

ABSTRACT

This study introduces a preliminary approach to integrating design framework with Low Impact Development (LID) technologies which promote education and awareness, and evaluates the impact of LID. The proposed framework, called a "BLUEprint" for Stormwater Infrastructure Design, serves as a three-tiered design performance measurement structure. To verify the proposed framework, three water conservation-based design projects in Texas were selected. The framework was applied to determine types of appropriate LID facilities in each project and to simulate their hypothetical performance with quantitative measurements utilizing same variables to compare efficacy of LID applications in each site.

First, to develop the framework, after reviewing existing LID facilities applied in previous projects, 17 LID facilities including the green roof, bio-swale, and bio-detention pond were selected and categorized into three typologies based on hydrological functionality: capture, convey, and clean. Runoff amounts and collectable rainwater were measured according to these typologies. Second, to promote public's awareness, each LID facility was suggested to be integrated with an innovative hierarchical way-finding system which illustrates the ratio of infiltrated water to total rainfall. Expanded social space and number of signage were correspondingly assessed to measure social benefits of LID. Finally, the vegetation palette effectiveness was evaluated based on drought tolerance and water treatment capacity relative to site conditions. In a comparison among the three projects, the hypothetical results showed that the LID facilities examined reduced runoff volume by up to 45% and could annually save about \$10,000 by planting xeriscape vegetation with less water demand and reusing harvested rainwater for irrigation.

This result emphasizes the significance of the integrated LID design framework and efficacy- evaluating model. The proposed framework would be an effective tool in the decision making process for holistic LID design and planning with more objective design strategies using quantitative measurements.