

# Sustainable Design in a Historic School: A Case Study of Woodrow Wilson High School

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**Sustainable Design in a Historic School:  
Woodrow Wilson High School  
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In an effort to transform the quality of education in the District of Columbia (DC), the Office of Public Education Facilities Modernization (OPEFM) created a Master Facilities Plan in 2008, with the belief “that the quality of the environment impacts students’ ability to learn” (Department of General Services, n.d.). The OPEFM sought to modernize 123 DC public school facilities that serve over 45,000 students through a 15-year, \$3.5 billion capital campaign (Austermuhle, 2011, p.1). On October 10, 2008, two Woodrow Wilson High School students, Evan Holly and Marc Murphy,

testified before the Washington DC City Council in regard to an initiative to modernize, or rebuild, Woodrow Wilson High School. Both students, Holly and Murphy, represented an array of diverse stakeholders from Woodrow Wilson High School who encouraged the council to pursue a “once in a lifetime” experience to modernize the historical school and attain Leadership in Energy and Environmental Design (LEED) Gold certification. “Go for Gold!” was the stakeholders’ ever-present mantra, backed by the Green Building Act of 2006, which required all DC public buildings to meet the United States Green Building Council’s LEED certification standards for environmental performance. LEED certification is a third-party verification standard for buildings designed and constructed using methods intended to conserve resources and provide a healthier indoor environment for its occupants. In order to obtain Gold certification, an accumulation of 60-79 points from a 100-point score scale is necessary from the prerequisites and elective categories of LEED for Schools (United States Green Building Council, 2011).

The commitment and interest, by Woodrow Wilson’s administration, teachers, staff,

students, parents, community, and alumni toward sustainable design certification stemmed from academic and extracurricular activities at Woodrow Wilson High School. An example of academic interest supporting sustainability is the Science, Math and Technology (SciMaTech) Academy at Woodrow Wilson. The SciMaTech Academy is a learning community for over 160 students interested in Science, Technology, Engineering, and Mathematics (STEM) careers. The SciMaTech Academy provided an opportunity for students to be exposed to sustainable design by tailoring their coursework, primarily in their junior and senior years, to highlight engineering, sustainable environments, information technology, and biomedical science. In addition, such programs encouraged students to develop environmental stewardship skills; whereby, they sought assistance from Architecture, Construction and Engineering (ACE) mentors to evaluate the requirements for Gold certification. ACE mentors are professional volunteers who act as role models to students with an interest in the architecture, construction, and engineering industry. Overall, the Office of Public Education Facilities Modernization (OPEFM), the Green Building Act requirement, and Wilson stakeholders

supported a vision of a fully funded, smart modernization plan, committed to sustainable design practices, as the preferred path for Woodrow Wilson High School.

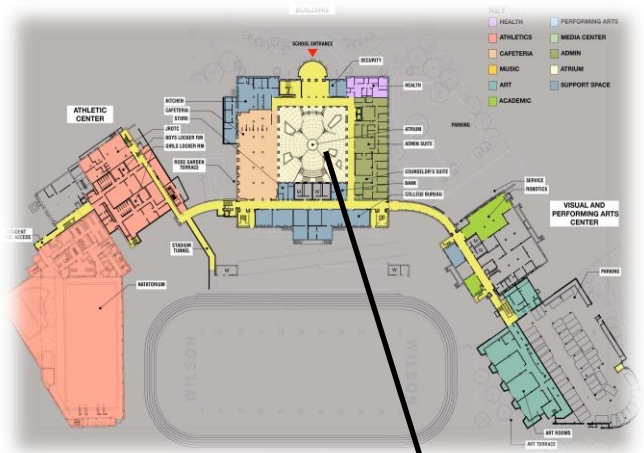
Because of this collaborative and shared vision, the ribbon cutting August 18, 2011, showcased a sustainable and fully modernized, \$110-million, 11-acre, 7 building campus at Woodrow Wilson High School. Together with Wilson stakeholders, former Washington, DC mayor Adriane Fenty shepherded the modernization project through its original planning stages. As renovations were concluded and Woodrow Wilson High School was reopened, the current mayor of Washington, DC, Vincent Gray, highlighted the District of Columbia's persistent pursuit of sustainability, including energy efficiency and environmental design, which culminated in the new campus. In addition, the collaboration with multiple agencies, such as the Office of Public Education Facilities Modernization (OPEFM), project architects, construction and program managers, were organized to assist with the project. An important element of the collaboration for sustainable design was a year-long cooperative charrette. The charrette was an intense effort by the architectural and engineering team to work

in partnership with OPEFM and Wilson stakeholders to elicit feedback on design elements of the facilities. The feedback equated into an overwhelming emphasis on sustainable design features for Woodrow Wilson High School.

### Sustainable Design Features

The sustainable design features of Woodrow Wilson High School incorporated the use of sunlight, water conservation, methods to prevent environmental pollution, and roof space with native landscaping.

**Atrium.** The most dramatic aspect of the modernized campus is the atrium, which is featured in the core academic building (see photo). Since 1935, Woodrow Wilson had an 11,000 square foot, open-air center to the campus. This open air space was not utilized for any purpose except cross ventilation. Thus, the new atrium incorporated a natural daylight feature, through the design of the atrium dish skylight and an elaborate acoustical treatment through a directional sound system. In addition, the piping design of the atrium captured rainwater and further recycled a portion of the water for use in the educational facility.



*First Floor – Floor Plan*



*The Atrium*

The atrium was purposefully designed as the focal point of Woodrow Wilson High School with a variety of services for students provided on the first floor including the main office, welcome center, College & Career Center, health services, and a cafeteria. The sustainable design of the atrium ensured instructional space was not disturbed on the upper floors. The centerpiece of Woodrow Wilson High School – the atrium –hosted a variety of events to showcase its design and

sustainable practices, including a 75<sup>th</sup> Anniversary Gala, an Arts & Music Festival, 2011 Homecoming Dance, and the Regional Kickoff of the 2012 For Inspiration and Recognition of Science and Technology ([FIRST](#)) competition.

**Water efficiency.** As an additional element of sustainable design, Woodrow Wilson High School incorporated water efficiency measures and a storm water management filtration system within its educational facilities. The new facility houses two water holding systems, one 15,000-gallon cistern and one 30,000-gallon storm water filtration system. The 15,000-gallon cistern is designed to hold rainwater and support the use of 55 toilets and 18 urinals in the main academic building. Whereas, the 30,000-gallon storm water filtration system is designed to control the quality and quantity of storm water runoff from Woodrow Wilson High School, which is at DC's highest point. The purpose of the storm water filtration system is to prevent water pollution of Rock Creek, the Potomac River, and ultimately the Chesapeake Bay, one of the world's most fragile ecosystems.

**Roof Space with Native Landscaping.** Woodrow Wilson High School extended its

sustainable design to include roof space with native landscaping. The auxiliary gym features a 7,600 square-foot rooftop space of low maintenance native grasses which naturally insulates the building, and retains storm water. The students are unable to access the rooftop space for educational use, yet instructional emphasis has highlighted its functionality in the design, construction, and operation of the educational facilities. Furthermore, the roof space is visible from the science classrooms which encourage instructional integration into the Environmental Science curriculum.



*Roof Space with Native Landscaping  
at Woodrow Wilson High School*

### **Adaptive Reuse**

The modernization of Woodrow Wilson High School united elements of the preexisting facility, alongside sustainable architectural features, to create an adaptive



reuse of the gymnasium and most classroom flooring. The contemporary auditorium was built using the original steel superstructure and refurbished hardwood seats from the original 1935 auditorium. Also, the classrooms featured refurbished, original wooden floors and state-of-the-art technology (i.e. Macintosh mobile labs, Promethean Boards, and Liquid Crystal Display (LCD) projectors) for an immaculate blend of the past and present.

Additional adaptive reuse of Woodrow Wilson High School converted a portion of the 75-year old coal and oil-burning three-story Power Plant into a highly efficient natural gas powered heating, ventilation, and air conditioning (HVAC) system. The remainder of the Power Plant was transformed into a state-of-the-art fitness center, called “The Power House”, used by students and faculty during school hours, and will soon be accessible to the public during non-school hours. The remaining 70-foot Power Plant smokestack has yet to be modernized. However, the potential of this space is limitless.

The campus location was a factor which allowed Woodrow Wilson to acquire additional points in the Sustainable Sites

category of the Leadership in Energy and Environmental Design (LEED) scale. As a result, the campus location encourages students and faculty to use smart transportation choices. The District of Columbia does not offer bus transportation for its elementary or secondary students. However, students are offered discounted pricing for public transportation options. Woodrow Wilson High School is located one-block from a Metrorail stop and Metrobus hub. Furthermore, students and faculty have the option to walk or bike to school. According to Alex Wilson, Director of Academic Development at Woodrow Wilson High School, three-fourths of students use smart transportation choices to and from school.

### **Facilities as a Teaching Tool**

The modernized campus serves as a teaching tool for educators, students, and the community. In collaboration with architects and school leaders, a guidebook was created to facilitate student volunteers, as “Green LEEDers”, to educate their peers, parents, community, and alumni about the sustainable features built into the new campus. The guidebook serves as a script of design features for the modernized campus,

which student volunteers use while touring visitors. Since August 2011, student volunteers have hosted over 3,200 participants using the guidebook for green tours. Several green tours included the 1961, 1965, and 1971 class reunions, which were thrilled at how much of the spirit and structure of the old campus had been preserved in the modernized facility. Specifically, the class reunion participants marveled that the original 1935 terrazzo floors had been matched by modern artisans who created the same flooring in most of the 70,000-square feet of new campus space.

In combination with instructional lessons to highlight the sustainable design of Woodrow Wilson High School, the design of instructional space was purposeful to meet the diverse academic needs of students. Science teachers integrated the green tour guidebook and various architectural features

around the campus into instructional lessons throughout the year. The modernized facility positioned all science classrooms and laboratories along one hallway on floors two, three, and four in the main academic building. An important element of the science curricula is the EcoLab (see photo), which is a complex greenhouse that can create any ecosystem on Earth and allow for creative environmental studies. Students of EcoLab studies engage in spring plantings to encourage community gardens at nearby middle and elementary schools. Furthermore, an offered science course, Environmental Science: Sustainable Earth, focuses on growing hydroponic plants to help oxygenate the Anacostia River – an endangered waterway. In addition, the Environmental Science Program and the Wilson International Studies Program have advanced sustainable practices at Woodrow Wilson High School through a school-wide recycling program using commingled recycling dumpsters.

**“Do One Thing” project.** The vision, design, and incorporation of sustainable elements at Woodrow Wilson High School has altered instructional perceptions of environmental stewardship. At Woodrow Wilson High School, three educators



*EcoLab at Woodrow Wilson High School*

involved in the Environmental Science: Sustainable Earth curriculum, including Sarah Riggen, Gabrielle Riesner, and Chris Obermeyer, collaborated with a school in Philadelphia, PA and two schools in Japan to outline an international project of sustainable education, called the “Do One Thing” project. Sarah Riggen, a participant of the Japan-United States Teacher Exchange Program for Education of Sustainable Development (ESD), described the ESD program as focused on the topic that human activity has a global impact on the future of humanity and the environment. The project included 675 students from four schools, including Woodrow Wilson High School, to create a mural measuring 15’ x 5’ which would be displayed at each participating school. Students picked one habit they were going to change for six weeks to be more sustainable; whereby, students would track their daily progress, create a mural piece, and write a reflective paper on their experience. All participants were required to create a mural image relating to his/her “Do One Thing” sustainable habit, as well as some specific information about energy or materials saved and why the action had an impact on the global community. The result of the international project represented the positive



*“Do One Thing” mural at  
Woodrow Wilson High School*

impact humans can have by acting together for a healthier, more sustainable community.

### **Potential Impacts**

The benefits of modernization for Woodrow Wilson High School have extended beyond sustainable features built into the campus. Woodrow Wilson Principal, Pete Cahall, asserted efforts of modernization have suggested a decrease in student absenteeism, discipline problems, and an increase of academic achievement by students. An overview of school data suggests student attendance has increased compared to 2010-11, and likewise extracurricular activities have increased in overall participation. In addition, during the past several years overall grade point averages have increased concurrently with campus modernization implying a positive relationship between grades and campus enhancement. Principal



Cahall further inferred student discipline problems, due to congested hallways, may have reduced as well. In the old campus building, congested one-story passageways between buildings often resulted in student altercations. Whereas, the modernized campus has converted one-story passageways to three-story passageways, potentially resulting in reduced disciplinary problems.

### **Reflection of Campus Modernization**

The process of modernizing Woodrow Wilson High School has produced several recommendations which could potentially assist schools across the nation to incorporate sustainable design elements.

**Diverse input.** One important recommendation, which cannot be overemphasized, is the charrette. A charrette is an intense period of collaboration by the design team and stakeholders on the physical design features of the school. Prior to selecting a design team for campus modernization, Woodrow Wilson encouraged a competitive environment for the process of selecting a design team. The advantage of this competitive selection ensured interested design teams would offer

innovative ideas for the educational facility. Aside from ensuring competition to solicit innovative ideas, Woodrow Wilson stakeholders sought a design team which would be receptive of diverse input. The design team was instrumental in collaborating with a variety of stakeholders to evolve the charrette over the course of one year. For example, the charrette outlined the music facility to be built at an intersection with residential housing across the street. Several neighbors near Woodrow Wilson expressed concern of excessive noise emanating from the campus. The design team respected the neighbor's concerns and incorporated acoustical sound-proofing for the music facility. Reflecting on the planning process and stakeholder input for Woodrow Wilson High School has proved advantageous during the modernization of Wilson's educational facility.

Modernizing Woodrow Wilson High School went beyond mere collaboration of diverse stakeholders and innovative ideas for design prospects. An important consideration of modernizing the facilities was preserving historic elements of the campus which would bind stakeholders of the past, present, and future. In the planning process,

Woodrow Wilson purposefully sought alumni involvement which culminated into retaining the Power House smokestack. At this time, no alterations have been initiated for this space.

**Post modernization.** Another important element Woodrow Wilson High School highly recommends during modernization is to ensure an on-site contractor representative is available for at least one year. For example, Woodrow Wilson High School incorporated an immense amount of technology into the physical design features, such as the heating, ventilation, and air conditioning (HVAC) system and sprinkler system. In the transition process of Woodrow Wilson maintenance personnel learning the new mechanical systems, the sprinkler system burst at the campus. Maintenance personnel were unable to immediately turn off the sprinkler system, which then flooded the garage. If Woodrow Wilson High School had utilized an on-site contractor representative, the contractor would have been present at the campus to turn off the sprinkler system, identify the problem, and repair the sprinkler system ultimately resulting in less water damage. Another advantage of an on-site contractor would have been timely completion of

punch-list items for the new facilities which would have assisted in bridging a collaborative environment between the design team and the occupants.

A final recommendation for modernization efforts would be to consider the extra costs of advanced technology being incorporated in the building design. Woodrow Wilson High School is a state-of-the-art facility which integrated a myriad of technology and sustainable design features (e.g., storm water management filtration system, mechanical system technology) into the physical development of the school. In consideration of these advanced features, Woodrow Wilson High School required additional maintenance staff as compared to the pre-modernized facility.

Since the reopening of Woodrow Wilson High School, stakeholders have noted the positive outcome of their endorsement for a fully funded, smart modernization plan, committed to sustainable design practices. Stakeholders were impressed with the modernized campus and equally proud that input became a reality. In conclusion, diverse stakeholders from Woodrow Wilson High School are confident in their valued

belief that green sustainable design matters for the future.

Photos are courtesy of Grover Massenburg and Sarah Rigen at Woodrow Wilson High School.

## Resources

Austermuhle, M. (2011, November 1). Huge modernization campaign transforms D.C. school system. *The Washington Diplomat*. Retrieved from <http://www.washdiplomat.com>

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