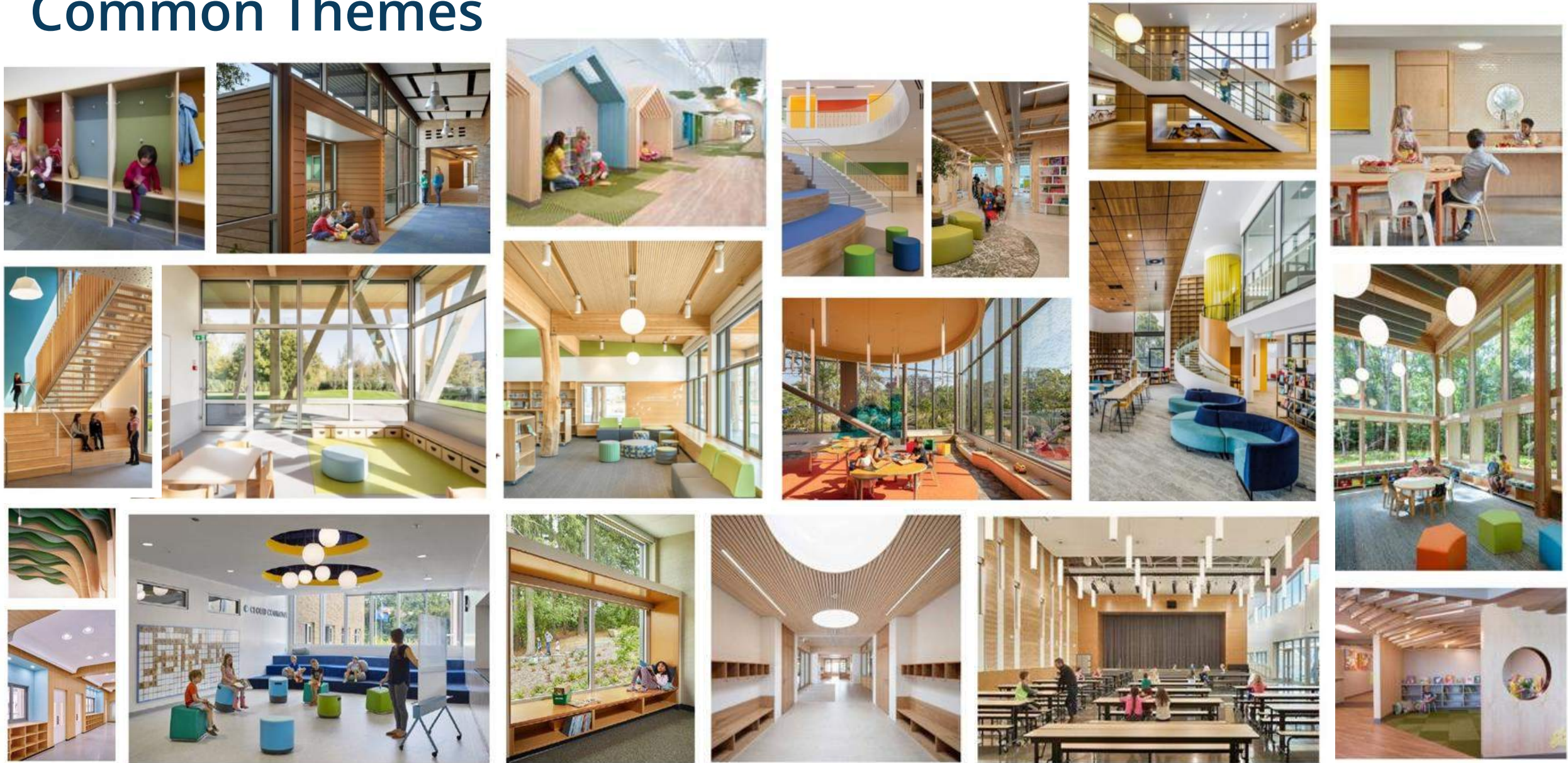


A solid dark blue vertical bar on the left side of the image.

Project Aesthetics Interiors

Aesthetic Imagery Visioning: Interior

Common Themes





WARM TONES: RED, ORANGE & YELLOW

Inspired by apples, fruits, and fall leaves, warm tones bring energy, creativity, and a sense of playfulness

Applications:

- Pops of color in seating, signage, and playful details like wayfinding markers
- Corridor walls having some apple-red accents for Pre-K and Kindergarten to anchor the roots
- Yellow tones for collaborative zones to inspire optimism and creativity

Design Impact:

- Reds stimulate energy and excitement (but used sparingly to avoid overstimulation)
- Yellows bring cheerfulness and encourage collaboration
- These tones are age-appropriate and create a joyful, lively atmosphere

WOOD TONES: WARM

Represents the trunk of the tree, serving as a metaphor for strength, stability, and a foundation for growth

Applications:

- In key structural elements such as columns, beams, along with accent walls and ceiling applications in the cafeteria, lobby, library, and corridors
- Used for furniture, handrails, and millwork to create a warm, inviting environment

Design Impact:

- Promotes feelings of safety and comfort, critical for younger students
- Connects students to the natural world, grounding them in a calm, organic setting
- Brings the outdoor environment connected to the interior and exterior

GREENS

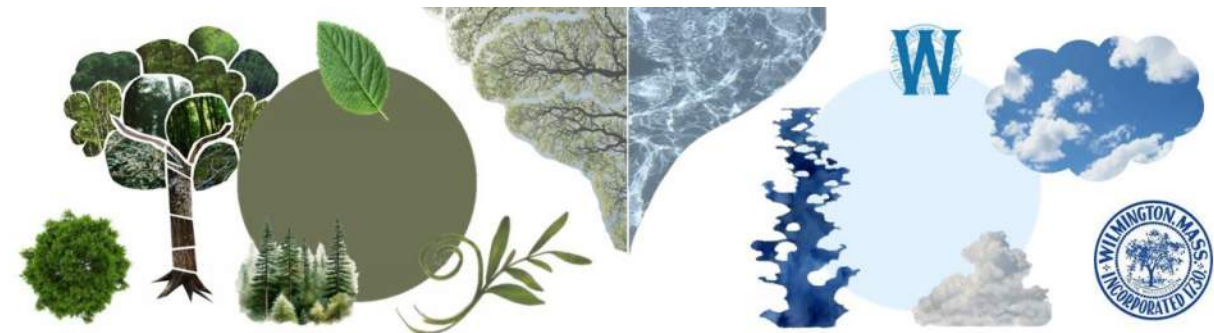
Symbolizes the leaves and canopy of the tree, representing a connection to nature. Fostering a sense of growth, renewal, and harmony, much like being in a forest.

Applications:

- Ceiling treatments with leaf-like patterns or acoustic panels in public areas
- Wall accents and wayfinding signage to tie different areas together
- Organic shapes and natural textures further soften the space

Design Impact:

- Enhances focus, reduces stress, and provides a sense of renewal and balance
- Younger grades might see brighter greens (energetic), while older grades might transition to deeper greens (maturity)



BLUES

Reflects the sky and a guiding path through mirroring streams that navigate students through their journey. Blue symbolizes calm, trust, and creativity while connecting to Wilmington.

Applications:

- Flowing floor patterns in hallways, mimicking streams to guide movement
- Accent walls in breakout spaces to create zones of calm for independent work
- Ceiling treatments in collaborative areas to simulate the open sky

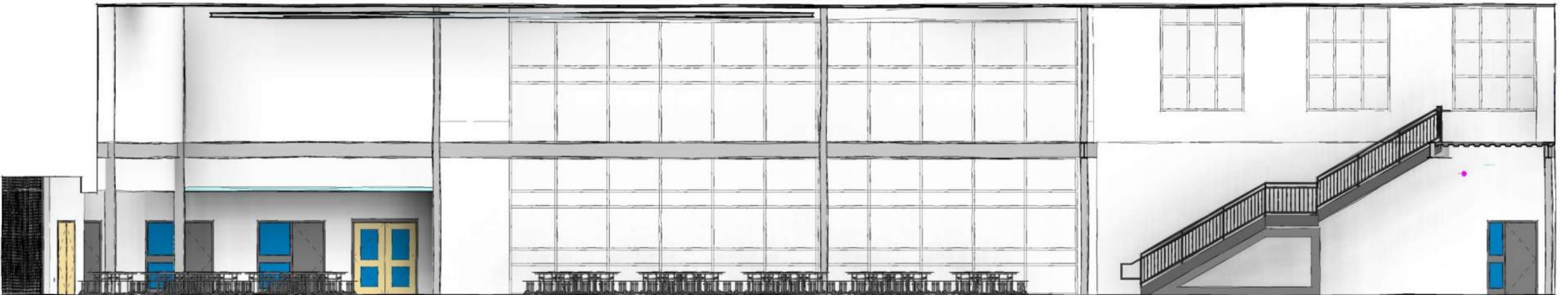
Design Impact:

- Encourages a sense of calm and promotes imaginative thinking
- Adds a soft contrast to warmer tones, balancing the overall palette

Cafeteria Study

Stair

Art Wall



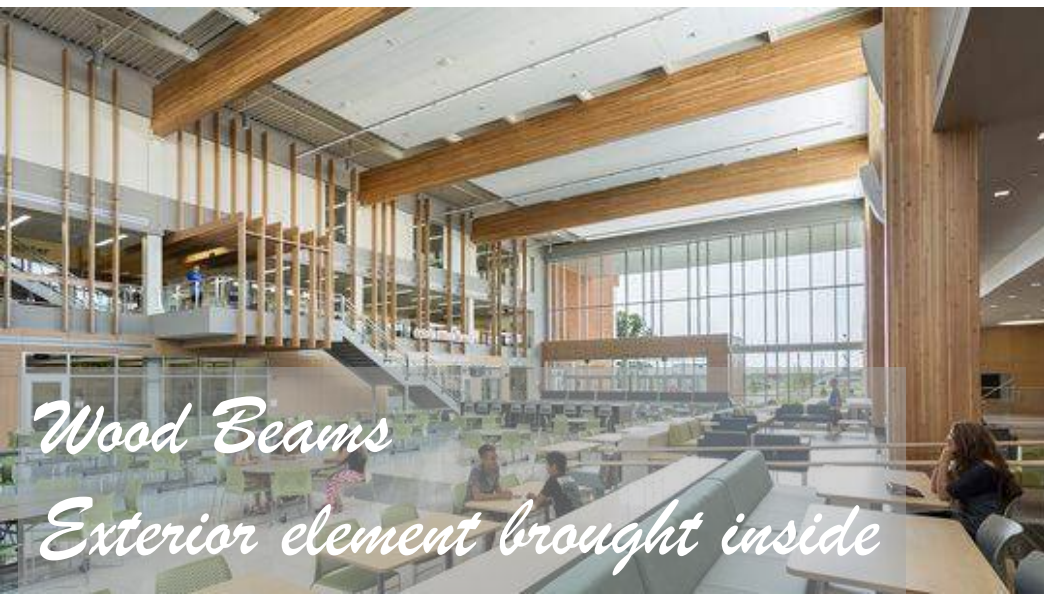




Stair from Cafeteria to Library



Structural columns



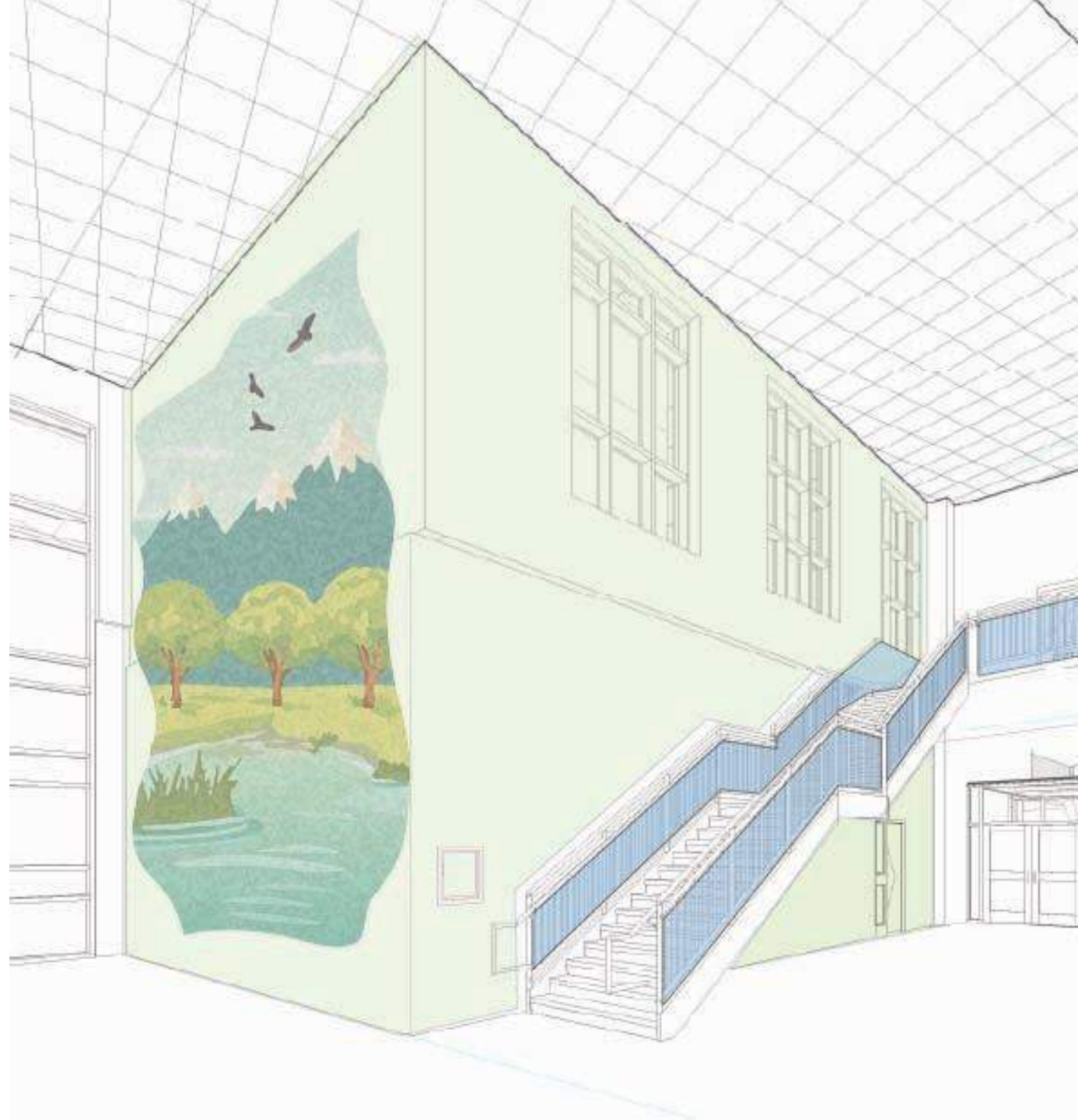
*Wood Beams
Exterior element brought inside*



"Under the Stair"

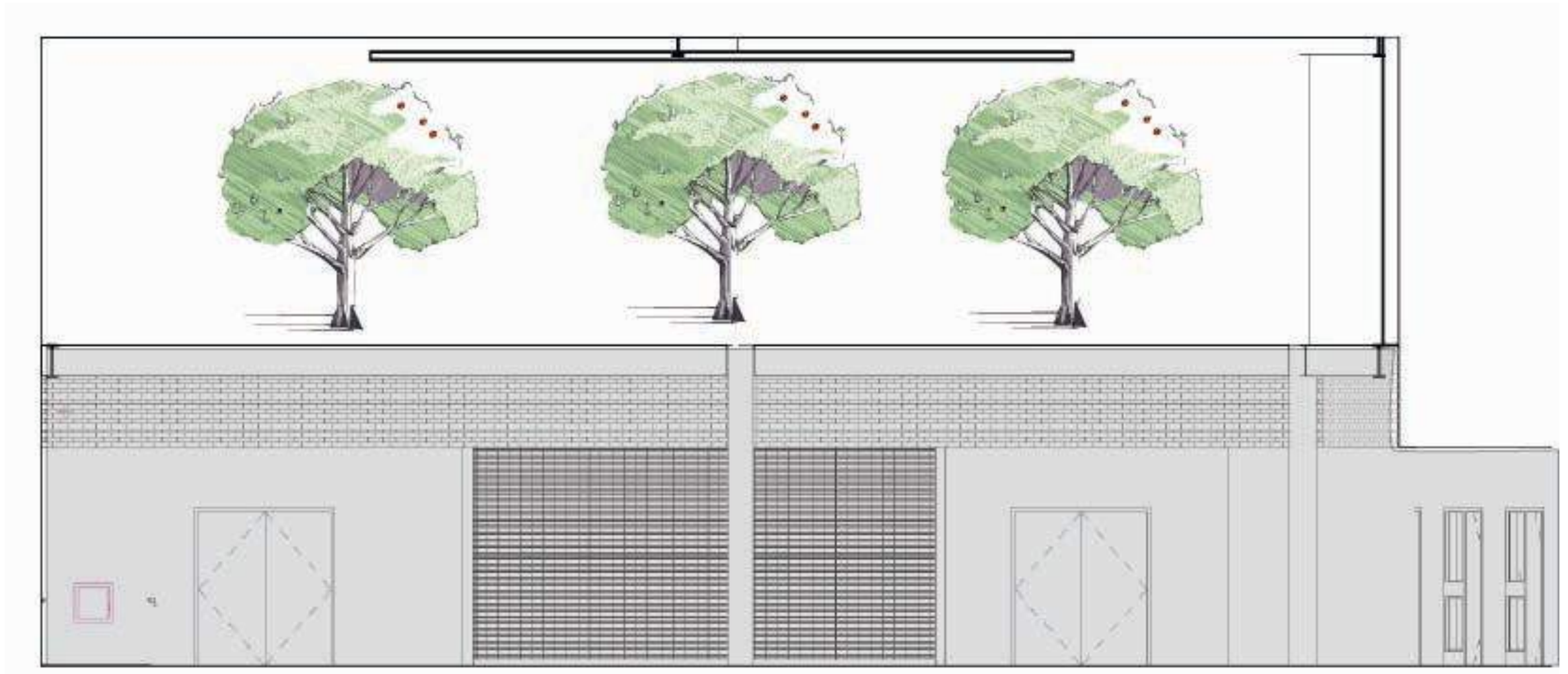
CAFETERIA ART WALL STUDY

- Murals
- Wrap the two-story wall in from windows to library



CAFETERIA - ART WALL STUDY

- Graphics printed on acoustical wall panels – imagery TBD



LIGHTING FIXTURES IN KEY AREAS

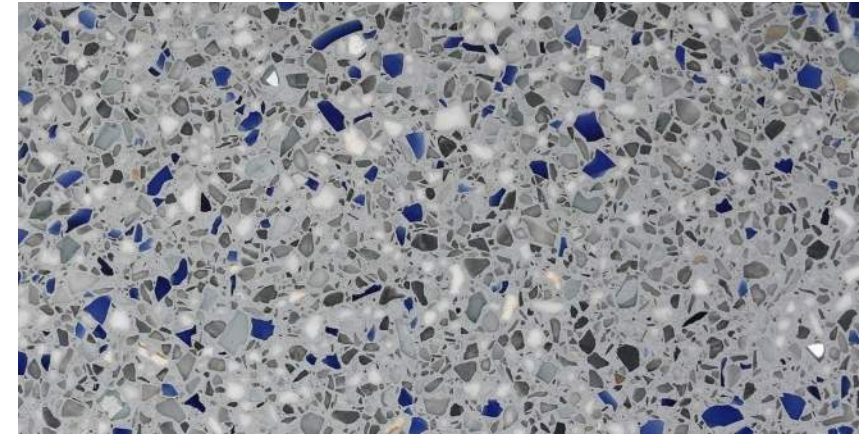
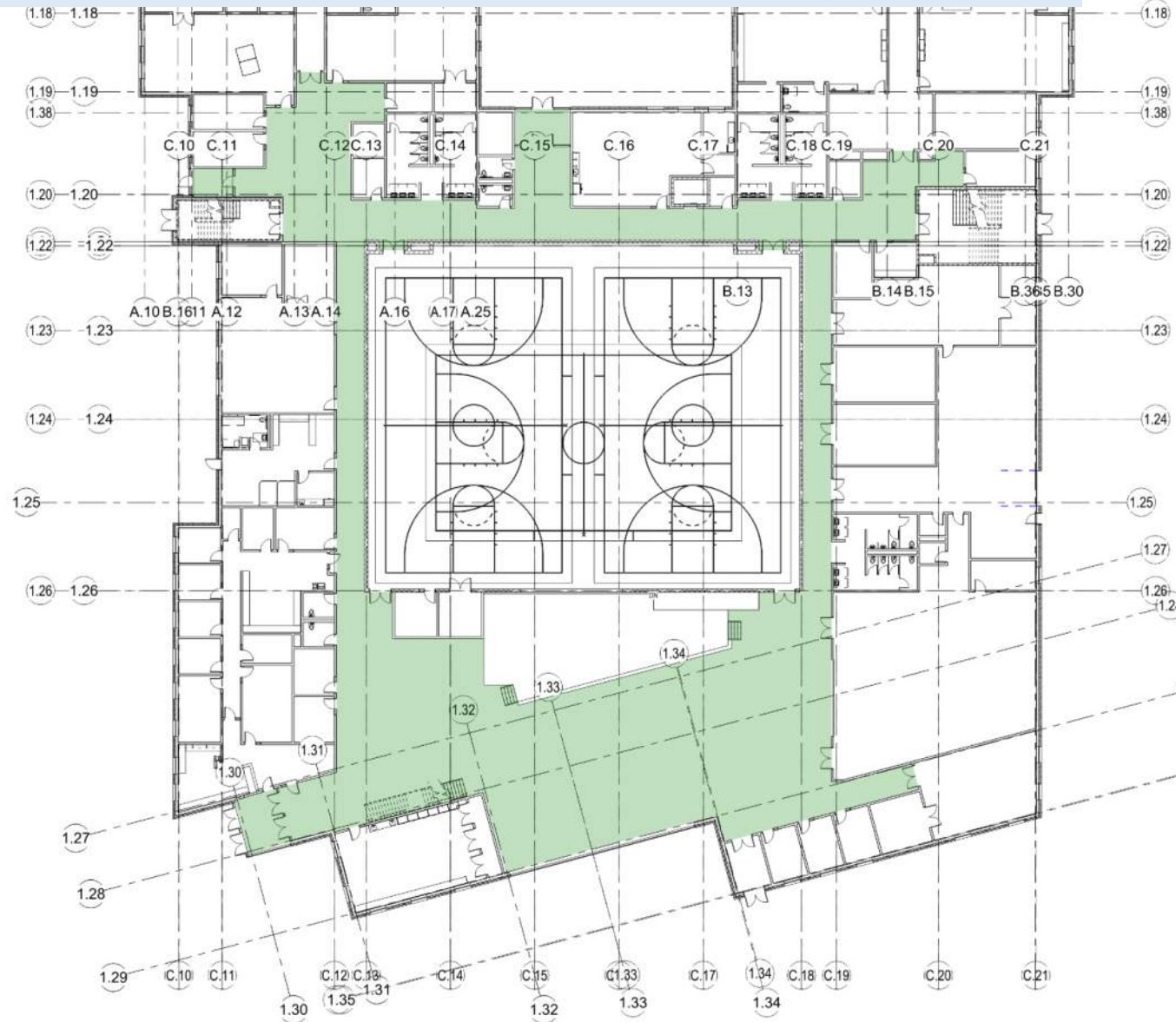
BRANCHES

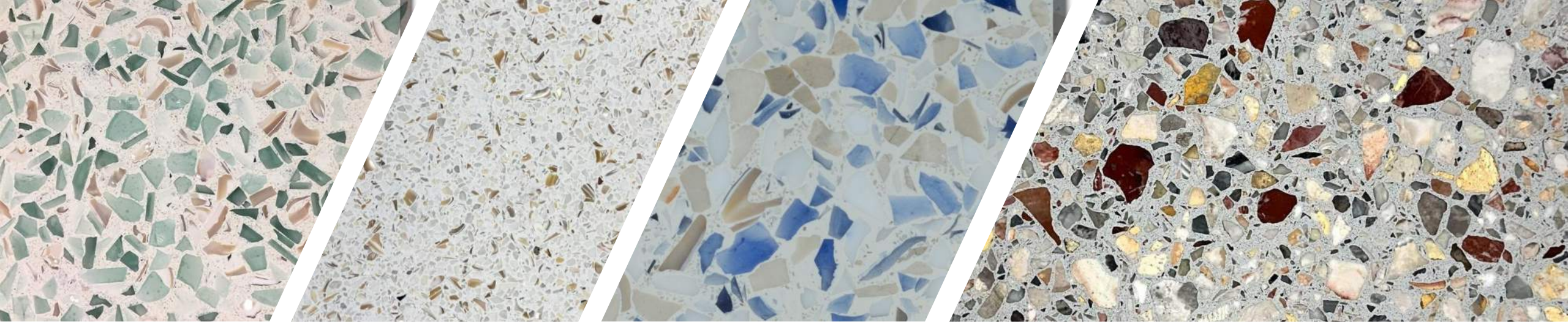
PETALS



Flooring Study

Flooring in Public Zone | Terrazzo

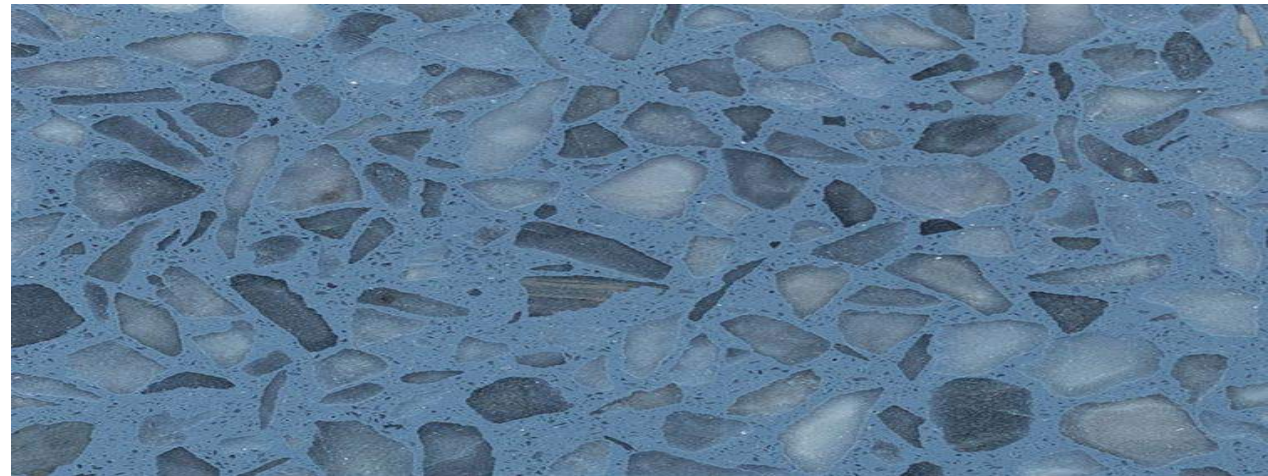
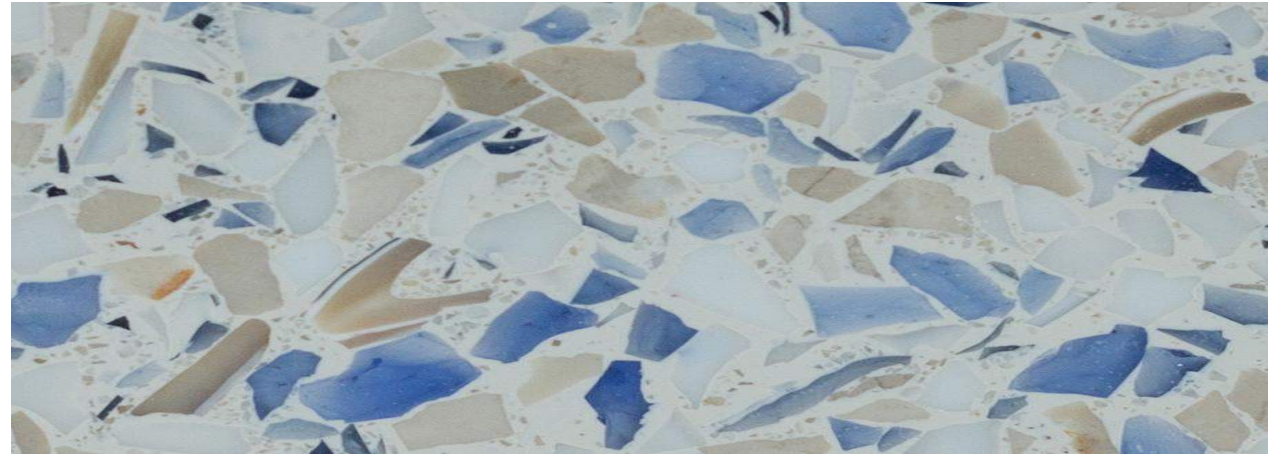




Aggregates can include, but are not limited to
Glass, Shell, Synthetic, and Mirror Aggregate.

Terrazzo flooring

Terrazzo Stairs | Cascading “waterfall”

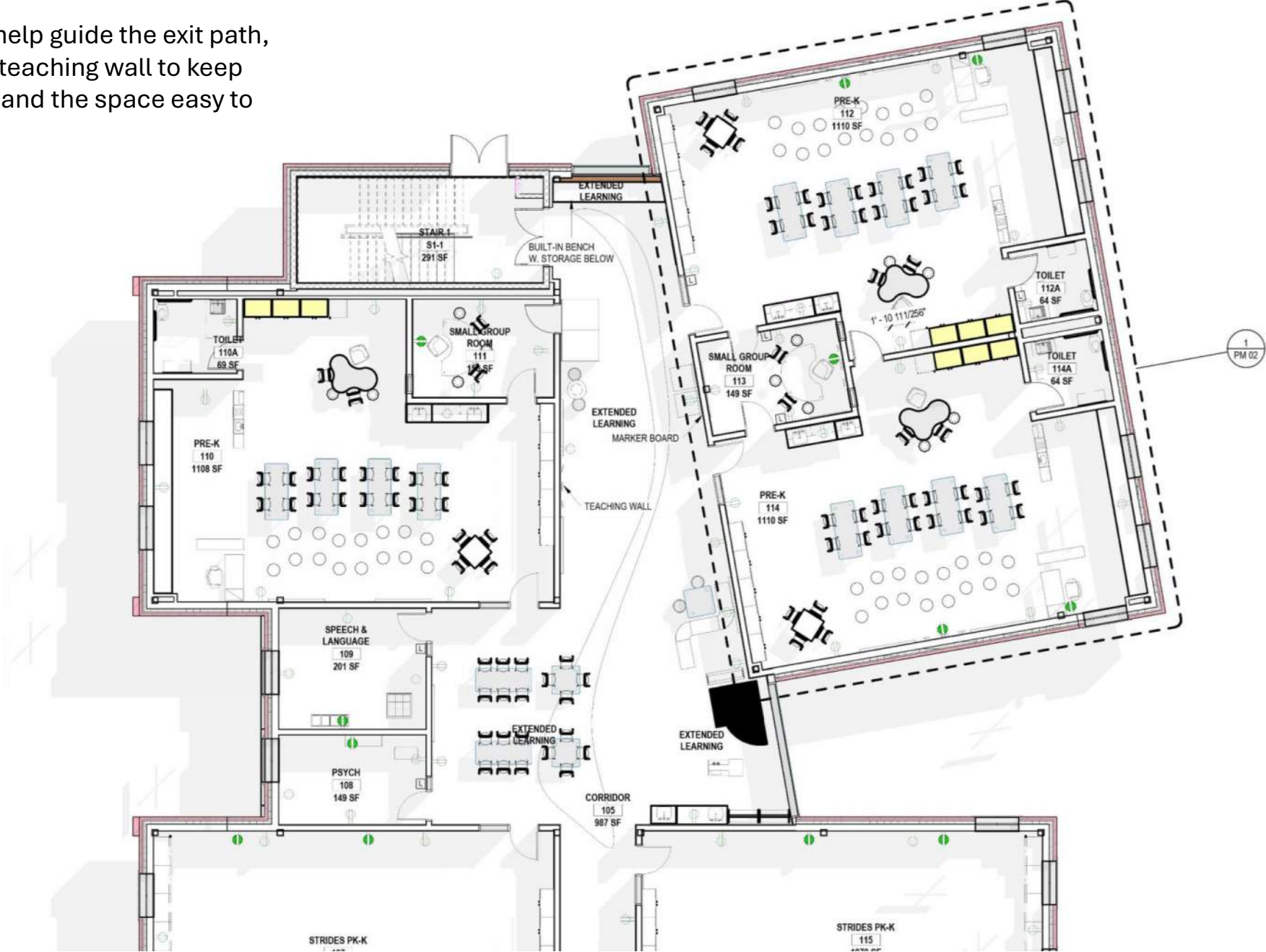


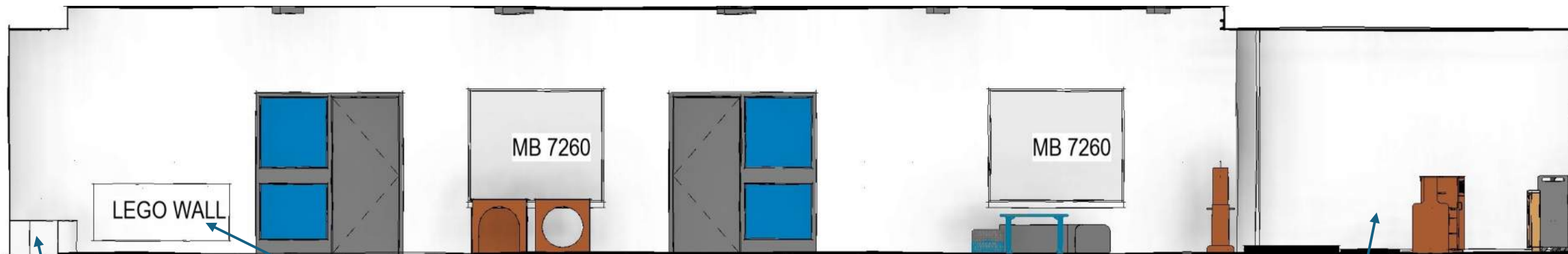
Academic Wings| Linoleum



Pre-K ELA Plan

Floor patterns can help guide the exit path, curving around the teaching wall to keep movement smooth and the space easy to navigate





PK – ELA Elevation | East



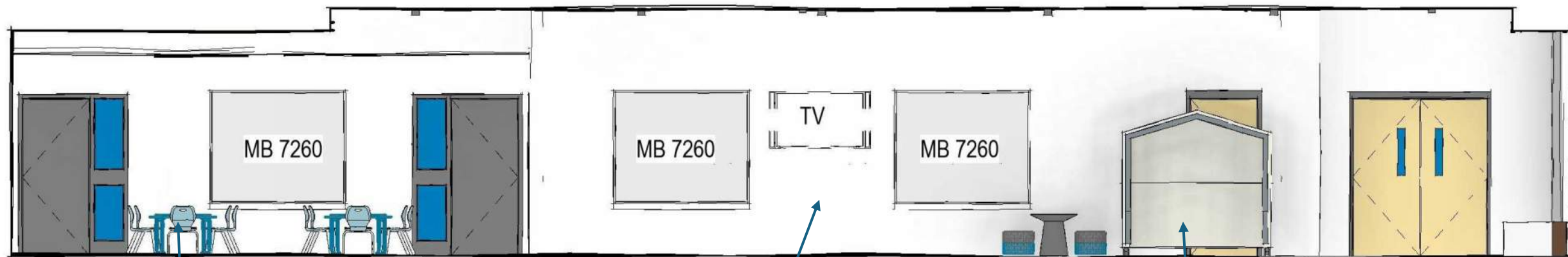
Window Seat



LEGO Wall



Extended Learning



PK – Extended Learning Area Elevation | West



Extended learning



Teaching Wall



Play Zone



Pre-K ELA View | North



Pre-K ELA View | South

A solid dark blue vertical bar on the left side of the slide.

Project Aesthetics Exterior Update



Project Inspiration

The school would be designed to emulate the tree's essence, where every child could feel rooted and free to grow. Here's how the Baldwin tree is a metaphor for the architectural vision:

- 1. Roots: A Strong Foundation**

The school would be grounded in the values of curiosity and community. The foundation, like the tree's roots, would spread wide and deep, symbolizing the knowledge and support systems that anchor children as they begin their educational journey.

- 2. Trunk: The Pillar of Learning**

Central, multi-purpose core: Cafeteria and Gymnasium gathering spaces are the "trunk" of the school. These spaces, tall and strong, are the core where children, teachers, and families can gather for assemblies, cultural events, and celebrations. It represents strength, stability, and shared purpose.

- 3. Branches: A Canopy of Growth**

The classrooms wings extend like branches from the central core. Each classroom is designed to be modular and adaptive, filled with natural light and airflow. Extended learning areas and small group rooms foster an environment that encourages exploration and interaction.

- 4. Leaves: Individual Potential**

The leaves, ever-changing yet integral to the tree's life, symbolize the children themselves. Outdoor learning spaces, art walls, and play areas are created to nurture each child's unique creativity and curiosity. Each child can grow and flourish, much like the leaves transforming under the sun.

- 5. Shade: A Place for All**

Like the Baldwin Tree, the school would offer shelter and inclusion. The design features communal spaces for the Town, ensuring the school is not just for children but a space for everyone to come together—celebrating life, knowledge, and unity.

Option 1



Southeast View of Main Entry



Southwest View



East Elevation at Cafeteria

Option 1



Southeast Perspective

Option 2



Southeast View of Main Entry



Southwest View



East Elevation at Cafeteria

Option 2



Southeast Perspective

Option 3



Southeast View of Main Entry



Southwest View



East Elevation at Cafeteria

Option 3



Southeast Perspective

Option 1



Option 2

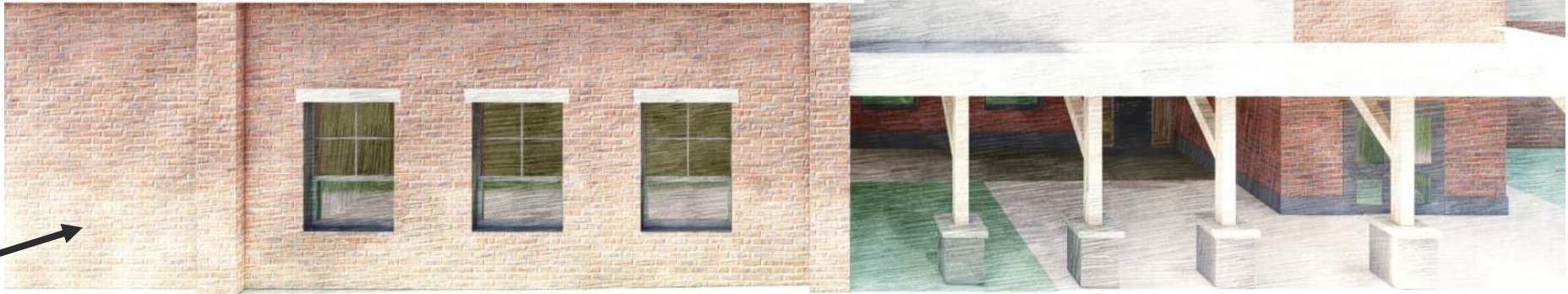
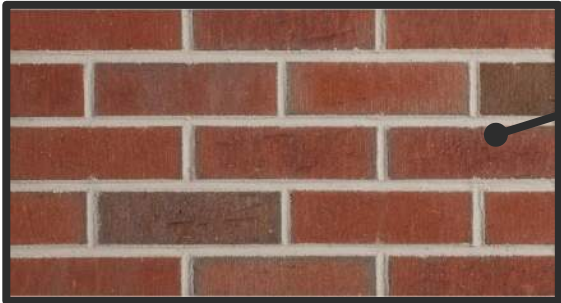
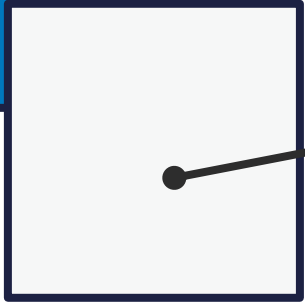


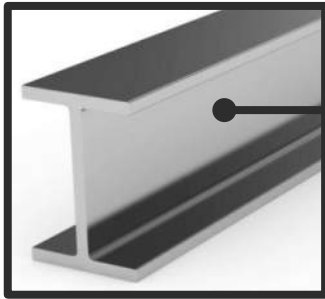
Option 3



Aesthetic Imagery Visioning: Elevation Studies







Building Systems Update

Wilmington Wildwood School



WILMINGTON PUBLIC SCHOOLS

Wilmington, MA

HVAC System Options & Life Cycle Cost Analysis (LCCA) Summary

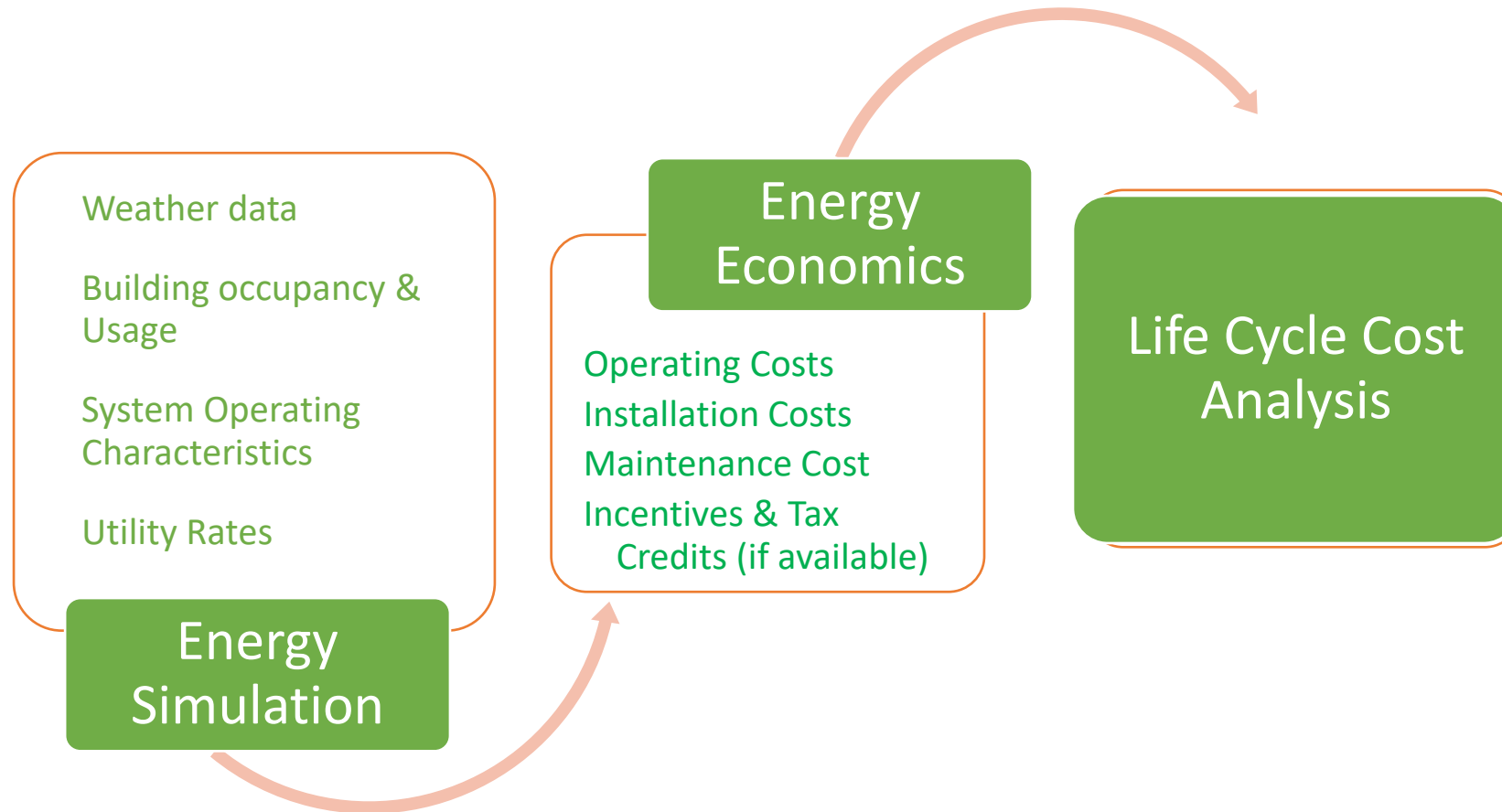


GOAL OF LIFE CYCLE COST ANALYSIS

- The goal of the mechanical lifecycle engineering economic analysis is to assess the performance of **various mechanical system options** in comparison to a baseline mechanical system.
- Each option is compared to the baseline system over a 50-year cycle to determine the most advantageous system considering **utility costs, maintenance costs, replacement costs, and initial construction costs**.
- By comparison of each option to the baseline system, the option with the **greatest total life-cycle savings** is generally recommended.



LCCA - ENERGY ECONOMICS METHODOLOGY



LIFE CYCLE COST ANALYSIS

Proposed Design Criteria Temperature Conditions

Notes:

DB = Dry Bulb

RH = Relative Humidity

WB = Wet Bulb

Design Outdoor Temperature Data

Per ASHRAE Tables for Weather Station –
Hanscom AFB: Heating 99.6% @ 2.6°F Heating &
Cooling 0.4% @ 91°F db, 74°F wb

Classrooms, Office, Cafeteria, Auditorium, Gym
are proposed for all options to provide:

Heating, Ventilation @ 70 °F db +/- 2°F

Air Conditioning : 75°F db +/- 2°F

with 55% RH +/- 5%RH

Storage & Utility Room: Heating and Ventilation
Only @ **70°F db for heating**

Unoccupied temperature setback of **55°F db**
Heating and **85°F db Cooling** is provided for **all**
options.



LCCA HVAC OPTIONS

ALL HVAC OPTIONS ARE BASED ON FOSSIL FUEL FREE, ELECTRIFIED HEATING SYSTEMS THAT WILL BE COMPARED TO A MASSACHUSETTS OPT-IN CODE COMPLAINT BUILDING & HVAC SYSTEM.

ALL OPTIONS SHALL MEET OR EXCEED:

- MSBA Requirement for Additional Reimbursement
- LEED Requirements
- MA Opt-in Stretch Energy Code Requirements

ALL PROPOSED SYSTEMS INCLUDE AIR CONDITIONING.



LCCA HVAC OPTIONS

BASELINE: Air Source Heat Pump Plant - Mixed-Air Overhead VAV System and High Efficiency Air-Source to Hydronic Heat Pump Chiller/Heating Plant for Chilled/Heating Hot Water (Fossil Fuel Free)

OPTION 1: Air-Source VRF (Variable Refrigerant Flow) and DOAS (Dedicated Outdoor Air Systems w/ Air Source Heat Pump) for Classrooms/Office areas & Air Source Heat Pump Rooftop Units for Gym, & Cafeteria with Supplemental electric heating for entryways, storage, and utility rooms. (Fossil Fuel Free)

OPTION 2: Geothermal Water-Source VRF (Variable Refrigerant Flow) and DOAS (Dedicated Outdoor Air Systems w/ Air Source Heat Pump) for Classrooms/Office areas & Water-Source Heat Pump Rooftop Units for Gym, & Cafeteria with Supplemental electric heating for entryways, storage, and utility rooms. (Fossil Fuel Free)

OPTION 3: Air Source Heat Pump Plant - VAV Displacement System w/ Passive Radiant Cooling/Heating Panels and High Efficiency Air-Source to Hydronic Heat Pump Chiller/Heating Plant for Chilled/Heating Hot Water (Fossil Fuel Free)

OPTION 4: Geothermal Heat Pump Plant - VAV Displacement System w/ Passive Radiant Cooling/Heating Panels and Geothermal Hydronic Heat Pump Chiller/Heating Plant for Chilled/Heating Hot Water (Fossil Fuel Free)



LCCA Summary (without Federal Tax Credits)

Baseline	System	Gross Capital Investment*	Annual Elec. Cons. (kWh)	Annual Electric Cost	Annual Utility \$/s.f.	Annual kBTU/s.f. (EUI)	Annual Maint. Cost	20 Year Equipment Replacement Cost	30 Year Equipment Replacement Cost	40 Year Equipment Replacement Cost	Combined Annual Expense	Combined Expense Savings**	Total Life-Cycle Savings***	Discounted Payback (Years)****
-	1. Mixed-Air Overhead CHW/HHW VAV AHU's w/ ERV & Terminal VAV's w/ Hot Water Re-Heat Coils 2. High-Efficiency ASHP Chiller/Heater Plant	\$15,838,440	1,738,354	\$327,852	\$1.96	35.5	\$77,410	\$1,620,000	\$3,198,500	\$1,620,000	\$405,262	-	-	-
Option	System	Gross Capital Investment*	Annual Elec. Cons. (kWh)	Annual Electric Cost	Annual Utility \$/s.f.	Annual kBTU/s.f. (EUI)	Annual Maint. Cost	20 Year Equipment Replacement Cost	30 Year Equipment Replacement Cost	40 Year Equipment Replacement Cost	Combined Annual Expense	Combined Expense Savings**	Total Life-Cycle Savings***	Discounted Payback (Years)****
1	1. Variable Refrigerant Flow (VRF) Units w/ Air-Source Condensers serving the Classrooms, Administration and Support Areas 2. ASHP DOAS AHU's w/ ERV & Terminal VAV's w/ DCV providing Ventilation to the VRF Units 3. Mixed-Air Overhead AHSP VAV AHU's w/ ERV & DCV serving the Cafe/Stage and Gym areas 4. Supplemental Electric Resistance Heating Units	\$14,007,900	1,443,027	\$291,930	\$1.75	29.5	\$58,460	\$1,943,500	\$1,185,000	\$3,167,000	\$350,390	\$54,872	\$4,025,486	Instant*****
2	1. VRF System w/ Water-Source Heat Pump (WSHP) Heat Recovery Condensing Units 2. WSHP VAV Dedicated Outdoor Air Systems (DOAS) w/ ERV & DCV with Terminal VAV Boxes 3. Supplemental Electric Heating 4. Geothermal Well Field and Distribution Plant	\$19,358,100	1,183,958	\$223,944	\$1.34	24.2	\$62,235	\$0	\$3,945,000	\$0	\$286,179	\$119,083	\$2,446,273	23
3	1. Displacement Ventilation Diffusers w/ Radiant Cooling/Heating Panels 2. CHW/HHW Dedicated Outdoor Air System (DOAS) AHU's ERV & Terminal VAV's w/ DCV 3. High-Efficiency ASHP Chiller/Heater Plant 4. Backup Electric Boiler Plant	\$14,442,360	1,160,735	\$229,174	\$1.37	23.7	\$74,000	\$1,620,000	\$2,289,500	\$1,620,000	\$303,174	\$102,088	\$5,680,330	Instant*****
4	1. Displacement Ventilation Diffusers w/ Radiant Cooling/Heating Panels 2. CHW/HHW DOAS AHU's ERV & Terminal VAV's w/ DCV 3. High-Efficiency Ground Source Heat Pump (GSHP) Chiller/Heater Plant w/ Geothermal Well Field 4. Backup Side-Stream Electric Boiler Plant	\$18,306,360	1,093,195	\$205,748	\$1.23	22.3	\$75,675	\$0	\$3,379,500	\$0	\$281,423	\$123,839	\$4,041,912	21

LCCA Summary (with Geothermal Federal Tax Credits)

Baseline	System	Gross Capital Investment*	25.5% IRA Geothermal Federal Tax Credit***	Net Investment	Annual Elec. Cons. (kWh)	Annual Electric Cost	Annual Utility \$/s.f.	Annual kBTU/s.f. (EUI)	Annual Maint. Cost	20 Year Equipment Replacement Cost	30 Year Equipment Replacement Cost	40 Year Equipment Replacement Cost	Combined Annual Expense	Combined Expense Savings***	Total Life-Cycle Savings***	Discounted Payback (Years)****
-	1. Mixed-Air Overhead CHW/HHW VAV AHU's w/ ERV & Terminal VAV's w/ Hot Water Re-Heat Coils 2. High-Efficiency ASHP Chiller/Heater Plant	\$15,838,440	\$0	\$15,838,440	1,738,354	\$327,852	\$1.96	35.5	\$77,410	\$1,620,000	\$3,198,500	\$1,620,000	\$405,262	-	-	-
Option	System	Gross Capital Investment*	25.5% IRA Geothermal Federal Tax Credit***	Net Investment	Annual Elec. Cons. (kWh)	Annual Electric Cost	Annual Utility \$/s.f.	Annual kBTU/s.f. (EUI)	Annual Maint. Cost	20 Year Equipment Replacement Cost	30 Year Equipment Replacement Cost	40 Year Equipment Replacement Cost	Combined Annual Expense	Combined Expense Savings***	Total Life-Cycle Savings***	Discounted Payback (Years)****
1	1. Variable Refrigerant Flow (VRF) Units w/ Air-Source Condensers serving the Classrooms, Administration and Support Areas 2. ASHP DOAS AHU's w/ ERV & Terminal VAV's w/ DCV providing Ventilation to the VRF Units 3. Mixed-Air Overhead AHSP VAV AHU's w/ ERV & DCV serving the Cafe/Stage and Gym areas 4. Supplemental Electric Resistance Heating Units	\$14,007,900	\$0	\$14,007,900	1,443,027	\$291,930	\$1.75	29.5	\$58,460	\$1,943,500	\$1,185,000	\$3,167,000	\$350,390	\$54,872	\$4,025,486	Instant*****
2	1. VRF System w/ Water-Source Heat Pump (WSHP) Heat Recovery Condensing Units 2. WSHP VAV Dedicated Outdoor Air Systems (DOAS) w/ ERV & DCV with Terminal VAV Boxes 3. Supplemental Electric Heating 4. Geothermal Well Field and Distribution Plant	\$19,358,100	\$4,936,316	\$14,421,785	1,183,958	\$223,944	\$1.34	24.2	\$62,235	\$0	\$3,945,000	\$0	\$286,179	\$119,083	\$7,382,588	Instant*****
3	1. Displacement Ventilation Diffusers w/ Radiant Cooling/Heating Panels 2. CHW/HHW Dedicated Outdoor Air System (DOAS) AHU's ERV & Terminal VAV's w/ DCV 3. High-Efficiency ASHP Chiller/Heater Plant 4. Backup Electric Boiler Plant	\$14,442,360	\$0	\$14,442,360	1,160,735	\$229,174	\$1.37	23.7	\$74,000	\$1,620,000	\$2,289,500	\$1,620,000	\$303,174	\$102,088	\$5,680,330	Instant*****
4	1. Displacement Ventilation Diffusers w/ Radiant Cooling/Heating Panels 2. CHW/HHW DOAS AHU's ERV & Terminal VAV's w/ DCV 3. High-Efficiency Ground Source Heat Pump (GSHP) Chiller/Heater Plant w/ Geothermal Well Field 4. Backup Side-Stream Electric Boiler Plant	\$18,306,360	\$4,668,122	\$13,638,238	1,093,195	\$205,748	\$1.23	22.3	\$75,675	\$0	\$3,379,500	\$0	\$281,423	\$123,839	\$8,710,034	Instant*****

HVAC LCCA CONCLUSIONS

➤ Without Tax Credits...

Option 3, Displacement Ventilation with an Air-Source Heat Pump Plant, represents the **lowest life cycle cost** (L.L.C.) of the system options studied by yielding an approximate \$5,680,330 savings over the 50 year study period with an instant payback by having a lower capital investment than the baseline system.

➤ With Utility Federal Tax Credits...

Option 4, Ground-Source Heat Pump Displacement Ventilation System, represents the greatest total life cycle savings by yielding an approximate \$8,710,034 savings over the 50 year study period with an instant payback.

The **geothermal system** additionally provides further benefits that should be considered:

- Second lowest EUI of all options at 22.3 kBTU/s.f./yr.
- System longevity
- Reduced maintenance
- Reduced downtime
- Improved controllability of equipment
- Best acoustics - does not require exterior mounted condensing equipment



HVAC LCCA SIMPLIFIED SUMMARY

		Initial Cost	Lifetime Cost Savings	Expected Operating Cost (annual)	Maintenance Zones	Primary HVAC Fluid	Outdoor Noise	Indoor Noise	Ventilation Effectiveness	Frequency of Replacement
Options	1	\$14.0M	\$4.0M	\$350K	All Spaces	Refrigerant	Moderate	Low	Standard	20 yr
	2	\$19.4M	\$2.5M	\$286K	All Spaces	Refrigerant	Low	Low	Standard	30 yr
	3	\$14.4M	\$5.7M	\$303K	Roof & Mech Rm	Water	Highest	Very Low	Improved	20 yr
	4	\$18.3M	\$4.0M	\$281K	Roof & Mech Rm	Water	Low	Very Low	Improved	30 yr

HVAC LCCA SIMPLIFIED SUMMARY

		Initial Cost	Lifetime Cost Savings	Expected Operating Cost (annual)	Maintenance Zones	Primary HVAC Fluid	Outdoor Noise	Indoor Noise	Ventilation Effectiveness	Frequency of Replacement
Options	1	\$14.0M	\$4.0M	\$350K	All Spaces	Refrigerant	Moderate	Low	Standard	20 yr
	2	\$19.4M	\$2.5M	\$286K	All Spaces	Refrigerant	Low	Low	Standard	30 yr
	3	\$14.4M	\$5.7M	\$303K	Roof & Mech Rm	Water	Highest	Very Low	Improved	20 yr
	4	\$18.3M	\$4.0M	\$281K	Roof & Mech Rm	Water	Low	Very Low	Improved	30 yr

Construction Manager at Risk



Working Group Updates



Discussion,
Correspondence,
New Items



Committee Questions



Public Comment



**Thank
You**