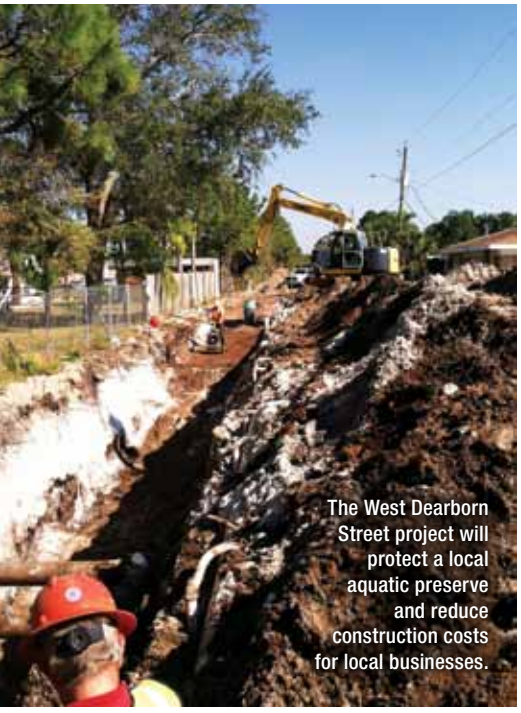
By Tori Durliat

GREEN & CLEAN

LID aids Florida storm water project

Using low impact development (LID) concepts in combination with proprietary systems in its plan to control storm water runoff in Sarasota, Fla., design engineering firm DMK Associates Inc. (Venice, Fla.) was able to create a system that would protect a local aquatic preserve and reduce construction costs for local businesses. According to the Stormwater Equipment Manufacturers Assn. (SWEMA), this type of design provides the means to reduce runoff volume, treat storm water pollution and beautify the neighborhood.

For several years, the Sarasota Board of County Commissioners had been planning storm water improvements for the West Dearborn Street neighborhood of Englewood. The neighborhood has struggled economically, which some attribute to the lack of centralized storm water infrastructure serving the area. Sarasota County's storm water management regulations would require any newly developed or redeveloped lots on Dearborn Street to include expensive storm water management systems on the site, designed and installed at the developer's cost.



The West Dearborn Street project will protect a local aquatic preserve and reduce construction costs for local businesses.

"When this project is completed, property owners in this area can develop their property without having any type of storm water requirements," said Mary Ann Lind, senior project manager/associate at DMK.

Goals & Strategies

The first goal of the storm water infrastructure upgrade—which was started in September 2012—was to improve and protect the water quality of the local Lemon Bay Aquatic Preserve by eliminating the discharge of runoff from the entire Dearborn Street district to the maximum extent possible. The second was to build a sustainable storm water management infrastructure that would eliminate the need for local businesses and prospective commercial developers to bear the expense of implementing their own storm water systems. Doing so could have a favorable impact on the local economy, lowering the cost of new commercial construction and spurring the redevelopment of the area.

The original design proposal relied on a large underground vault system to capture and detain storm water runoff from the neighborhood. The concept of integrated LID was recommended to the Board of County Commissioners as an alternative that would meet the storm water management requirements as well as provide additional benefits. The LID scheme would reduce the total volume of runoff, as opposed to simply detaining it. This approach also would create new green space that beautified the neighborhood in addition to detaining and treating storm water runoff. The plan called for converting certain residential side streets to one-way traffic to make room for new bioswales, sidewalks and parking areas, improving traffic flow and increasing pedestrian safety. The board brought in DMK Associates, Florida Waterscapes LLC (Englewood, Fla.) and Axis Engineering PLC (Venice, Fla.) to further develop the West Dearborn Street LID Pilot Project.

The design team's strategy was to "surround and capture" the storm water runoff with LID practices wherever possible. The team recognized the importance of using a treatment train approach for an optimal level of pollutant reduction when runoff could not be eliminated and had to be discharged into the aquatic preserve. The team also prioritized preservation of assets, reuse of materials and minimizing impervious areas in the design.

BMPs & LID

Although a wide variety of storm water BMPs was used in the scheme, roadside biofiltration swales were most extensively used. The swales are the first BMP in the large treatment train network that spanned the site from State Road 776 (Indiana Avenue) on the east to the 700 block of West Perry Street on the west.

Road and roof runoff is conveyed to the roadside bioswales, where engineered soil media provide a high level of treatment. Runoff is infiltrated back into the ground until the infiltration rate is exceeded. Because seasonal high groundwater will limit infiltration, the bioswales incorporate underdrains that discharge effluent to a reuse/discharge pipe. During more intense storm events, or during periods of seasonal high groundwater that limit infiltration capacity, excess runoff flows into the reuse/discharge section, which was constructed using 13,000 ft of 12- to 36-in.-diameter HP pipe manufactured by Advanced Drainage Systems Inc. (ADS). Pipe connections into this system were made using 74 ADS InsertaTee fittings ranging from 6 to 18 in.

in diameter. Water from this system is available to property owners for irrigation. When the flow in the reuse/discharge unit exceeds its storage capacity, the excess flow is conveyed to an 8-ft Hydro Intl. Downstream Defender advanced vortex separator installed on West Perry Street for final treatment prior to being discharged into Lemon Bay, an 8,000-acre aquatic preserve.

A 6-ft-diameter vortex separator was installed nearby as the last BMP in the treatment train managing runoff from Englewood Road, a more heavily traveled street, which carries a higher concentration of pollutants. The design scheme called for vortex separators to be the final BMP in the treatment train before runoff is discharged to the aquatic preserve. The use of the units provided redundancy in the LID treatment scheme, which was essential due to the frequent incidence of intense storms and the potential for seasonal high groundwater to limit the infiltration capacity of the upstream bioswales.

"When the hydrodynamic separator is the last line of defense before an aquatic preserve, the last thing you want is a device that is prone to washout," said Laurie L. Honnigford, managing director of SWEMA. "This LID design provides redundancy and lends confidence that the Lemon Bay Aquatic Preserve will be well protected. There are a number of BMPs at work [here], ranging from non-structural design BMPs to manufactured treatment BMPs. This type of integrated scheme has been proven to help meet the NPDES Phase II Storm Water Rule."

Along with the two separators, the system used 109 ADS Flexstorm inlet filters to trap debris. Additionally, 135 ADS Nyloplast basins—which combine ductile iron grates with a heavy-duty PVC structure—18 to 30 in. in diameter were used to filter silt, solids and other pollutants from road surfaces.

A New Standard

"The commercial district of Englewood now has an LID storm water management scheme that incorporates environmentally sound components such as bioswales, green roofs, storm water reuse pipes and manufactured BMPs to reduce runoff volume as much as possible and treat the remaining runoff that cannot be eliminated," Honnigford said. "Because these LID techniques economically maximize the effectiveness of reducing and treating storm water runoff in a small area, we believe this pilot project will soon become another industry standard."

Once the LID design is fully implemented, the city will select a third party to conduct water tests before and after heavy rains to determine the impact on water quality in the bay. In order to ensure the units perform at maximum efficiency, Sarasota County will be maintaining the units on a monthly basis. SWS

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