

Stormwater Pioneers

The Stormwater Pioneers program, started by the Philadelphia Water Department in 2014, recognizes the very best in stormwater management on private property. It showcases innovation, excellence, the ability to overcome technical challenges and a true dedication by the property owners, developers, engineers and designers to reduce runoff.

The Challenge

Stanley's True Value Hardware opened in 1948 in Roxborough, and has operated as a family-run business for 66 years. After years of growing a business in tight quarters, brothers Mark and Joseph Jaconski decided to expand Stanley's Hardware with a new building on their current property. The size of the redevelopment project required it to meet Philadelphia's stormwater regulations. With help from the True-Value hardware co-op, the Jaconskis engaged Ruggiero Plante Land Design to develop a cost effective stormwater management solution. Among the challenges: keeping the current store open while building a significantly larger one, designing underground systems around high points of bedrock, and managing stormwater in tight quarters surrounded by residential properties.

The Solution

A value engineering process considered four different strategies to determine the best. Permeable pavement was determined infeasible due to heavy traffic on the property. Stormwater solutions included a rain garden with an impervious liner near the neighboring home and two underground infiltration beds.

Working around both the bedrock and the existing store required a tightly-orchestrated, seven-phase construction project. Ultimately, the Jaconskis built a 9,800 square foot, state-of-the-art store plus a new storage building, and moved their parking lot. The additional 7,000 square feet of space has allowed them to add two new lines of business: rentals and a garden center. Business is booming, employment has doubled and the brothers have met their 10-year business goals in year two. The rain garden brings beauty to the property on Ridge Avenue, and customers have taken note. The Jaconskis also believe they have inspired others in Roxborough to add vegetation to their properties. Given the complexity of accomplishing the project on time and on budget, Stanley's True Value Hardware was a model of intelligent and eco-conscious design—and one with lasting impact for the owners, the community and the City of Philadelphia.



Technical Summary

Stanley's True Value Hardware is located in a separate storm sewer area near the border of the Schuylkill River Watershed and Wissahickon Watershed. Prior to redevelopment, the site included the hardware store, two vacant buildings, asphalt parking, gravel and lawn, with approximately 26,000 square feet of impervious area. Stanley's redevelopment plan included a new store, a storage shed and associated parking. Due to a planned increase of more than 8,800 square feet of directly connected impervious area (DCIA), the redevelopment project was subject to the Water Quality and Flood Control requirements of the Philadelphia Water Department Stormwater Management Regulations.

The geotechnical investigation revealed underlying soils with favorable infiltration rates although bedrock was encountered in several locations. The design solution included a bioinfiltration basin and two subsurface infiltration basins with care taken to avoid the underground areas with bedrock.

Highlights

- Performed 11 infiltration tests allowing strategic placement of infiltration basins
- Planned and completed a 7-phase construction process
- Conservatively designed basins with 20% to 25% more volume than required
- Verified compliance with Record Drawings confirming the as-built site condition

Meeting the Regulations

Water Quality Requirement

Because this site was able to take advantage of infiltration, Stanley's met the Water Quality requirement primarily through subsurface infiltration basins, leaving room for surface level parking. The remaining Water Quality management was provided at the surface by the bioinfiltration basin. Because the bioinfiltration basin is easier to access and maintain than the subsurface SMPs, it is less susceptible to sediment load and is therefore able to receive a higher DCIA loading ratio than the subsurface system. This reduces the bioinfiltration basin footprint needed to manage its respective drainage area.

Flood Control Compliance

Flood Control compliance was accomplished through the use of a well-planned grading and drainage design that captures and routes runoff to the SMPs. The design avoids areas of bypass so that all runoff from large storm events can be controlled and attenuated to the Flood Control standards. Additionally, a significant portion of runoff is infiltrated by the SMPs which reduces runoff volume and further controls peak discharge rates.

Demolition, Erosion & Sediment Control Plans

To prevent compaction of the native soils in areas where infiltration was proposed, the project was built in seven phases, allowing Underground Infiltration Basin 1 and 2 to be installed and covered with asphalt without placing the rock construction entrance within their footprints. Construction entrance placement is critical to avoid compaction of the subsurface infiltration systems. The phasing also allowed Stanley's Hardware to operate until the new store was ready for business.

Watershed	Schuylkill River
Sewer System Type	Separate Sanitary/ Stormwater
Applicable Requirements	Water Quality, Flood Control
Limit of Disturbance	44,438 sf
Existing Impervious Area	26,341sf
Proposed Impervious Area	35,603 sf
Volume Managed On-Site	3,138 cf
Compliance Approach	Subsurface Infiltration, Bioinfiltration

Directly Connected Impervious Area (DCIA):

An impervious surface proposed as a part of a development project that is directly connected to a drainage system

Water Quality:

Management of the first inch of runoff from all proposed DCIA

Water Quality Volume (WQV) :

The volume of 1-inch of runoff over all proposed DCIA

Flood Control:

Rate control of large storm events

SMP:

Stormwater management practice

Static Storage:

Volume of water stored below the lowest overflow elevation in a SMP

Design Features

Underground Infiltration Basin 1

Approximately 6,500 square feet of DCIA from the storage building and easternmost parking area is routed to Basin 1, which was conservatively designed to statically store approximately 680 cubic feet of runoff - about 25% more than the required Water Quality Volume. Incorporating this extra storage volume provided a level of conservatism making the basin resilient to variations during construction.



Underground Infiltration Basin 2

This basin receives approximately 21,500 square feet of rooftop and surface DCIA, and was designed to statically store approximately 2,150 cubic feet of runoff. Similar to Basin 1, Basin 2 was designed conservatively to store approximately 20% more than the required Water Quality Volume. In order to avoid bedrock, Basin 2 is split into two storage beds connected via three solid HDPE pipes. During storms, runoff is controlled by an elevated overflow weir and distributed throughout the two storage areas via perforated and non-perforated HDPE pipe.



Rain Garden - Bioinfiltration

The remaining surface-level DCIA is routed to a bioinfiltration basin set lengthwise adjacent to the parking lot. Flow from the parking area drains directly into the surface of the basin via curb cuts. Because the basin is located adjacent to a neighboring property, an impermeable clay barrier was installed along the southern edge of the system to prevent lateral flow from impacting the neighboring parcel.



CASE STUDY: Stanley's Hardware



Installation According to Design

PWD inspected the site during and after construction to ensure that the stormwater management features were installed in accordance with the approved design. After construction was completed, Record Drawings were submitted to PWD to confirm that the site was constructed in compliance with the Stormwater Regulations. Upon review, the Record Drawings showed that the outlet pipe controlling the flow within Basin 1 was set too low, which resulted in insufficient static storage. To bring the basin back into compliance, a small weir plate was installed in front of the outlet pipe, raising the controlling elevation by approximately six inches.

Controlling invert elevations in Basin 2 were also slightly different from the approved design. However, because the original design called for approximately 20% more than the required Water Quality Volume to be stored in Basin 2, the changes did not impact the site's compliance. In this case, building more capacity into the design of the systems and responding quickly to changes during construction led to a highly successful project.

Recognition

More than 50 customers, neighbors, Philadelphia Water Department employees, City Council representatives and Roxborough community members attended an award ceremony for Stanley's Hardware in November 2014. A permanent Stormwater Pioneer plaque was unveiled at the store on Ridge Avenue and the owners, Mark and Joe Jaconski, received a City Council Citation. PWD also recognized the design team from Ruggiero Plante Land Design.

Be a Pioneer

PWD is selecting two projects each year to be Stormwater Pioneers. Projects can be Stormwater Management Incentive Program (SMIP) grant winners, stormwater billing credit recipients or development projects that meet PWD Stormwater Regulations. For more information, visit: www.phillywatersheds.org/stormwaterpioneers.

Conceptual Plan Submitted	July 22, 2011
Conceptual Approval Issued	August 4, 2011
Technical Plan Submitted	November 9, 2011
Technical issues addressed	February 21, 2012
O & M Agreement Executed	March 7, 2012
Technical Approval Issued	March 13, 2012
Construction Completed	April, 2013
Record Drawings Submitted	July 25, 2013
Project Verified	October 28, 2013