Integrating Low Impact Development Storm-Water Management with Development Planning at Historic West Point

by Jim Frisinger

In 1802 President Thomas Jefferson authorized building the U.S. Military Academy at West Point on the heights where Polish military engineer Thaddeus Kosciuszko had built Army fortifications in 1778 to block British movement on the Hudson River. The U.S. Army Corps of Engineers (USACE) is now supporting the Military Academy's mission to "educate, train and inspire the Corps of Cadets" by tackling modern storm-water runoff issues and improve upon this awesome historic landscape as West Point develops into its third century.

Today the 2,000-acre main campus cantonment area has a daily population of 12,400 and graduates 4,500 cadets a year. The U.S. Army Garrison (USAG) at West Point, the nations longest continuously occupied military installation, is using USACE to integrate 21st century environmental technology into its vision for a growing campus in its 20-year development plan.

Storm-water runoff complications include steep topography and impermeable soils, both being design constraints at West Point. Adding to the complication is the shortage of good mapping of buried utilities and stormwater collection points, and the aging wastewater treatment system" West Point struggles to maintain this aging storm-water infrastructure, which results in erosion and pollution downstream. Storm-water pressure on the historic and aging infrastructure of West Point required a systematic approach with regard to green infrastructure planning, an approach to managing storm water by infiltrating it in the ground where it is generated using varying practices including enhanced natural systems.

Aerial view of West Point

Under Section 438 of the Energy Independence & Security Act (EISA), West Point as with all federal agencies must maintain predevelopment hydrology of a site under development to ensure receiving waters are not negatively impacted by changes in runoff rates, volumes, durations and temperatures.

In the nearly completed 16-month Low Impact Development (LID) Storm Water Management Plan (SWMP), USACE identified cost-effective green technology opportunities to manage storm water runoff. The project team led by USACE Engineer Research and Development Center, Construction Engineering Research Laboratory (ERDC-CERL), drew upon the USACE Fort Worth District's extensive experience. The team had previously participated in the development of the LID Guidance Manual and training for USACE Districts and military installations, funded by the Assistant Secretary of the Army for Installations, Energy and Environment. USACE collaborated with Henningson, Durham and Richardson Architects and Engineers to create a combined team of agronomists, landscape architects, historic landscape architects, and civil and agricultural engineers.

"Integration of LID technology with historic architecture and historic landscapes is a unique challenge most installations don't have to deal with," said Heidi Howard, research agronomist at ERDC-CERL. "So we've had to not only address security issues and Americans with Disabilities Act (ADA), but the historic aspects."

Acronyms and Abbreviations	
ADA	Americans with Disabilities Act
DPW	Directorate of Public Works
EISA	Energy Independence & Security Act
ERDC-CERL	Engineer Research and Development Center, Construction Engineering Research Laboratory
LID	Low Impact Development
SWMP	Storm Water Management Plan
USAG	U.S. Army Garrison
USACE	U.S. Army Corps of Engineers

West Point's campus is a historic district and National Historic Landmark where some of the landscapes were designed by Olmsted Brothers a century ago. These landscapes surround historic staff and cadet housing, and pervade design of such iconic locations as the Plain, the Flirtation Walk, Buffalo Soldier Field and Kosciuszko's Garden. Adding complexity is the 200 years of West Point development: buildings were built upon buildings – and also built upon landfills across the installation. Historic buildings and landscapes, as well as the rocky coastline of the Hudson River, present interesting challenges for the team as they utilize Low Impact Development technologies based on a landscaped approach.

As the project draws toward the finish line, the team has compiled a list of concrete recommendations to USAG at West Point. Together, the recommendations integrate LID concepts into the master planning process. These green planning principles and concepts are now available early in the project design cycle and not a last-minute consideration. The recommendations will significantly reduce runoff pressure on the wastewater treatment system.

Concept design plans were developed ➤

Planning and Designing the Built Environment for Military Resiliency

by Andrea Stolba

American military bases are beset with a multitude of complex planning and urban design inadequacies. Technocratic urban forms, the prioritization of vehicular movements, the absence of community centers, and sprawl create degraded social interactions, increased vehicular traffic, and place a tremendous burden on residents and resources. Encouraging strong, motivated military units is dependent on the relationship of facilities, unit cohesion, and the connection of the Service Member and Families to their neighborhood. The goal of military planning and design should be to craft cohesive identity, promote positive interactions, and enable voluntary Service Members to train, deploy, live, and raise their families with a quality of life commensurate with the extraordinary demands of the American military.

The human experience is greatly affected by the layout which determines circulation, adjacency, distance and speed of travel and aesthetics of a city's urban fabric and public spaces. Cultural connections, civic vitality and natural movements are predetermined by urban design; improving the setting for the experience is critical to creating the desired outcome. A defined vision, articulated through architecture, landscape design, and infrastructure, sets the stage for the user's experience. Bridging the gap between individually allocated projects and the comprehensive urban planning and design of American military bases can foster the vibrant, walkable, and desirable communities that Service Members and Families deserve. Improving the quality of public spaces and community centers to resemble what has been achieved in revitalized cities across the nation enhances the Department of Defense's ability to retain experienced Soldiers, Marines, and Airmen and to provide them with an appropriate quality of life through their environment.

A multitude of studies have been conducted on the sociological importance of communities, public spaces and urban design; however, the application of this well researched topic to American military bases has sparsely been undertaken. Military bases are enclaves that house and employ hundreds of thousands of American Service Members and their Families and are connected to the infrastructure and environment of the region. The revision of the Master Planning doctrine, Army Regulation 420-1, Chapter 10, attempts to establish a platform for the planning, design and retrofit of dozens of military bases in parallel with that of revitalized cities and suburbs across the nation.

The economic adversity that faces today's military construction requirements should further emphasize the importance of comprehensive planning that enables the development or redevelopment of a built environment over time to achieve a collective vision for a place. The establishment of comprehensive design principles should be embraced and prioritized by senior executive leadership as it reinforces the strong values already instilled in the culture, training and organizational components of the military. A shared concern and appreciation for the military community improves the quality of life for Service Members and their Families as well as enhances the Department of Defense's ability to attract and retain a qualified and experienced workforce.

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for sites that were vetted during a USACE-led design charrette with West Point personnel, including cadets, to demonstrate the feasibility and benefits of green infrastructure technologies. One of these plans, ranked highest based on specific criteria, will be brought to full design for short-term construction. As a result of the team's involvement with the faculty and staff, project members were invited as guest lecturers to the cadets' Water Resources Planning and Design class.

The achievements of this LID SWMP may have a national impact. The program is on the radar of Assistant Secretary of the Army for Installations, Energy and Environment Katherine Hammack. USAG's Directorate of Public Works (DPW) is well-integrated into the user community and talks to other installations. This project will serve as a pilot in the development of a process for SWMPs that can be replicated at other federally owned or operated facilities.

"The Fort Worth District has presented ideas that expose the storm water in the landscape while filtering it non-mechanically before it reaches the Hudson River," said Matthew Talaber, director, USAG DPW. "West Point is excited about the possibilities being considered."

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