Finding Space: A Field Guide for Incorporating LID into Military Historic Districts

Low Impact Development (LID) has two main components: non-structural practices and structural BMPs. Non-structural practices are large-scale planning and design strategies to minimize the impacts of development. Structural BMPs are smaller-scale designed and constructed interventions that directly manage stormwater volume, velocity, and quality. Both practices maintain or reintroduce hydrologic system functionings to a site (U.S. Army Corps of Engineers 2013, 1-3).

In historic districts, structural LID BMPs are the most effective and easiest to integrate. Structural BMPs work by collecting and slowing runoff from impervious surfaces. Runoff, also described as sheetflow, can carry nonpoint source pollution, excessive sediment, and debris that LID BMPs are designed to address (U.S. Army Corps of Engineers 2013, 2.26).

The specific aim of LID is to allow for "full development of the property while maintaining the essential site hydrologic functions" (EPA 1999). LID addresses sustainable stormwater management with the goals of:

- Reduced and delayed stormwater runoff volumes
- Enhanced groundwater recharge
- Stormwater pollutant reductions
- Reduced sewer overflow events
- Increased carbon sequestration
- Urban heat island mitigation
- Improved air quality
- Added wildlife habitat and recreational space
- Improved human health
- Increased land values

Locating and sizing structural LID elements is determined by climatic conditions, land use, calculated runoff volume, soils, and the complexities of the overall existing stormwater management system. Selecting the appropriate LID BMP to accommodate all factors is essential for the successful functioning of the system. In developed areas, like historic districts, structural BMPs are associated with, connected to, and located near impervious surfaces such as streets and alleyways, parking lots, driveways, and roofs (U.S. Army Corps of Engineers 2013, 2-26).





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Project 14-752 Department of Defense Legacy Resource Management Program

Potential Locations of LID BMPs

Bioretention collects and holds stormwater runoff i flat-bottomed, shallow depressions or basins. The main components of **bioretention** systems are underground so they can be designed to blend with the characteristics of a historic district through appropriate site selection, vegetation patterns, species selection, and hardscape materials.

Historic military building types such as administrative buildings, barracks, and utilitarian structures have roof areas that are too large to have rainwater harvested into rain barrels. For these buildings, a cistern system to collect and store rainwater would be most effective. Cisterns are buried and have minimal impacts to historic characteristics, but do come with increased planning and construction costs. The stored water can be used for non-potable applications such as irrigation and in greywater systems.

> Vegetated swales are historically compatible ID systems because of their use of turf grass minimal vegetation. With proper planning, grassed swales can be integrated throughout a historic district with minima disruption to the historic context.

Infiltration practices are constructed landforms that collect and temporarily store stormwater runoff. Infiltration basins and berms are generally grassed with some additionally vegetation to provide stabilization. Infiltration trenches are small drainage areas filled with stones; appropriately placed, these trenches are small enough to not significantly compromise historic integrity.

> The DoD has been tasked by the Energy Independence and Security Act of 2007 and EO 13514-Federal Leadership in Environmental, Energy, and Economic Performance to conserve and protect water resources through increased efficiency, reuse, and management. As a result, sustainable stormwater management strategies are being incorporated throughout the military's built environment to manage stormwater in ways that work with natural hydrologic systems. Collectively, those strategies are called Low Impact Development (LID).

In most historic districts, extensive green roofs could be integrated into new building designs, but have limited applicability in historic building retrofits due to roof slope, historic roofing materials, and the structural capacity of a building. In this example, areen roofs could have been constructed on the flat-roofed additions to these former barracks.

Permeable pavements have wide applicability throughout historic districts because they can replace existing, or be substituted for, impermeable surfaces. In historic districts, permeable pavements are well-suited for alleyways, parking stalls, driveways, sidewalks, and some recreational surfaces in all historic land use areas.