

This 230-page book communicates the design process and design alternatives for creating an eco-schoolyard.



Executive Summary

Clara Barton Elementary School Project was conducted by the [REDACTED] Senior Landscape Architecture Studio during fall 2014. The project involved a comprehensive study of the Clara Barton School to transform the site into an eco-friendly school. By integrating principles of green infrastructure and best management practices. The goal was to create designs for an educational and active environment for children, teachers, and the community.

School properties cover a vast area of impervious paving, such as asphalt and concrete. This condition is highly unsightly, environmentally unfriendly, deprives any greening in the environment, and imposes higher water tax penalty on schools in some cities. It deprives teachers and students from interacting within an aesthetic and healthy setting.

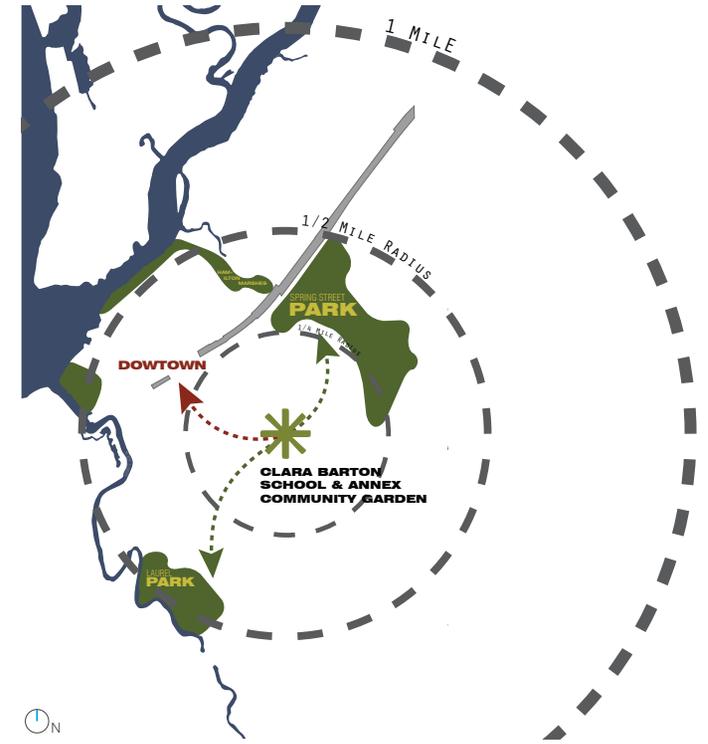
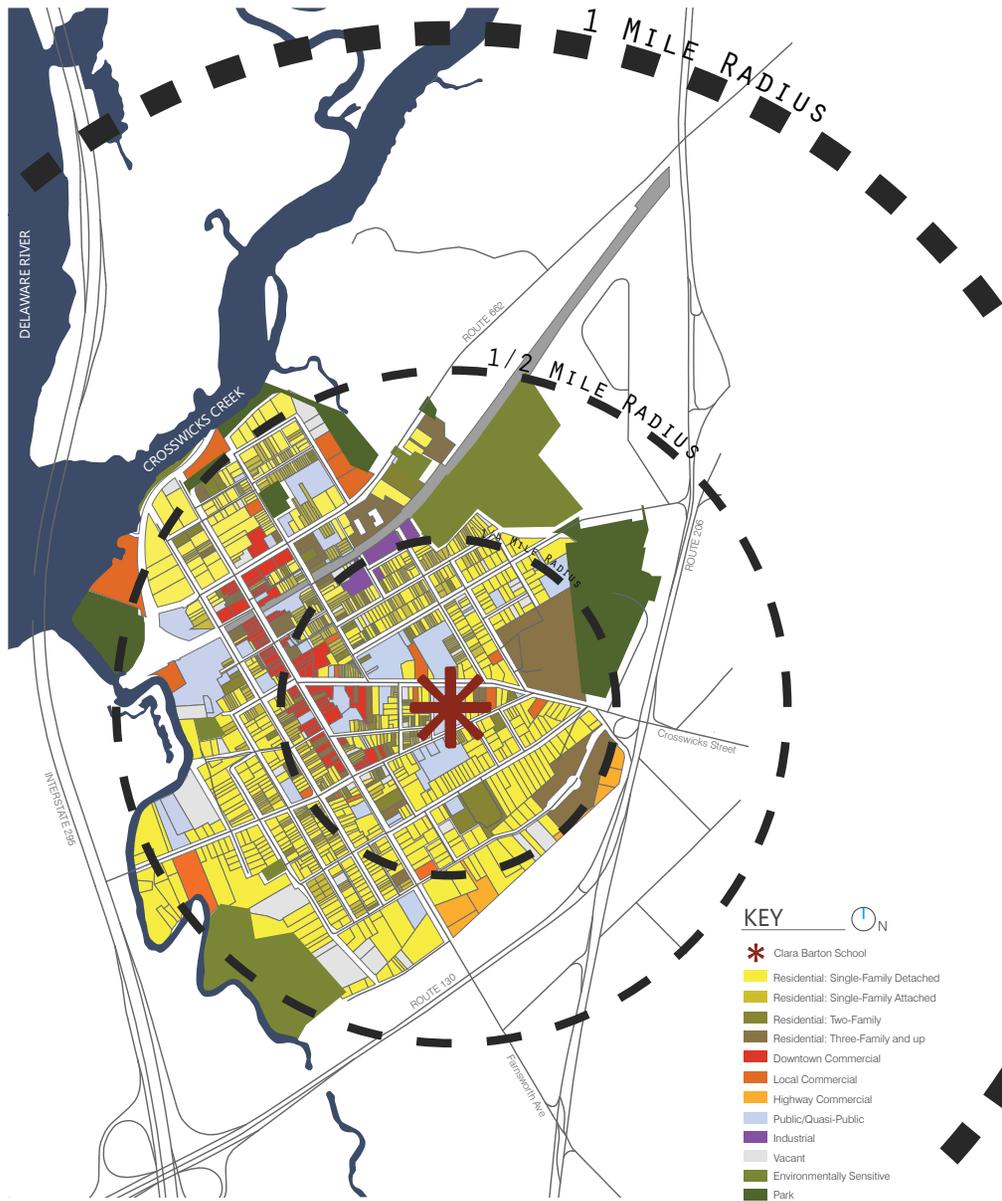
Our Design Studio enthusiastically took the challenge to create sustainable design solutions for the Clara Barton School. Through the design process, We performed an extensive site inventory and analysis of the school and adjacent areas and researched relevant case studies to inform the design development process. We examined the school's history; uses of the schoolyard and relationship to classrooms; pedestrian and vehicular circulation including parking and service areas; views and aspect; micro-climate and wind patterns; hardscape materials and site furnishings; utilities; soils, topography and drainage; site lighting; and existing and projected use of the space. We created final designs that accommodated the goals and objectives for the project.

As designers, we wanted to present Clara Barton School with suitable design solutions that provide an educational and active environment for children that would also enhance their mental, physical, and emotional well-being. We hope that our designs will be helpful to the Bordentown School District and serve as a model for other schools.

Photo courtesy of: Diedre Ryan, Editorial Photography

The existing schoolyard is 86%+ paved. This project transforms the schoolyard into an eco-friendly environment by utilizing concepts of green infrastructure.

Land Use



Bordertown Land Use

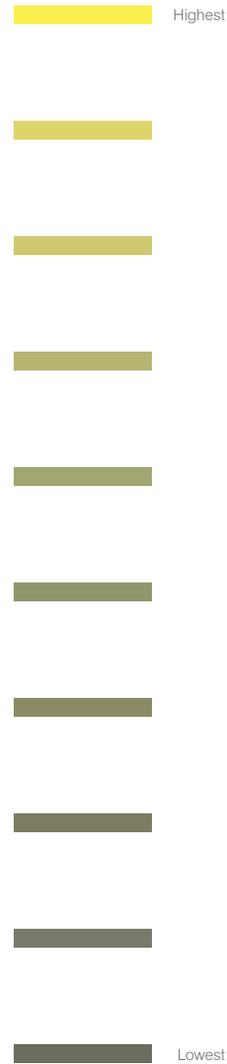
Clara Barton Elementary School (CBES) is located in a residential area with MacFarland Intermediate School Across Crosswick Street. This location is centrally located and provides a convenient location for the community to access during after school hours.

Connections

The Clara Barton School is 1/4 mile from Bordertown's downtown area. The close proximity makes it easily walkable between CBES and the garden annex and the local shops and businesses. CBES is also centrally located and within 1/4 - 1/2 mile from vicinity green spaces in Bordertown.

A series of site analyses were conducted to understand the site's context, potentials, and constraints.

Topography & Drainage



CLARA BARTON

Clara Barton School has positive drainage away from the building. A problem area is found at the lowest point at the junction between East Burlington Street and Hopkinson Street. Although the main sewer inlets are located here, runoff water collects at this point. Interception of this water flow is necessary and will further enhance and promote the goal of an ecological schoolyard.

ANNEX

The site is predominantly flat which offers a blank canvas for design. Currently no drainage issues are apparent at this site, however, the design of stormwater management facilities would enhance the site and promote sustainability.

Views & Aspects: Annex



Front & Side

LEFT: Front entrance of the Clara Barton Elementary School.

RIGHT: Adjacent to the school is an abandoned barn.



Green Areas

LEFT: In the background is the existing green courtyard and in the foreground is another existing compacted area with drums.

RIGHT: Existing green courtyard.



K- 1st grade Playground

The existing K-1st playground area is situated next to the abandon barn. The condition of the playground is fair. Renovating or replacing the playground will enhance the overall appearance of the schoolyard.

The Schoolyard



Play Equipment

Basketball Court

Chiller Building
Building entrance behind

Green Courtyard

Building Entrance

K-1st grade Playground

A Views analysis explored how to best provide views into/out of the site and to best promote greening of the schoolyard.

Vegetation



Analysis

There is a lack of vegetation on the site. Most of the vegetation can be found around the edge of the property lines. Much of the vegetation seen is offsite, some of which is not in great condition. Vegetative screening is an option for shielding any unpleasant views surrounding the school. Adding new plants opens up an opportunity to create new spaces for the school and neighborhood.

There was much opportunity to add vegetation without having to worry about taking down multiple existing plants. The constraints

consist of the cost of adding a lot of the vegetation as well as providing shade in the schoolyard while conforming to the spacing guidelines between playground equipment.

Little shade was found throughout the schoolyard. Even the smaller microclimate areas got a substantial amount of sun. With the ground plane being a sea of blacktop along with almost no trees, the schoolyard was an uncomfortable place for the children.

Existing Conditions



1. Memorial and planting bed at main entrance.



2. Dogwood tree at the corner of the school building.



3. Raised grass beds on site, some containing small play equipment.



4. Oak tree with no planter. Uncontained sandy debris surrounds trunk base.



5. Intimate outdoor classroom space with small garden.



6. K-1 play area surrounded by school and off-site trees.



7. Ginkgo tree in raised bed. Bed contains small play equipment and sandy area.



8. Court surface is poor and cracked surrounded by overgrown vegetation.



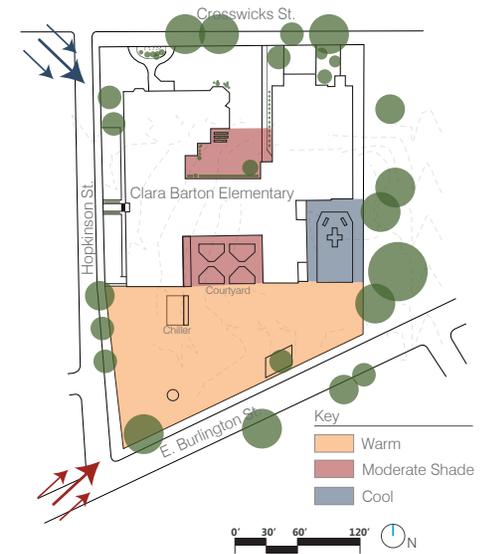
9. Lack of vegetation results in views of surrounding neighborhood.

Schoolyard Microclimates

The area around the school has three microclimate categories: warm, varying, and cool where the students gather and spend time throughout the day. Generally, a large part of the schoolyard has no shade throughout the year (see solar/shade diagrams). There is an opportunity to add new vegetation to help cool down and shade the area. In the "moderate shade" areas, shade is provided at times from the shadow cast by the building. These areas are also protected from the northwesterly winter winds. For the "cool" area, it tends to be somewhat shady because it is an enclosed area protected by the building on two sides and trees on the east side.

The courtyard is an appropriate place for an outdoor classroom and/or play area because of its close proximity to the school building and because of it being an enclosed space.

The annex portion of the site, just south of E. Burlington Street was not broken up into microclimates since it was essentially an open field with no real spaces.



Our analysis showed one major constraint: There was only one existing tree in the schoolyard!



Goals

Design a sustainable, interactive schoolyard focused around interactive play, and neighborhood engagement for children.

Objectives

- Increase the amount of green space within the school yard.
- Create outdoor learning, and creative play spaces.
- Add shade with trees and structures.
- Include Best Management Practices.
- Create educational and directional signage to facilitate community connections.

Design Concept

The incorporation of nature into a learning environment can be a priceless addition to a child's life. This design incorporates that concept while also integrating active and imaginative play spaces. Within the adjacent annex property, similar goals are maintained. Incorporated are a community garden, a wetland area, and t-ball field. The creation of a sustainable school yard and annex property for the children of Clara Barton Elementary school and community will ultimately inspire the community to become a more intellectually diverse group that will carry that knowledge with them for the rest of their lives.

The plan of the proposed design meets the goals and objectives that were set for the school yard and annex sites. This includes space for educational, active play, and leisure activities within both sites. Items such as the existing t-ball field and play set were kept as they fit well within the proposed design. Included were multiple features focused on stormwater management such as a wetland and a cistern which many will use water from within the community garden. The community garden, the focus of the annex space, includes a composting facility, and tool shed. Overall the intent was to create a well designed and interactive space that will be used by the community.

Master Plan

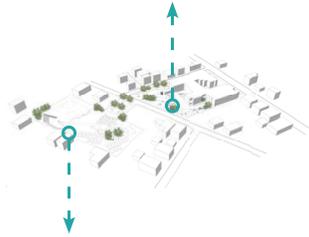


This student's design showed concepts for integrating play, education, gardening, and environmental education.

Perspectives



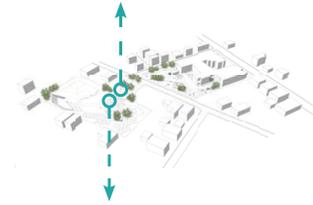
Above
View of the school yard looking north from the boardwalk within the educational area.



Below
Looking east at the community garden, shade structures, and lawn space.



Above
Showing the entrance to the community garden area in the fall. Notice the shade structures and raised planting areas.



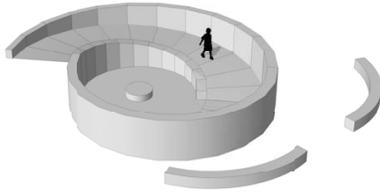
Below
A night scene from within the annex showing some potential uses for the open space.



Perspective sketches show a variety of outdoor activities for children and the community.

Site Elements

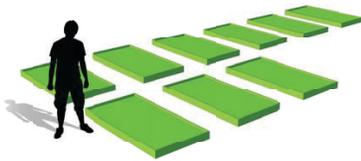
LEARN



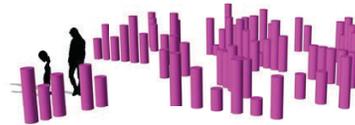
TOOL SHED



GROW



MAZE



SEATING



SHADE



TOWER



Key Elements

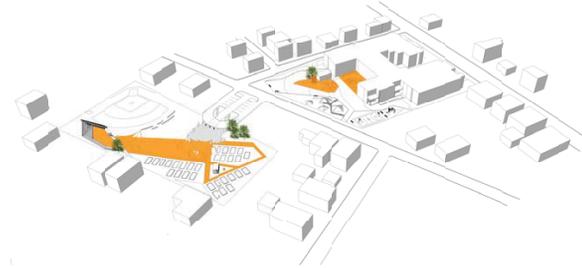
Many of the main elements of the design can be seen here in their true form. Structures are shown in orange, the seating in grey, the play areas in purple, and the gardens in green. All of these elements were designed to enhance the design and create interesting spacing for play and interaction.

Phasing & Cost Estimate



PROPOSED:
 -Raised beds
 -Pump and cistern
 -Rain garden
 -Basketball court
 -Relocate play structures
 -Vegetation

COST: 67,100 - 87,000
 MATERIALS- 16,000 - 26,000
 LABOR- 44,000-54,000
 VEGETATION- 1100
 DESIGN- 6000



PROPOSED:
 -Rope tunnel tower
 -Log maze
 -Rain garden
 -Paths and plaza
 -Shade structures
 -Vegetation
 -Classroom

COST: 152,000 - 202,000
 MATERIALS- 48,000 - 68,000
 LABOR- 97,000 - 127,000
 VEGETATION- 1300
 DESIGN- 6000



PROPOSED:
 -Educational garden
 -Boardwalks
 -Shed
 -Parking lot re-design
 -Garden entrance
 -Vegetation

COST: 259,000 - 299,000
 MATERIALS- 110,000 - 130,000
 LABOR- 140,000 - 160,000
 VEGETATION- 2900
 DESIGN- 6000

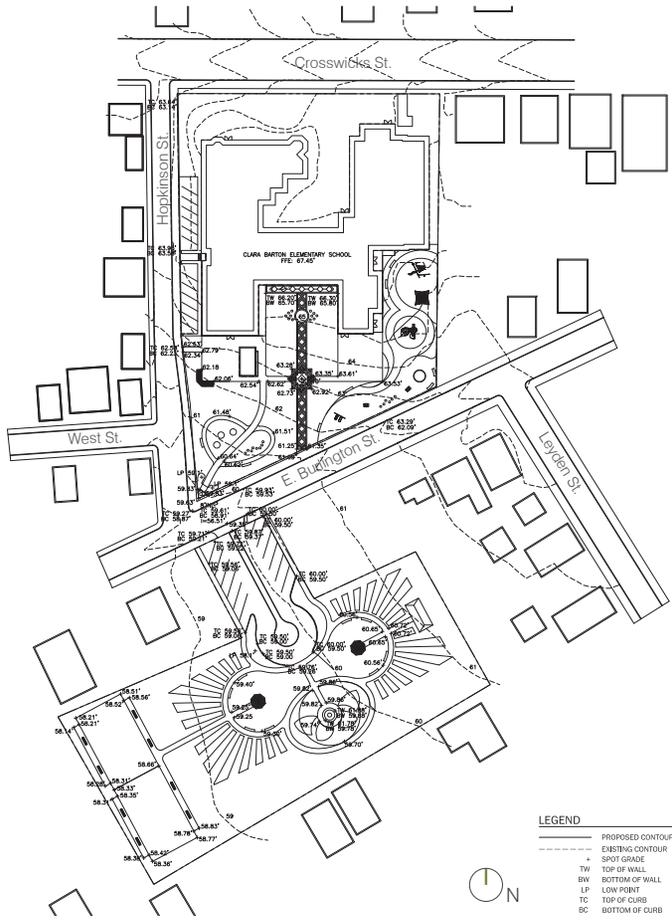
Phasing

Proposed are 3 phase stages, they were based upon cost and spaces that draw the most people. Beginning with the most usable, cost efficient, and interactive spaces.

PHASES COST 478,300 - 588,300
TOTAL: MATERIALS- 174,000-224,000
 LABOR- 281,000 - 341,000
 VEGETATION- 5300
 DESIGN- 18,000

This student integrated design elements such as play structures, raised beds, outdoor classrooms, and a tool shed to encourage passive, physical and social interaction.

Grading Plan



Grading Concept

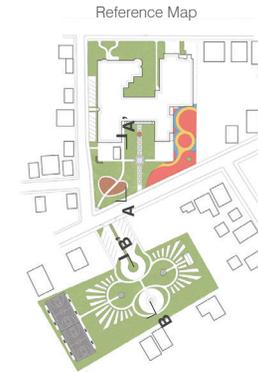
The grading plan generally works with and maintains most of the existing contours. The main changes were the low points created for the rain gardens, which would require some cut, along with some additional cut being done in the parking lot of the annex to straighten a contour. Spot elevations were added to delineate high and low points. Existing contours remained the same with a practically flat grade of 0.7 - 1% slopes in the annex and 2.5 - 3.5% in the schoolyard.

Sections/Elevations

Section A-A'



ABOVE: Section A-A' shows the schoolyard looking west. It illustrates the relationship between new vegetation and the new building structures in relation to the scale of people.

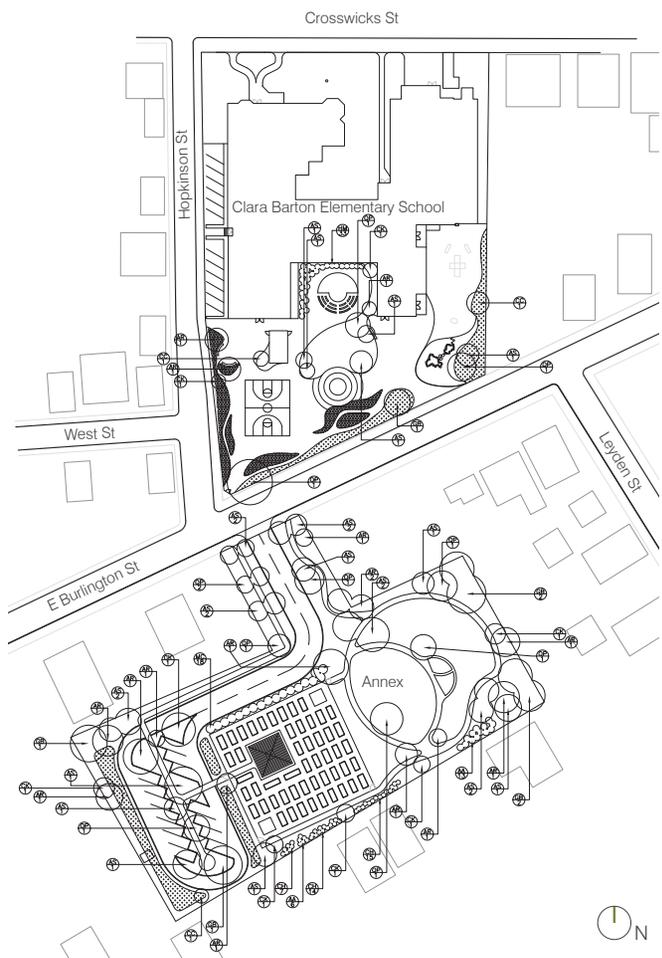


BELOW: Elevation B-B' shows the annex park looking west. It indicates the design elements and the spacing and relationship between them. It illustrates how circulation might work and the convenience of the proposed drop-off area from the parking lot.

Elevation B-B'



Planting Plan



Planting Concept

The vegetation selected for the Clara Barton School and Community Park Project are mostly native plants that are visually appealing and have attractive fall colors. Two particular tree species were chosen for their spring bloom. All of the tree species selected are native to the area with the exception of the Ginkgo tree. The shrubs were also chosen for their fall and spring colors along with their flowering qualities. The Wax Myrtle planted along the roadway are salt-tolerant. The vegetation for the rain garden have the ability to tolerate dry and wet conditions, and are also appropriate for the butterfly garden.

TREES



Red Maple



Sugar Maple



Eastern Redbud



Flowering Dogwood



Ginkgo



Pin Oak

SHRUBS



Red Chokeberry



Plum Yew



Bigleaf Hydrangea



Waxberry

RAIN GARDEN



Butterfly Weed



Summersweet



Switch Grass



Goldenrod



Indiangrass

BUTTERFLY GARDEN



China Aster



Wild Cosmos



Coneflower



Baby's Breath



Baby Snapdragon



Black-eyed Susan



Catchfly

Images:

- <http://treesofantiarcountyny.blogspot.com/2013/04/acer-nubrum-red-maple.html>
- http://www.worleysgreenhouse.com/index.cfm?fuseaction=plants.plantDetail.plant_id/230/index.htm
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- <http://imgkid.com/trifolium-incarnatum.shtml>
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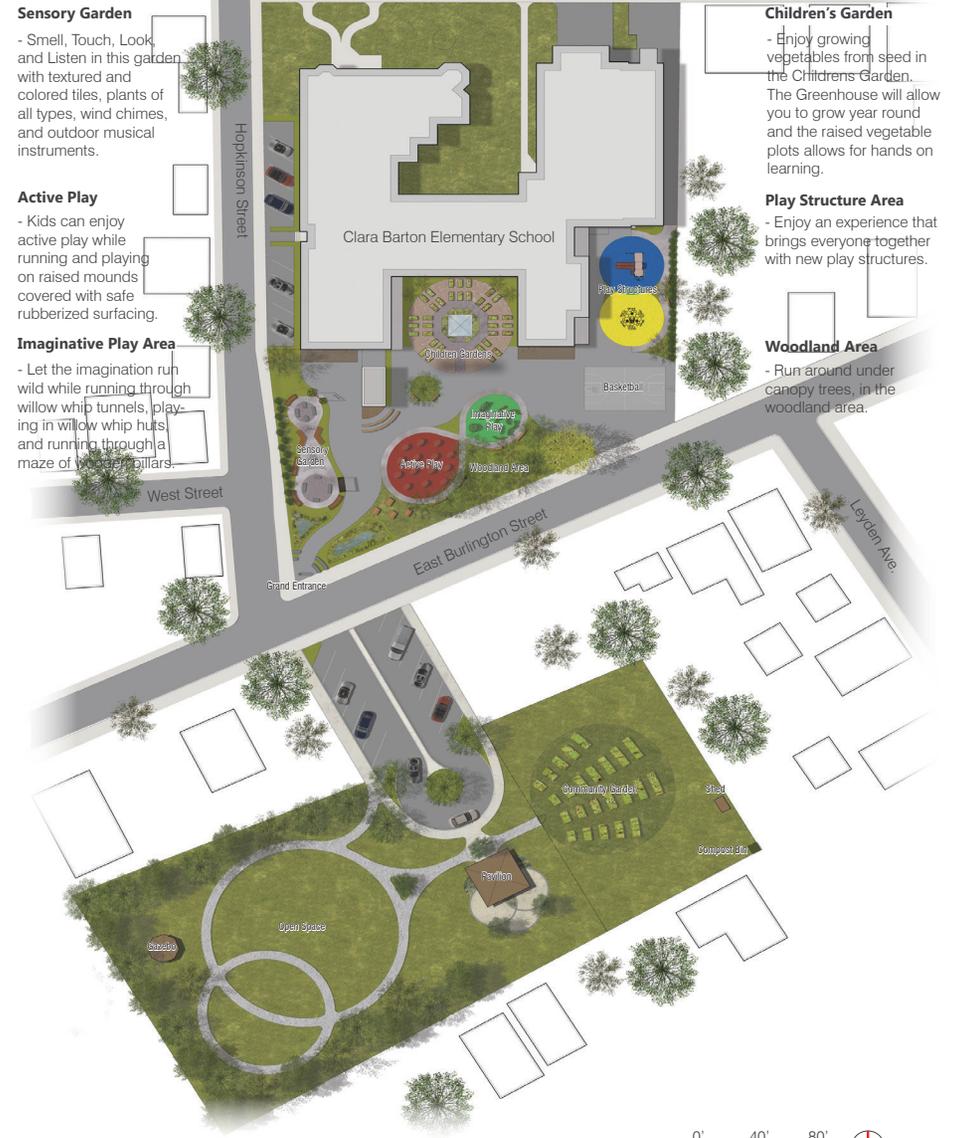
Design Concept

This design focused on creating distinct areas of play that wove together to create a cohesive playground for Clara Barton Elementary School. Within the schoolyard there are six distinct areas. These include, the Childrens Garden, the Sensory Garden, the Active Play Area, the Imaginative Play area, the Woodland Area, and the Play Structure area. The Childrens Area, consists of a central greenhouse, raised plant beds, seating, and rain barrels that collect water from the roof downspouts. The Sensory Garden is a garden for the senses. This garden contains walls that have different colored and textured tiles; a sound pole with wind chimes; a variety of plants that are interesting to the touch, smell and sight; a small water fountain and an area for musical instruments. The Active Play area consists of playful mounds that kids can run in that is cushioned with safe rubberized material. The Imaginative Play area has willow whip huts and willow whip tunnels that the kids can round around in and a maze created by varying heights of wood pillars. In the Woodland Area, children can run around under a canopy of trees and fallen logs just like the woods. The Play Structure Area has two play structures, the existing play structure and a new geodesic dome.

The parking lot in the community park has been redesigned. A circular turn-around has been added with drop off area. An open air pavillion with a patio in the back has been added for community events. The community garden with a shed is located on the eastern side of the site. This garden has varying size plots for flexibility. On the western side of the site, a new lawn with two intersecting paths allows for a short or long walk.

Master Plan

Crosswicks St.



Sensory Garden

- Smell, Touch, Look, and Listen in this garden with textured and colored tiles, plants of all types, wind chimes, and outdoor musical instruments.

Active Play

- Kids can enjoy active play while running and playing on raised mounds covered with safe rubberized surfacing.

Imaginative Play Area

- Let the imagination run wild while running through willow whip tunnels, playing in willow whip huts, and running through a maze of wooden pillars.

Children's Garden

- Enjoy growing vegetables from seed in the Childrens Garden. The Greenhouse will allow you to grow year round and the raised vegetable plots allows for hands on learning.

Play Structure Area

- Enjoy an experience that brings everyone together with new play structures.

Woodland Area

- Run around under canopy trees, in the woodland area.

Perspective



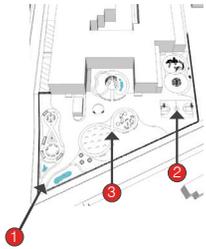
The proposed Children's Garden is located in the current courtyard in Clara Barton's schoolyard. A 15'x15' greenhouse is on axis within the courtyard. The 3'x6' plant beds are laid out in a radial pattern from the greenhouse. A six foot wide pathway surrounds the greenhouse and separates it from the planting beds. The planting beds are placed on each side of the octagon shape, with the exception of the entrance side. Plots placed were designed to be 3'x6'. Ivy on the fence and shrubs along the walls serve as a buffer and contribute to the aesthetics of this intimate space.

The final design incorporated a greenhouse, raised beds, music garden, and play mounds. These features provide opportunities for interactive and imaginative play and learning.

Perspectives



1 - Looking Northeast From the Main Entrance



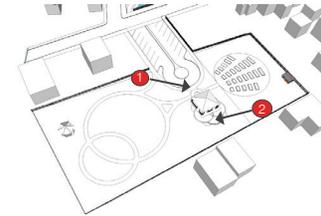
2 - Looking North into the Playscape Play Area



3 - Looking North into the Outdoor Classroom



1 - Looking Southeast towards Community Garden

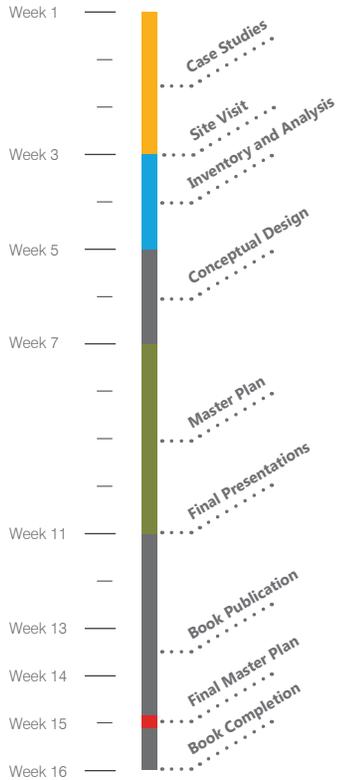


2 - Looking Northwest into the Open Space

These perspectives detail passive and active spaces. A community garden with a variety of seating is incorporated in the Annex park across from the school.

Reflections of 16 Weeks

A typical semester at Temple University consists of 16 weeks. Our studio class of 13 students spent the entire semester deeply immersed in researching, designing, and producing a final book for the Clara Barton Elementary School and the adjacent Annex Park project. The design process began with three weeks of researching case studies that were relevant to our project and that would serve as inspiration for our design. We then conducted site visits, utilizing the findings to assemble pertinent site inventory and analysis information. What followed was the design phase of the project. The first step involved conceptual designs that were represented on white trace paper. Eventually, the designs were refined into final master plans as shown in this book. At the eleventh week, the final master plans were presented to members of the P.T.O. and design professionals at Temple. The P.T.O. at large reviewed the designs in the following week and chose one design to use as Clara Barton Elementary School's final master plan. The "reflections of the 16 weeks" captures the essence of the design process.



Week 3 Interviews with Parents & Children



Site Inventory and Analysis

TOP LEFT: [REDACTED] interviewed children and parents as school was let out for the day. Many students were interested in providing input about improvements for the schoolyard.

TOP CTR: [REDACTED] spoke to children about their desires for the playground and annex space.

RIGHT: Temple students explored, documented, and analyzed the lone climbing structure and its adjacent surroundings.

BELOW [REDACTED] and [REDACTED] interviewed a parent and her children. Their ideas were noted on the clipboard.



A book was published to communicate the design process, criteria for designing for children, and concepts of green infrastructure that was integral to creating the eco-friendly schoolyard.