

EXECUTIVE SUMMARY

The new Booker T. Washington STEM Academy Elementary School (BTW) is a 60,300 sf K-5, 3-strand magnet elementary school accommodating 425 students. The design of the building forms a living laboratory for the Science, Technology, Engineering and Mathematics (STEM) magnet school curriculum and provides spaces throughout the school, and specifically in the STEM Lab, Academic Communities, and Outdoor Learning Areas for hands-on learning experiences that focus on problem-solving projects and learner-centered education. The design of the environment of the school encourages students to ask questions and engage in activities with their teachers and peers to create a more productive learning environment. The design integrates the building and the STEM curriculum through the use of collaborative project-based learning configurations, flexibility, graphics, and visible sustainable strategies.



- 60,300 SF replacement school
- K-5 Magnet Elementary School
- 425 students / 3 classrooms per grade level
- 2.2 acre site
- School of choice District
- Geothermal HVAC

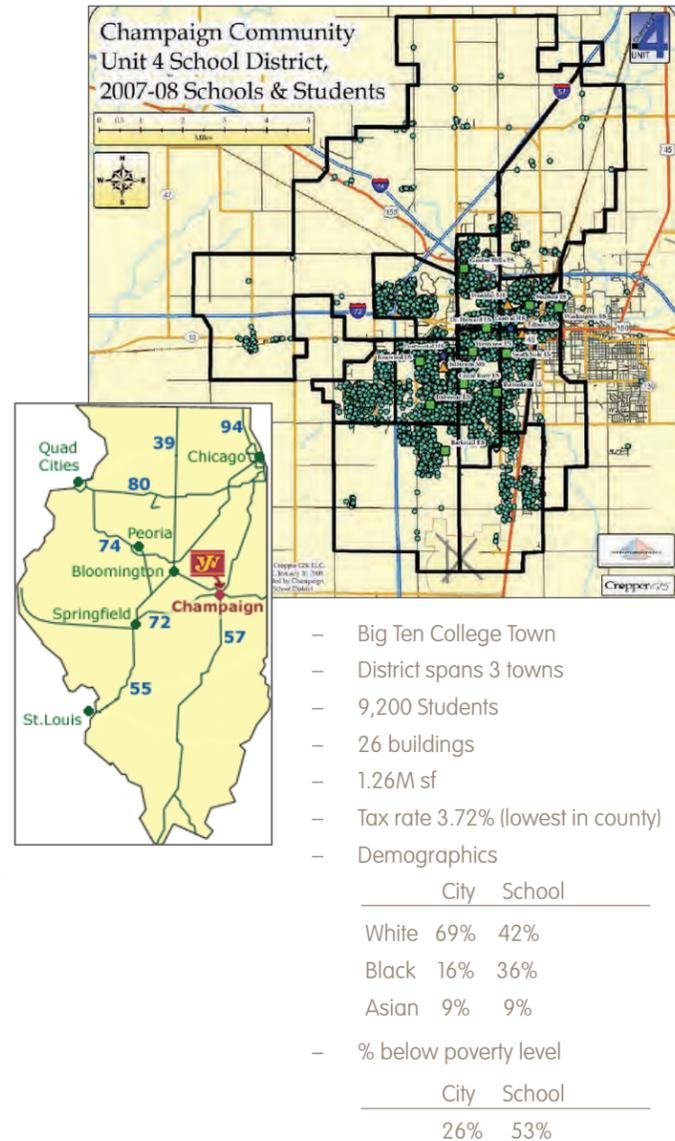
1

**COMMUNITY
ENGAGEMENT
PROCESS**

Context, Challenges, and Stakeholders

Community engagement was a high priority in the design process for the BTW project in order to demonstrate that the School District intended to fulfill the promises and commitments made to the community during a 1% sales tax referendum for school capital projects, and as a part of the settlement of a desegregation order (Consent Decree). Historically, trust between the School District and the community of the City of Champaign, as well as other city agencies such as the Park District, had not been strong. In order to optimize the quality and effectiveness of the execution of the sales tax referendum school capital projects, it was necessary for the School District to develop a productive working relationship and inclusive design process.

The Promises Made—Promises Kept committee started during the design process and continued on throughout the construction of BTW. This committee was made up of community and school board members who held monthly meetings to ensure that the promises made by the district were being kept to the community.



It had been nearly fifteen years since the last significant building project had been completed in the District, and since then, many deferred maintenance and educational adequacy issues had developed amongst the twenty-six buildings owned by the District. In particular, many older school buildings were in disrepair and in need of significant improvements and energy efficiency upgrades.



Additionally, the size and location of the school buildings were not in alignment with the growth patterns and enrollment needs of the community. Challenges of facility needs meeting 21st century learning also existed district-wide. As funds were made available by the sale of bonds from the successful 1% sales tax referendum, it was necessary for the District to carefully plan and prioritize the execution of all projects in the context of the available funds and to provide appropriate execution of the BTW project.

District Community Engagement Process

The community engagement process for the project began many months before more detailed aspects of the building design were discussed. Each of these efforts formed multiple dimensions to the community engagement effort, laying the ground work for a successful design process. In each of these efforts, multiple community members as well as district staff participated.



- **Great Schools Together** – The goal of Great Schools Together was to create a cohesive, long-range plan for Unit 4 schools—using as much community input as possible so that the Unit 4 School Board and Administration could move forward in ways that truly reflect the vision and goals of those they serve. To achieve this, the community was engaged in a variety of ways. Community members served on a Vision Committee, in Working Groups, and as facilitators. All other community members were encouraged to attend one or more of 10 community forums to brainstorm and share ideas. Seven of the forums were theme-based, focusing on: Excellence & Equity, Programs, Infrastructure, and Engaging Community Stakeholders. This process occurred during **Spring 2008**.
- **Passing the 1% sales tax referendum** – A 1% sales tax referendum was successfully passed in the community to fund school construction. This funding mechanism provided necessary capital to build and complete addition and renovation work on 7 schools without raising property taxes. **April 2009**.
- **Magnet selection process** – The community engagement process committed to the establishment of educational programs in the underserved African American neighborhoods on the north side of Champaign. Three magnet school themes were chosen through a community process and tied back to 3 of the major capital projects. The magnet theme of STEM was chosen for BTW. **Spring 2009**.
- **Settlement of the Consent Decree** – The school district was able to demonstrate to the community its efforts providing equity and opportunity for students of the African American community. The decade-long legal process was concluded, allowing much needed capital and attention to be directed toward programs and facilities that were formerly utilized to pay the legal fees of both the plaintiff and defendant. **July 2009**.
- **Capital Improvement Plan** – The Great Schools Together Plan included a goal of developing a 10 year CIP to both structure the major capital projects of the 1% sales tax referendum, and also to plan out ongoing capital projects to all schools within the District. The City of Champaign provided the professional staff to lead and organize the CIP process, fostering the collaborative working relationship between the school District and the City. The CIP provided an opportunity for additional interaction with the community building credibility, good will and demonstrating fiscal responsibility. **2010**.

2008



2009



2009



2009



2010



"A Day In The Life Of A Student At The Great Campus"

A major component of The Great Schools Together initiative was a narrative describing a day in the life of a student named, Tahleh, at The Great Campus. This narrative was a major driver in formulating the building concept and The Great Schools Together initiative helped us structure the conceptual design process.



Tahleh quickly walks the few blocks to school in the fall morning light. Water conserving prairie grasses surround the school... Tahleh enters the school building where a parent greets him at the front desk. On the wall down the hallway past the office he sees a banner that reads, "Every day we will strive to take care of ourselves, to take care of others, and to take care of our environment."

A DAY IN THE LIFE OF A STUDENT AT THE GREAT CAMPUS.

In a multi-charette process students, parents, teachers, staff, administrators, and community members participated in developing an understanding of the education delivery method, determining what spatial adjacencies best represented Tahleh's education experience to create an understanding of ecology and sustainability and create opportunities for community activism and partnerships, and composing those ideas into a conceptual plan diagram.

The first workshops discussed the possible teaching styles that should be addressed at Booker T. Washington and how the STEM curriculum combined with Tahleh's day would shape the learning environment.

This led to an understanding that all aspects of a student's day must interact with STEM and the learning environment must be shaped so the students can also continually engage each other.

Discovery of critical adjacencies and development of the plan at additional workshops lead to a spatial diagram where learning spaces flowed around and into each other reducing, and in some cases eliminating, the need for dedicated circulation.

Ultimately the conceptual workshops concluded with a plan that located a STEM Studio at the heart of the building. Reinforcing da Vinci's connection between the arts and sciences, the art room at BTW maintains a direct visual connection to the STEM Studio, to promote a continual flow of inspiration and creativity between the disciplines. Resource and community gathering spaces completed the central spine which is flanked by a series of learning studios, each clustered by grade level and connected to each other with a common collaboration space having a direct connection to an outdoor garden lab.

Many of Tahleh's experiences also represent the goals of the STEM curriculum. BTW creates a focus on Science, Technology, Engineering, and Mathematics through immersing the students in a collaborative learning environment that infused with sustainable features and technology while creating visual and physical connections to the local ecology.

BTW Design Workshops

Co-creative Design Process and Community Engagement - The collaborative design process occurred as a parallel process to the community engagement process and the resulting design reflects both the desires of the community, educators, and students. On the heels of the Spring 2009 magnet selection and the passing of the sales tax referendum, the community engagement process continued and the design process for BTW began.

A community-based school design committee was formed for BTW in the late spring of 2009. The goal of the committee was to participate in 5 collaborative design workshops to establish educational specifications and conceptual direction for the project. The following community and district groups were represented on the committee.

- Parents & PTA
- Teachers
- Administrators
- School Board
- Facilities Department
- Curriculum Directors and Coordinators
- City of Champaign
- Park District
- Boys and Girls Club
- Local District Councilman
- University of Illinois STEM Program
- Construction Manager

Educational Specifications: Process is vital to bringing about clarity in vision. If outcome drives the process you can end up at places everyone has been before. However, if you focus on the process and create a collaborative plan and design, you will arrive at new places together. In order to better comprehend the school district's vision and mission, a dynamic dialogue and exchange between the school district, the community and the planning team needed to be generated.

The Educational Specifications for BTW are not a standalone document distinct from the planning and design process but rather part of the design process, and are documented by a series of presentations documenting workshops, sharing ideas with wider circles of the district and community and guiding the design team in the schematic and design development phases and throughout the project. The start of this process was the "A Day in the Life" narrative created as a part of Great Schools Together. The process involves an exploration of learning, teaching, and how the learning environment impacts learning and teaching. Design thinking and problem solving skills are developed in all participants to create a truly collaborative design process.

During the 5 workshops, various aspects of the project were explored in a collaborative session involving both large and small group work to explore the educational direction of the project. The goal of the workshop process was to generate a synergistic process involving multiple stakeholders in the establishment of the vision of the new BTW STEM Elementary School.

- **Design Workshops 1 and 2:** The first two workshops focused on exploring the future of education and the STEM Magnet Theme resulting in learning process diagrams and a program of requirements that served as educational specifications integrated with the concept design for the school.
- **Design Workshop 3:** The third workshop focused on sustainability and high performance building design goals, as well as overall facility requirements and the basis of design, resulting in energy performance targets, system options, and basis of design criteria for the building.
- **Design Workshop 4 and 5:** The fourth and fifth workshops built on the educational planning completed and established the schematic design for the school, and further explored the integrated learning features of the building.



Post-its and images from a co-creative design workshop

2

ENVIRONMENT SUPPORTING THE CURRICULUM

STEM

STEM Magnet Curriculum Selection

The District made the decision to establish magnet schools for a variety of reasons lending themselves to enhanced learning opportunities, attracting diverse students to achieve integration, turning around low performing schools, and revitalizing the community. As a part of the community engagement process, the District explored multiple magnet themes and their application at 3 schools in different neighborhoods in Champaign.

Science
Technology
Engineering
Mathematics



During the magnet selection process, STEM was chosen as a magnet focus for BTW. The architectural concept of the new Science, Technology, Engineering and Mathematics (STEM) Academy creates a STEM-centric, project-based learning environment to help students gain the skills and abilities to think critically, solve complex problems, and drive advancements in science and technology.

Recent studies have shown that science and engineering jobs are growing exponentially faster than other occupations. Students who participate in STEM education environments will obtain 21st century learning skills which will come as a benefit when competing for employment and setting career paths in the future. STEM education encourages students to ask questions and engage in activities with their teachers and peers to create a more productive learning environment.

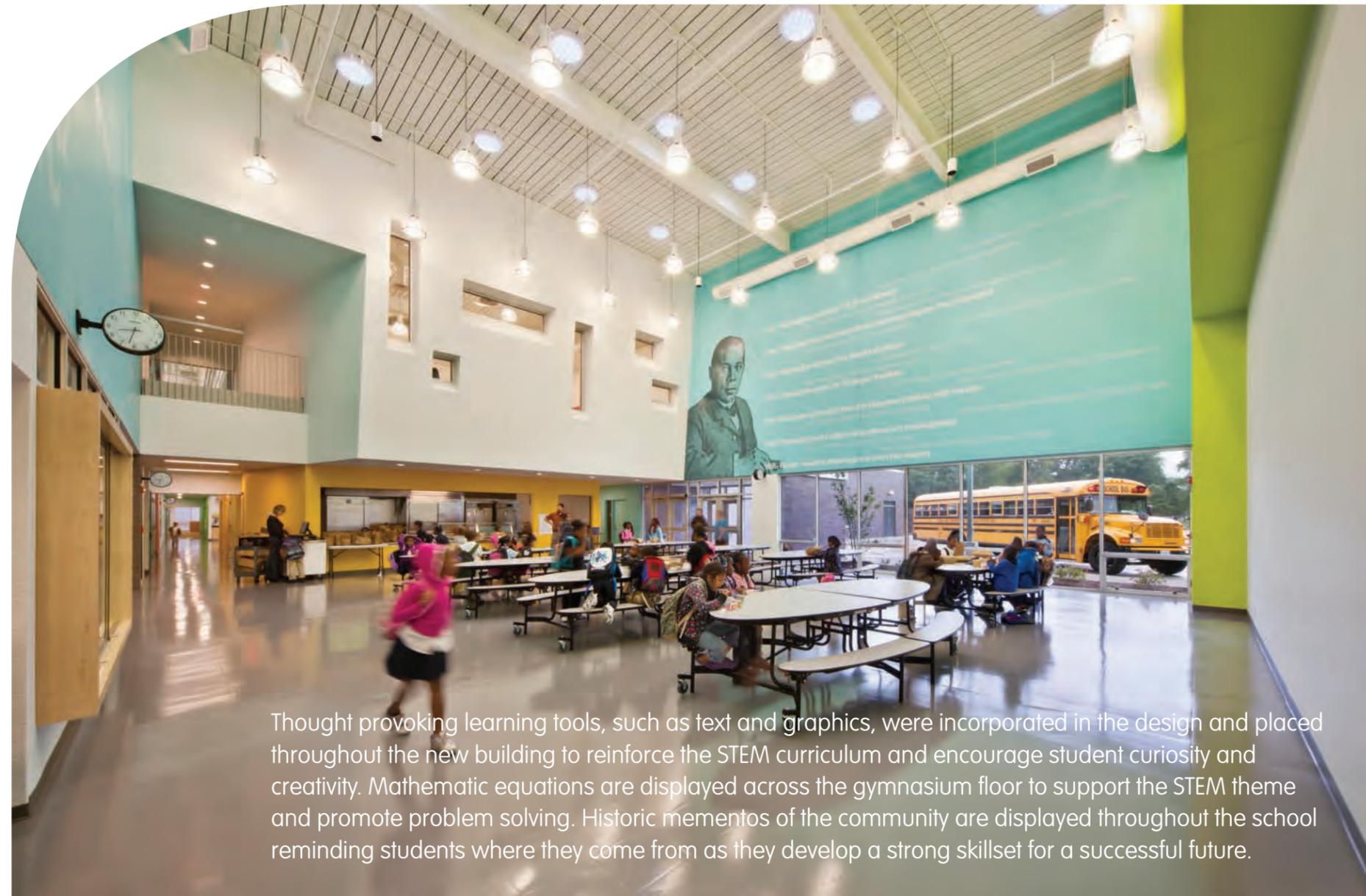
The interior spaces in the center spine of the building create a student experience of Discovery, Creation, Connection and Awareness.

STEM Learning Environment Design

In response to the opportunities and challenges of designing a STEM elementary school, the Design Team conducted the first 2 design workshops to explore the learning activities and attributes of a STEM-centric learning environment, the physical needs of those attributes, and the spirit and vision of the project that would drive the imagery of the building. The following key attributes of the learning environment were identified and integrated into the physical design of the building in the last 2 design workshops.

- Project-based learning environment
- Permeation of science throughout the building in multiple learning settings
- Flexibility and adaptability of space
- Building layout and flow that structured key spatial relationships for inquiry and production
- Graphics that speak of math and science themes

These key attributes are instilled in the building program and relationship of the spaces. The STEM curriculum drives the need for space that allows students to learn through group and individual project activities and promotes better attitudes, more enthusiasm, better communication, better interpersonal skills, ownership in accomplishments, and greater civility towards others as compared to schools with traditional programs.



Thought provoking learning tools, such as text and graphics, were incorporated in the design and placed throughout the new building to reinforce the STEM curriculum and encourage student curiosity and creativity. Mathematic equations are displayed across the gymnasium floor to support the STEM theme and promote problem solving. Historic mementos of the community are displayed throughout the school reminding students where they come from as they develop a strong skillset for a successful future.



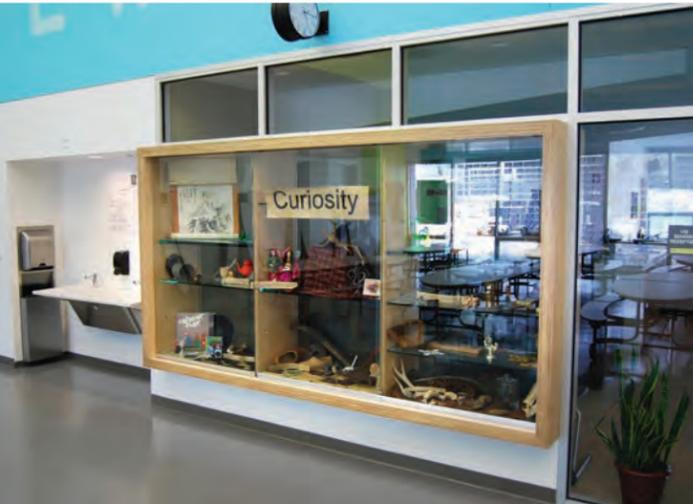
The **STEM Studio** is located in the middle of the spine, where students connect with instructors and local university experts to explore and create projects that express their understanding of STEM.



Bookending the center spine is the **Library** where students can connect with information vital to the advancement of STEM, and the Student Commons where graphics make the students aware of how STEM impacts all facets of life.

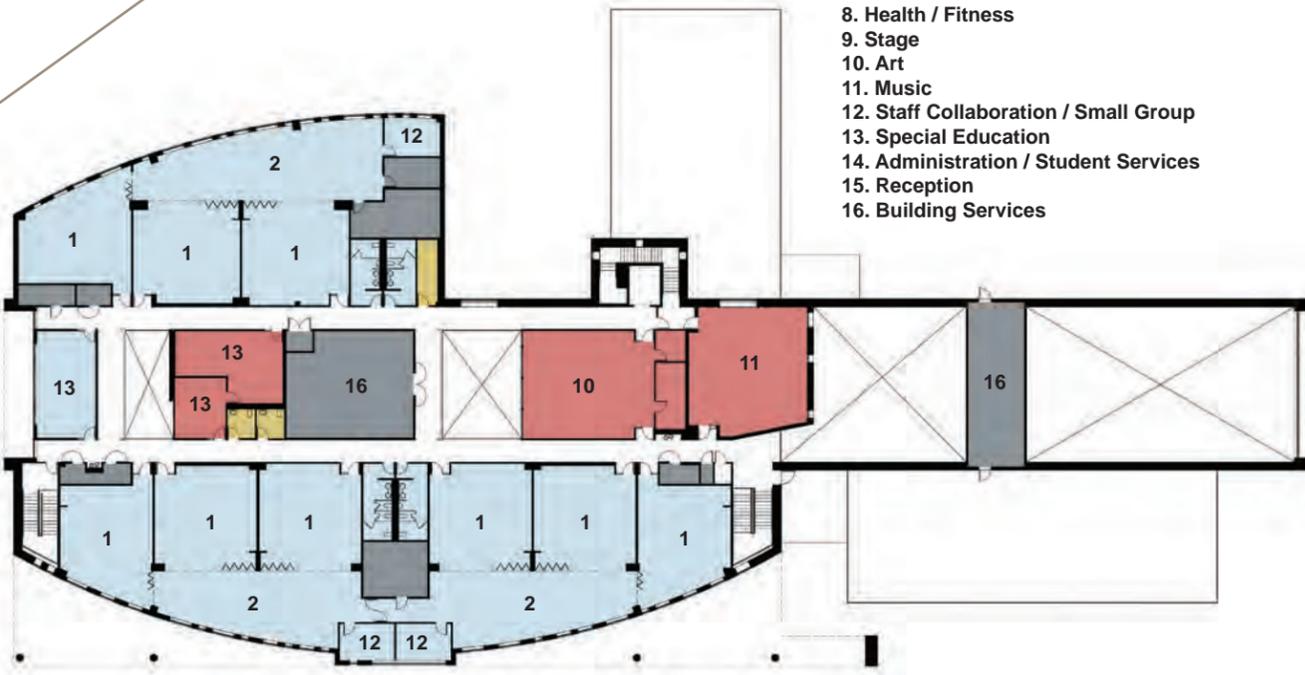


The **Commons** is also where artwork, models, and graphics are prominently displayed.

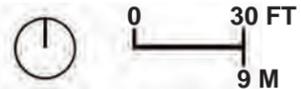


FIRST FLOOR

- 1. Learning Studio
- 2. Piazza (collaboration)
- 3. Outdoor Learning
- 4. Resource / Media
- 5. STEM Studio
- 6. Student Commons
- 7. Kitchen
- 8. Health / Fitness
- 9. Stage
- 10. Art
- 11. Music
- 12. Staff Collaboration / Small Group
- 13. Special Education
- 14. Administration / Student Services
- 15. Reception
- 16. Building Services



SECOND FLOOR





Academic Communities | Piazza

Academic communities offer increased opportunity for collaborative, flexible, and interactive learning. Each academic community is inwardly focused forming a cluster of three learning studios that open onto a collaboration area and project workspace, through the use of folding glass partitions, for discussion and collaboration. The collaboration area is outfitted with a demonstration counter and a large sink allowing science and engineering project demonstrations and activities to occur in close proximity to the learning studios realizing the goal of permeating the building with science and engineering project based learning opportunities.



Surrounding the center spine are the grade level academic communities (pictured to the right). The academic communities consist of 3 classrooms and a collaboration area which encourage interaction among students. The folding glass partitions create transitional and multifunctional spaces providing collaborative, flexible, and interactive learning environments for students.

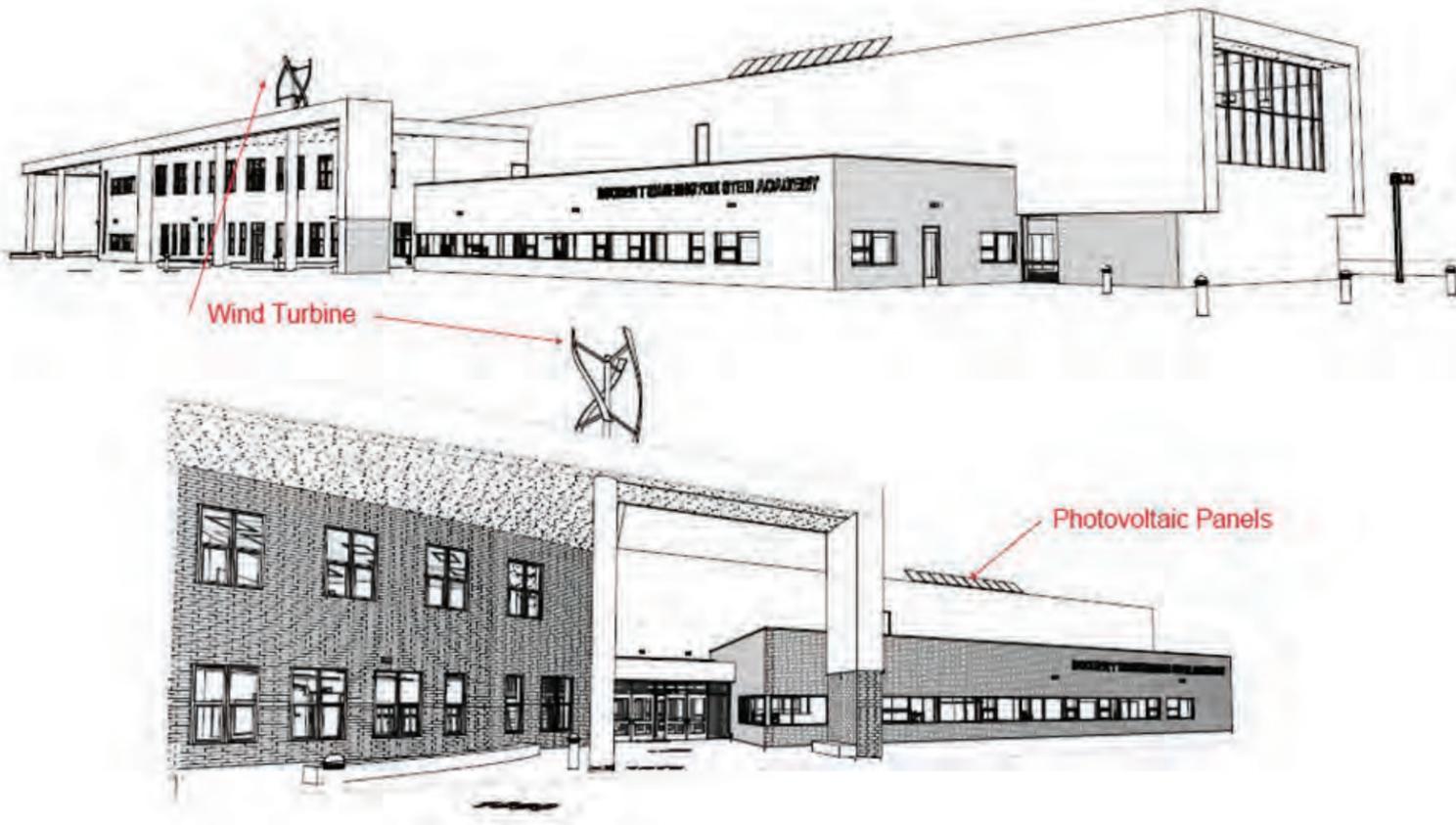
- 1. OPEN - Maximized floorspace and interactivity
- 2. CLOSED - Composed classroom environment
- 3. PARTIAL - Increased interactivity and traffic flow

Round lighting fixtures in each of the six Piazza ceilings are composed in patterns of constellations.

Building Patterns and Sustainability

The building material patterns, resources, and energy used to construct and operate the building are intended to reinforce the STEM curriculum and encourage student curiosity and creativity. Materials are organized on the building façade through the use of colored glazed masonry to diagram the **human genome** and window patterns divided to the rhythm of the **Fibonacci sequence**. Natural daylight, geothermal energy, and **photovoltaic panels** demonstrate the schools commitment to sustainability.

Booker T. Washington STEM Academy received more than \$320,000 in grants associated with the energy-efficiency measures incorporated into the project.



b



Human chromosomes



Outdoor Learning Area

Outdoor learning areas, native vegetation, and vegetable gardens foster a sense of environmental stewardship and healthy lifestyle choices in the students. The outdoor learning areas and landscaping are designed to integrate with the schools science curriculum. The STEM courtyard contains raised planting beds for growing vegetables and a rain barrel for watering the school landscape.

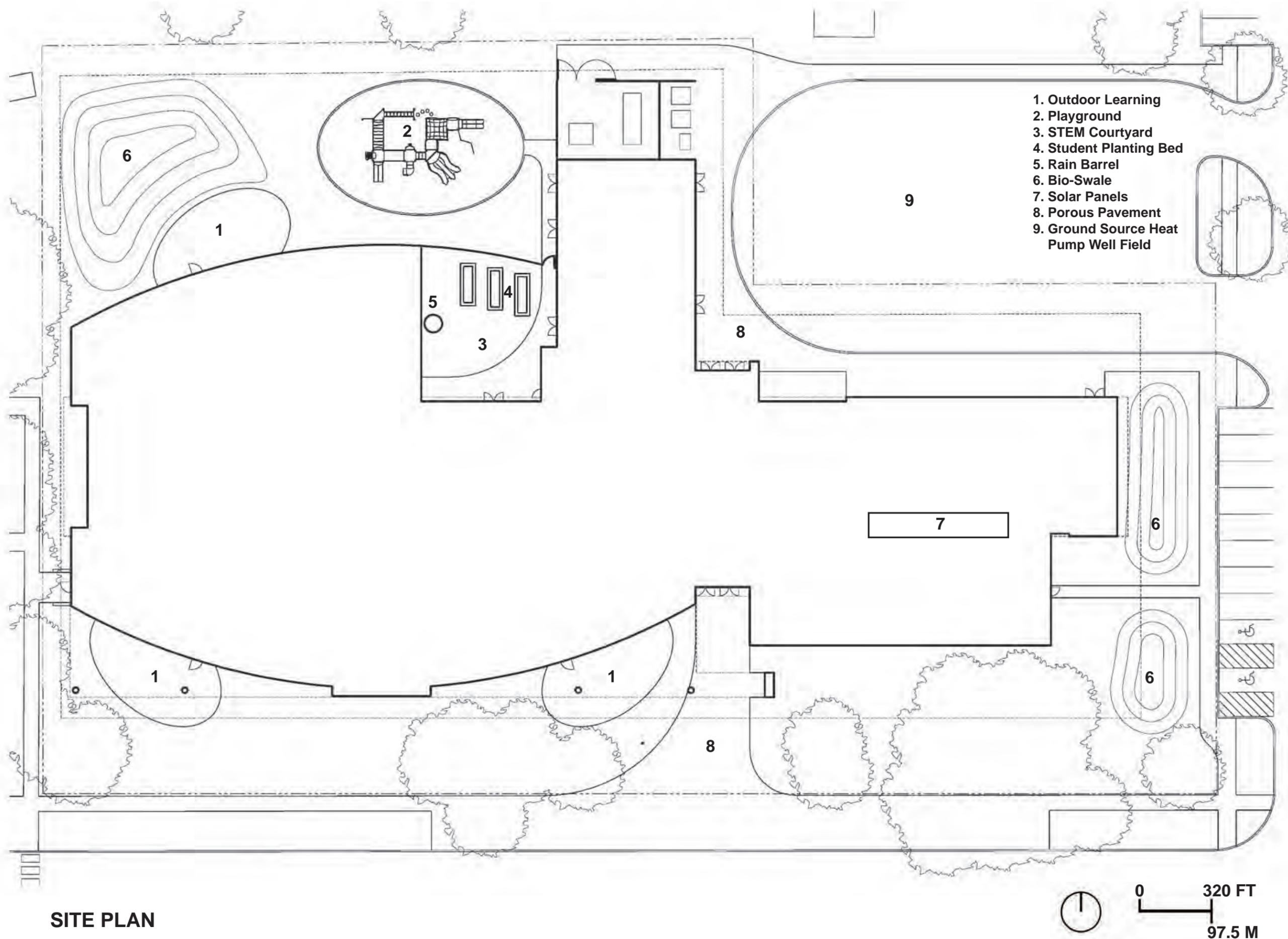


BTW has a holistic focus where students are learning to not only care for their environment but to also care for their needs and the needs of those around them, both in their school and beyond. Students actively participate in class projects related to gardens, recycling, and energy efficient school building with increased student motivation and meaningfulness of student investigations.

Science Curriculum

- K – Where does our food come from?
- 1 – Seeds & Plants
- 2 – Insects; Recycling
- 3 – Agriculture; Prairie Ecosystem
- 4 – Woodland/Forest Ecosystem
- 5 – Botany; Public land use; Natural Resources

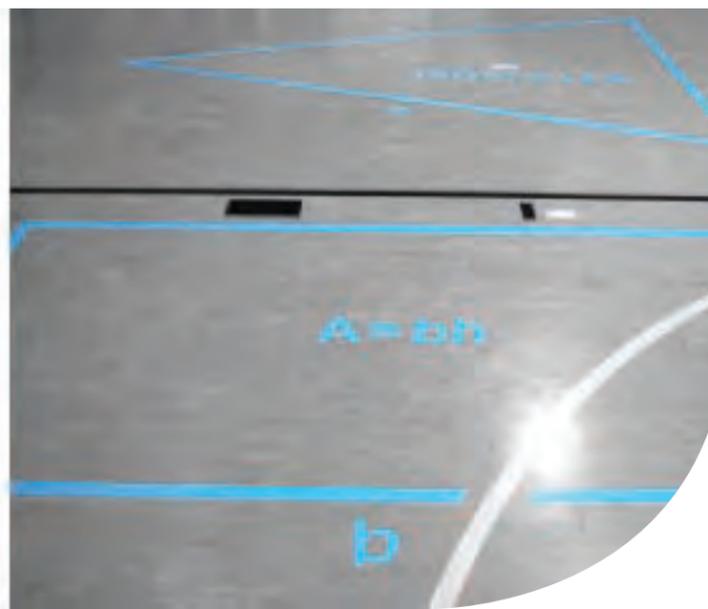
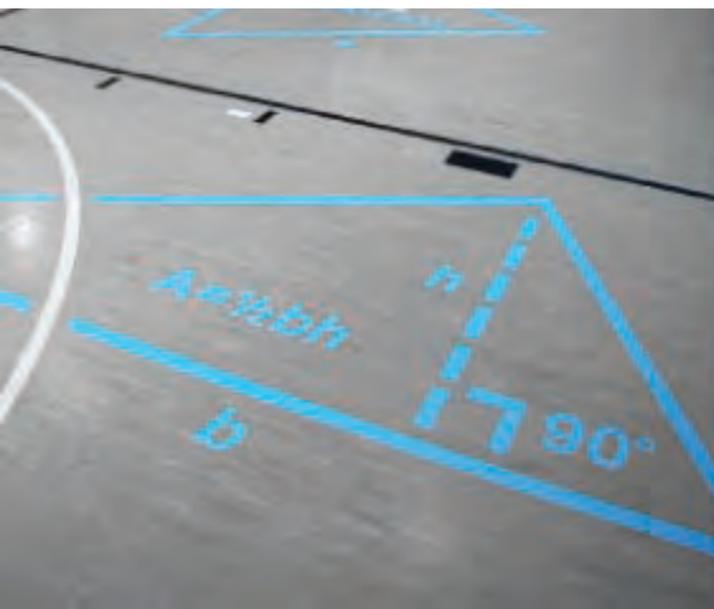
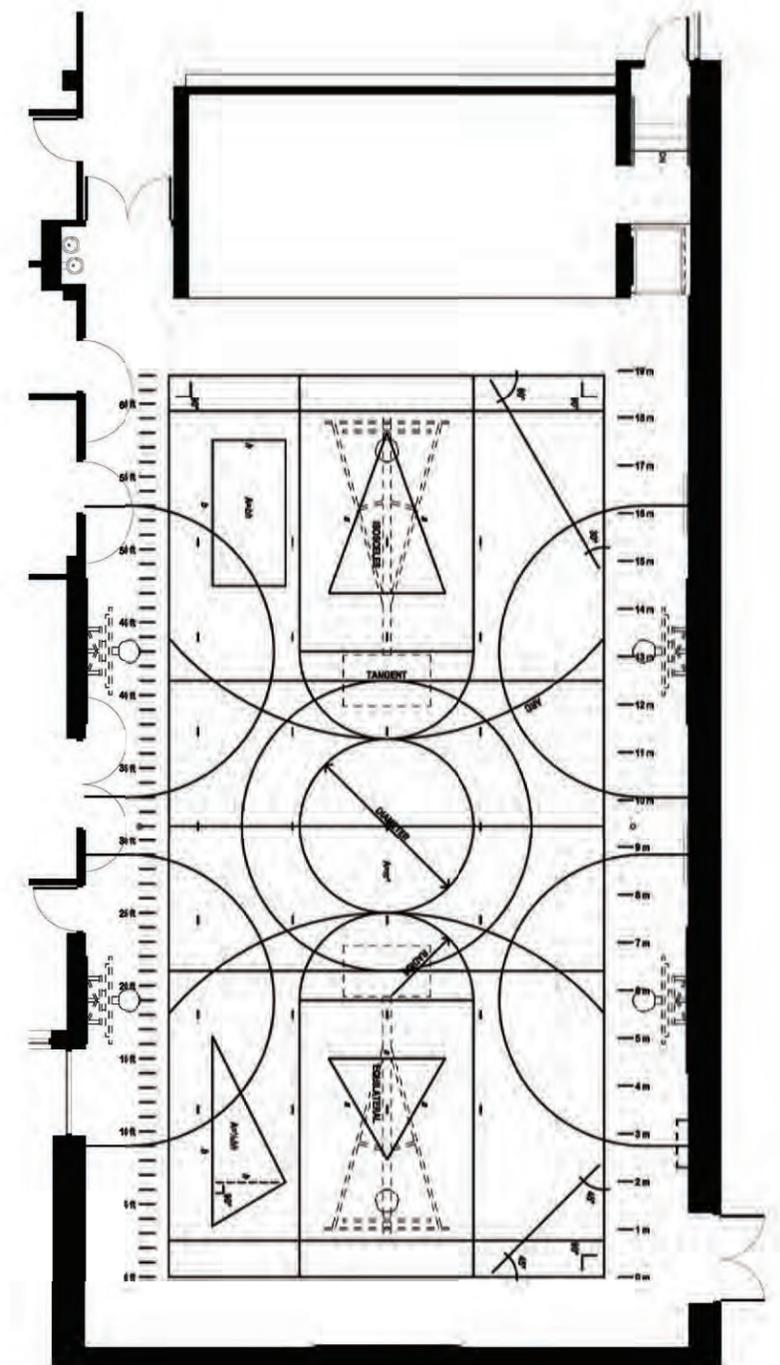






Health and Fitness Area

Court striping on the floor of the Health & Fitness room is further articulated with geometric symbols denoting shapes, angle degrees, and measurement systems.



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**COMMUNITY
GOALS**

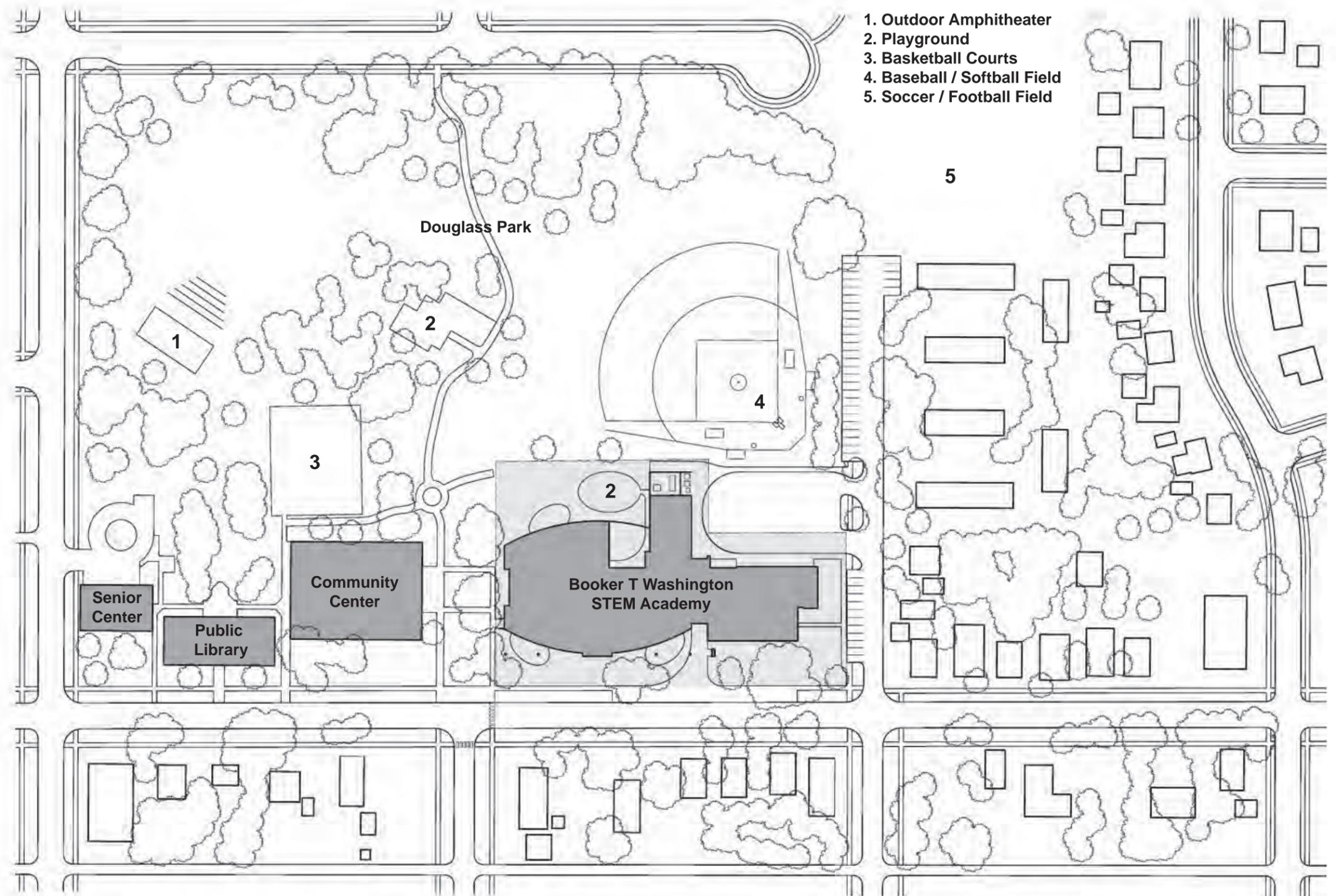
History & Community

The creation of Booker T. Washington incorporated a community-based design process and includes building features for community use as well as a strong connection with the history of the neighborhood and the original school built in 1958.

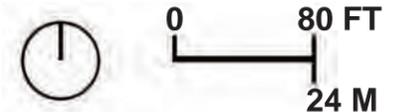
The new school is located in an underserved African American neighborhood, and the decision to build it was a response to a desegregation order. The new STEM elementary school replaced the existing school building which had important roots in the community. Necessary measures were taken to insure that the needs and history of the neighborhood played a vital role in the design process. Values and virtues of the original Booker T. Washington school were incorporated in the design of the new school building. The main goal of the school was to attract and integrate students community-wide through the design of a new STEM building and magnet program that would generate a strong sense of community across the district.

The decision process to make the school a STEM magnet school along with the design process were intentionally constructed to engage the community in an inclusive process to foster awareness, enthusiasm, and an exciting learning environment, resulting in a meaningful new building.

The site for BTW was shared with the Park District directly adjacent to the Public Library, Community Center and Senior Center.



DOUGLASS PARK COMMUNITY MAP



History & Community Cont'd

Community involvement is vital to the success of an elementary academy. The school is intended to educate the whole child, and the program and design are organized to reflect that goal. A designated area in the building is provided for doctors and dentists to administer annual exams for all students. Advanced facilities for special education allow for the extra attention any individual student may need. Spaces within the building are open to the community for use after school hours, and additional space is provided for community members to engage in mentorship activities with students.

There is a strong history to the role that the BTW school has played in the neighborhood. In order to achieve a meaningful and lasting memory of the school as it was originally built, its relationship to the community, and how it is being taken into the future with the new STEM magnet curriculum, two important graphic art features are integrated into the building design.

The STEM Timeline Graphic and the STEM Ceramic Mural (please see the following pages).



Photo provided by Alonzo Mitchell

Chisholm Johnson's second-grade class poses on the steps of Booker T. Washington School in Champaign in 1953. Johnson is at left in the top row. Standing next to her is Alonzo Mitchell. The other students are unidentified, as is the student teacher at right in the top row.

At the heart of this northeast Champaign community is Douglass Park of which Booker T. Washington STEM Academy is an essential component to fully meet the needs of the community. Douglass Park was formed in 1931 and through various purchases and land agreements took its final form in 1970.

In 1941, the Douglass Community Service Center Committee was founded to construct a community center at Douglass Park to service the black community who's needs were not being meet with the inadequate and segregated facilities that existed at the time. Facilities at Douglass Park continued to expand with the construction of the original Washington School in 1958, the senior center in 1978, and more recently the completion of a Champaign Public Library branch in 1996. The outdoor spaces of Douglass Park includes an amphitheater, playgrounds, ball fields, and a community garden.

Douglass Park is a very active community space with students attending the school during the day, playing with their friends at the community center, studying at the library in the evenings, and socializing with their neighbors at community events on the weekends.

Booker T. Washington and STEM Timeline Graphic

The building entry sequence is comprised of a timeline that begins with milestone years stained into the concrete paving at the front plaza, continues in the tile flooring in the Commons and concludes with a large wall graphic on the Commons north wall. The wall graphic includes the historic photo of Booker T. Washington overlaid on the wall as a bust on left side, and a timeline of significant milestones in Booker T. Washington's life paired with significant milestones in science and technology on the right side of the graphic.



"This school is symbolic of what can happen when Unit 4 and the community work together for our students. This is an outstanding, 21st century world-class school."

ROBERT MALITO,
(FORMER) INTERIM
SUPERINTENDENT

Booker T. Washington and STEM Ceramic Mural

Also included in the entry sequence is a large ceramic mural depicting themes important to the history of the school, the neighborhood, and the new STEM magnet curriculum. The mural forms a prominent and permanent memory for the neighborhood and community. The mural will also be known for the educational opportunity it created for the school as the building was being built. The mural project was initiated by the art curriculum leader for the District who worked at BTW for nearly 30 years as an art teacher, and also served on the building design committee. Recognizing the need to preserve the history of the school as the new building was being conceived, she secured a state arts grant to implement the mural project.

The curriculum leader and artist worked for an entire school year on the development of the mural design ideas, production of the clay tiles, and firing and glazing, with the students as a part of the art curriculum. When the wet clay tiles were completed, a portion of the tiles in the form of a border were set aside for community members to place their finger prints and small engravings on the tiles. The location for the mural was chosen for its prominence in the building design and proximity to the building entry sequence.



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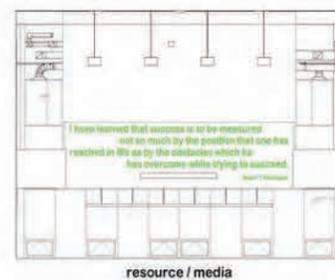
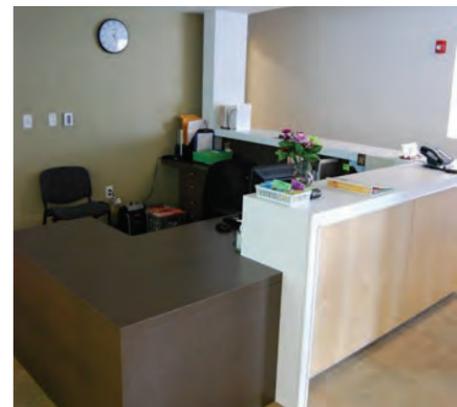
PROGRAM OF REQUIREMENTS

Program of Requirements

Following the vision of the Great Schools Together Community Engagement Process, the design of BTW responds to important priorities established District and the Community.

The school is intended to educate the whole child and the program and design are organized to reflect that goal. The planning principal allows for important adjacencies and flow necessary to support the STEM project based learning approach, while establishing a simple and efficient design that saves space and responds to the tight site constraints. The building system choices and envelope design respond to aggressive energy efficiency goals established early in the workshop process. The physical environment of the building is designed reinforce the STEM curriculum and encourage student curiosity and creativity.

- **Center Spine** - The interior spaces in the center spine of the building create a student experience of Discovery, Creation, Connection and Awareness. This zone of the building allows STEM inquiry and project based learning, activity and gathering, arts and presentation, and physical activity to occur. The center spine contains the library, STEM studio and courtyard, the commons, and the health and fitness area. Advanced facilities for special education, literacy, and reading recovery, provide for the extra attention any individual student may need.
- **Academic Academies** - The academic communities create a STEM-centric, project-based learning environment which helps students gain the skills and abilities to think critically, solve complex problems, and understand advancements in science and technology. Each grade level academy consists of 3 classrooms, a collaboration area called the Piazza, and a small group room used for student literacy instruction, staff development and planning, and other activities.
- **Student and Community Services** - The main entrance of the building contains a secure vestibule and reception space with offices for the administration of the school. Space is provided for doctors and dentists to administer annual exams for all the students.



Program Spaces and Sizes

Learning Studios: Kindergarten through 5th Grade	14,312 square feet
Piazas: collaboration space at each grade level	7,126 square feet
Special Education	2,053 square feet
Administrative Offices	3,254 square feet
Mechanical: decentralized heat pump system	4,056 square feet
Health / Fitness	3,083 square feet
Student Commons	3,033 square feet
STEM Studio	1,747 square feet
Resource / Media	2,579 square feet
Music	1,054 square feet
Art	1,188 square feet
Gross Building Area	60,293 square feet

- **Design efficiency and flexibility** - The new school replaces the former school that was approximately 45% smaller in area and the new program called for one additional strand of classrooms. These challenges were met creatively on site as well as in the floor plan design—both adding value to the learning environment.

The new two story building is designed for a no net increase of impervious area on the site, resulting in no additional storm water runoff. Pervious concrete paving and bio-swale gardens were utilized to reduce storm water run-off and provide educational opportunities for the STEM curriculum.

The design incorporates an efficient building plan that reduces unused circulation space and optimizes learning opportunities. The center spine and academic communities are clustered together in a configuration reducing the need for extra space dedicated to circulation, optimizing the amount of space available to the students and teachers.

- **Sustainability** - Targeting LEED for Schools Gold Certification, the building includes multiple strategies to achieve high levels of energy efficiency. Energy and sustainability goals were established early in the process which provided the Owner access to several grants to offset incremental costs.

- **Mechanical systems and energy response** - Geothermal heating and cooling, including centralized ventilation air handling units equipped with heat recovery wheels and geothermal heat pumps, localized heat pumps were provided for individual room conditioning close to the point of use to minimize the size of the ductwork and maximize the efficiency of the air distribution system. Through the use of tall exterior windows and skylights the design maximizes the potential for daylight interior spaces and reduces the need for electric lighting. Lighting is zone switched with occupancy sensors throughout the building. The overall building and system design results in a 35-40% reduction in energy consumption.

- **Construction type and materials** - The building structure incorporates the use of a steel structure and cold formed light gauge framing resulting in a lighter weight, material and cost efficient structure and envelope. The steel frame is in-filled with cold formed metal framing and covered with a continuous air and vapor barrier and continuous uninterrupted exterior insulation. The exterior skin consists of brick and insulated metal panel. Interior partitions consist of metal framing and impact resistant gypsum board.

