Feasiblity Study and Due Diligence for The Shared Green Roof @ BLS, a Community Learning Center

building **sustainable** communities

studio GO ARCHITECTS

Right:
Boston Latin School 1922 front facade
Below:
Overview from east of The Shared Green Roof, with Entry Gallery, Multi-Use Classrooms and Greenhouse at right, Cafeteria Farm on gym roof in foreground.

JANUARY 2012

Study Team

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Boston Latin School
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Boston Latin School Association
Peter Kelly, BLSA President

BLS Youth CAN and Faculty Advisor Cate Arnold

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Pam McKinney, President

Fenway Green Roof Coalition Vision of a green roof enclave in the Fenway/Longwood Medical Area

Background

The Shared Green Roof @ Boston Latin has grown out of a collaboration between BLS Youth CAN and Studio G Architects, begun in 2009. The effort arose in response to an energy audit and action plan initiated by BLS Youth CAN students. They contacted local architecture firms with a BLS connection about designing a green roof for the school. From several responses, Studio G was selected, because of its green design experience and commitment to engaging youth in the planning and design processes.

Studio G facilitated a series of brainstorming sessions and design charrettes with Youth CAN members to determine the program elements to be included in the Shared Green Roof, and to develop a concept design for the sustainable roofscape. It was determined early on that it should serve as a model: by improving the school's environmental performance and reducing its carbon footprint, and a catalyst: by offering new educational opportunities and spaces.

The Shared Green Roof Community Learning Center represents a multi-phase effort to transform the rooftop of the oldest school in the country into a natural learning environment that encourages inquiry-based, hands-on learning. It is designed to enable students from other Boston schools and beyond to use the roof: through field trips and virtual webcam tours, and through utilizing data sets generated by experiments on the roof. Programmatic development is being pursued for the Shared Green Roof in conjunction with the bricks and mortar development. Teachers from schools across the City of Boston are being invited to participate in a compensated Green Roof curriculum development team that will generate education for sustainability demonstration lessons for the roof during the summer of 2012. Additional stakeholders in the Shared Roof will be cultivated from schools across the City on an ongoing basis through roof top teacher trainings. Rooftop summer garden camps and Green Jobs Energy Audit training programs will engage youth from neighborhoods throughout the City in use of the Green Roof.

The Shared Green Roof is part of BLS Youth CAN's larger sustainability efforts, supported by the BLS Headmaster, faculty, and BLSA. BLS Youth CAN students have developed a comprehensive set of sustainability initiatives that include an energy conservation action plan for Boston Latin, an Education for Sustainability Campaign (EfS) curriculum pilot utilizing the Shared Green Roof, a Youth Green Jobs/Energy Audit Training Program, and a schoolyard garden. BLS students have also developed partnerships with neighboring colleges and universities, to support sustainability efforts on each campus. Together, they formed the Fenway Green Roof Coalition. Each component supports ambitious educational goals, including improved environmental performance, student activism, and the creation of outdoor learning space with the long-term capacity for engaging students and educators in an educational process that instills a sense of stewardship for the planet.

Educational Program

The Shared Green Roof: An Educational Resource
The Shared Green Roof will be a valuable educational resource for Boston Latin School (BLS) and the Boston Public Schools. It will serve as a year-round laboratory, classroom, research station, teacher training facility, garden and fresh food source for the cafeteria, and energy source for the school.

Access to the Shared Green Roof will allow for field trips from other schools, and rooftop sensors and webcams will eventually supplement onsite visits with virtual data, constantly refreshed online.

More than just a physical space, the Shared Green Roof will bring together a community of collaborators, made up of K-12 teachers and students from a broad range of disciplines in both the sciences and humanities.

Central to its design and core pedagogical thinking are the concepts and best practices of Education for Sustainability (EFS). This approach to teaching and learning links the global to the local, is interdisciplinary and inquiry-based, and helps students understand the interconnectedness of what they are learning.

EFS breaks down the siloed nature of knowledge contained within specific disciplines. Instead, students investigate systems. This "big picture" thinking gives them an invaluable context for their classroom learning. They explore the relationships between economic systems, social systems, and natural systems, which richly juxtaposes and interconnects history, the sciences, economics, literature, and the arts.

Rather than being a distraction from or add on to Standards and MCAS benchmarks, the Shared Green Roof and its pedagogical model provide a context that helps students integrate learning and find purposefulness in what they are studying, which research indicates enhances retention and depth of understanding. This approach also effectively confronts the classic student question, 'Why do we have to learn this?' Instead, students become activists, service learners, and collaborative problem solvers.

There is perhaps no better example of the efficacy and power of this service-learning model than this project itself, which represents the intense work and dedication of a group of 7th-12th grade students at BLS. They leveraged an extracurricular activity into a juggernaut of initiatives that were highlighted on NBC's "Today Show" and in the Boston Globe.

The Shared Green Roof will be built in phases, with the steps to completion driven in part by the pedagogical model itself. For example, as planning for Phase 1 construction begins, a community of diverse users and initial resources will be brought together to participate in creating and piloting curriculum and activities for shared, collaborative, inquiry-based endeavors using the green roof facility. The aim is to use the green roof to engage both teachers and students in learning about sustainability.

As a city-wide resource, the Shared Green Roof and its educational model have the potential to garner national attention and replication opportunities for Boston and the Boston Public Schools.

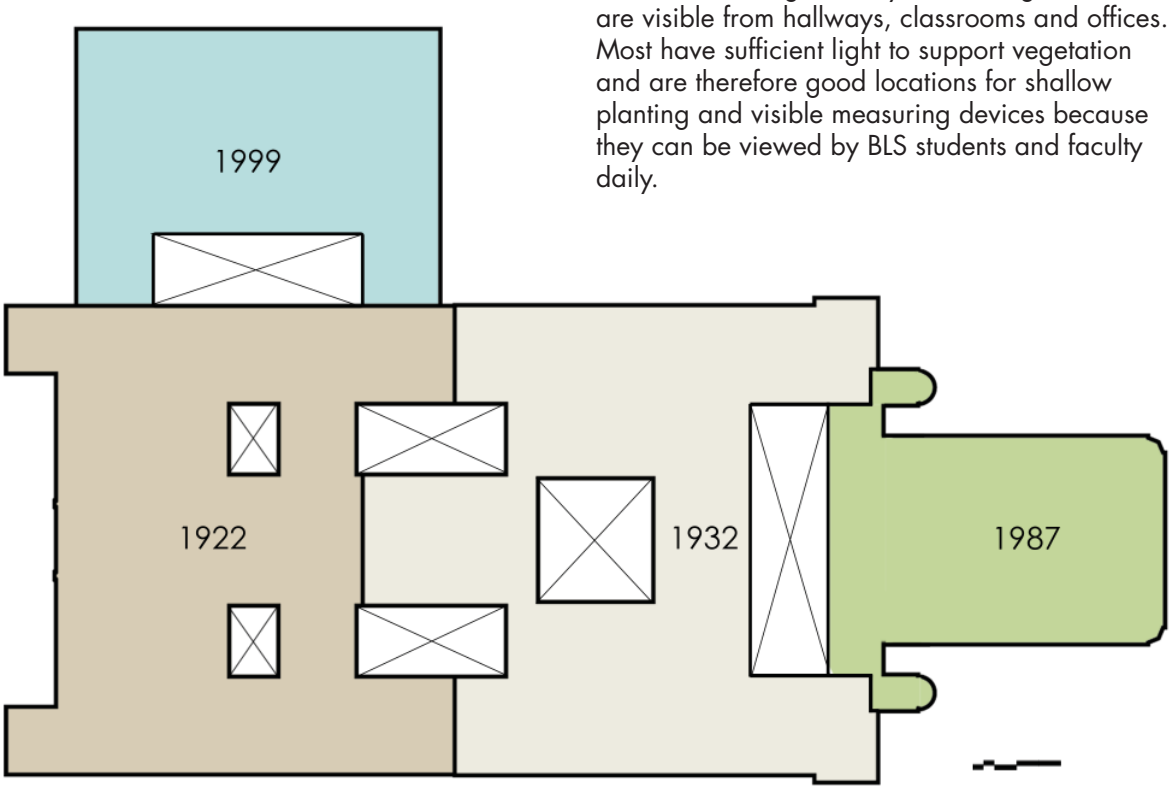
Roof Conditions and Opportunities

Boston Latin School has been built over decades, with four distinct buildings: 1922, 1932, 1987 and 1999. The front of the 1922 building has a slate gable roof with a copper cupola, which offers a great architectural focal point and backdrop for The Shared Green Roof, and creates a wall along the street. The 1932 building is continuous with the 1922, creating the main building and upper roof, over 90% of which is flat. The main upper roof has large open areas available, with limited significant mechanical equipment and head houses to interfere.

The 1922-1932 upper roof offers expansive views of the city. There is a low parapet, which means that occupied areas of the roof will need to be kept back from the edge and fenced. The 1987 gym addition is approximately 5' lower and not directly connected to the upper roof. Neither has a code-compliant stair access: the 1932 building has a cast iron spiral stair in a low headhouse. The 1987 building has a maintenance ladder to the roof. The 1999 building has multiple roof elevations, with sloped sidewalls. The upper flat portion contains sizable mechanical equipment. It was determined to be unusable for the green roof and no further investigation was done of this roof area.

SAR Engineering performed a preliminary mechanical systems review, which is summarized in the mechanical engineering report which follows. Souza True and Partners performed a structural analysis, summarized in the structural report which follows. The mechanical elements on the roof will require consideration and some will be required to be relocated. The existing roof decks have limited structural capacity, which is detailed in the structural analysis diagram. Structural upgrades for the Shared Green Roof project are described in the structural report.

The multiple building additions have created one- and multi-story light courts between existing and new buildings. Many of these light courts are visible from hallways, classrooms and offices. Most have sufficient light to support vegetation and are therefore good locations for shallow planting and visible measuring devices because they can be viewed by BLS students and faculty daily.



Key Diagram: Boston Latin School

Solar Study

Studio G did a preliminary solar shading study. According to the analysis, there is little shadow cast on the upper 1922-1932 roof by adjacent buildings, even at winter solstice. The lower 1987 gym roof is sunny for all seasons except winter, at which time the roof receives sun at mid-day only. It can be used for green roof activities, including 3-season outdoor gardens for food production, but is unsuitable for a greenhouse, which requires year-round sun.

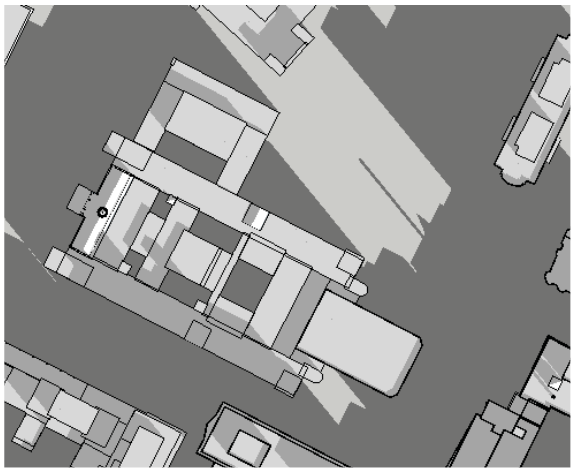
The diagrams at the right illustrate the shadows cast on the roofs at equinox, summer and winter

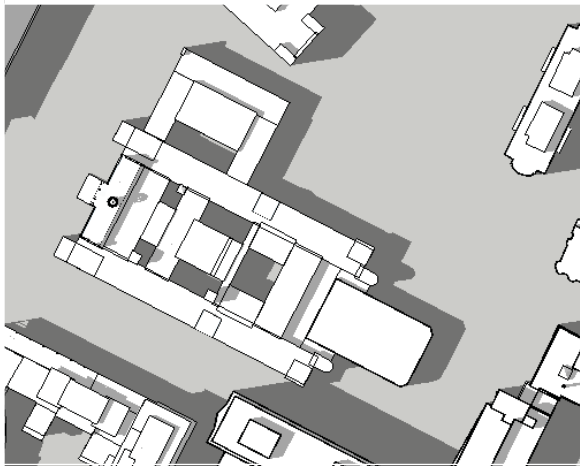
9am

12pm

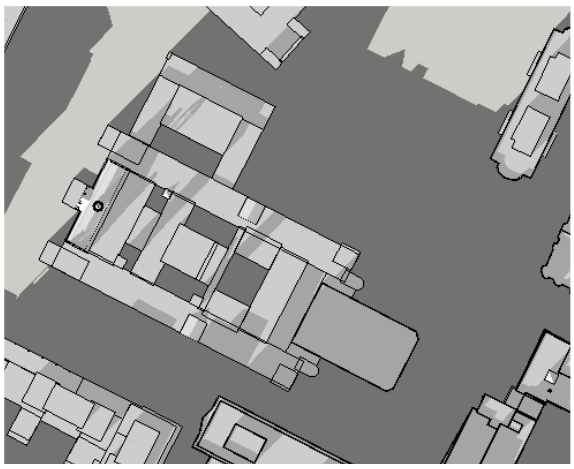
3pm

Equinox





Summer Solstice



Winter Solstice

Structural Review

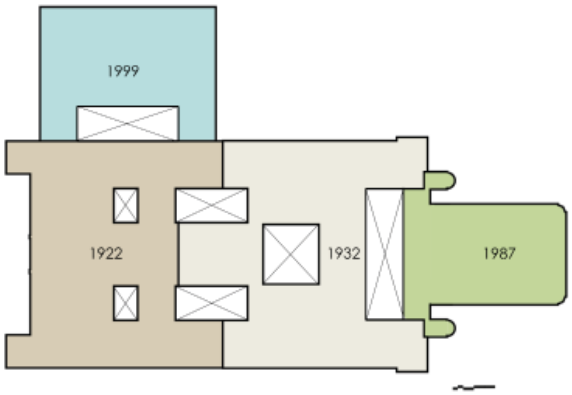
Souza, True and Partners, structural consultants to Studio G Architects, have performed a structural evaluation for the above referenced property to determine the feasibility of creating an educational green roof environment, and submitted the following report.

We reviewed existing structural drawings prepared by McLaughlin & Burr Architects, dated February 8, 1932, and by Souza, True & Partners, Inc., dated December 18, 1987, for pertinent information of the roof framing systems. It is our understanding the roof shall be built in phases to incorporate a welcome center, green houses, classrooms, open green areas, PV arrays, and planting beds. The nature of this conception raises several structural matters: increased loading, new structure, and an existing building code review. The following is an outline of our findings.

Section 1: Existing Structural Capacity Review

Section 2: Design Loads for the Proposed Spaces
- (a) Dead Weight of New Systems
- (b) Live Loads for Each Use

Section 3: Existing Building Code Review
- (a) Work Area Method
- (b) 1932 Building
- (c) 1987 Building



Boston Latin School Key Diagram

Section 4: Findings and Required Upgrades
- (a) 1932 Building
- (b) 1987 Building

Section 1: Existing Structural Capacity Review
The Boston Latin School has four different building sections. The original portion was constructed in 1922 (facing Louis Pasteur Avenue); the middle portion was constructed in 1932, the gym (at the rear) was constructed in 1987, and the north section was constructed in 1999. See the Key Plan.

Three factors considered for the existing capacity review were records of existing structural drawings, location, and current obstacles/ equipment. Because the existing structural drawings for the 1922 building could not be found, we did not perform a structural review of this section. The 1999 building currently houses multiple rooftop units, has multiple different levels, and access does not provide quality space for the proposed green roof. As such, we did not review the 1999 building. Existing structural drawings for the 1932 and 1987 buildings provided the means for our structural review of these sections.

The 1932 building is constructed of brick masonry walls, concrete waffle slabs, steel/ iron frames, and is founded on concrete beams and caissons. The roof slabs are supported by the masonry walls in multiple configurations and distances. Our review is broken down into each arrangement and their available capacities are shown in figure 3.2.1 as net capacities (capacity after taking out dead weight and snow load).

The 1987 building is constructed of a steel frame, long span open web joists, and is founded on concrete beams and caissons. The long span joists frame the roof of the open gym area, while steel beams frame the enclosed areas of this building. The roof deck consists of a 1 ½" deep, 20 gage metal deck. Figure 3.2.1 shows the available capacity of the structural systems. Please note the available capacity of 40psf (pounds per square foot) is located over the steel beams, while the 0psf is located over the long span joists.

Section 2: Design Loads for the Proposed Spaces

Section 2 (a): Dead Weight of New Systems

Each new area of the green roof will have its own dead weight (or self weight). The makeup of the systems can be tailored to the existing structural capacities in order to limit structural reinforcing.

Typical gravelly wet soil can weigh 120pcf (pounds per cubic foot - a 1 foot cube) which means a 2x8 raised bed planter can weigh 80psf for the soil alone. Certain lightweight soils are available to expand the opportunities for green roof applications by cutting its self weight as much as half normal soil. Planter trays have self weights ranging from 15psf to 50psf. Drainage and watering utilities can range in self weights between 5psf and 10psf. One inch thick concrete pavers can weigh 12psf and crushed stone can weigh 100pcf.

Photovoltaic Panels (PV Panels) do not have significant self weight; they range from 3psf to 10psf. The crucial design consideration for PV panels is the wind uplift forces and their attachment to the structure.

Enclosed spaces, such as the green houses, welcome center, and classrooms, will be framed out of new materials. The most economical and practical solution for these spaces would be to build up from the existing walls below and span between them with open web steel bar joists. The floor could be constructed of a 3" lightweight concrete on metal form deck.

The new spaces self weights are as follows:

- Welcome Center, Greenhouse, Classroom - new open web bar joists with a 3" concrete floor on metal deck, utilities, walls (TBD), and roof (TBD) = 45-50psf (floor) and 10 - 20psf for the walls and roof.
- Outdoor green spaces - Utilities, roofing membrane, crushed stone and pavers, and planting beds or trays = 75psf to 100psf (can be reduced to almost half with lightweight soil).

Section 2 (b): Live Loads for Each Use

Each new area of the green roof will have its own use. The International Building Code (IBC 2009) (as adopted by the Mass State Building Code) prescribes certain Live Loads (active loads) applicable for different uses. The live loads are additive to the dead loads. The IBC minimum design live loads for each use are as follows:

- Roofs used for roof gardens or assembly purposes = 100psf.
- Roofs used for promenade purposes = 60psf.
- Classrooms = 50psf.
- Corridors = 80psf.
- Stairs and exits = 100psf.

The layout of the new spaces can be refined to maximize the use with the available capacities.

Section 3: Existing Building Code Review

Section 3 (a): Work Area Method

The Massachusetts State Building Code recognizes the International Existing Building Code (IEBC 2009) for renovations or alterations to existing buildings. Chapter 4 of the IEBC classifies the extent of the alterations in levels of work (1, 2, & 3). The first level of work is the removal and replacement of materials, elements, and systems. The second level of work is the reconfiguration of space less than 50% of the area of the building, or new windows, doors, or systems. The third level of work is the reconfiguration of space greater than 50% of the area of the building.

Each level of work triggers different structural requirements, from a simple gravity load check, to a wind and seismic analysis in conjunction with the gravity review.

Section 3 (b): 1932 Building

The work on the 1932 roof involves the reconfiguration of space and systems in an area that is less than 50% of the area of the building. Therefore, the Level of Work is classified as Level 2. Due to the size and configuration of the building, and the fact that we are not altering any existing lateral force resisting system, a lateral analysis (wind and seismic) is not required. The 1932 building will be analyzed only for the additional gravity loads.

Section 3 (c): 1987 Building

The work on the 1987 building roof involves the reconfiguration of space and systems in an area

that is less than 50% of the area of the building. Therefore, the Level of Work is classified as Level 2. The IEBC sets a limit for applying a lateral analysis to alterations of existing buildings. If the alterations increase the seismic demand by more than 10% of its existing condition, a lateral analysis must be completed. As such, the addition of systems on the gym roof should be designed to stay within the IEBC limit of 10% in order to avoid a lateral analysis.

Section 4: Findings and Required Upgrades

Section 4 (a): 1932 Building

As seen in Figure 1, the existing roof slab of the 1932 building possesses an array of available capacities. The limiting factor for the roof slab occurs over walls and beams (the slab supports). In order to increase the roof's capacity, these areas over the supports can be reinforced from above.

The most applicable reinforcement for this roof slab is the addition of Carbon Fiber Reinforced Polymer (CFRP) strips. The CFRP strips are added to the top of the concrete slab in a similar fashion to applying fiberglass on a boat. The woven strips are glued onto the surface with an epoxy resin and then act compositely with the system like external rebar. The layout of the outdoor spaces can be customized to the available capacities and the layout of the walls below to minimize the amount of added reinforcement.

The new green houses, classroom, and welcome center will be best constructed out of new structural framing. The floor of these new buildings should be an open web steel bar joist system with concrete on metal deck flooring. This system would enable the transfer of loads directly to existing walls, provide the space requirement for new mechanical utilities, and can be designed directly for the new loads. As an alternate to reinforcing the existing slabs at the outside spaces, a new floor system can be built similar to the one described above.

Section 4 (b): 1987 Building

Figure 1 shows two different available capacities for the roof system of the 1987 building. The area of the long span open web joists shows zero available capacity. Steel joists are designed for efficiency and to be extremely cost effective to build. As such, additional loads require reinforcement of the joists. The most effective reinforcement consists of welding round bars inside the top and bottom chords, and adding angles next to the diagonals (at the ends of the span) and the joist seats.

The area of the steel beam framing will require reinforcement for loads above 40psf (assuming the connections have available strength as well). The steel beams can have added plates to their bottom flange. Columns which would otherwise be overstressed can be reinforced to increase their strength (as necessary) by adding plate jackets.

Another factor (not shown in Figure 1) is the metal roof deck. The metal roof deck has an available capacity of 50psf - 60psf. Any load above this will require reinforcing the deck. The least intrusive, and probably most cost effective way, would be to add another sheet of metal deck on top of the existing. This could be done locally where loads may be higher in certain areas.

A lateral analysis of the gym (wind and seismic forces) does not have to be completed if the green roof systems are designed to stay within 65psf of dead weight.

Conclusion

The 1932 and 1987 buildings at the Boston Latin School have the potential for supporting a green roof environment. With the use of lightweight engineered soils, each new system can be specifically customized to minimize the structural impacts.

The 1932 building can have new framing for the enclosed spaces that will minimize roof slab reinforcement by spanning to existing walls. The outdoor spaces can be arranged to utilize the wall layout below and the application of externally applied CFRP strips.

The 1987 building can have new systems up to 65psf without requiring a lateral analysis. New planting beds, up to 12 inches deep, stay within this limitation. Where new beds are placed over joists, the reinforcement (as previously described) can be applied. Where new beds are placed over the steel beam framing (with an available capacity of 40psf) layouts can be customized to minimize the amount of reinforcing.

With direct coordination, we hope to assist in creating systems that maximize existing structural capacities, and limit structural reinforcement.

Right: Existing rear entry/stairwell at location of proposed new access tower
Below: Roof of 1987 gym

AVAILABLE STRUCTURAL CAPACITIES LEGEND	
MARK	AVAILABLE CAPACITY
	0 psf
	15 psf
	20 psf
	25 psf
	40 psf
	70 psf

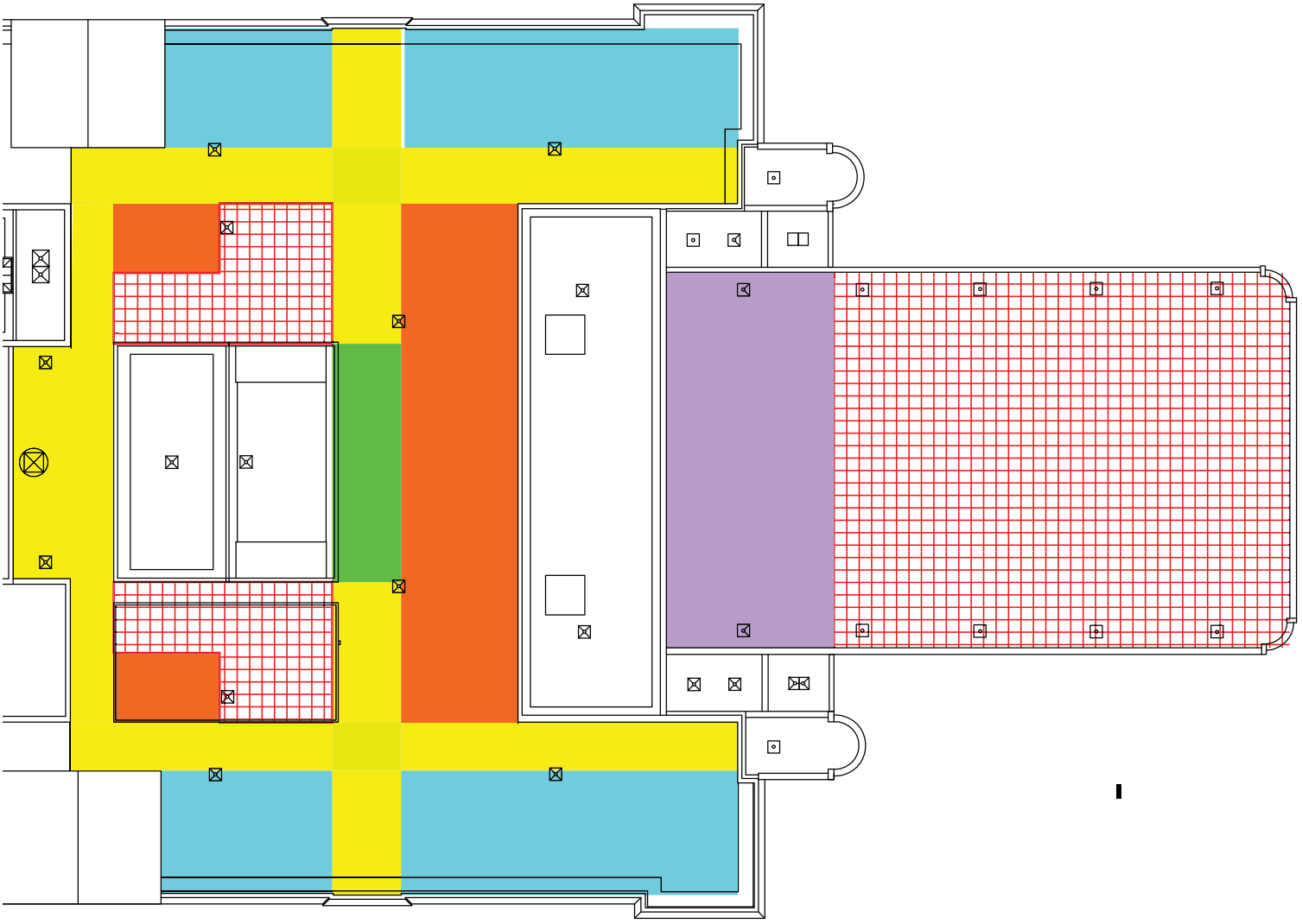


Figure 3.2.1 Roof Plan Showing Available Structural Capacities; scale =1/40=1'-0"

Mechanical Review

SAR Engineering, consultants to Studio G Architects, provided the following observations of rooftop mechanical equipment, based on a November 7, 2011 site visit and follow-up assessment.

1922 and 1932 Buildings
HVAC rooftop equipment includes original gravity-type ventilation monitors that have been converted to mechanical ventilation by replacing the monitor with a powered exhaust fan. These structures are approximately 6' x 10' and 8' high. The monitors can be identified on the 1999 HMFH Roof Plan HVAC (Note No. 1). It may be possible to relocate the monitors by reconfiguring the ductwork below the roof however it is unlikely that they could be moved very far from their original location because these systems are centralized and the duct risers are intentionally consolidated to begin with. Figures 3.3.1 and 3.3.2 represent the typical monitor.

Figure 3.3.1

Figure 3.3.2

The fire protection roof manifold is required by the Fire Department and is located according to their instructions. It would be possible to move the manifold in its vicinity but not too far from the access to the roof. Figures 3.3.3 and 3.3.4 photographs the roof manifold. Figure 3.3.4 is taken from the same position at 180-degrees and shows the access door to the roof.

Figure 3.3.3

Figure 3.3.4

There are numerous mechanical exhaust fans over the entire roof. The typical fan is of the up-blast design that implies the effluent is noxious. The fans can be identified on the 1999 HMFH Roof Plan HVAC. The fans are probably individual systems and could probably be relocated by modifying the ductwork below the roof and it might be possible to consolidate some of the systems. Figures 3.3.5 and 3.3.6 show a representation of these fans.

Figure 3.3.5

Figure 3.3.6

There are two brick ventilation structures approximately 10′ x 10′ and 12′ high. These appear to be complex structures consisting of intake, relief and turbine exhaust components, and it can be assumed that they are part of major central ventilation systems located below the roof. Attempting to move these structures would probably prove to be impractical. Figures 3.3.7 and 3.3.8 show the two structures.

Figure 3.3.7

Figure 3.3.8

There are numerous roof drains. The roof drains can be extended to the surface of a new green roof. A green roof will require additional drains for planters and walkways that can probably be connected to the existing roof drainage system. Figures 3.3.9 shows a typical roof drain.

Figure 3.3.9

There are numerous sanitary vents over the entire roof. According to Code the vents must be extended 8′ above occupied areas of the new green roof. Odors were smelled during this observation. The vents can be relocated and also consolidated within the limits of required pitch to reduce the quantity. Figure 3.3.10 shows some of the typical sanitary vents.

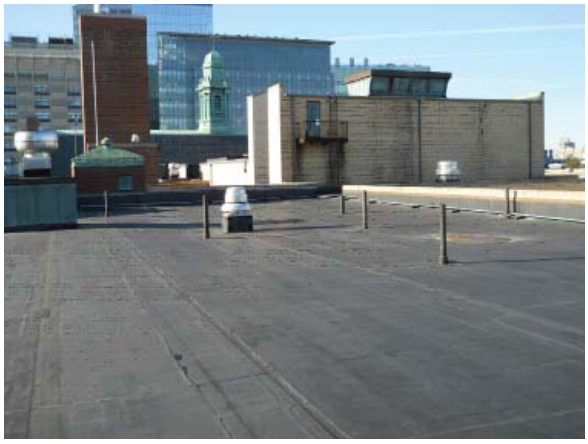


Figure 3.3.10

There is an air conditioning unit on the north side of the 1932 building. The unit can be identified on the 1999 HMFH Roof Plan HVAC. This unit and its associated piping can be relocated within the limits of proper refrigeration piping design (possibly 50'). Figure 3.3.11 shows the air conditioning unit.

Figure 3.3.11

1987 Gymnasium Building

There are approximately eight mechanical ventilation units on the roof. Many of these units are large, about 6' x 6'. It might be possible to relocate some of the units by modifying the ductwork below the roof however they probably cannot be consolidated because they likely are not associated and serve different functions and operating requirements. There are roof drains on the perimeter that could be extended to the surface of a new green roof. There is also a chimney that would have to be extended above the occupied area. There are three sanitary vents that must be extended 8' above occupied areas of the new green roof. The vents can be relocated within the limits of required pitch but they are probably too far apart to be consolidated. Figures 3.3.12 and 3.3.13 show some of the typical equipment on the roof.

1999 Building

The 1999 building has too many challenges in the ways of access, available space and quantity of mechanical equipment to be considered for a new green roof.

Opinions

1922 and 1932 Buildings

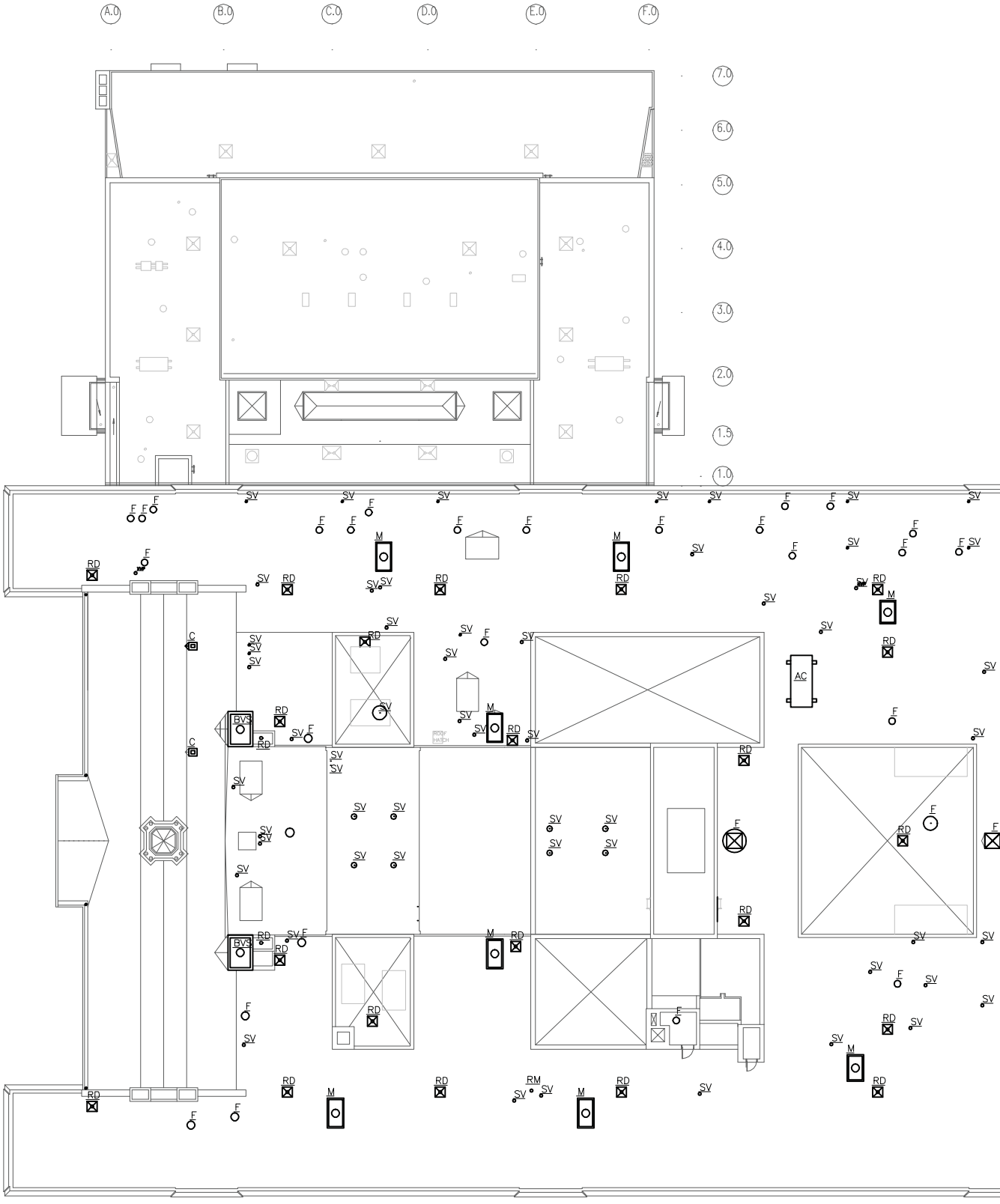
- The brick ventilation structures probably cannot be relocated.
- The ventilation monitors probably can be relocated within their vicinity.
- The exhaust fans most likely can be relocated according to ductwork below the roof.
- The sanitary vents can be relocated.
- The air conditioning unit can be relocated within a proper distance.

1987 Gymnasium Building

- The equipment on the roof cannot be eliminated but their locations could probably be adjusted.

Figure 3.3.12

Figure 3.3.13



Keyed Mechanical Roof Plan

SAR Engineering, Inc.
Mechanical/Electrical Engineers
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Quincy, Massachusetts 02169
617 328-9215 Fax 617 328-9216
email: sar.com web: www.sar.com

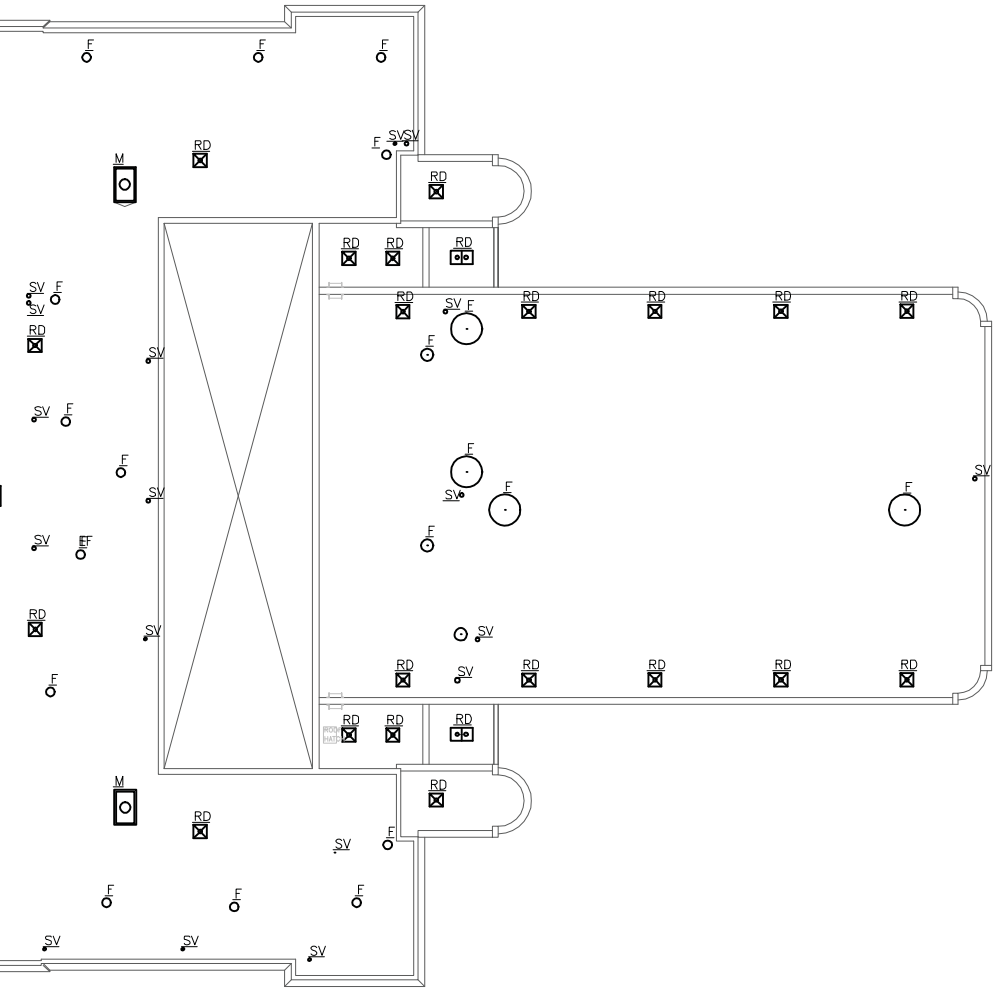
Sheet Title:	ROOF PLAN
Project Name:	BOSTON LATIN SCHOOL
Date:	12-08-11
Scale:	1"=40'
Project #:	11030.00
Drawn by:	DJR
Checked by:	BM
Sketch #:	SK M-1
Reference Sheet #:	-

LEGEND:

AC	AIR CONDITIONING UNIT
BVS	BRICK VENTILATION STRUCTURE
C	CHIMNEY
F	FAN
M	MONITOR
RD	ROOF DRAIN
RM	ROOF MANIFOLD
SV	SANITARY VENT

NOTES:

BASED ON DRAWING M2.4
DATED 03/08/99
TMP CONSULTING ENGINEERS INC.
HMFH ARCHITECTS



Multi-use Outdoor Classroom area can serve 3 classes, and has a focus on S/T/E/M education

Interior of greenhouse will provide classroom area as well as planting areas for food production

Design Narrative

Design Goals
The design reflects multiple goals with diverse design elements. As a learning environment that utlizes the facility itself as an integral dimension of the teaching and learning experience, The Shared Green Roof offers both indoor and outdoor learning spaces. It also provides a variety of different micro-environments, and utilizes various green roof systems, to offer opportunities for longitudinal study of the effectiveness of each system, as well as study of natural and other sciences.

We anticipate the Shared Green Roof will add to school utility costs because it creates additional interior space, and therefore demand for heat, lighting and power. However, it should also help reduce costs by improving overall building efficiency, and with high performance construction at the roof. The project goal is to offset the additional energy demand with already-identified energy efficiency measures, a few of which are implemented; and with renewable energy systems at the roof.

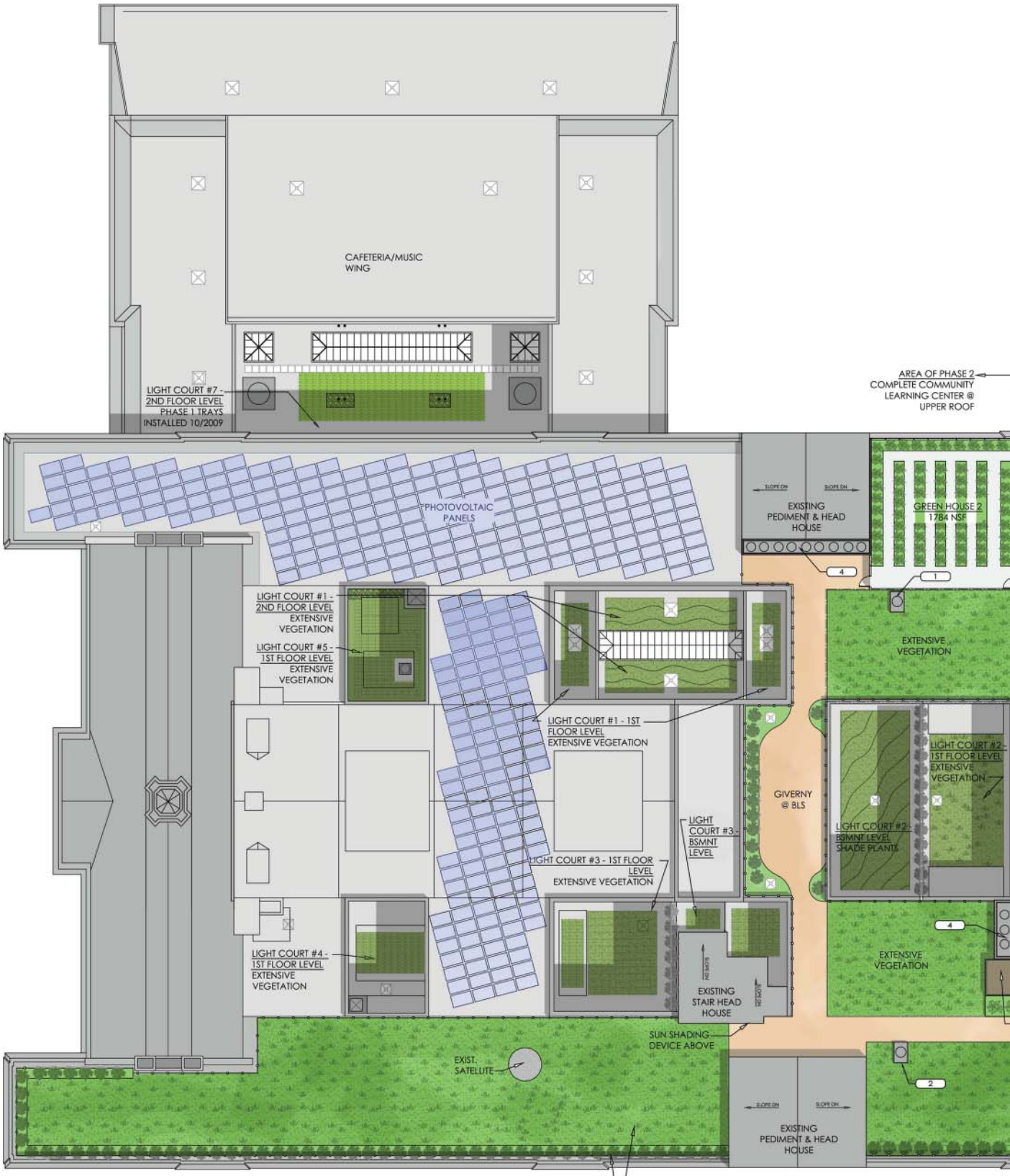
Design Description:
The Shared Green Roof @ BLS is on two levels: the upper roof of the 1932 building, and the roof of the 1987 gym addition, half a floor level below. Both are accessed from a new addition adjacent to the gym, providing community access for all BPS students to the Green Roof without disrupting Boston Latin School's daily activities. At the upper roof, the design of the Community Learning Center creates a series of linked spaces with multiple paths, from indoors to outdoors, linking two points of roof access at the northeast and southeast corners of the building. At the lower roof, the BLS Cafeteria Farm is 13000sf of working rooftop farm.

The key elements of the upper rooftop Community Learning Center include:

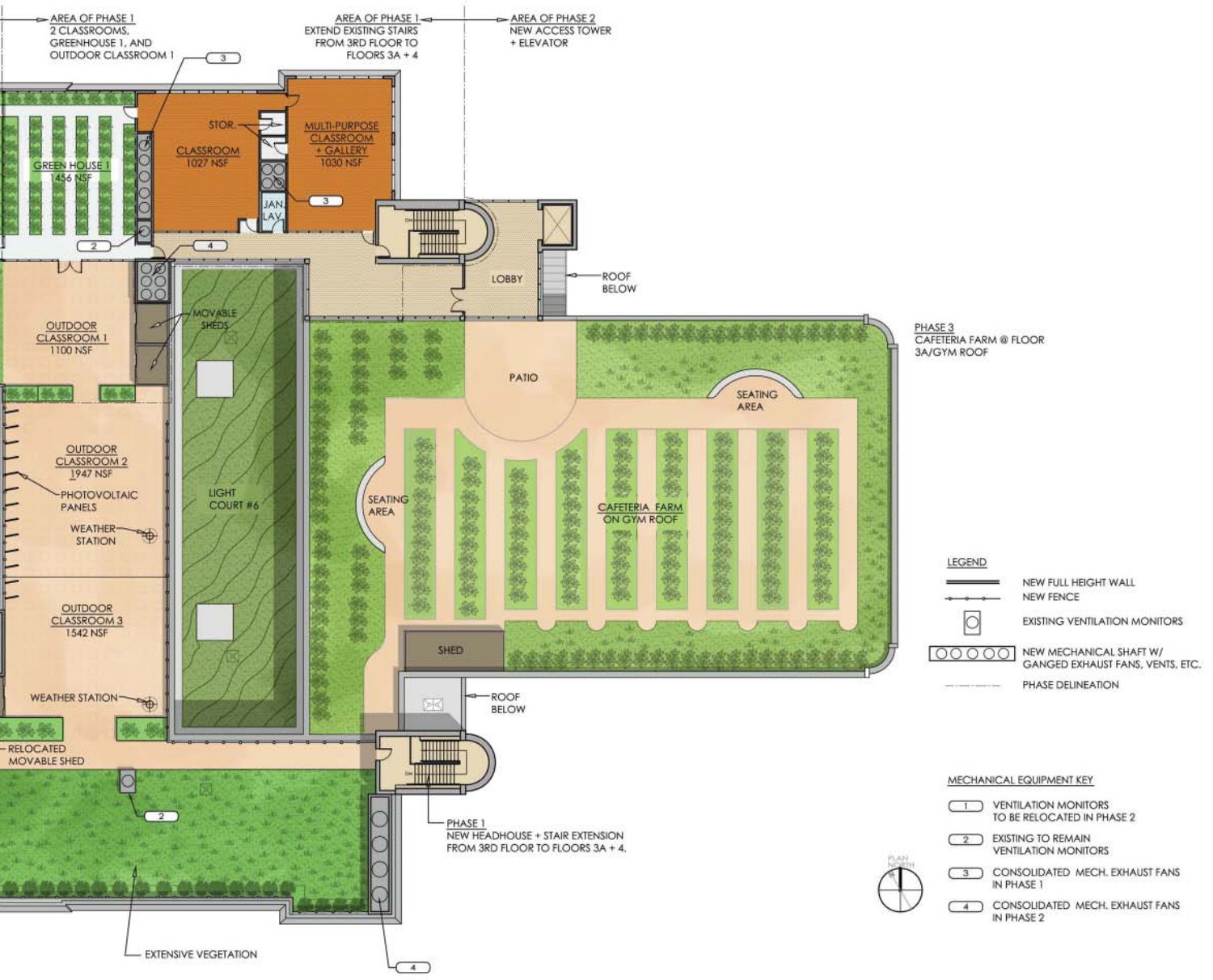
- Two indoor multi-use classrooms, with technology to record and display data collected from Green Roof experiments as well as display for other activities on roof
- A greenhouse to grow food for the cafeteria throughout the school year, serving as both a learning center and an opportunity for student community service
- Three outdoor multi-use classrooms of varying sizes support Science/Technology/Engineering/Math (S/T/E/M) learning, with a weather station, measuring devices for carbon exchange, water absorption and temperature, to compare differences between systems. Technology and equipment will support a variety of learning opportunities, and the means to document and disseminate data collection, such as video monitors in main floor hallway showing roof data, announcing the fresh BLS-produced food
- One multi-use classroom, edged by dense plantings and oriented toward arts and humanities, has been dubbed "Giverny @ BLS"
- Photovoltaic (PV) panels backfeeding electricity to the school when needed, and delivering the power to the utility grid when not needed. The existing 28-panel array has delivered 6840 kW/hours per year. The anticipated 50kW PV array could deliver 65kW hours per year.
- Solar thermal panels to provide hot water for school use
- Small scale wind turbines for electricity generation
- Extensive vegetated areas adjacent to learning spaces and along the southern perimeter of the building provide habitat for birds, bees and insects; absorb rainwater that would otherwise be sent to stormwater lines and wasted; reduce heat load in the building and the heat island effect in the Longwood Medical Area

The key elements of the lower roof 13000sf Cafeteria Farm include:

- An entry patio for students to gather, from which the main path opens to a network of paths to the planting beds
- Nine central raised planting beds.
- Perimeter planting areas for plants that require larger areas, with vines and climbing plants at the back of each along the perimeter fence.



Masterplan with all phases


AREA OF PHASE 1
2 CLASSROOMS, GREENHOUSE 1, AND OUTDOOR CLASSROOM 1
AREA OF PHASE 1
EXTEND EXISTING STAIRS FROM 3RD FLOOR TO FLOORS 3A + 4
AREA OF PHASE 2
NEW ACCESS TOWER + ELEVATOR
GREEN HOUSE 1
456 NSF
CLASSROOM
1027 NSF
STOR.
MULTI-PURPOSE CLASSROOM + GALLERY
1030 NSF
JAN.
LAV.
LOBBY
ROOF BELOW
OUTDOOR CLASSROOM 1
1100 NSF
MOVABLE SHEDS
PATIO
SEATING AREA
OUTDOOR CLASSROOM 2
1947 NSF
PHOTOVOLTAIC PANELS
WEATHER STATION
LIGHT COURT #6
SEATING AREA
CAFETERIA FARM ON GYM ROOF
OUTDOOR CLASSROOM 3
1542 NSF
SHED
WEATHER STATION
ROOF BELOW
RELOCATED MOVABLE SHED
PHASE 1
NEW HEADHOUSE + STAIR EXTENSION FROM 3RD FLOOR TO FLOORS 3A + 4.
EXTENSIVE VEGETATION
PHASE 3
CAFETERIA FARM @ FLOOR 3A/GYM ROOF
LEGEND
NEW FULL HEIGHT WALL
NEW FENCE
EXISTING VENTILATION MONITORS
NEW MECHANICAL SHAFT W/ GANGED EXHAUST FANS, VENTS, ETC.
PHASE DELINEATION
MECHANICAL EQUIPMENT KEY
1 VENTILATION MONITORS TO BE RELOCATED IN PHASE 2
2 EXISTING TO REMAIN VENTILATION MONITORS
3 CONSOLIDATED MECH. EXHAUST FANS IN PHASE 1
4 CONSOLIDATED MECH. EXHAUST FANS IN PHASE 2
PLAN NORTH

Green Light Courts
In addition to the roof areas, a series of green outdoor spaces will be created in existing light courts throughout the school, integrating the green roof into the daily fabric of the school. Most of the light court green roofs will be only visually accessible, but some may be made usable by students and faculty. They will have shallow tray systems. Vegetated trays were installed at the Music Wing light court, in 2009. Others will be added as funds are available, and will use various systems, as part of the learning and testing approach of The Shared Green Roof.

Light court at Music Wing with vegetated tray system installed October, 2009

Renewable Energy Opportunities
One goal of The Shared Green Roof project is to reduce the BLS demand for electricity and gas. Based on the solar and structural analyses, the roof can support additional photovoltaic and solar thermal panels on the upper roof. The panels require available roof capacity of 8 to 10 pounds/sf, which is minimal and available in most sections of the 1932 roof according to the structural analysis. We have estimated an available 9600 sf of appropriate area for photovoltaic installation on the BLS upper roof. We have not included the 1999 addition because of the multiple levels and quantity of mechanical equipment. However, it might be possible to add to the estimated area when a more detailed feasibility study for PVs is done.

Based on planning guidelines provided by photovoltaic design consultant, Zapotec Energy, it is reasonable to assume a 50kW installation at BLS, which requires approximately 8000sf, and would cost approximately $250,000 to install. (Installation costs are dropping rapidly with greater availability.) The 50kW installation will generate about 65kW hours/year. A conservative assumption of electricity cost of $.15/kWh, a 50kW installation should save $10,000 per year in electricity costs. The savings increase if electricity costs go higher. The28-panel PV installation on the BLS roof since August 25th 2010 has generated 9,114 kWh to-date, saving BPS $1,914 over the 16 months since installation, given a rate of $0.21 / kWh.

Because of the high first cost, the design team has not included in the budget the cost of renewable energy installation. There are two options for financing renewable energy. Some may be financed with a dedicated grant for the purpose, though the Mass. Technology Collaborative grants that were available are no longer. Alternatively, photovoltaic installations can be fully financed through a Solar Power Purchase Agreement (PPA) with a private for profit or non-profit entity.

The PPA model involves agreement between a building owner and a company that manages and pays for the design, installation, and operation of a photovoltaic system. The PPA uses the PV panels on the roof to generate power, in consideration of which the building owner pays a reduced cost of electricity. The PPA sells excess power to the utility company. The PPA organizes investors, and uses Renewable Energy Credits to reduce its costs. This is considered a secure business model, with little or no risk for the building owner, because if the company fails, the owner has the system on the roof and uses the power. There are numerous PPA's offering such services, anxious to contract with public school districts. This could be a means to initiate significant photovoltaic installations on BPS schools. The Shared Green Roof @ BLS could be a pilot for BPS in evaluating the PPA approach. If requested, BPS is likely to receive responses from top ranked PPA companies.

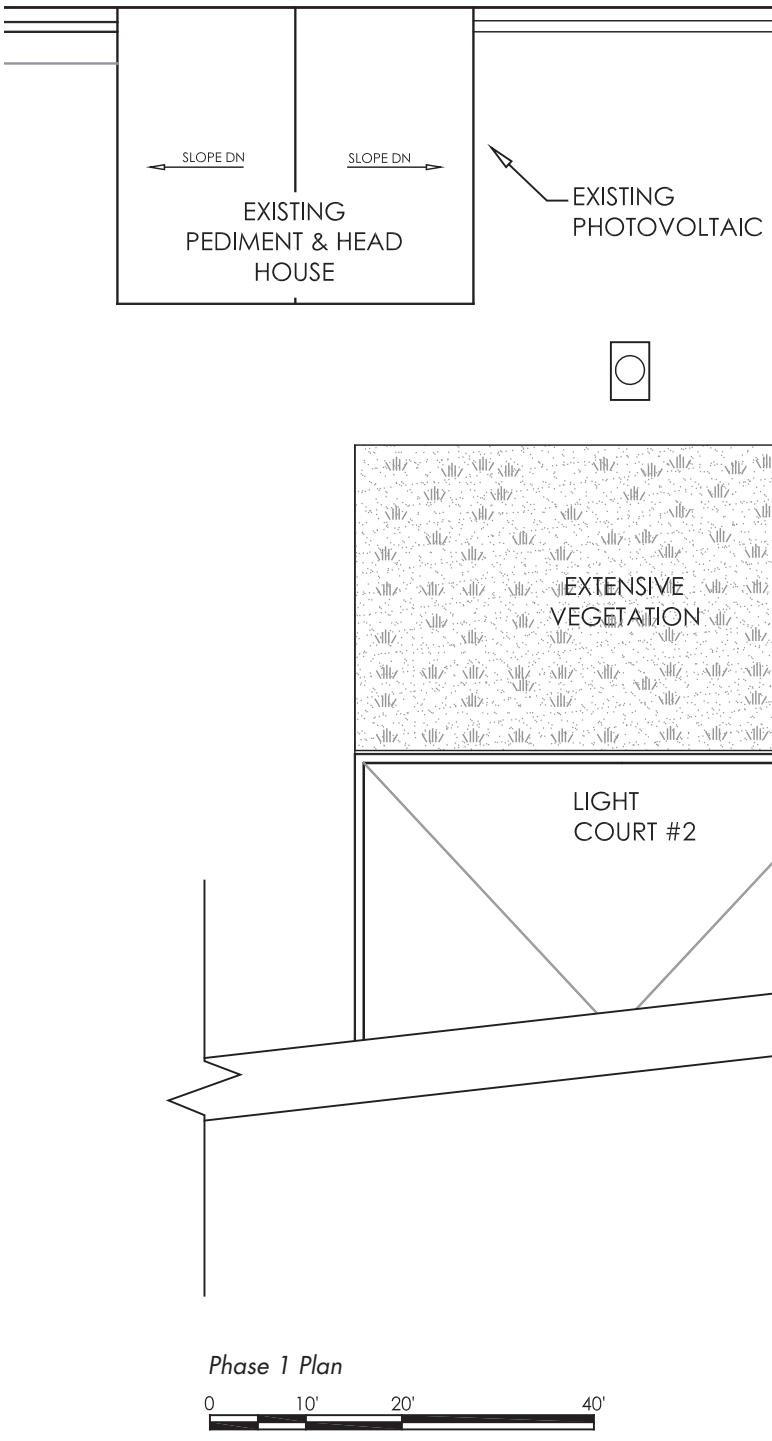
BLS Youth CAN students with the first 28kw array of photovoltaic panels feeding electricty to the school, and provided by Mass. Technology Collaborative

Planned Construction Phases:
The design presumes phased construction due to budget constraints and the need to minimize disruption of school activities. The roof will be handicapped accessible.

Phase 1: The Pilot Shared Green Roof
The first phase is focused on the upper, 1932, roof. It includes access to the upper roof for BLS and other BPS students by extended the existing northeast stair (1987 addition) from 3rd floor to the new 4th floor/upper roof. The southeast stairwell (1987 addition) will also be extended to the roof for a second means of egress. The existing roofing will be demolished, and new steel framing bearing on existing vertical structure, and composite deck will be added to support the Community Learning Center. Insulation will be upgraded below new outdoor spaces.

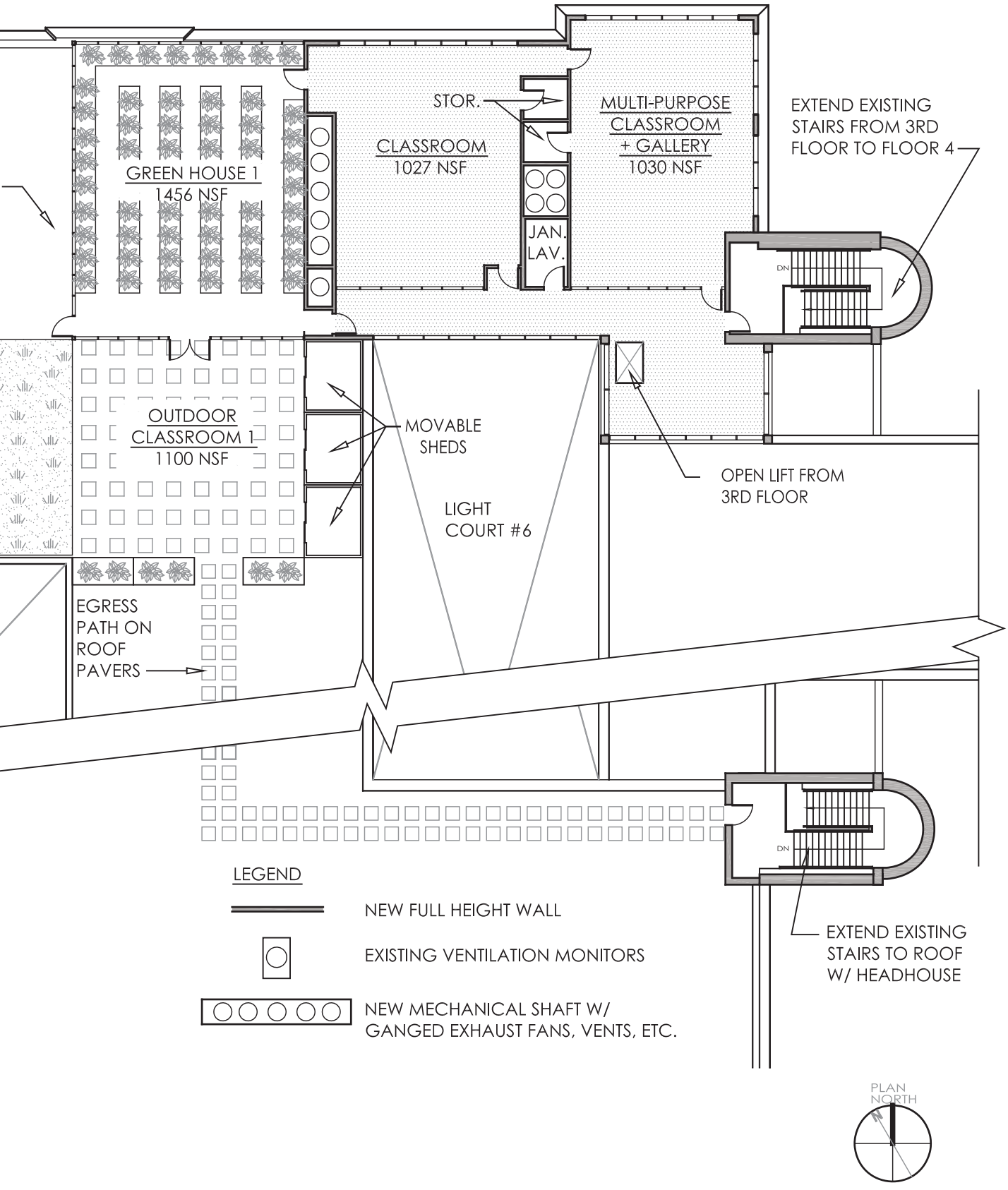
Construction includes two indoor multi-use classrooms, a 1500sf greenhouse, an accessible lavatory, an adjacent outdoor space to be used as a classroom and testing area, and a small area of extensive vegetation. The existing 28-panel photovoltaic array is adjacent to the new usable spaces. Additional PV panels will be added if dedicated funding or financing is available.

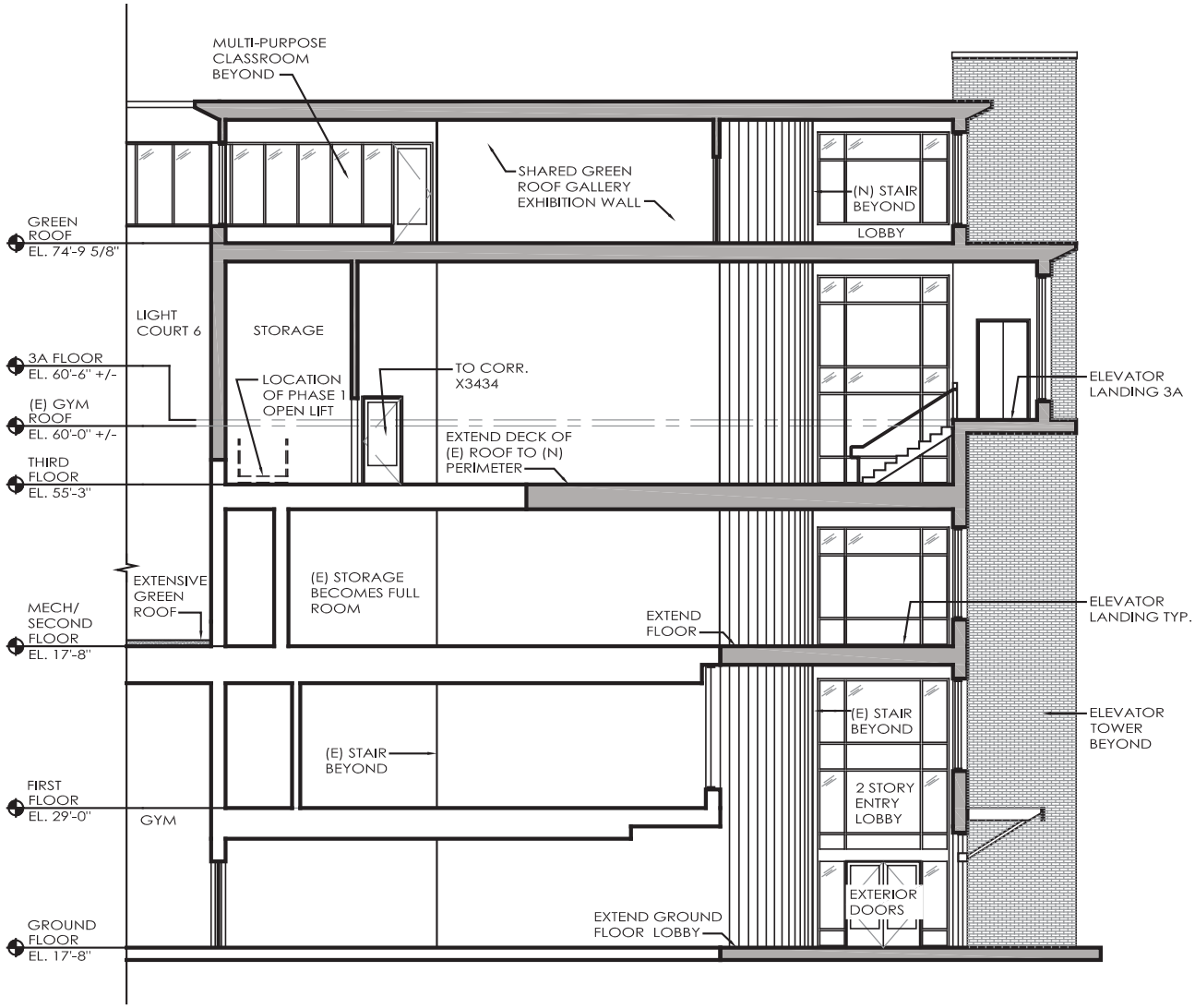
The new enclosed construction at classrooms and stairwells will be steel-framed, with veneer construction. The greenhouse will have double polycarbonate glazing and an operable roof for natural ventilation. A rainwater catchment system will capture and distribute water in the planting beds. Mechanical work will be limited in this phase to relocating exhaust fans into a shaft between the greenhouse and classroom, and the systems needed for the greenhouse, classroom and access tower. No fencing is required because most of the space is enclosed, and the usable outdoor area will be blocked from the roof edge with movable sheds, to be relocated in Phase 2. An additional light court will be planted in Phase 1, to connect the students to the Shared Green Roof.



Phase 1 Plan

0 10' 20' 40'


GREEN HOUSE 1
1456 NSF
CLASSROOM
1027 NSF
STOR.
JAN.
LAV.
MULTI-PURPOSE
CLASSROOM
+ GALLERY
1030 NSF
EXTEND EXISTING
STAIRS FROM 3RD
FLOOR TO FLOOR 4
DN
OUTDOOR
CLASSROOM 1
1100 NSF
MOVABLE
SHEDS
LIGHT
COURT #6
OPEN LIFT FROM
3RD FLOOR
EGRESS
PATH ON
ROOF
PAVERS
DN
LEGEND
NEW FULL HEIGHT WALL
EXISTING VENTILATION MONITORS
NEW MECHANICAL SHAFT W/
GANGED EXHAUST FANS, VENTS, ETC.
EXTEND EXISTING
STAIRS TO ROOF
W/ HEADHOUSE
PLAN
NORTH



Section through new access tower, with gallery/exhibit space at third and fourth floors supporting Community Learning Center

Phase 2: Completing the Community Learning Center

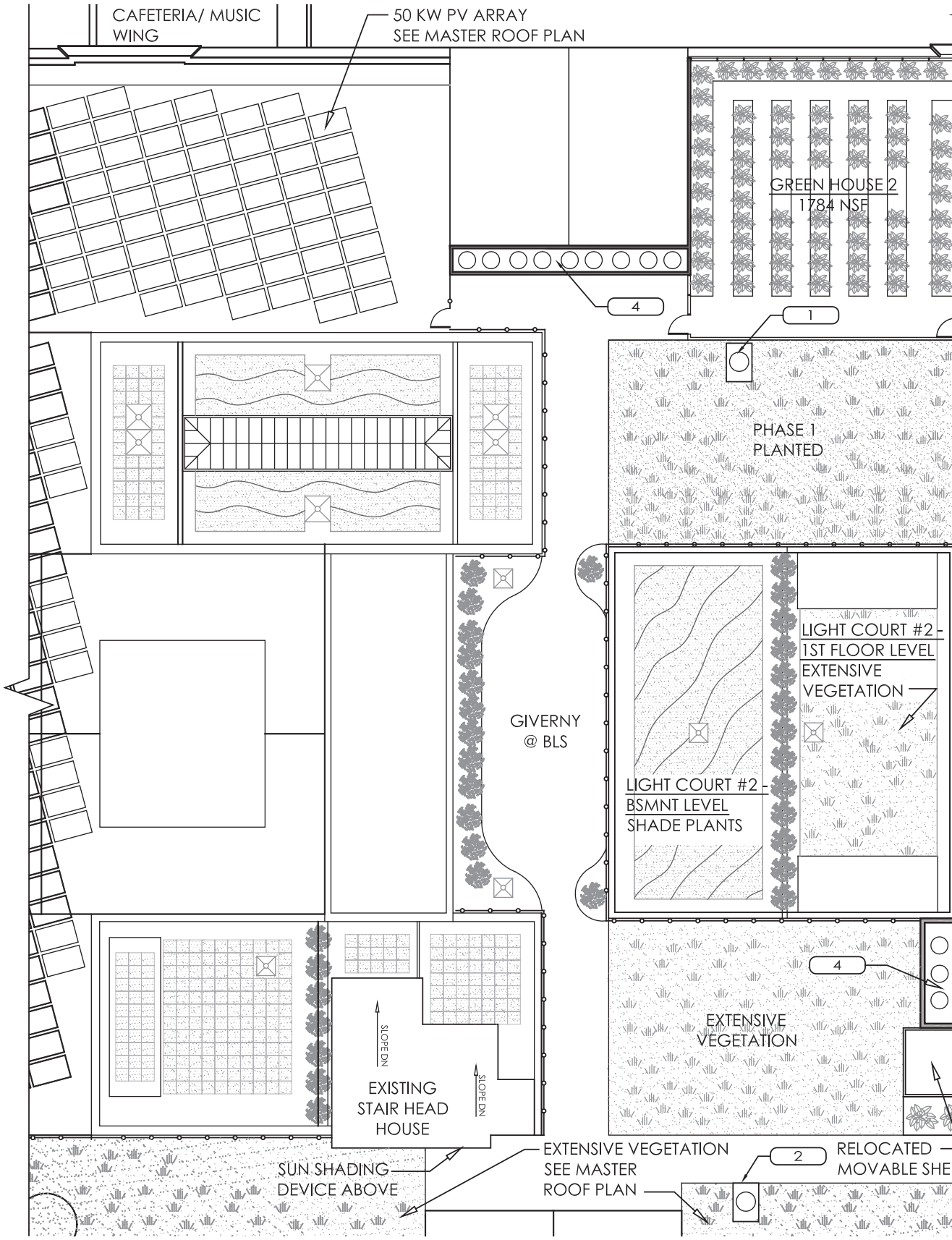
To provide dedicated access to the two roof levels, a 5-story Access Tower will be built at the northeast corner of the building that links to the existing northeast stairwell and ground floor lobby. The access tower will be primarily glazed walls connecting the masonry-clad elevator tower and stairwell, with steel framing and composite deck floors typical. It includes a new 6-stop elevator serving floors Ground, 1, 2, 3, 3A (gym roof) and 4 (upper roof-1932 building). The second and third floors are extended out to the new east wall, expanding a lobby adjacent to the gym at the second, and creating a gallery/exhibit area for the green roof at the third, and another at the fourth floor.

This phase requires structural upgrade for outdoor classroom area: the existing roofing will be demolished, and new steel framing and composite deck added to support the Community Learning Center. It will include relocation of 1 large ventilation monitor at the new greenhouse location, and other rerouting of mechanical devices and plumbing vents. Insulation will be upgraded below new outdoor spaces.

This phase will complete the upper portion of The Shared Green Roof Community Learning Center with:

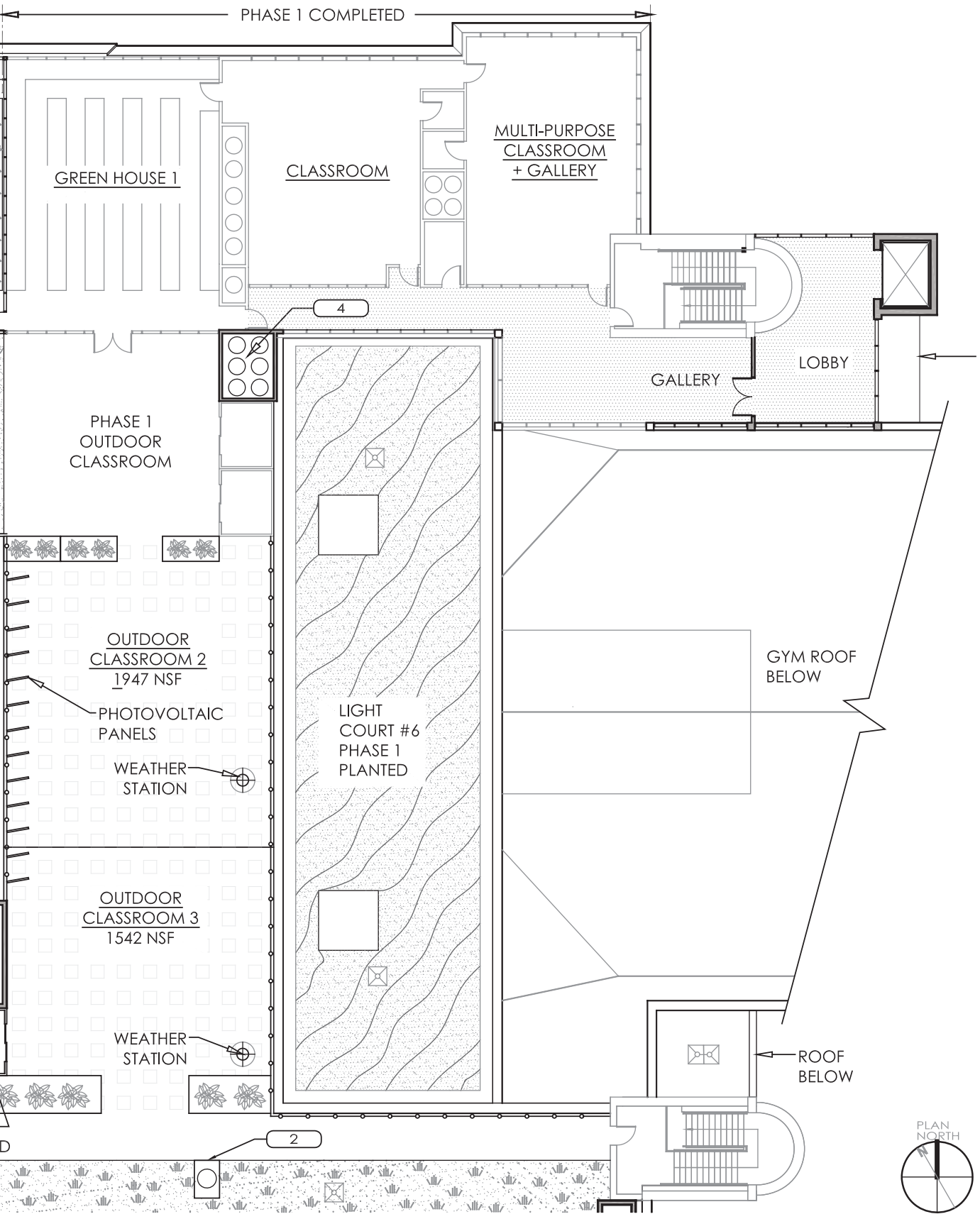
- Greenhouse extension of approximately 1600sf.
- Two outdoor S/T/E/M classrooms contiguous with the existing, with adjacent storage sheds
- A multi-use classroom, edged by dense plantings and oriented toward the humanities, dubbed "Giverny @ BLS"
- Large areas of extensive vegetation

Greenhouse will provide food production, but also support science education and service-learning



Phase 2 Plan completes upper roof of Community Learning Center

0 10' 20' 40'


PHASE 1 COMPLETED
GREEN HOUSE 1
CLASSROOM
MULTI-PURPOSE CLASSROOM + GALLERY
4
GALLERY
LOBBY
PHASE 1 OUTDOOR CLASSROOM
OUTDOOR CLASSROOM 2 1947 NSF
PHOTOVOLTAIC PANELS
WEATHER STATION
LIGHT COURT #6 PHASE 1 PLANTED
GYM ROOF BELOW
OUTDOOR CLASSROOM 3 1542 NSF
WEATHER STATION
ROOF BELOW
2
PLAN NORTH

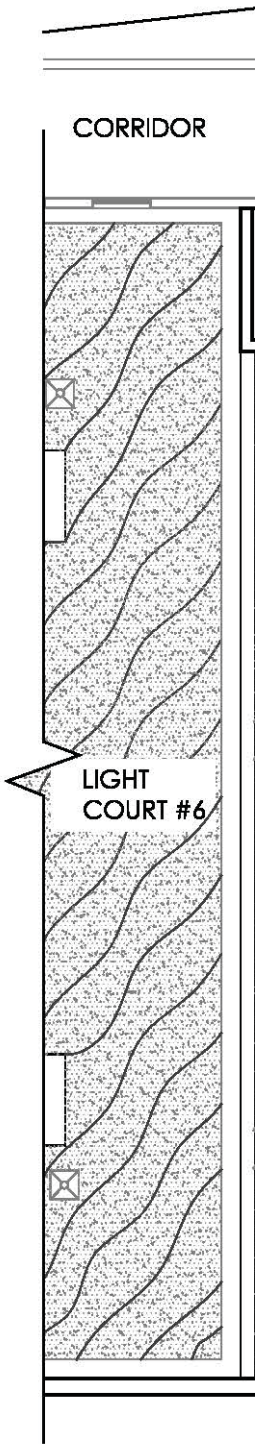
Multi-use outdoor classroom, focused on S/T/E/M-related education, looking south toward extensive green roof

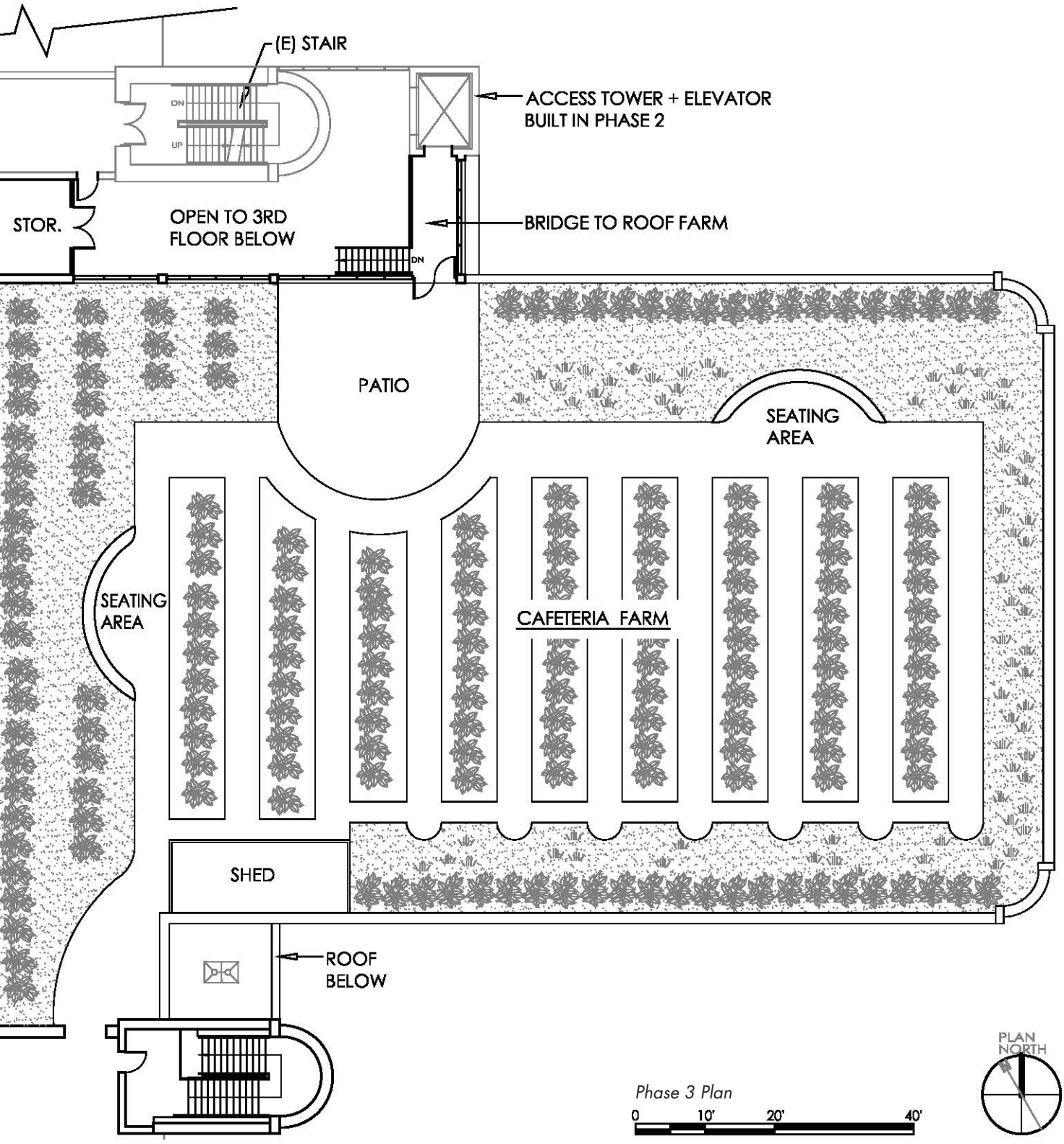
Interior of greenhouse, with class gathering area in foreground

Multi-use outdoor classroom and contemplative garden, "Giverny @ BLS,' supports arts and humanities as well as other education for sustainability

Phase 3: The Rooftop Cafeteria Farm

Phase 3 requires structural upgrade of the open web joists, and perhaps some beams, the deck may require reinforcement with carbon fiber strips below planting beds. More detail can be found in the structural report. In the existing access tower, a bridge will be added for barrier free access to the gym roof, 5' above the third floor from an elevator landing perpendicular to the typical landings. All space on this roof is outdoors. The design includes a series of raised beds with lightweight engineered soil for growing vegetables, herbs and fruit. Beds are separated by a network of paths and water supply for drip irrigation. Perimeter planting areas will be provided for plants that require larger areas, with vines and climbing plants at the back of each along the perimeter fence. The lower roof will connect to the southeast stairwell for a second means of egress.




(E) STAIR
DN
UP
ACCESS TOWER + ELEVATOR
BUILT IN PHASE 2
STOR.
OPEN TO 3RD
FLOOR BELOW
BRIDGE TO ROOF FARM
DN
PATIO
SEATING
AREA
SEATING
AREA
CAFETERIA FARM
SHED
ROOF
BELOW
PLAN
NORTH
0
10'
20'
40'

Phase 3 Plan

An Educational Resource for All Boston School Students

Educators recognize the importance of creating opportunities to integrate teaching across subject areas, yet within the walls of traditional classrooms it's often difficult to make the shift. The Shared Green Roof offers a literal and figurative change of scene designed to inspire the big picture thinking that goes with learning in a more integrated way.

While the Boston Public Schools District has considerable deferred maintenance, systems to be replaced, and building envelopes to be upgraded, a project such as The Shared Green Roof has the unique advantage of providing the district with the means to deliver an educational space in which Boston students can engage in the sort of innovative learning that is key to their successful futures. The Shared Green Roof is a Community Learning Center that will bring excitement to learning for all Boston students and teachers. It also offers a model for the important role that school building systems and school building design can play in contributing to teaching and learning and will serve as a clear model for the role school systems and community partnerships can play in furthering innovative educational opportunities.

The Shared Green Roof is designed to serve as a bridge between the classroom and the world at large, a learning environment that promotes not only the synthesis and integration of interdisciplinary ideas but also functions as an entry point for students to become local activists and positive change agents. They move their learning from theory to practice, out into their communities, and find a sense of momentum and purpose missing from much of traditional learning. The importance of supporting student activists and change agents is already well demonstrated by BLS Youth CAN's successful track record. With the institutional supports, structure, and community partnerships that have already been developed by BLS Youth CAN over the course of the past five years, Boston Latin School is uniquely positioned to ensure the success of this project.

View of the Cafeteria Greenhouse in Phase 1

Aerial view: Greenhouse at left when completed in Phase 2, with Phase 1 Multi-use indoor classrooms behind; extensive vegetation and S/T/E/M outdoor classrooms at the center, one to be completed in Phase 1; and Phase 3 Cafeteria Farm beyond at lower roof

Development Budget

Phase 1 Program and Budget

Based on professional construction cost estimating provided by Daedalus Projects, Inc., Byrne McKinney & Associates has prepared a fully loaded development budget for the Phase 1 plan, designed to deliver 6,765 square feet of new program area on the roof. The total development budget for Phase 1 is estimated at $2.5M. A 15% contingency of roughly $360K brings the aggregate Phase 1 budget to $2.86M (all amounts are in 2011 dollars).

As indicated in the Phase 1 Program and Budget Table on the following page, hard costs for each program element have been estimated and include the creation of two multi-purpose indoor classrooms, one outdoor STEM classroom, an expandable greenhouse and extensive vegetation. Handicapped access, primary and secondary means of access, a lavatory, and all systems (electrical, mechanical and plumbing) required to serve the Phase 1 program are included in the estimate.

The existing photovoltaic array will be part of the Phase 1 program. Additional photovoltaic panels, solar-thermal panels and wind turbines are expected to be included through partnerships with installer/providers (Power Purchase Agreements/PPA's) and as fund raising efforts allow. Future phases of the program contemplate the construction of additional indoor and outdoor classroom areas, a production scale greenhouse and a seasonal cafeteria farm and garden.

The cost of the Phase 1 construction (hard cost only) is estimated to total approximately $2.1M including construction labor, materials, contractor profit and general conditions. A 15% contingency of roughly $310K brings the total Phase 1 hard cost budget to $2.4M.

Phase 1 Program and Budget

Construction Cost Phase 1				
ITEM	# Units		COST/SF or Unit	TOTAL COST
Access & Systems				
Access Stairs & Lift	2	$	240,000	$ 480,000
Egress Path	965	$	10	$ 9,650
Moveable Sheds	2	$	750	$ 1,500
Stair Tower/Lobbies			Phase 2	
Subtotal				***$ 491,150***
Program Areas[1]				
Indoor Multi-Purpose Classrooms/Lavs (2)	2,533	$	350.00	$ 886,550
Outdoor Classrooms (1)	971	$	65.00	$ 63,115
Rooftop Greenhouse	1,536	$	400.00	$ 614,400
Cafeteria Farm & Gardens (Lower Roof)			Phase 2	
Other Program Expansion (Upper Roof)			Phase 2	
Subtotal	***5,040***			***$ 1,564,065***
Plantings[2]				
Extensive Vegetation (Non-trays)	1,725	$	10.00	$ 17,250
Light Courts	0	$	50.00	$ -
Subtotal	***1,725***			***$ 17,250***
Hard Cost Subtotal	***6,765***	***$***	***310.00***	***$ 2,072,465***
Renewable Energy Systems[3]				
Photovoltaic Panels (assumes PPA-$250K value)	0	$	-	$ -
Solar Thermal Panels	0	$	-	$ -
Windturbines	0	$	-	$ -
Renewable Energy Subtotal				***$ -***
Contingency Allowance	***15.0%***	***of Hard Cost***		***$ 310,000***
Total Estimated Phase 1 Construction Cost	6,765	$	352.00	$ 2,382,465

The table below presents the soft cost budget for Phase 1 including the cost of architecture, specialty design consultants, engineering, project coordination and overhead, security and site maintenance during construction and classroom furniture and program-related scientific, farming and maintenance supplies and equipment. The soft cost budget is estimate to total $425K. A 15% contingency of $50K brings the total Phase 1 soft cost budget to $475K.

A complete presentation of the Daedalus construction estimate for Phase 1 and for additional phases currently envisioned by the Masterplan may be found in Appendix B. Note that the future phase cost estimates are illustrative only. We expect that subsequent phases of the project will be refined and that revised budgets will be prepared based on what is learned from utilization of the Phase 1 program spaces.

Soft Costs			
ACTIVITY/ITEM	% of HARD COST		TOTAL COST
Design, Testing & Project Management:			
Design Fees + Reimbursables est'd @ 12%	12.0%	$	248,696
Specialty Consultants	2.0%	$	41,449
Additional Testing	2.0%	$	41,449
Subtotal Design	***16.0%***	***$***	***331,594***
Cumulative Cost			
Project Administration			
Project Coordination/Overhead	2.0%	$	41,449
Security/Site Maintenance	1.0%	$	20,725
Subtotal Administration	***3.0%***	***$***	***62,174***
Furniture, Fixtures and Equipment[4]			
Classroom Furnishings	0.8%	$	20,000
Scientific Equipment	0.4%	$	10,000
Farming Equipment	0.1%	$	1,500
Maintenance Supplies and Equipment	0.1%	$	1,500
Subtotal FF&E	***1.4%***	***$***	***33,000***
Soft Cost Contingency Allowance	***15% of Soft Cost***	***$***	***50,000***
Total Estimated Soft Cost	**20%**	**$**	**476,768**
Total Estimated Phase 1 Project Cost	**Rounded**	**$**	**2,499,233**
	With Contingencies	*$*	*2,859,233*

1 Program expansion to be planned in response to Phase 1 evaluation process

2 Extent of rooftop plantings beyond formal program areas could increase depending on financing

3 Renewables could increase in number & variety delivering more power + hot water depending on technology evolution and available financing

4 Donations and other fund raising could reduce the cost of FF&E

Anxious to begin growing food, BLS students grew vegetables in raised beds they built in the school yard

Support for The Shared Green Roof

Foundation Support - Received
Boston Digital Bridge Foundation **$2,500.00**
Annual Operational Grant from National Grid Foundation **$10,000.00**
National Wildlife Federation **$10,000.00**

Cash Awards Won by BLS Youth CAN
Green Heroes Award - **$15,000.00**
Green Award - **$25,000.00**
Lexus Eco Challenge - **$10,000.00**
Alliance for Climate Education Grant - **$2,500.00**
Student Conservation Association Green Your School Award - **$2,500**
Do Something Increase Your Green Award - **$1,500** (3 times)

Grants Won by BLS Youth CAN
Annual Operational Grant from National Grid Foundation **$10,000.00**
National Wildlife Federation Grant to Fund Summit **$10,000.00**
National Wildlife Federation Grant for Network (Climate Action Grants) **$10,000.00**
2010 & 2011 Grants to Fund Summer Institute on Sustainability for Educators (National Grid Foundation – Youth CAN secured a pass through grant to pay the Children's Environmental Literacy Foundation to provide the educator training) **$15,000.00**
2011 Grant to Fund Youth Green Jobs/ Energy Audit Training Program (National Grid Foundation **$9,000.00** – Youth CAN secured a pass through grant for Dorchester Bay Youth Force – the agency that distributed the funds to student green jobs participants)

Support from the Business Community
GE I-Care - Employee Fundraiser – Award in Support of Roof Project 2010 - **$1,300.00**

Initial Foundation Support Being Sought
Boston Foundation
Barr Foundation
Cabot Family Charitable Trust
Jane's Trust
Merck Family Fund
John D. Merck Fund
American Honda Foundation

Bank of America Neighborhood Excellence Initiative funds three programs recognizing neighborhood initiatives: "Neighborhood Builders" awards to nonprofit organizations on local neighborhood priorities; "Local Heroes" champion causes vital to their communities and inspire others to get involved; and "Student Leaders" are recognized for their commitment to making a difference in their communities.
Eligibility: Nonprofit organizations and individuals
Awards range up to $200,000
Information: http://www.bankofamerica.com/foundation/index.cfm?template=fd_grantapp

Grants for Youth Education. American Honda Foundation funds to support youth education, specifically in the areas of science, technology, engineering, mathematics, the environment, job training and literacy.
Eligibility: Public schools, independent school districts and nonprofit organizations
Awards range from $20,000-$60,000
nichole_whitley@ahm.honda.com; http://corporate.honda.com/america/philanthropy.aspx?id=ahf.

Jenzabar Foundation Annual Student Leadership Awards will honor ten student-led campus groups or activities that have made a difference in the world through community service and philanthropic activities. $5,000 grant to support the student or group's future humanitarian endeavors.
http://www.thejenzabarfoundation.org/ICS/Foundation_Homepage.jnz?portlet=Student_Leadership_Awards

Gloria Barron Prize for Young Heroes honors young people between the ages of 8 and 18 who have made a significant positive difference to people and our planet. Each year, ten national winners each receive **$2,500** to support their service work or higher education. http://www.barronprize.org/

Potential Partners and Suppliers

The Green Roof @ BLS will pursue donated goods and services. The team has begun to identify potential sources, including the following companies.

LiveRoof LLC. Subsidiary of Hortech, Inc.
P.O. Box 533
Spring Lake, MI 49456

American Hydrotech, Inc.,
303 E. Ohio Street, Chicago, IL 60611

Green Roof Blocks
11701 New Halls Ferry Road
Florissant, Missouri 63033-6900

Conservation Technology
2633 North Calvert Street
Baltimore MD 21218

G-sky Green Roofs and walls
704-318 Homer St.
Vancouver, BC
V6B 2V2

Aerovironment
181 W. Huntington Drive, Suite 202
Monrovia, CA 91016

Mariah Power
5450 Louie Lane
Reno, NV 89511

Soma Power Pty. Ltd
18/13 Gibbens Road
West Gosford NSW 2250

Northern Power
29 Pitman Road
Barre VT, 05641

Southwest Power
1801 W. Route 66
Flagstaff, AZ 86001 USA

Swift
4855 Thirty-Seventh St. SE
Grand Rapids, MI 49512

Green Energy Tech.
846 North Cleveland-Massillon Road
Akron, Ohio, 44333

1 SolTech
1920 Diplomat Drive
Dallas, TX 75234

Sunpower
77 Rio Robles
San Jose, California 95134

Kyocera Solar, Inc.
7812 East Acoma Drive
Scottsdale, AZ 85260

New England Solar Hot Water
677 Temple St,
Duxbury, MA 02332

Heliodyne
601 Old River Road Suite 3
White River Junction, Vermont 05001

APPENDICES
Appendix A:Team Resumes
Appendix B: Daedalus Projects Cost Estimate
Appendix C: Other Support for the Green Roof Project
Appendix D: List of available BLS Drawings

Firm Overview

We are Studio G Architects: designers creating sustainable communities and buildings. Our vibrant, multi-disciplinary capacity draws upon a 20-year history. We serve public and private clients, tackling each client's agenda with a fresh and creative approach. Studio G Architects have licenses in multiple states, national certification, and LEED Accredited Professionals. The firm is a certified woman-owned business.

We specialize in:

- designing functional and beautiful places for living, working, playing and gathering
- sustainable, green buildings and landscapes, to reduce energy demand and improve health
- preserving historic structures, often adapting them to new uses
- urban commercial and neighborhood revitalization projects
- helping clients shape their vision, secure public approvals, and get their projects completed

Approach

Design is a powerful tool. It resolves problems, reveals unexpected solutions, and unifies different points of view into a satisfying and singular outcome. Yet, a great project isn't the only outcome of good design. Design also educates, engages and transforms. Studio G Architects' approach **educates** clients about the relevance of the design process to their individual needs and to community, regional and global concerns; it **engages** diverse groups of people to develop ideas and generate enthusiasm for the project; and it **transforms** environments and the people who inhabit them. At Studio G Architects our goal is to leverage the capacity of design to craft rich, individualized and highly functional designs that arise through connection with our clients and the insight and self-knowledge they acquire through participation in the process.

studio G ARCHITECTS

building sustainable communities

Gail Sullivan, AIA, NCARB, LEED AP, Principal

gails@studio-g-architects.com 179 Boylston Street Jamaica Plain, MA **02130** T 617.524.5558

EMPLOYMENT

Studio G Architects, Inc.	1991-present
Sunset Street Associates	1986-1990
Kanda Associates	1985

EXPERIENCE

Institutional Projects

Rockland Senior Center	current
DYS Roslindale/Connolly Building Repairs	current
MIT/ Technology Children's Center North Court	2011
Eastern Mass Women's Correctional Facility - Study	2010
Harvard University Feasibility Study and Schematic Design	2008
Roxbury Presbyterian Church- After School Program	2006
Harvard University/Harvard Yard	2006
Wendell Free Library Study and Preliminary Design	2005
MIT Technology Children's Center at Stata	2004
City of Boston - Mattapan Community Center	2000
Brown University Study of Child Care Centers	1999

Educational Projects

Innovation Academy Charter School—Master Plan	current
Boston Latin School Sustainable Roofscape Learning Center	current
Sturgis Charter Public School	current
Natick High School South Campus Improvements	2010
Hill View Montessori Charter Public School	2010
Compass School	2009
Holden School Phased Renovations	2008
Beacon High School/Walker Home & School	2003
Paige Academy	2002

Child Care Projects

Harvard University/Mt. Auburn Child Care Center Study and Design	2008
Crispus Attucks Children's Center Phased Renovations	2006
Berrybrook School- Design	2005
MIT Technology Children's Center at Stata	2004

Community and Senior Centers

Rockland Senior Center	current
Jewish Geniatric Services - Wernick Adult Day Health	2008
Kit Clark Senior Services - Joseph Timilty Adult Day Health Center	2004
John E. Williams Community Center	2003

Commercial, Office and Mixed Use Projects

Beverly Housing Authority Offices	2011
Corporate Accountability International Headquarters	2008
J Jill Headquarters –Selective Renovation	2004
Central Street Office and Retail	2004
Moody Street Center for Coalition for a Better Acre	2001

Housing & Residential Projects

Rockland Senior Supportive Housing	on hold
Mattapan Heights V	on hold
270 Centre – Mixed Use Development	2011
Heading Home – 100 Devon	2011
Heading Home – 96 Bellevue	2011

Cambridge Housing Authority: Federalization of State Units	2011
Beverly Housing Authority: Garden City Towers	2008
Historic Preservation Projects	
Ebenezer Baptist Church	2011
Salem Street Redesign – City of Boston	2007
Roxbury Presbyterian Church	2006
Terrace Street Lofts in association with Stull + Lee, Inc.	2006
Wendell Free Library Study and Preliminary Design	2005
Moody Street Center for Coalition for a Better Acre	2002
Urban Design and Planning	
Salem Street Redesign – City of Boston	2007
St. Marks Area Main Streets- Planning Process for Peabody Square	2004
Brighton Main Streets- Planning Process for Washington Street	2002
Jackson Square Planning Initiative Design Charrette	2001
Dudley Street Neighborhood Initiative	1994

PUBLICATIONS

"Student ideas for green roof make school a teaching lab"
The Boston Globe 2010

"How to Make a Greener, Healthier, More Productive Workplace"
Women's Business Boston 2007

"Triple Bottom Line is Best Measure for Sustainable Building Design"
Banker and Tradesman 2006

Putting The Pieces Together: A Report on the Jackson Square Planning Initiative
Boston Redevelopment Authority 2001

Preserving Highland Park: Protecting a Livable Community
Boston Landmarks Commission 1999

"Our Lives Have Changed, Our Housing Hasn't," Coauthor
Sojourner 1992

Youthful Visions: Building a Foundation for Community, Coauthor
Dudley St. Neighborhood Initiative 1991

Designs for Interdependent Communities, Coauthor
Unpublished 1986

AWARDS

Massachusetts Historical Commission	Roxbury Presbyterian Church	2008
Boston Preservation Alliance	Paige Academy	2004
Massachusetts Historical Commission	Paige Academy	2004

EDUCATION

Massachusetts Institute of Technology	Master of Architecture	1986
Goddard College	Bachelor of Arts	1976

MEMBERSHIPS

American Institute of Architects, Boston Society of Architects, National Trust for Historic Preservation, Citizen's Housing and Planning Association, US Green Building Council

LANGUAGES

English, Spanish

REGISTRATION

Commonwealth of Massachusetts #8666, State of New Jersey, NCARB, LEED Accredited Professional

SAR Engineering, Inc.

Bruce McGregor, P.E.

Position
Senior HVAC Engineer

Education
A.S., University of Massachusetts

Professional Registration
Massachusetts: 37483
Maine: 8437
New Hampshire: 9068

Affiliations
American Society of Heating, Refrigeration and Air-Conditioning Engineers

Bruce McGregor has been working in the industry for 35 years and is responsible for the engineering and design of HVAC systems for a wide variety facility projects throughout New England. The projects include industrial, educational, commercial, institutional, residential, office, airports and municipal facilities. Mr. McGregor's responsibilities includes the engineering and overseeing the design of various types of HVAC systems including Geothermal Heat Pump systems, hydronic heating/cooling systems, air handling heating/cooling system, steam systems, and BMS systems. Mr. McGregor has extensive experience with green building design including energy reduction, sustainable energy solutions and cost analysis.

Mr. McGregor's project experience includes the following:

- North Andover Elderly Housing, North Andover, MA
- Charlestown Housing Authority, Renovations to Low Income Buildings, Charlestown, MA
- Lynn Housing Authority, Renovations to Low Income Buildings, Lynn, MA
- Brockton Housing Authority, Basement Storm Water Sump, Brockton, MA
- Roehr Residence, Vineyard, MA
- Irwin Penthouse, New York, NY
- Charles Street Jail Hotel, Boston, MA
- General Services Administration - Donahue Federal Building Worcester, MA
- Boston Common Garage, Boston, MA
- Suffolk County Courthouse, Boston, MA
- Central Artery Operations and Control Center, Boston, MA
- United States Embassy, Bangkok, Thailand
- Dover-Sherborn Regional High School, Dover, MA
- West Office Tower, Boston, MA
- North Shore Medical Center, Salem, MA
- Yale Biology Building, New Haven, CT
- Museum of Fine Arts, Karolick Gallery, Boston, MA
- Suffolk University, Archer Building Chilled Water Plant, Boston, MA
- Candle Factory, Barrow in Furness, UK

SOUZA, TRUE
AND PARTNERS, INC.
STRUCTURAL ENGINEERS

TERRY A. LOUDERBACK, P.E., Principal

EXPERIENCE

Mr. Louderback has been Principal Engineer on many projects since joining our firm in 1972. He has designed health care and research facilities, museum, university, library, community centers, office, student housing, public housing, athletic, recreational, maintenance facilities, industrial, religious and parking structures in structural steel, concrete, prestressed concrete, wood and other structural materials. Mr. Louderback has been involved in construction supervision of all of the above type projects. Before coming to the firm, Mr. Louderback served as a commissioned officer in the U.S. Army Corps of Engineers

EDUCATION

B.S.	*Civil Engineering, Cornell University*	*1970*
M.S.	*Civil Engineering, M.I.T.*	*1971*

PROFESSIONAL

1988 *President and Director of Engineering*
Souza, True and Partners Inc., Watertown

1985 *Vice President and Director of Engineering*
Souza, True and Partners, Inc., Watertown

1977 *Principal, Souza and True, Inc., Cambridge*

1972 *Engineer, Souza and True, Inc., Cambridge*

1971 *U.S. Army Corps of Engineers*

1968 *Allstates Design and Development Company*
Trenton, NJ

REGISTERED PROFESSIONAL ENGINEER

Massachusetts #28641

Connecticut, Delaware, Georgia, Maine, Maryland, Missouri, New Hampshire, Michigan, New Jersey, New York, Ohio, Pennsylvania, Rhode Island

PROFESSIONAL SOCIETIES

American Institute of Steel Construction
Boston Association of Structural Engineers (BASE)

Education:

Northeastern University – Certificate, Building and Construction Technology

BA; Colby College

Affiliations:

NEWIRE, Steering Committee Member, Co-Chair Programs and Seminars

Greater Boston Chamber Women's Network, Advisory Board

Boston Center for the Arts, Board of Visitors

CREW, Financial Committee Member

American Society of Professional Estimators (ASPE), Member

American Association of Cost Engineers (AACE), Member

Noriko Miyakoda Hall
Senior Cost Estimator

Noriko Hall has over twenty years of experience in the construction industry as a cost estimator. She is experienced in all aspects of construction management and in providing preconstruction phase services related to budget, cost and life cycle issues. Additionally she has a strong knowledge of early program estimating, cost modeling and cost studies, from schematic phase to completed documents. Noriko excels at evaluating alternative systems, materials, and construction methods to determine those that offer greatest cost efficiency.

Noriko is well known as one of New England's premier estimators and cost consultants, in a niche area of the construction industry that has historically been dominated by men. She has been the recipient of Boston Business Journal's 40 under 40 award and Greater Boston Chamber's Pinnacle Award for Emerging Executive. She is a seasoned speaker having run workshops at Build Boston for over three years as well as various other venues.

Representative projects include:

- Washington Beech Housing Units; Roslindale, MA
- Camfield Garden I & II; Boston, MA
- Christina Street Study; Brookline, MA
- Everett Housing; Everett, MA
- Hebrew Home and Housing, Assisted Living Facility; West Hartford, CT
- Malden Housing; Malden, MA
- Quincy Hope VI and V; Quincy, MA
- Theroc I, II, III Housing; Boston, MA
- Viviendas la Victoria Housing; Boston, MA
- Brookline Condominiums; Brookline, MA
- South End Condominiums; Boston, MA

PAMELA S. McKINNEY, MAI, CRE

Pamela S. McKinney, MAI, CRE, has conducted a broad range of consulting and valuation assignments for public, private, and institutional clients. Her background includes both public and private sector experience, with an emphasis on commercial, industrial, large-scale residential and special purpose property.

Notable assignments undertaken by Ms. McKinney include: master planning, asset management and disposition/acquisition counseling for public agencies, Fortune 500 companies and institutional investors; market and financial feasibility studies for large scale waterfront developments; development feasibility and marketing implementation studies for both downtown and suburban office, industrial, bio-medical research parks and retail malls; development consulting for major mixed-use developments; hotel valuation and feasibility analyses; adaptive re-use, redevelopment planning and disposition studies for surplus public, corporate and institutional properties; residential condominium, rental apartment and senior housing analyses for market rate and affordable projects; retail district revitalization planning, affordable housing and fiscal impacts studies for various state and local governments; and the evaluation of investor-held properties nationwide. Ms. McKinney has qualified as an expert witness in the Middlesex, Norfolk and Suffolk County courts in Massachusetts as well as the Massachusetts Land Court, the Court of Chancery of the State of Delaware and the federal bankruptcy and tax courts.

Ms. McKinney is the President and a Principal of Byrne McKinney & Associates, Inc. with 30 years of experience in the field of real estate development counseling and valuation. Prior to founding the firm in 1989, Ms. McKinney was Senior Vice President of Leggat McCall Advisors, Inc., the national consulting arm of the Leggat McCall Companies. Before joining Leggat McCall, she served as Senior Vice President of Minot, DeBlois & Maddison, Inc., the nation's oldest real estate firm, where she was a principal in the consulting group and a director of the firm. Ms. McKinney also worked as a planner and market analyst for metropolitan Boston's Regional Planning Agency where she managed major land use projects, and authored several planning manuals for local officials.

Ms. McKinney has taught courses in real estate development and investment analysis for Harvard University Graduate School of Design, the Boston University School of Management and Metropolitan College and Tufts University and lectures widely on the topics of real estate finance, valuation and development and the economics of smart growth.

Ms. McKinney holds the CRE designation of the Society of Real Estate Counselors, the MAI designation of the Appraisal Institute, is a former member of the Board of Directors of the Greater Boston Chapter of the Appraisal Institute and has been elected to Lambda Alpha International, an honorary land economics society. She is a State Certified General Real Estate Appraiser holding Massachusetts license number 745. Ms. McKinney is a founding director of New England Women in Real Estate (NEWIRE) and of the Massachusetts Chapter of the Assisted Living Facilities Association of America. She is a past-chair of the Board of the YWCA Boston and a current officer of the Board of the Advent School in Boston.

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CATE ARNOLD

Boston Public Schools
Boston Latin School
Boston, MA 02115

617-688-2262
catebarnold@aol.com

PROFILE

Dynamic educator and youth organizer promoting extensive youth leadership and high impact community service programs led by teens

EXPERIENCE

EDUCATOR, BOSTON LATIN SCHOOL, BOSTON, MA — 2000 - 2011

8th Grade US History Educator, Connections Program. Initiated grant funded Interdisciplinary *Looking At Student Work* Program. Steering Committee Boston Latin School Accreditation Process

FACULTY ADVISOR, BOSTON LATIN SCHOOL YOUTH CLIMATE ACTION NETWORK, BOSTON, MA — 2000 - 2011

Founded BLS Youth CAN, a nationally recognized, award winning youth-led sustainability organization. BLS Youth CAN awards include: Student Conservation Association Green Your School Award 2010 http://thesca.org/contest/green-your-school-finalists/bls-roofscape-learning-lab; National Wildlife Federations Campus Chill Out Award, 2010 http://www.nwf.org/News-and-Magazines/Media-Center/News-by-Topic/Global-Warming/2010/04-21-10_Five_US_Colleges_Win_National_Award_For_Campus_Climate_Innovations.aspx; Increase Your Green Contest 2010 http://www.dosomething.org/increase_your_green/national_grid_winners/2010; President's Environmental Youth Award 2011 http://www.epa.gov/region1/ra/ema/2011recipients.html; Secretary's Award for Excellence in Environmental Education 2011, National Energy Education Development Award 2011, EPA Merit Award 2011, http://www.epa.gov/region1/ra/ema/2011recipients.html; Eco-Schools USA Green Flag Award, 2011 http://online.nwf.org/site/MessageViewer?em_id=104749.0;

Major initiatives include: Statewide EfS Curriculum Campaign; Shared green roof and community learning center proposal; School Garden; School Salad Bar; Zero-sort Recycling Program; Youth network (20 member groups); Youth Green Jobs Program; Summer Institutes for Teachers; Annual Climate Summit at MIT; Community partnerships; Mentoring; and multiple programs and annual events that educate for sustainability. See website at www.blsyouthcan.org

EDUCATION

Harvard College — MDIV 1999 –Program in Religion & Secondary Education

Bryn Mawr College — AB Philosophy 1995

SKILLS

Talented events planner, curriculum developer, youth worker, and educator.

AWARDS

3 x Nominee for BPS Teacher of the Year Award; Crystal Apple Award; Mayor's Green Award; 2011 Green Award http://www.thegreenawards.com/; Teacher's Rock Winner http://speakunited.org/node/2728; Winner 2012, USGBC Coolest Teacher Search http://www.centerforgreenschools.org/coolestteacher;

Ron Gwiazda
143 Mt. Vernon Street
West Roxbury, MA 02132
(617) 970-3712 (cell)
ron.gwiazda@ trworkbench.com

After twenty–seven years of experience in the Boston Public Schools as a teacher, English department head, and curriculum and program developer, Ron Gwiazda has been doing educational consulting and is one of the founders of TRintuition LLC, an educational software company that has developed a collaborative online authoring environment for educators and students.

Education

Columbia University, New York, NY, Ph.D., 1972, English
Dissertation Title: *The Spiral Staircase and the Blank Wall: Fantasy and Anxiety in Three Early Novels by Henry James*
Wesleyan University, Middletown, CT; B.A., 1967, College of Letters
(an interdisciplinary program in literature, history, & philosophy)
Theodore Heuss Gymnasium, Heilbronn, Germany, 1962-63 (exchange student for a year)

Developing Curricula & Programs

Boston Latin School
Assistant to the Headmaster for Curriculum and Instruction (focusing on funding, planning, implementing, and directing special programs, which usually included institutional collaboration); Sept 1988 – June 1999

Secured 3 years of funding from the National Endowment for the Arts, oversaw a year of planning with teachers, then implemented and directed the *Connections Program*, a thematic, integrated 8th grade cluster program that was developed in partnership with the Isabella Stewart Gardner Museum and the Museum of Fine Arts, 1989 – June 1999

Oversaw Boston Latin School's collaboration with *Facing History and Ourselves*, which led to the summer training of BLS teachers by FHAO, the creation of a year-long FHAO senior elective, the endowment by an alumnus of a chair for teaching that elective, a school-wide annual FHAO website scholarship competition, and the development by a student team of the *learntoquestion.com* website, which served as a digital counterpart to the FHAO classroom, 1996 – 2001

Received funding from, and oversaw Boston Latin School's collaboration with, the *Leonard Bernstein Center for Education through the Arts*. Took a team of teachers for training to the Center in Nashville TN, 1996 – June 1999.

Developed and co-taught an interdisciplinary, 12th grade *Honors Humanities* course that investigated expansive themes, such as *fate, time, nature,* and *reality*, through literature, psychology, philosophy, history, science, and the arts. Students created culminating digital projects for each theme, 1993 – 1996
Received a grant from Apple Computer, designed, built, and oversaw the Boston Latin School *MacLab*, a multimedia computer laboratory for experimenting with new educational ideas and approaches for integrating technology into teaching and learning, 1989 – June 1999

Office of Curriculum and Instruction, Boston Public Schools
Oversaw *The Professional Development Resource Center* and the granting of professional development credit to teachers by the Office of Curriculum and Instruction, 1986-88
Wrote, directed, videotaped, and co-edited *For Always: Parents on Parenting,* a 30 minute video that was aired on WGBH, Channel 2, Massachusetts Department of Education morning programming; completed 1988
Developed and ran with Margaret Burchenal, Head of School Programs, Museum of Fine Arts, a series of workshops for BPS teachers that used the Museum of Fine Arts' Asian

Collection to promote understanding of diverse Asian cultures, 1988

Chairman, English Department, Madison Park High School, 1975 – Oct. 1986
Oversaw the creation of an innovative high school English program and helped withthe opening of the new Madison Park High School on a campus in Roxbury, MA

English Teacher, Brighton High School Annex, 1974-75

Provisional English Teacher, Boston Latin School, 1972-74

Selected Additional Professional Experience

Co-Presenter, *MassCUE Conference: Promoting 21st Century Learning*, "Web Content Creation for Everyone," Sturbridge, MA, November 2008

Co-Presenter, *Our History, Our Future* Conference for the National Association of Lab Schools, "New Possibilities for Web Authoring," Rhode Island College, April 2008

Consultant, investigating the use and impact of student management software at Shady Hill School, Cambridge, MA, winter, 2008

Co-Presenter, *No Teacher Left Behind* Conference, "Teaching with Art, Photography, and Computers," Brown University, March 2007

Co-Presenter, *Promising Practices* Conference, "Building Digital Communities with Students and Families: Giving Voice to the Digitally Silent," Rhode Island College, Nov. 2007

Consultant and developer of *Memory, History, and Memorials*, an experimental website for Facing History and Ourselves' online Campus, 2001-2003

Consultant and trainer, the *Leonard Bernstein Center for Artful Learning* at the Grammy Foundation, 1999 – 2001

Contributor to, and co-teacher of, the initial version of the Leonard Bernstein Center's on-line course, *Learning is a Work of Art* (skylightedu.com), 2001

Member, Board of Trustees, the Conservatory Lab Charter School, 1998 - present; Chair of the Human Resources Committee, 2009

Panelist, Blue Ribbons Schools Program: assessing middle and high school applicants to the U.S. Department of Education; assessing schools seeking special recognition in the arts; January & June, 1998

Publications

"Leonard Bernstein at Boston Latin School," *Leonard Bernstein: the Harvard Years, 1935-38,* produced by the Eos Orchestra, January, 1999

"The Peter Pan Proposal," a response to the Paideia Proposal, *Harvard Educational Review,* November 1983; reprinted in *The Great School Debate: Which Way for American Education?,* Beatrice and Gross, editors, (New York, 1985)

Appendix B: Daedalus Projects Cost Estimate

DESCRIPTION		GFA	$/SF	TOTAL
Phase 1				
Greenhouse		**1,536 GSF**	$400.00	$614,400
Multipurpose Classroom		**1,181 GSF**	$350.00	$413,350
Classroom Phase		**1,352 GSF**	$350.00	$473,200
Extend Stairs		**480 GSF**	$500.00	$240,000
Extend Stairs		**480 GSF**	$500.00	$240,000
Outdoor classroom		**971 GSF**	$65.00	$63,115
Egress path on roof		**965 GSF**	$10.00	$9,650
Removeable sheds		**2**	$750.00	$1,500
Extensive Vegetation		**1,725 GSF**	$10.00	$17,250
Subtotal				**$2,072,465**
Design Contingency	14.00%	$2,072,465		$290,145
Escalation to 2012	3.00%	$2,362,610		$70,878
Estimated Construction Cost Total, including Escalation				**$2,433,488**
Phase 2				
Elevator and lobby		**3,230 GSF**	$800.00	$2,584,000
Subtotal				**$2,584,000**
Design Contingency	14.00%	$2,584,000		$361,760
Escalation to 2012	3.00%	$2,945,760		$88,373
Estimated Construction Cost Total, including Escalation				**$3,034,133**
Escalation to 2015	9.00%	$3,034,133		$273,072
Estimated Construction Cost Total, including Escalation 2015				**$3,307,205**
Phase 3				
Extend Stairs		**176 GSF**	$500.00	$88,000
Shed		**271 GSF**	$65.00	$17,615
Storage		**173 GSF**	$65.00	$11,245
Cafeteria Farm		**14,135 GSF**	$60.00	$848,100
Subtotal				**$964,960**
Design Contingency	14.00%	$964,960		$135,094
Escalation to 2012	3.00%	$1,100,054		$33,002
Estimated Construction Cost Total, including Escalation				**$1,133,056**
Escalation to 2015	9.00%	$1,133,056		$101,975
Estimated Construction Cost Total, including Escalation 2015				**$1,235,031**

DESCRIPTION	GFA	$/SF	TOTAL
Phase 1, 2 and 3 (including Escalation to 2012)			**$6,600,678**
Phase 1, 2 and 3 (including Escal. Phase 1 2012 Phase 2 & 3 to 2015)			**$6,975,725**

Appendix C:
Other Support for The Green Roof Project

Institutional Support

- **BLS Administration:** The Green Roof Project has the full support of Boston Latin School Headmaster Lynne Mooney-Teta, the Boston Latin School Alumni Association, and the Boston Latin School Faculty - BLS Youth CAN students successfully recruited faculty and staff support – Malcolm Flynn, Scott Balicki, Liz Hauck, Kathleen Bateman, Jeff Gibbons, Judi Freeman, Aimee Gauthier, Jessie Southwick, Aaron Osowiecki, Zach Smith. Members have attended meetings and done research and outreach on behalf of the project.
- **BLS Community**: BLS Youth CAN students presented to the **School Site Council** about the Green Roof Project & the **Parent Site Council**
- **Parent & Community Volunteers:** The Green Roof *Kitchen Cabinet* – The students meet regularly with a group of adults who volunteer their time in strategic planning sessions with students to further the proposed green roof project: Pam McKinney, Ron Gwaizda, Doreen Treacy, Yvette Crozier, Denise Breiteneicher, Jackie Goggin, Nancy Waters, and Architect, Gail Sullivan. Other parent volunteers: Margaret Wu, Andrew Rainer, Loie Hayes, Lucy Maffei, Duncan Hay, Evie Weinstein-Park.
- **BPS Facilities Department** – students have met with Facilities Staff about the project
- **City of Boston Public Officials & State Public Officials:** Students have communicated about the project to Governor Deval Patrick, Senator John Kerry, Senator Scott Brown, and Congressman Michael Capuano (each were given an presentation about BLS Youth CAN, the roof project 2011); James Hunt III, City of Boston; City Councillor John Connolly have both been proponents of the project
- **BLS Youth CAN Advisory Board:** Peter Kelly, President, Boston Latin School Association; William Moomaw, Professor of International Environmental Policy, Tufts University; Jim Hunt, Chief for Environmental and Energy Services for the City of Boston; John Connolly, At-Large City, Chair of the City Council's Education Committee, the Environment & Health Committee, & Special Committee on a Livable Boston; Elizabeth Soper, Associate Director of Eco-Schools USA at National Wildlife Federation; Robert Garrity, Executive Director of the Massachusetts Climate Action Network; Lynne Mooney-Teta, Headmaster, Boston Latin School; Patricia Weinmann, Assoc. Coordinator, Technology and Culture Forum at MIT; Andrew Rainer, Chief of the Massachusetts Environmental Strike Force, for the Massachusetts Department of Environmental Protection; Pic Walker, Alliance for Climate Education, Executive Director; Ron Gwaizda, Founder TRintuition, LLC; former BLS Curriculum & Instruction Assistant to Headmaster

Project Visibility

- Project Roll Out Fall 2009, Tray Installation 2009, Green Roof Block Party 2009, Green Roof Showcase and Alumni Tours 2010, Ground Level Garden 2010, Rooftop PV array 2010.
- 2010 Chicago School Building Expo – Presentation about the Project by Cate Arnold & Gail Sullivan
- Media & Recognition - Today Show, Boston Globe, Mass High Tech, Boston Magazine, Smart Planet, Slate Magazine, Huffington Post, West Roxbury Transcript
- Youth CAN all expense paid trip to Paris with Jim Hunt to present about the project at *Les Respiration* a Sustainability Conference - 2011
- Sustainability Training for Educators at Primary Source – Roof presentation – Cate Arnold
- 100 Mass Audubon educators presentation – Youth CAN students
- West Roxbury Energy Saves Forum Green Roof Project presentation – Youth CAN students
- MEES (MA Environmental Education Society) Conference Workshop – March 2012 – Youth CAN Presenting

- National School Board Association Conference in Boston in April 2012 with the US Green Building Council: *The Essential School District Sustainability Toolkit* – Cate Arnold Panelist
- US Green Building Council's Center for Green Schools –2011 Antarctica Trip (in recognition of the project and Youth CAN's work)

Fundraising - BLS Youth CAN Students
- Vegetative Trays for Green Roof **$11,000.00**
- 1st Save A Light CFL Fundraiser **$5,000.00**
- 2nd Save A Light CFL Fundraiser **$7,400.00**
- We Add Up T-Shirt Fundraiser **$1,400.00**
- Equal Exchange Fair Trade Fundraiser **$2,300.00**
- Sustainable Food Fair Healthy Baked Goods Sale **$700.00**

Awards To BLS Youth CAN
- Green Wishes Competition – FTL 10x10 Solar Tent **$10,000.00** value
- BLS Salad Bar (Great American Salad Bar Competition) **$3,000.00** value
- International Facilities Management Association Special Recognition Award Green Schools Green Difference Award (twice)
- Governor's Citation
- President's Youth Environmental Award 2011
- Secretary's Award for Excellence in Energy and Environmental Education 2011
- EPA Merit Award 2011
- Massachusetts Senior Level, Nat'l Energy Educational Development Youth Awards 2011
- Eco-School's Green Flag Award (First Public School in USA)

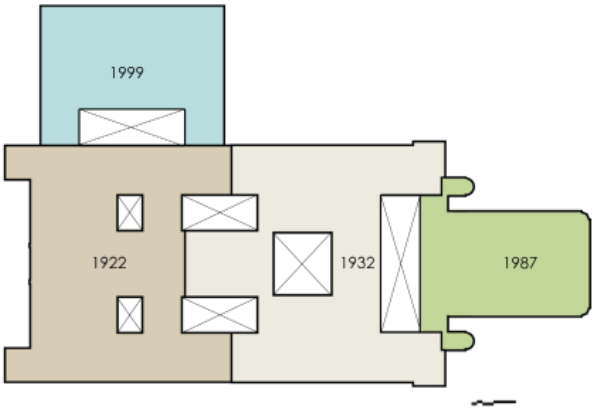
Private Donors
- Boston Latin School Association **$500.00**
- Boston Latin School Association **$10,000.00**
- Individual Alumni Gifts (Reunion 2010) **$900.00**
- Individual Donation **$2,000.00**

Business Partnerships
- United Hydroponics
- City Feed
- Red Sun Press
- Migrant Winds T-s
- NSTAR
- Constellation Energy
- Mazon Lighting
- Casella Recycling
- Energy Management Associates

Community Partnerships
- Dorchester Bay Youth Force
- MIT Technology and Culture Forum
- The Food Project
- Boston Public Health Commission, Boston Food and Fitness Collaborative
- Fenway Green Roof Student Coalition
- Philbrick Elementary School
- Franklin Park Zoo
- Boston Nature Center & Mass Audubon Society
- Sociedad Latina
- Green City Growers
- City Sprouts
- Alliance for Climate Education
- National Wildlife Federation
- Green Schools
- Mass Energy Consumer's Alliance


Huntington Ave
Longwood Ave
Massachusetts College of Art
Harvard Medical School
Longwood Ave
Children's Hospital Boston
Longwood Ave
Massachusetts College of Pharmacy & Allied Health Services
BOSTON LATIN SCHOOL
Avenue Louis Pasteur
Harvard Institutes of Medicine
Simmons College
Beth Israel Deaconess Medical Ctr

Appendix D:
List of Available BLS Drawings



Boston Latin School
Key Diagram

Project Year	Sheet #	Sheet Name	Digital: Scanned Files	Digital: AutoCad Dwgs	Flat Files
1932	9	Existing Elevations	X		X
	14	Basement Framing Plan	X		X
	15	Ground Floor Framing Plan	X		X
	16	First Floor Framing Plan	X		X
	17	Second Floor Framing Plan	X		X
	18	Roof Framing Plan	X		X
	19	Truss Detail and Grid Framing Plan	X		X
1987 Shepley-Bulfinch	A3.1	South & West Elevations and Sections thru New Gym			X
	A3.2	North & East Elevations and Sections thru New Gym			X
	A3.9	Wall Section thru New Gym Stair G2 Existing Wall and Curved Wall			X
					X
	S-1	General Notes and Typ. Details	X		X
	S-2	Caisson Plan and Detail - Gym	X		X
	S-3	Ground Floor Framing Plan - Gym	X		X
	S-4	First Floor Framing Plan - Gym	X		X
	S-5	Second Floor Framing Plan - Gym	X		X
	S-6	Roof Framing Plan - Gym	X		X
	S-7	Column Schedule and Bracing Details	X		X
	S-8	Grade Beam Schedule and Ground Floor Section - Gym	X		X
	S-9	First and Second Floors Sections - Gym	X		X
	S-10	Roof Section Details - Gym	X		X
	S-11	Modifications to Existing Building	X		X
	S-12	Modifications to Existing Building	X		X
	S-13	Modifications to Existing Building	X		X

List continues on next page

	A0.2	Code Sheet			X
	A0.3	Code Sheet			X
	A0.4	Phasing Plan - Phase 1			X
	A0.5	Phasing Plan - Phase 2			X
	A0.6	Phasing Plan - Phase 3			X
	A0.7	Phasing Plan - Phase 4			X
	A2.0A	Ground Floor Plan - Part A		X	X
	A2.0B	Ground Floor Plan - Part B	X	X	X
	A2.0C	Ground Floor Plan - Part C		X	X
	A2.1A	First Floor Plan - Part A		X	X
	A2.1B	First Floor Plan - Part B	X	X	X
	A2.1C	First Floor Plan - Part C		X	X
	A2.2A	Second Floor Plan - Part A		X	X
	A2.2B	Second Floor Plan - Part B		X	X
	A2.2C	Second Floor Plan - Part C		X	X
	A2.3A	Third Floor Plan - Part A		X	X
	A2.3B	Third Floor Plan - Part B		X	X
	A2.3C	Third Floor Plan - Part C		X	X
	A2.4	Roof Plan		X	X
	A3.1	Elevation - Addition		X	X
	A3.2	Elevation - Addition and Precast Details	X	X	X
	A3.3	Existing Building Front Elevation		X	X
	A3.4	Existing Building South Elevation-Repairs		X	
	A3.5	Existing Building North Elevation-Repairs		X	
	A3.6	Existing Building Repairs East Elevation and Light Court		X	X
	A3.7	Existing Building Repairs Light Courts #1 and #4	X	X	X
	A3.8	Existing Building Repairs Light Courts #2 and #5	X	X	X
1999 HMFH	A3.9	Existing Building Repairs Light Courts #3	X	X	X
	A4.1	Building Section	X	X	X
	A4.2	Addition Building Section	X	X	X
	A4.3	Building Section Existing Building New Library and Existing Auditorium		X	X
	A5.1	Wall Section - Addition		X	X
	A5.2	Wall Section - Addition			
	A5.3	Wall Section - Addition		X	X
	A5.4	Elevation Section Building Section		X	X
	A5.5	Wall Section - Addition		X	
	A5.6	Wall Section - Existing Building		X	X
	A5.7	Wall Section - Addition	X	X	X
	A5.8	Wall Section - Addition		X	X
	A5.9	Wall Section - Existing Building	X	X	X
	A5.10	Wall Section - Existing Building	X	X	X
	A5.11	Wall Section - Existing Building		X	X
	A6.5	Section Details		X	X
	A6.10	Roof Details - Existing Building		X	X
	A10.1	Stair Plans, Sections and Details			X
	A10.2	Stair Plans, Sections and Details			X
	A10.3	Stair Plans, Sections and Details			X
	A10.4	Elevator Plans and Details			X
	M2.4	Roof Plan HVAC		X	
	S1.0	General Notes and Typical Details	X		
	S2.0A	Ground Floor Foundation Plan - Part A	X		
	S2.1A	First Floor Framing Plan	X		
	S4.3	Floor Section I - Part A	X		

End of List

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