High-Profile Focus: Civil Engineering and Landscaping

Designing Green and Complete Streets

by Jerry Blumenthal, PE, LEED Green Associate

Over the past few years, the City of Boston has focused on putting all transportation users on equal footing with motor vehicle drivers. This focus on improving the quality of life in Boston by balancing the needs of motorists, pedestrians, and cyclists is known as the Complete Street approach and has become an important element of modern communities. One critical component of a Complete Street is sustainability: using best management practices and environmental sensitivity during design and construction, thus making the street a Green Street as well.

Jerry Blumenthal

Green and complete streets help restore a sense of neighborhood cohesion through context-sensitive design that evaluates the needs of all users and takes into account how the street is used, such as land use and density. The philosophy reverses many of the problems that the traditional approach of widening streets to increase roadway capacity for vehicular traffic. This has created unfriendly pedestrian environments, decreased foot traffic for local businesses, and increased accident rates. With communities now working to win back the streets of their neighborhoods, motorists will have to adjust to the concept of sharing the roadway with pedestrians, bicycles, and transit users.

Redesigned Peabody Square © Christopher Barnes Photography

Meanwhile, sustainable transportation engineers and landscape architects have pointed out the many benefits involved in making a street more green. Implementing stormwater Best Management Practices (BMPs) and using Low Impact Development (LID) approaches (such as porous pavement and/or bioretention areas) can improve water quality and reduce pollutants entering water bodies. A healthy tree canopy and other plantings provide important aesthetic and shade benefits, while improving air quality and reducing the heat island effect.

The City of Boston Public Works Department decided to address these issues at Peabody Square, at the intersection of Dorchester Avenue, Talbot Avenue, and Ashmont Street. Adjacent to the Massachusetts Bay Transportation Authority Ashmont subway and bus station, the multi-legged configuration of Peabody Square had many channelizing islands and numerous signal phases, resulting in an unfriendly and unsafe environment for pedestrians, congestion and long delays for motorists, and a higher-than-average accident rate.

Nitsch Engineering provided transportation and civil engineering services for the redesign of Peabody Square. Working closely with landscape architect Carol R. Johnson Associates and structural engineer Lin Associates, Nitsch Engineering led a complex design and community process to find the best option to improve roadway layout, reduce points of conflict, create a safe environment for vehicles and pedestrians, and revitalize the Square to promote commercial and community activity.

As the project entered the 75% design phase, the Department of Environmental Protection through the Charles River Watershed Association (CRWA) funded a grant to integrate LID techniques into the redesign of Peabody Square as a Green Street Pilot Demonstration Project. The project team worked with CRWA to implement sustainable design techniques to reduce stormwater runoff volume into the closed drainage system and remove pollutants from waterways. These LID techniques included a bioretention basin to collect and treat stormwater runoff via engineered layers of mulch, soil, and plant root systems; porous pavers/pavement to provide infiltration with an overflow protection connection to the storm drain system; and an infiltration trench to recharge and treat stormwater runoff from the adjacent parking lot.

The low impact, best management

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practices that were selected for the project provide numerous stormwater benefits, including runoff volume and rate reduction, groundwater recharge, natural treatment of stormwater runoff, and runoff temperature reduction. These benefits are particularly important because the stormwater runoff that discharges from the site into the City's storm drain system eventually makes its way to the Neponset River, which is on the Massachusetts list of impaired waters and is identified as impaired for organics, pathogens, and turbidity, all common pollutants in stormwater runoff. By treating the stormwater on-site using sustainable design components, the project is doing its part to improve the water quality of the Neponset River. The sustainable components not only provide a cost-effective way for treating stormwater by reducing the infrastructure needed, but also enhance the beauty of public spaces by incorporating stormwater into landscape-based systems and aesthetic patterns of porous pavers.

Peabody Square © Christopher Barnes Photography

The reconstructed Square is now being used as a model by the Boston Public Works Department to promote the benefits of green and complete streets techniques and their successes. City Engineer Para Jayasinghe said "Peabody Square has been recognized by the community as a resounding success and by the City as a prime example of what a Complete Street should be."

Jerry Blumenthal, PE, LEED Green Associate, is a Senior Project Manager at Nitsch Engineering, Boston.