

CAROLINA DAY LOWER SCHOOL

A4LE LEsolutions Design Award | Renovation / Major Addition





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EXECUTIVE SUMMARY

*“The way that we have kept some of the old, enhanced the inside, and come up with a new interior and saved some of the historic exterior embraces the fact that **THIS IS THE HEART OF THE SCHOOL.** I think it really helps us keep our sense of tradition and honor those who have been here before.”*

JULIE ROSE, LOWER SCHOOL PARENT



EXECUTIVE SUMMARY

TRADITION, TRANSPARENCY, AND TRANSFORMATION

The Lower School at Carolina Day serves Pre-K through 5th graders in an inquiry-based learning environment, providing educational space that supports creative problem-solving and teaches students to strive to make a meaningful difference in the world. The facility serves as the “heart” and primary entrance of the Carolina Day School campus, which also includes a middle and high school. Located in the first structure built on the campus in 1958, the Lower School suffered from a lack of flexibility and was in severe need of improved wayfinding, modern MEP systems, and better overall functionality.

In response to the school’s goals to use space efficiently, the building was re-imagined to support current and future functionality by revitalizing the original building and seamlessly integrating new space. Complementing the extensively renovated existing facility, originally designed by renowned Asheville modernist architect Bertram King, a 6,500 SF addition establishes a new face for the school while housing administrative offices and a multipurpose library space.

The renovated existing building focuses on the student experience – creating larger classrooms with flexible furniture arrangements, new HVAC systems for improved climate control, and integrated audio-video technology. Throughout the design process, efficiency, flexibility, and student educational experience were considered for every space. With the inclusion of many multipurpose features, virtually every space in the building can adapt to new needs and purposes, effectively positioning Carolina Day School for future growth and the impact of changing educational trends.

SCOPE OF WORK & BUDGET

“WE ARE A STUDENT-CENTERED SCHOOL THAT REALLY EMPHASIZES DESIGN, CREATIVITY, AND AUTONOMY IN OUR STUDENTS. *I would love to have a renovated Lower School that matches that emphasis on student learning.”*

DANA HAVNER, LOWER SCHOOL FACULTY



SCOPE OF WORK & BUDGET

BREATHING NEW LIFE INTO AN OLD BUILDING

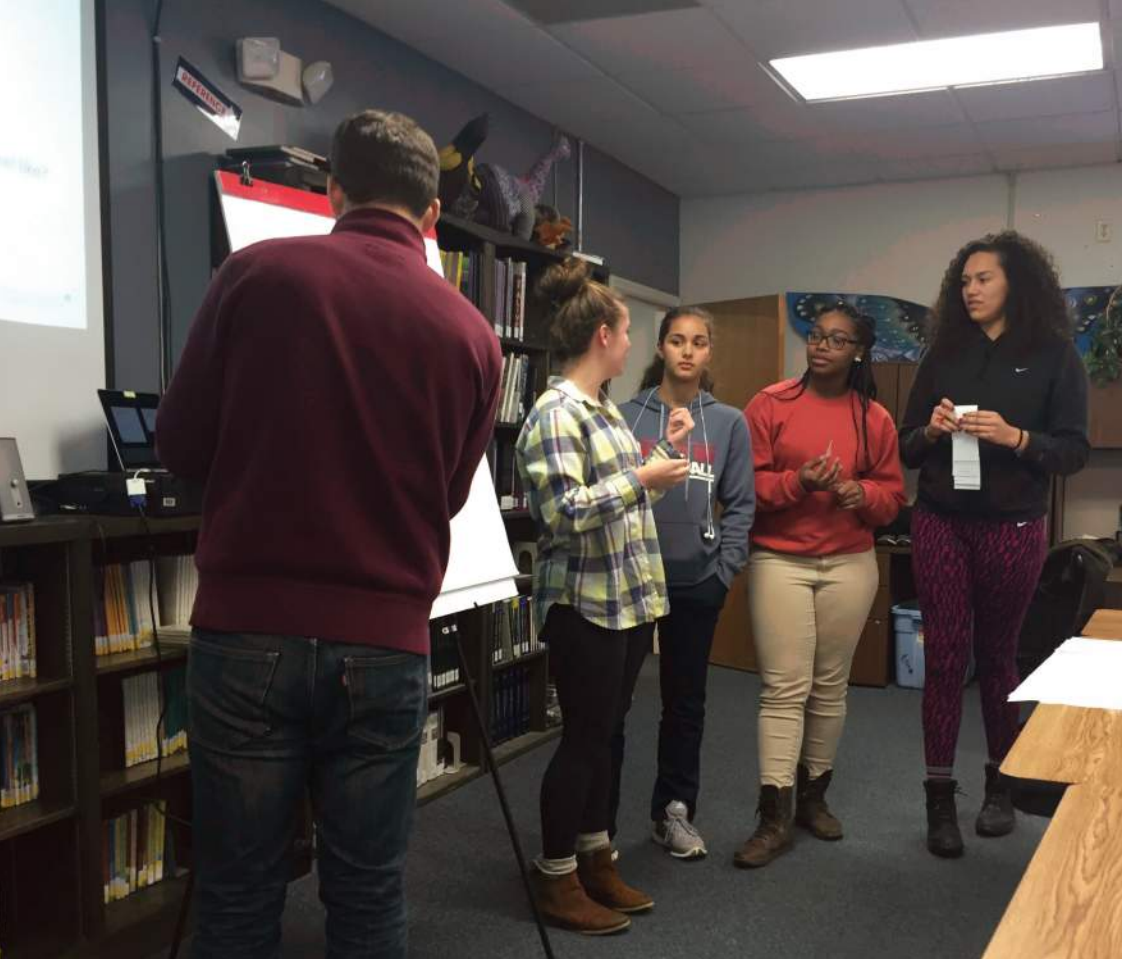
When Carolina Day engaged the architect to evaluate the building in 2014, it still had its original single-pane windows and window-mounted air-conditioning units in each classroom. Although the building had excellent “bones,” it was in desperate need of modern MEP systems, new windows, an improved thermal envelope, and many exterior repairs. The small classrooms no longer supported the school’s emphasis on project-based pedagogy and the library was located at the periphery of campus in a dilapidated, non-accessible building. The school’s Board of Trustees debated whether it made more sense to tear the building down and build a new facility or to try to renovate the existing. Ultimately, the architects encouraged the school to “breathe new life” into the old building by renovating the existing classroom and gym building and adding an addition, which would house the administrative spaces and new library and become a welcoming new “front door” for the school campus.

Owner:	Carolina Day School
Location:	Asheville, North Carolina
Original Date of Construction:	1958
Renovation Date of Construction:	2016
Grades:	Pre-K - 5th Grade
Student Capacity:	320
Building Area:	
Renovation:	35,152 SF
Addition:	6,311 SF
SF/Student:	129 SF/Student
Construction Cost:	
Budget:	\$6,480,000
Final Cost:	\$6,200,000
Cost / SF (Renovation + Addition):	\$149/SF

SCHOOL & COMMUNITY ENGAGEMENT

“We asked for tiny ***LITTLE NOOKS FOR KIDS TO CUDDLE UP WITH BOOKS*** and also asked for a ***GIANT SPACE WHERE I COULD FIT A WHOLE DIVISION***. I didn’t expect to get both of those things, and they brought us both of those things.”

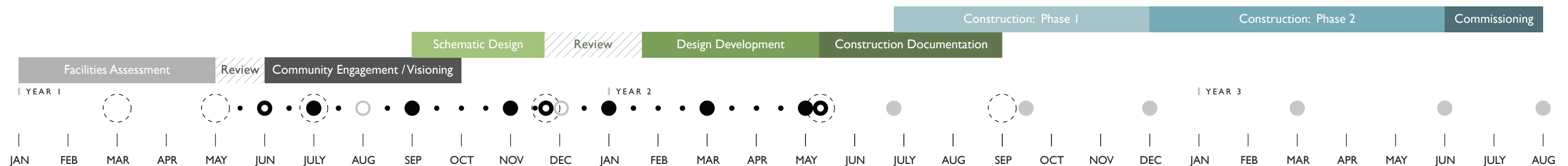
STEPHANIE HOWELL, LIBRARIAN



PROCESS

A ROBUST PLANNING PROCESS

After a thorough facilities assessment phase, the architects engaged the school community in a rigorous programming process centered around bi-monthly meetings with a “core” design committee including key members of the school administration and representative lower school faculty. The purpose of these meetings was to establish program goals for the project. These meetings were punctuated by presentations to the full lower school faculty and the entire school community, including the middle and upper school faculty and parents and the Board of Trustees. A parallel series of meetings was held with the adjacent Town of Biltmore Forest to address any concerns from neighbors.



PROJECT REVIEW MEETING KEY

- Core Design Committee
Head of School / Principal
CFO / Project Manager
Librarian / (3) Teachers
- All Lower School Faculty
- Entire CDS Campus
- Biltmore Forest Community
- Construction Facilities Committee
- CDS Board of Trustees



ESTABLISHING PROJECT GOALS

Guided by the architects, the design committee members envisioned a future that placed the lower school as the physical center and metaphorical “heart” of the school campus. It would become the face of the school, not only serving as a nurturing learning environment for the youngest students on campus, but also housing the head-of-school office and admissions staff, showcasing what Carolina Day has to offer prospective students. The design committee members established the following design principles, which were used to evaluate the design at every step of the process:

DESIGN PRINCIPLES:

- Make the Most of Every Space
- Breathe Life into the Old Building
- Integrate the New with the Old
- Connect the Inside with the Outside
- Make the Building Safe and Secure
- Create a Building that Teaches
- Capitalize on Smart Sustainable Design





PROGRAM DEVELOPMENT

CAROLINA DAY SCHOOL MISSION STATEMENT

To inspire students to become innovative thinkers who communicate with intelligence and clarity, create with vision and purpose, and act with courage and compassion to confidently make a meaningful difference in the world.

DEVELOPING A PROGRAM TO GUIDE THE DESIGN

The architects and design committee worked to translate the design principles into a program that would help guide the design of the building. Creating a student-focused design stood out as a guiding principle for program development. The result of this process generated the following specific design goals:

- Bigger classrooms space to support project-based learning
- Create flexible space that allows teachers to customize classrooms
- Need more/better organized storage space for materials and active projects
- Project display and ability to share what is happening inside classrooms
- Capitalize on outdoor spaces –indoor/outdoor connection
- Move administrative spaces to the front of building
- Make the main entrance more prominent
- Library should be a large flexible space to accommodate the whole lower school
- Find spaces for individual “tutoring”
- Improve climate control
- Improve security
- Integrate technology



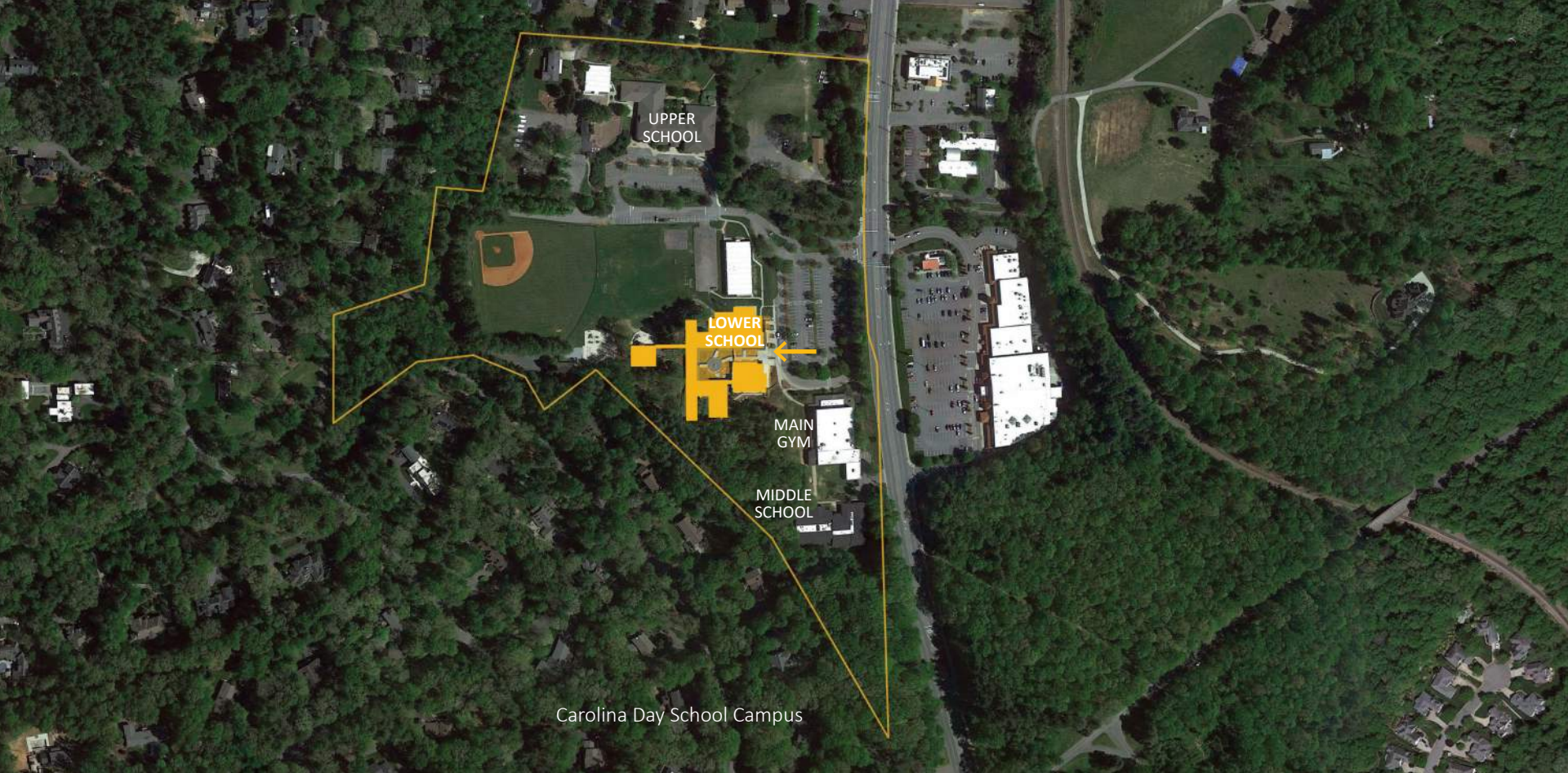
HISTORY & TRADITION

A SCHOOL COMMUNITY GROUNDED IN ITS PAST

George Vanderbilt III, the builder of a “county mansion” in the mountains of western North Carolina that would eventually become known as the Biltmore Estate, was a life-long lover of books and knowledge. So it was only fitting when in 1958 the Biltmore Company, run by Vanderbilt’s descendants, donated a piece of land for a growing independent school. The gift allowed then Asheville Country Day School to construct a new school building to accommodate their growing student body of 149 students in grades kindergarten through 9th-grade. The school hired local architect Bertram King, a Western North Carolina modernist, to design the first building on the new campus. The building now known as The Lower School, was progressive for its time, featuring an open-air porch used to access small classrooms organized around three sides of a courtyard. In 1999, there was a minor renovation which updated the heating system and enclosed most of the open porch.



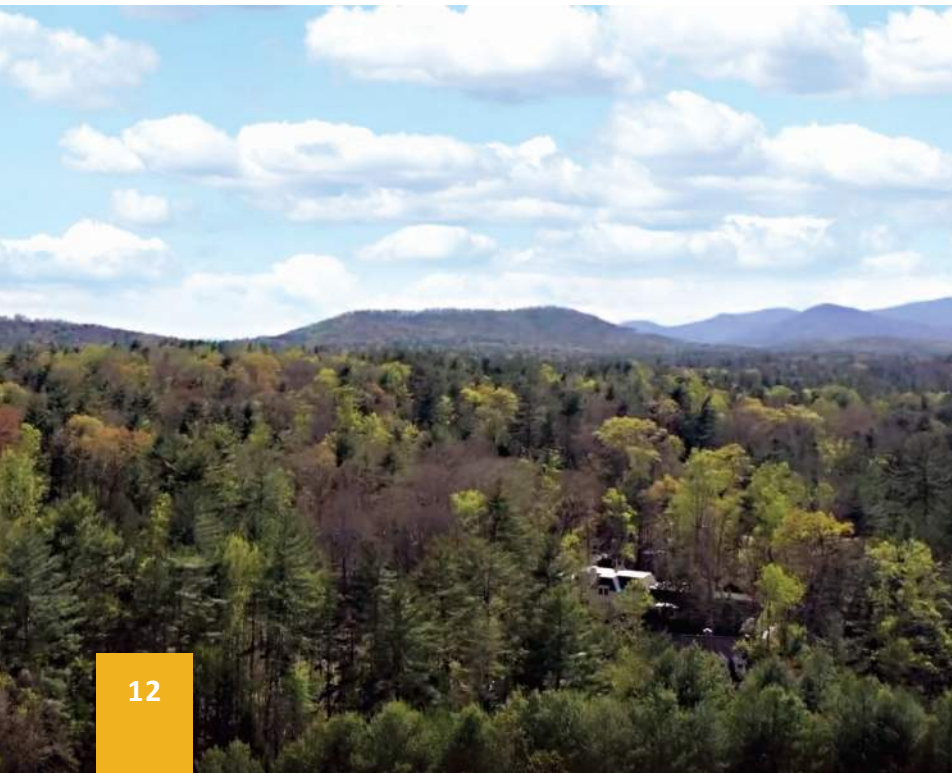
The Lower School Building c.1959



CONTEXTUAL FIT

TAKE FULL ADVANTAGE OF NATURAL SURROUNDINGS

Nestled in the scenic Appalachian Mountains of western North Carolina, Carolina Day School is situated on the outskirts of the City of Asheville. The existing Lower School building is sited on part of the campus tucked into the edge of a forest buffering the adjacent Biltmore Forest neighborhood. Many of the classrooms already looked out to the forest, so the task became how to emphasize the existing visual connections and create new ones. Existing exterior spaces were refurbishing and improved with new plantings to become easily accessible outdoor learning and play spaces.



EDUCATIONAL ENVIRONMENT

*“We’ve been studying ancient Romans, who lived in Pompeii, where a lot of the houses have open courtyards. All of the sudden one of the students raised their hand and said, ‘just like our courtyard’. It was exciting to see how **STUDENTS ARE RELATING THEIR LEARNING TO THEIR SCHOOL BUILDING.**”*

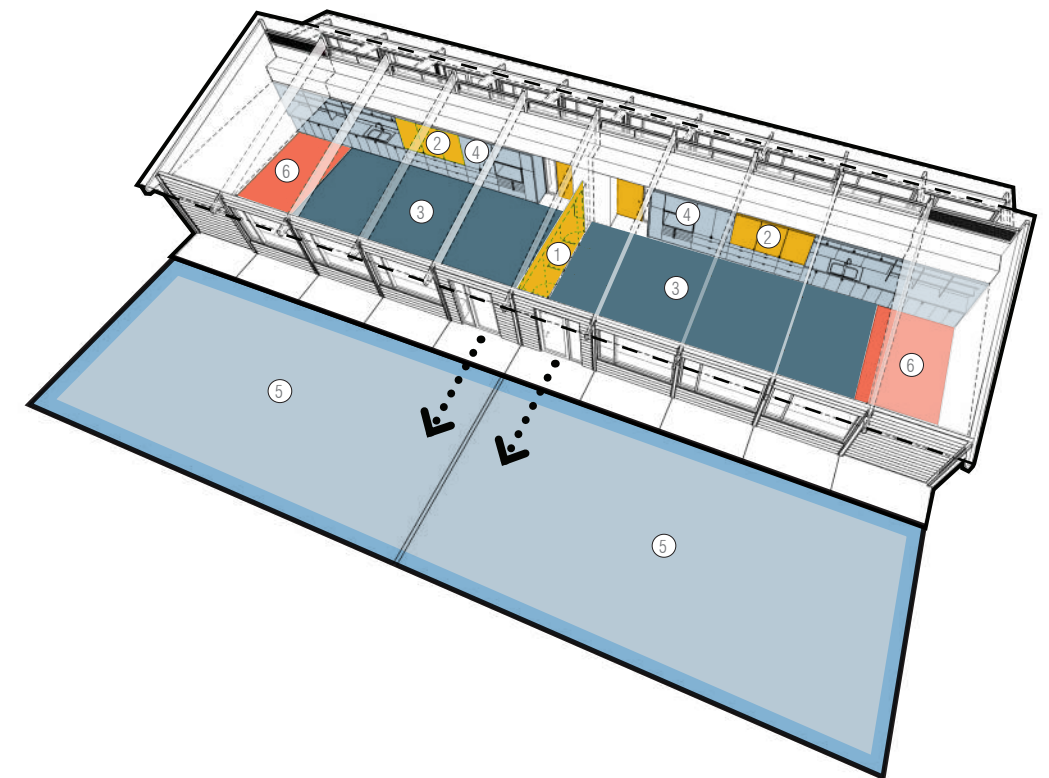
MARGARET SINNOTT, 3RD GRADE TEACHER



HOW TO CREATE SPACE TO SUPPORT A VARIETY OF LEARNING STYLES

SPACE FOR ALL TYPES OF LEARNING

The planning process revealed that a major deficit the existing school was that there were not enough varied spaces for different learning styles. Small, cluttered classrooms couldn't support the experiential, project-based curriculum that the school fully embraced. By rearranging space and working within the existing, relentless 8-foot structural bay, each classroom was enlarged by 8 feet, allowing for the creation of a cozy reading nook at the end of each classroom. Two small tutoring rooms were added at each end of the north-south hallway for up to four students each. Care was taken to provide spaces for different learning styles including visual, auditory, kinesthetic, and reading/writing learners. An assortment of scales of furniture were selected to provide a variety of seating options for students with different preferences.



Visual Learning

Ample space for drawings

1. Operable partitions clad in magnetic dry-erase boards & pin-up fabric for drawing and project display
2. Cabinet doors clad in magnetic dry-erase boards

Auditory Learning

Space must perform well acoustically

3. Easily cleanable carpet tile for improved acoustics

Kinesthetic Learning

Space for making and displaying projects and outdoor project space

4. Built-in storage with vitrine window looking out to hallway for project storage and display
5. Every classroom has direct access to an outdoor teaching space

Read/Write Learning

Reading nooks for quiet reflective space

6. Reading nooks with lowered ceiling and bookshelves provides quiet, reflective space



Library configured with book stacks and seating

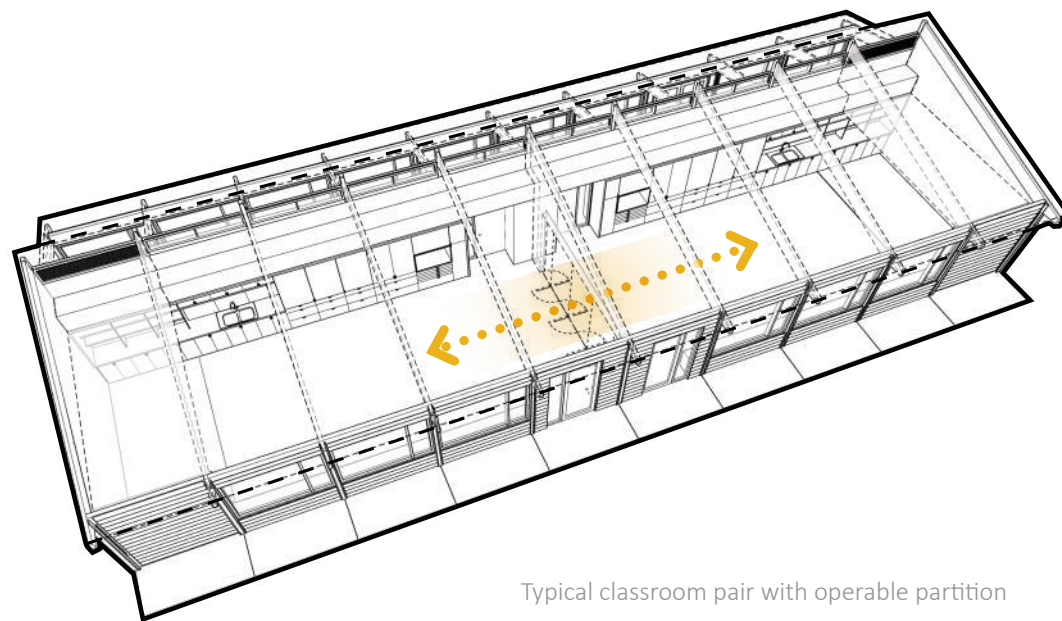


Library configured with open floor for school meetings

FLEXIBLE AND ADAPTABLE SPACES

EVERY SPACE MUST HAVE MORE THAN ONE USE

In an effort to stretch the budget and make the most out of the renovation project, a goal was set that many spaces in the building should be flexible and multi-functional. Operable partitions are installed between pairs of adjacent classrooms so that two classrooms can be combined into one larger classroom to enable entire grade collaboration. The library is furnished primarily with low bookshelves mounted on casters that would allow them to be pushed aside periodically for bi-monthly all-school meetings. The gymnasium is equipped with convenient chair storage closets to facilitate easy transformation into a theater space for viewing performances on the renovated stage. The newly enclosed central courtyard serves as an outdoor classroom as well as a play area.



Typical classroom pair with operable partition



Library classroom with operable partition

BUILDING AS TEACHER

CAN A BUILDING ACT AS A TEACHER?

Early in the planning process, the design committee asked the architects to think of ways that the students could learn from the building. The design team embraced the challenge and endeavored to weave this powerful idea into the design wherever possible.

By exposing the structure of the building and emphasizing the inherent tectonic quality of its post & beam construction, students can visually understand how the building is made.

The primary building form is defined by an inverted-gable butterfly roof that covers the library and rises up and out over the lobby to create a clear and welcoming entrance. When it rains, the roof is designed to visually amplify the stormwater collection process by collecting and channeling it through a large projecting scupper and down a rain-chain into bio-retention ponds located in the courtyard. During larger rains, the rain garden can fill up with a significant amount of water before it filters back into the earth through native plantings, demonstrating the cyclical process of precipitation, infiltration, and evaporation.

A major component of the renovation was the modernization of the building’s envelope, mechanical, plumbing, electrical, and fire protection systems. Rather than concealing the myriad of piping and conduit within walls, the interior gypsum board was removed at two strategic locations to reveal the “circulatory” systems that support the building. Students can peek inside the wall with “x-ray vision” and see what makes their school building function.



Butterfly roof prominently directs storm-water into rain-garden at entry



Rain-chain directs water to rain-garden at courtyard



Inverted Gable Butterfly Roof Concept



X-Ray wall reveals the building’s hidden systems to students

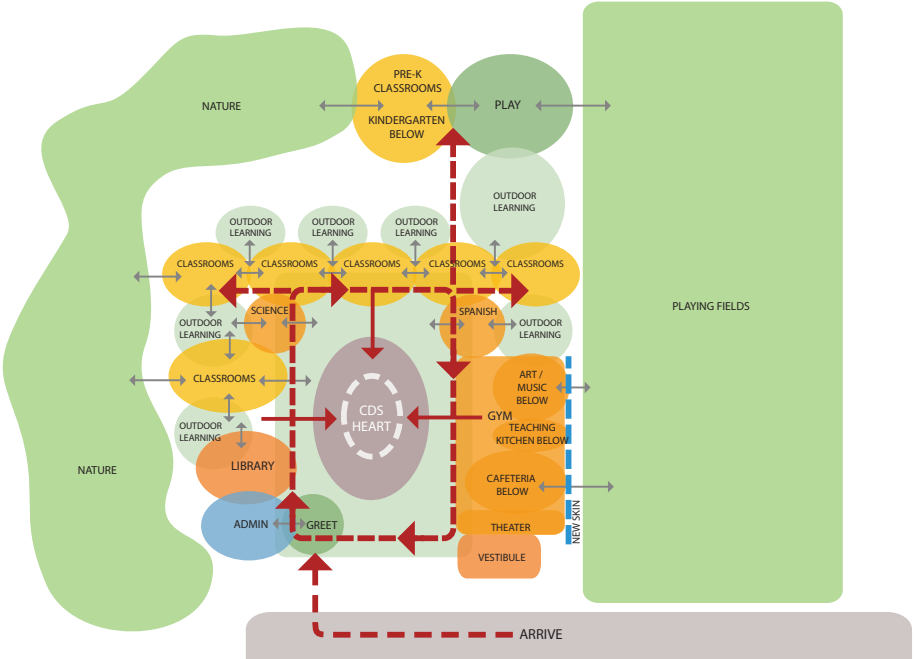


CONNECT TO THE OUTDOORS

BLUR THE BOUNDARY BETWEEN INSIDE AND OUT

Throughout the design, emphasis was placed on reinforcing indoor–outdoor connections. Not only was it important for every teaching space to have views out to nature, but it was determined that all spaces should have direct access to the outdoors. Biophilic design reduces stress, stimulates creativity, increases cognitive function, and improves mental health for school-age children.

The design of the addition delivered on multiple goals for improved security and access to the outdoors. The addition creates a new courtyard, which serves dual purposes as a learning and play space. Viewing the outdoors as an extension of the classroom, the design integrates seating and gathering areas, as well as a bio-retention rain garden pond for scientific exploration.

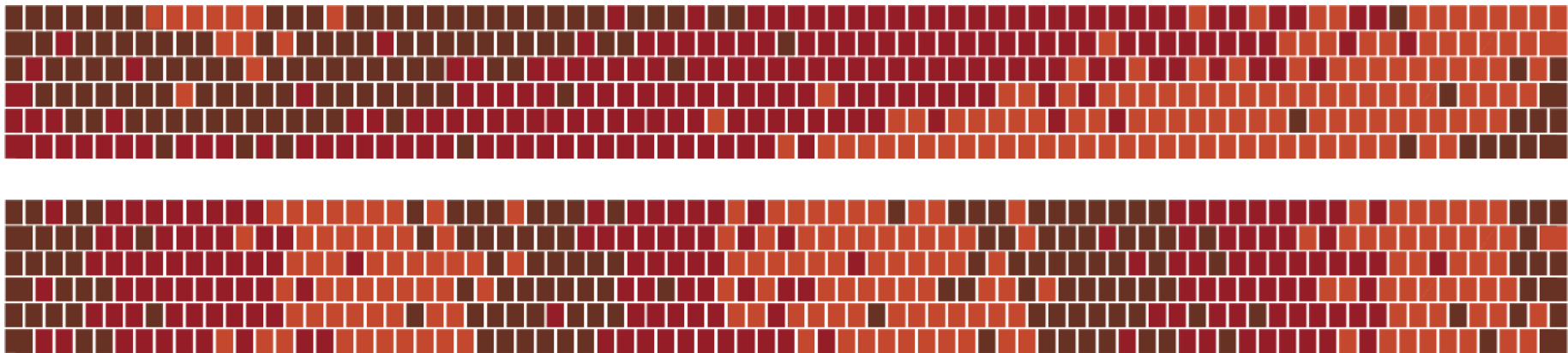




SAFETY & VISIBILITY

HOW CAN A SAFE, SECURE BUILDING FEEL OPEN AND PLAYFUL?

The existing school left much to be desired concerning security. Student play spaces opened directly to forested areas without fencing, and the main building entry and administrative offices were located deep within the school so there was no good way to visually monitor the front of the school. By re-locating the administrative offices, entry, and library to the new building addition at the front the school and adding a fence with a strategically located gate, the central courtyard was enclosed, proving a safe play and learning space, while maintaining a friendly, visual connection to the courtyard from the front of the school. The fence was seen as a design opportunity and became an armature on which to mount hundreds of brightly-colored building donor plaques, providing both a visual contrast to the rest of the muted colors of the school and a clear indication to parents that their children can play safely outdoors.



SAFETY & VISIBILITY

Prior to the renovation, the pre-K and kindergarten, located in an adjacent building, were connected only by an open-air breezeway. The challenge became how to enclose this critical circulation path for the smallest and most vulnerable students without making it feel like security fencing. Curving steel horizontal bars along the length of the breezeway serve to mount vertical rot-resistant wooden slats at close intervals giving the appearance that the walls are warping and flowing. This creative and playful solution to a very utilitarian problem brings joy to the students and faculty that walk back and forth between the buildings many times a day.



PHYSICAL ENVIRONMENT

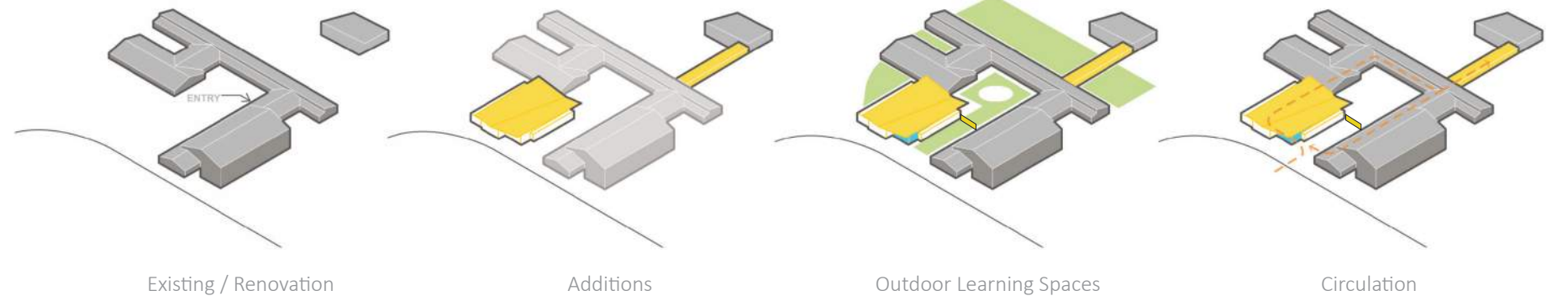
***“THE ACCESSIBILITY TO THE OUTDOORS IS RIGHT THERE.** All of the windows and the light. The doors leading directly to courtyards **WHERE THE KIDS CAN EXPLORE AND PLAY.** It’s a big part of who we are and who we want to be as a learning community.”*

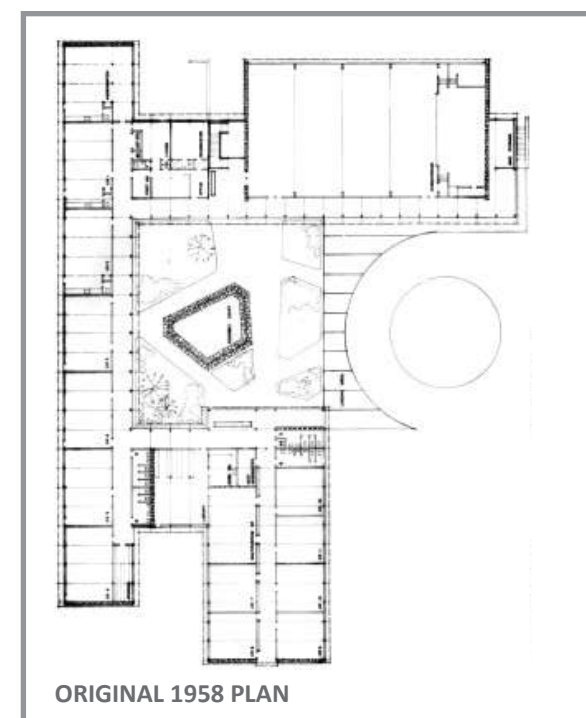
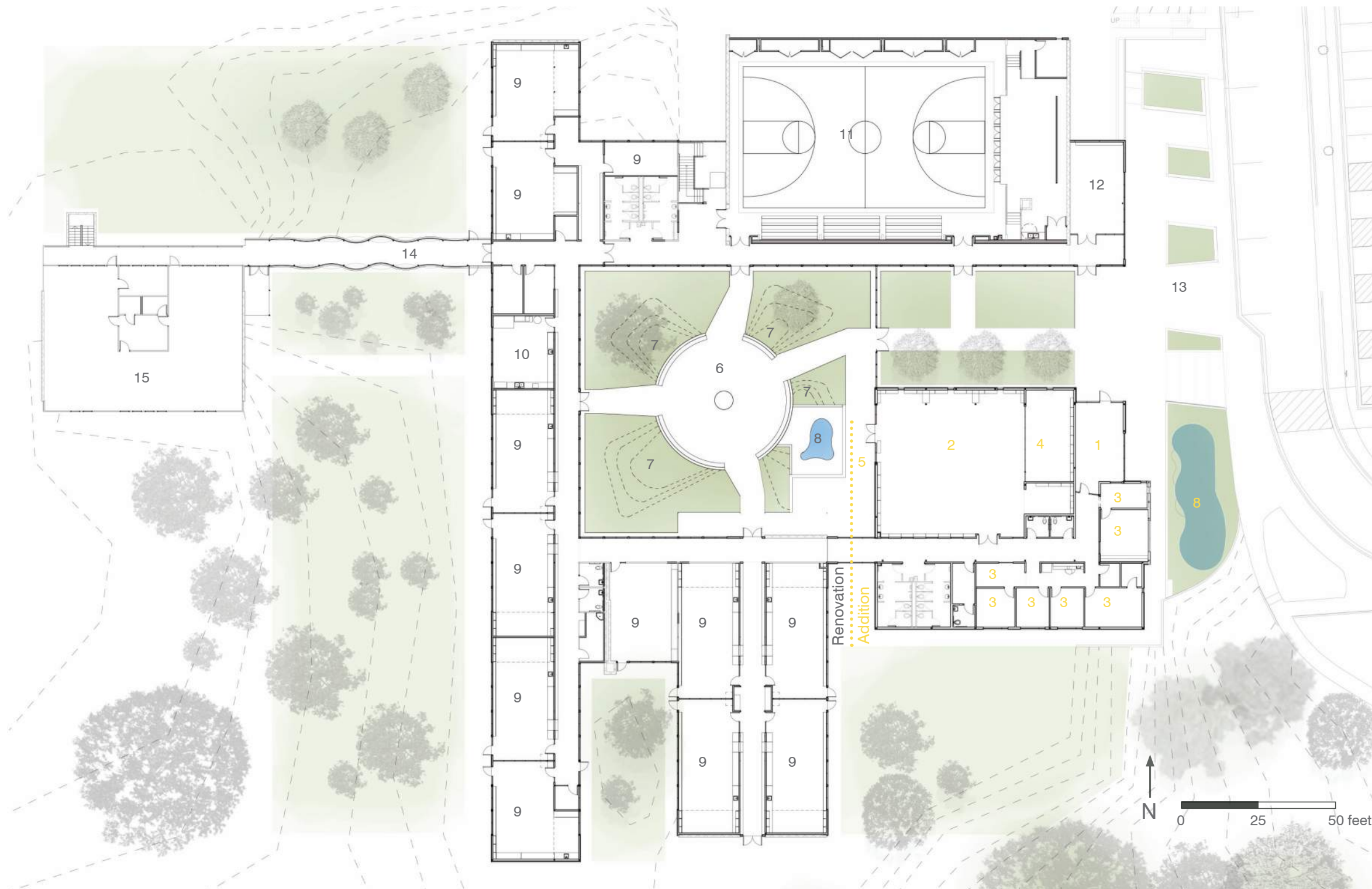
BESS BRYAN, 1ST GRADE TEACHER



ENCLOSE THE COURTYARD TO CREATE A SAFE OUTDOOR LEARNING SPACE

By moving the administrative spaces and library to the front of the facility and creating a prominent new entry, two goals were achieved: the improvement of wayfinding for students, parents, and visitors, and the efficient re-purposing of classroom space in the original building. The addition completes the enclosure of the existing courtyard, creating a gathering space and play area while enhancing campus security.





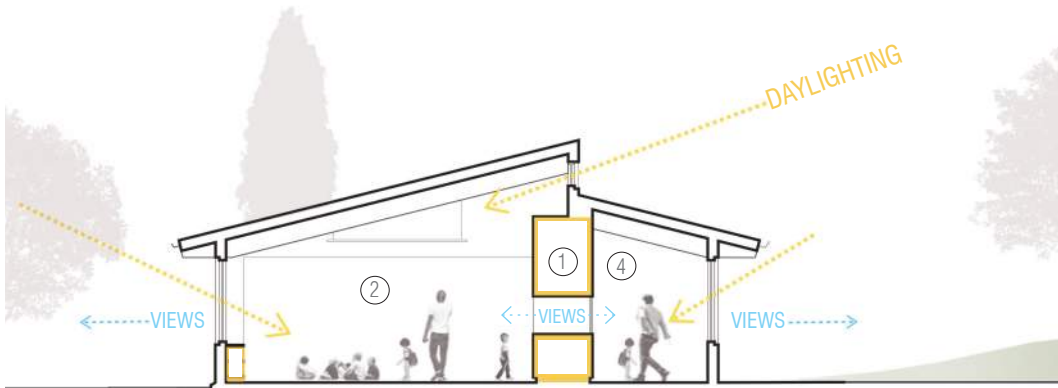
ADDITION

- 1 Entry
- 2 Library
- 3 Administrative Office
- 4 Flexible Classroom Space
- 5 Library Reading Porch

RENOVATION

- 6 Courtyard
- 7 Landscape Berm
- 8 Rain Garden
- 9 Classrooms
- 10 Teacher Workroom
- 11 Gymnasium
- 12 Conference Room
- 13 Entry Plaza
- 14 Breezeway
- 15 Pre-K / Kindergarten

STRUCTURE FOR ADAPTATION



1 Multi-functional Spine Wall

- Teaching Surfaces
- Classroom Storage
- Display Space
- Lockers
- Mechanical Space
- Plumbing Space
- Electrical Space

2 Classroom

3 Exposed Structure

4 Corridor

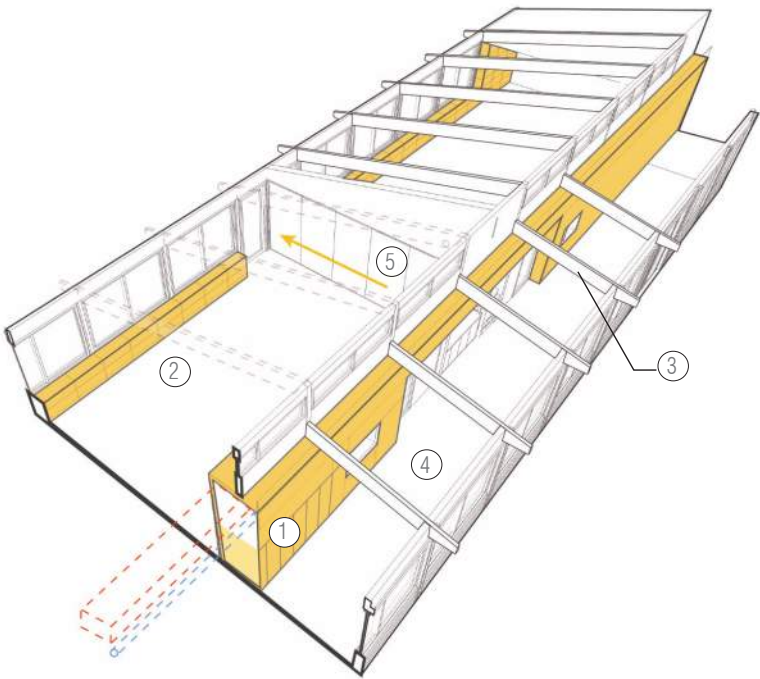
5 Folding Partition

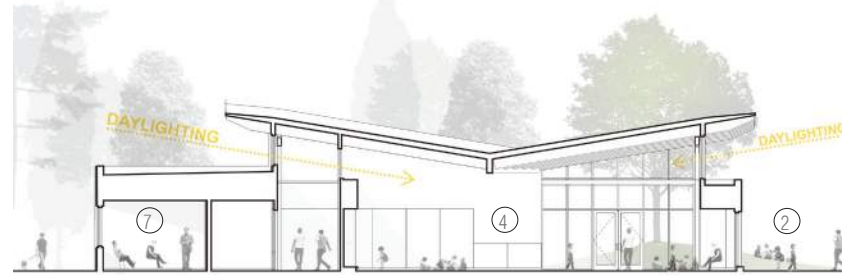
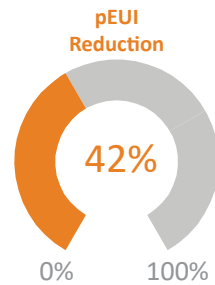
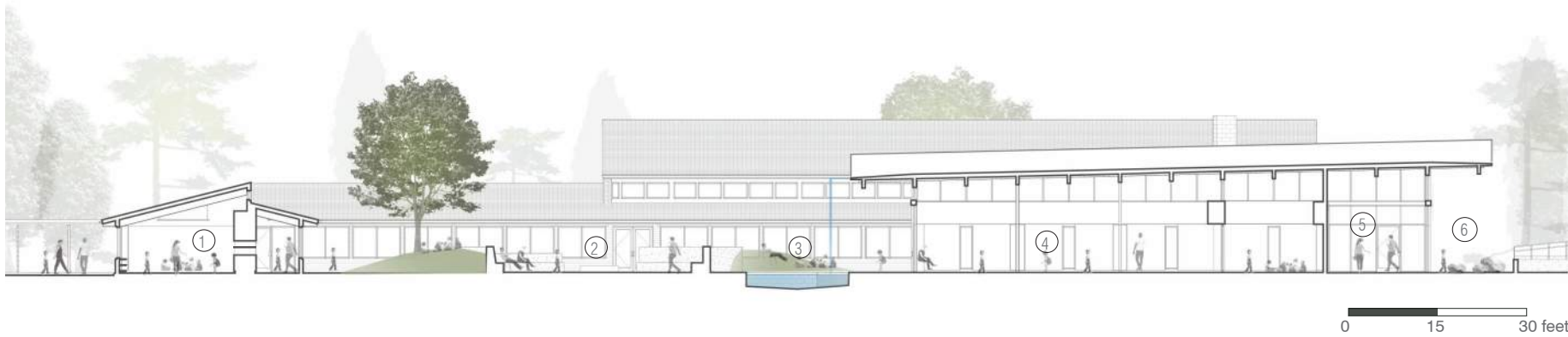
ORGANIZE SYSTEMS ALONG A MULTI-FUNCTIONAL SPINE WALL

Installing MEP systems in a 60-year-old structure with low ceilings proved challenging. To efficiently utilize available space, the building features a “spine wall” that serves multiple purposes. It houses building MEP systems, serves as lockers and project pin-up space on the hallway side, and provides customizable teaching and storage space on the classroom side. Teachers can adapt the core wall to suit their individual teaching styles while maintaining an organized classroom space.

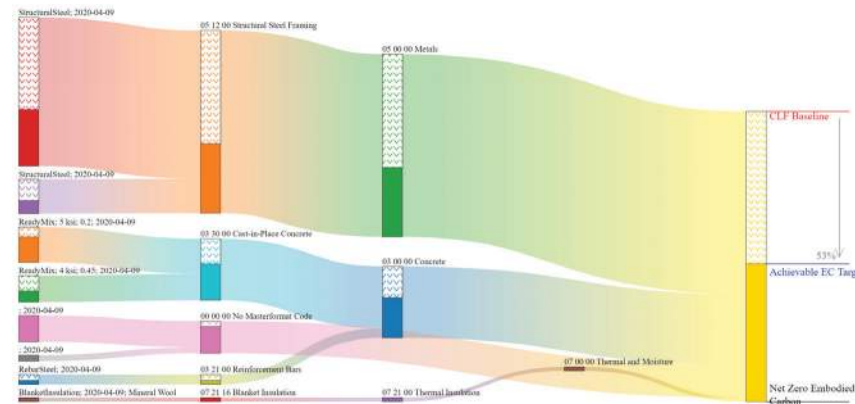
CELEBRATING A RATIONAL BUILDING STRUCTURE

The renovated building reuses existing steel tube columns and glulam frames with exposed tongue and groove wood roof decking on a rigorous 8-foot grid. The existing structure was demolished down to its primary frame and wrapped with an energy-efficient continuous exterior insulated, non-loading bearing envelope. The addition utilizes the original design material palate, following the 8-foot grid, and is framed with steel columns, glulam roof beams, and exposed T&G roof deck. Both the addition and renovated building are skinned in a combination of lapped-siding and fiber-cement panels to seamlessly integrate the old and new. Strategically placed gypsum board soffits conceal modern mechanical, plumbing, and electrical systems throughout the project. The courtyard incorporates site cast concrete walls with integrated wood benches and landscape berms created with earth excavated for the new structure’s foundation. Landscaping consists of native, pollinator-attracting plants and trees.





- 1 Renovated Classroom
- 2 Courtyard Seating
- 3 Rain Garden / Rainwater Roof Collection
- 4 Library
- 5 Lobby
- 6 Plaza
- 7 Administrative Suite



By using LCA tools Tally and EC3 it was estimated that by reusing the existing building that the project was able to **save 591 k kgCO2e of embodied carbon**, lowering the project's footprint by **21.1 kgCO2e / ft2**.

LOW-COST SUSTAINABILITY WITH LARGE IMPACTS

LOWER CARBON SOLUTIONS

The renovation and addition have formed a facility that instructs by design and provides light-filled, engaging spaces for students, teachers, and staff. More than 80% of the project is adaptive reuse, with 100% of the existing structure and roof decking reused. Additionally, the use of wood as the primary building material for the addition reduces the project's embodied carbon.

TRANSPARENCY IN DESIGN

The building serves as a teacher, with windows into interior walls to reveal the MEP systems and a butterfly roof that directs rainwater into a bio-retention pond. Outside, the courtyard is more than a place to gather, learn, and play; it handles 100% of stormwater (roof and site) via the retention pond and features native, educational landscaping as well as earthen berms for free play.

GREEN VIEWS & NATURAL LIGHTING

The school is surrounded by Asheville's outdoor beauty and care was taken in the renovation design to reinforce this indoor-outdoor connection. Generous natural light abounds, with 95% of occupied spaces having direct exterior views and receiving natural daylight. All classrooms have direct views to the outside while clerestory windows serve to balance daylighting. In the gymnasium, the conversion of existing ventilation panels to clerestory windows allows the gym to be used with no artificial lighting at most times.

DESIGN BELOW BASELINE

A new HVAC system improved both climate control and energy efficiency. The renovated school now uses 42% less energy than the baseline. Additionally, the R-23 walls exceed the North Carolina energy code by 53%. By integrating sustainable design elements along with K-12 design best practices, the school reflects its region's commitment to protecting the environment while enabling children to learn and explore.



PROCESS & PROJECT RESULTS

*“To teach in this library, its like coming to a palace. **I’M SO GRATEFUL TO TEACH HERE** . To be able to see nature, to look out and see the beautiful greens, the fall leaves changing, the kids playing in the courtyard and so close to the kids. The space is used the way a library should be. It is the center of the community. **THE DESIGN OF THIS LIBRARY HAS CHANGED THE WAY I TEACH.**”*

STEPHANIE HOWELL, LOWER SCHOOL LIBRARIAN

PROCESS & PROJECT RESULTS

A MODERN BUILDING STEEPED IN TRADITION

The Lower School renovation and addition comprehensively reflects educational goals for 21st century learning as well as school community goals for an inclusive, welcoming, and safe environment. By renovating the existing building and seamlessly merging the new with the old, the re-imagined facility created larger, more flexible spaces to support collaborative, hands-on, and project-based learning. Beyond these spaces, the school building itself serves as a teacher, allowing students to see and understand how the building performs and how it is made. The existing building and courtyard were transformed into vibrant, modern spaces that celebrate learning, while reflecting the school’s respect for tradition. The Lower School is where students first learn at Carolina Day and is viewed as the “heart” of the campus. Fittingly, the school’s seniors come full circle and return to the Lower School’s courtyard to ‘ring the bell’ as graduates.

COVID-19: A SCHOOL PREPARED FOR THE UNEXPECTED

While the renovated facility intentionally enhances the learning experience, other results were unintended and unanticipated. The emphasis on maximizing space and flexibility, originally prioritized based on changing pedagogy, has recently enabled the Lower School to return to in-person education more rapidly than other schools during COVID-19. The enlarged classrooms and library, and the use of flexible furniture, more easily accommodates new layouts required for social distancing. Ample and easily accessible outdoor space outside every classroom allow for the majority of teaching to occur open-air during good weather. Planning for the unknown is difficult, but doing it well instills the inherent qualities a building needs to be flexible for the future.



Using the courtyard as outdoor classroom (photo taken pre-pandemic)



Graduates ringing the bell in the Lower School courtyard (pre-pandemic)



Enlarged classrooms allow for physical distancing during COVID-19 Pandemic



Using space outside classrooms to teach during the COVID-19 Pandemic



BESS BRYAN
GRADES 1 & 2

*"The accessibility to the outdoors is right there. All of the windows and the light. The doors leading directly to courtyards where the kids can explore and play. **It's a big part of who we are and who we want to be as a learning community.**"*



STEPHANIE HOWELL
LIBRARIAN

*"To teach in this library, it's like coming to a palace. I'm so grateful to teach here. To be able to see nature, to look out and see the beautiful greens, the fall leaves changing, the kids playing in the courtyard and so close to the kids. The space is used the way a library should be. It is the center of the community. **The design of this library has changed the way I teach.**"*

PROCESS & PROJECT RESULTS

A BUILDING THAT PROVIDES NEW OPPORTUNITIES FOR LEARNING

Collaboration, creativity, communication, and critical thinking are central to 21st century pedagogy. Throughout the indoor and outdoor spaces, different scales of collaboration are promoted and opportunities for hands-on learning abound. The expanded classrooms accommodate a variety of collaborative layouts and project-based exploration. It is well-documented that access to the outdoors and abundant natural light consistently correlate with better academic performance and improved mental well-being, and the design prioritizes these experiences for students. All classrooms have direct outside views, and 95% of occupied spaces receive natural light. Outside, students and teachers have access to outdoor classroom spaces, courtyard, earthen berms, and a bio-retention rain-garden that serves dual purposes for education and stormwater management. Every aspect of the design was thoughtfully planned to engage and facilitate learning for young students.



Renovated Courtyard and Classroom Wing



Existing Courtyard and Classroom Wing



Multi-functional renovated courtyard and library addition



The library and administration addition creates a new, welcoming entrance to the Lower School and campus