

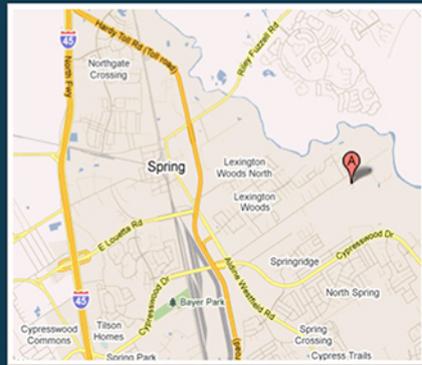
Birnamwood Drive LID Roadway Project

Harris County, TX (Harris County Public Infrastructure Department)

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Introduction

Harris County has recently completed construction on a roadway project that is the first roadway in Texas to utilize Low Impact Development (LID) techniques. Birnamwood Drive is located in northern Harris County, east of Spring. The new section is approximately .68 miles in length and extends north to Spring Creek Drive, leading to John Pundt Park along the Spring Creek Greenway Project. Harris County Public Infrastructure Department – Architecture & Engineering Division managed the project design on behalf of Harris County Precinct 4 – Commissioner Jack Cagle's office. The Birnamwood roadway project will serve as a model for future green roadway projects.



Engineer: Klotz Associates

Landscape Architect: Knudson

Road Construction: Sept. 2011-May 2012

Landscaping: May-June 2012

Water Quality Monitoring began May 2014.

LID applications that were designed within the median include native landscaping, high infiltration engineered soils, and modular rain tanks. The plantings were chosen based on their ability to maximize the filtration of larger debris particles, to adapt to the conditions for this area, and to minimize maintenance. Engineered soils, which provided infiltration rates around 100 inches per hour, were placed before each outfall to filter runoff in low rainfall events. After being filtered by the soils, runoff is collected in modular rain tanks before entering the system at each outfall. In high rainfall events, runoff not filtered in the soils is designed to bypass through a pipe directly to the outfall. The Birnamwood green roadway design features a 32-foot depressed median in the middle of the four-lane concrete boulevard that will accommodate stormwater runoff during rainfalls. A median bioswale, the natural component, runs between the two sets of roadway lanes, providing on-site detention during major rain events, thereby eliminating the need to build off-site detention facilities. The bioswale's hardy native grasses filter rainfall, which soaks into the soil and recharges the groundwater. The engineered component is a layered system that filters pollutants such as auto fluids that storm water runoff picks up from roads, scrubbing the water of impurities before rain tanks release the water into the bayous. The overall effect is cleaner downstream water quality and a community amenity in the planted bioswale.

LID Design Elements

The Harris County Public Infrastructure Department enlisted Klotz Associates to design the mile-long, four-lane Birnamwood Drive Extension as the county's first roadway to implement low-impact development (LID) principles for storm water management. The Birnamwood project radically upends the standard for incorporating stormwater management into public roadway construction. The roadway's drainage system combines natural and engineered components to eliminate the typical underground storm sewer and off-site storm water detention. The natural median bioswale provides on-site detention. Native grasses filter rainfall, which recharges groundwater. An engineered, layered system collects, scrubs and slowly releases storm water. The project also incorporated experimentation with native grasses to guide eco-friendly, lower-maintenance future planting on 6,100 miles of county roadways.



Native Vegetation

Native plantings, such as Gulf Coast muhly grass, inland sea oats, bald cypress, Savannah holly, and Texas redbuds, will slow down the flow of stormwater, giving it time to drain through engineered soils designed to filter out large particles of debris. What is ultimately discharged into the creeks and downstream is clearer, cleaner water. The bioswale design not only protects water quality and reduces the potential of flooding, but also creates an aesthetically pleasing roadway and helps to preserve and protect native plants and wildlife.



Water Quality Monitoring

Monitoring of the project is intended to evaluate the pollutant removal capability and the hydraulic performance of the bioretention system by measuring pollutant concentrations entering and exiting the swale and by measuring the flow entering and exiting the system.



Water released downstream into bayous is cleaner

- 1 Rainwater falls on the roadway and drains into the bioswale
- 2 Water is cleaned naturally by vegetation as it flows down the bioswale
- 3 Clean water drains into an outfall and into downstream bayous

