Sidewalk in Etna showing decorative stormwater collection grates

BOROUGH OF ETNA:
Designing green stormwater infrastructure

The Borough of Etna is the most downstream community in a 67.3-square-mile Pine Creek watershed in Allegheny County near Pittsburgh, PA. The Borough is highly urbanized and densely populated. Etna's Butler Street Central Business District contributes stormwater to adjacent sections of Pine Creek via the Borough's combined sewer system, dedicated stormwater facilities, and direct runoff. This also led to flooding and the discharge of sewage into Pine Creek.

The Borough tasked BH with refining and implementing its green streetscape vision to reconstruct Butler Street in the Borough's business district. The objective was to renew and revitalize its business district while simultaneously reducing the impact of impervious surface and managing stormwater through the retrofitting of Green Stormwater Infrastructure (GSI). The Borough had laid the groundwork for the project under the Act 167 Pine Creek Watershed Implementation Plan. Ultimately, with the assistance of BH, the Borough was able to secure support for the initial project phase through the Pennsylvania Department of Environmental Protection (PADEP) Growing Greener and the US Environmental Protection Agency (US EPA) Section 319 grants, with a match by the Borough of Etna.

Installation of trench drain, tree grates, and downspout disconnect

BH was authorized to provide design services for Phase I of the project: the reconstruction of the east side of Butler Street between Bridge and Freeport Streets as well as the reconstruction of the north side of Freeport Street between Butler Street and Union Alley.

As part of the streetscape project, a new aggregate sidewalk was installed with attractive, curving, metal grates with a natural leaf pattern to direct sidewalk runoff to modular plastic stormwater storage boxes under the sidewalk. Here, the stormwater is temporarily stored and gradually infiltrated into the underlying soil. The sidewalk runoff combines with the runoff now channeled from disconnected downspouts of the buildings. Stormwater from Butler Street is also conveyed to the storage and infiltration system under the sidewalk via one curb inlet fitted with an innovative pretreatment filter to remove trash and sediment from the street runoff. Storage is provided for the 1.25-inch design storm for the impervious area.

This phase involved installing 12 street trees, 2,300 CF of underground storage to promote infiltration, 3,900 SF of pervious pavers, downspout disconnection, and restatement to new conveyances and related work.

To the rear of the same block, four private parking areas were retrofitted with permeable paving systems with subsurface storage. Surface runoff from the parking areas along the roof runoff from the adjacent buildings is now piped to this stormwater system for infiltration.

The Borough has just finalized the funding arrangements for constructing Phase 2 of the green streetscape project, also designed by BH through PADEP and US EPA funding. Phase 2 will involve the reconstruction of the south side of Butler Street between Winschel and Freeport Streets as well as the reconstruction of the south side of Freeport Street between Butler Street and Cherry Alley. This phase will continue the basic visual design elements of the Phase 1: a new exposed aggregate sidewalk with attractive, curving, metal grates with a natural leaf pattern along with urban tree plantings under matching decorative gratings. This phase will involve installing planting areas with nine trees, 2,400 CF of underground storage in two locations to promote infiltration, 1,800 SF of pervious pavers, a unique "rain park" to repurpose an existing vacant lot , an innovative "green" inlet, downspout disconnection, and restatement to new conveyances and related work. Phase 2 will also include planting areas adjacent to the municipal parking lot on Winschel Street.

Both phases also include other improvements and traffic calming/safety features, including realigned curbing to create bump-outs, new concrete sidewalks, new curb ramps, and inlets to accommodate drainage.

The full implementation of the green streetscape project will create storage sufficient to retain the runoff generated from between two- and five-year, one-hour storms from the contributing business district roofs and pavements. This translates into an estimated 4.8 million gallons in annual runoff reduction.

The Borough government strongly supports the project. However, because this streetscape is home to the Borough's commercial district, the final design takes into consideration the needs of the business community. The Borough has successfully addressed concerns during the project though meetings, outreach, and maintenance of high levels of personal communication with the affected businesses and property owners. Another indicator of the success of the Borough's outreach efforts has been the Borough's ability to execute agreements with property owners under Phase 1 for the installation of Best Management Practices in four private parking areas.

The successful completion of the Green Streetscape Phase 1 was only achieved through the partnership of the Borough and BH working cooperatively with the PADEP and US EPA. The Borough has been engaged in all phases of the project and continues to be strongly committed to realizing its streetscape vision.

Q&A WITH ETNA'S BOROUGH MANAGER, MARY ELLEN RAMAGE

What primary benefits has the Borough received as a result of the Phase I green streetscape project?

The primary benefits are two fold - some relief on the combined sewer system/localized taxing of those systems and the aesthetics of the business district.

What do you see as the driving force to tackle these green infrastructure changes?

The driving force is addressing stormwater management within our community and our combined sewer overflows. If we don't do our part to address stormwater issues, everything else we do moving forward cannot be fully realized. This has to be a big part of our comprehensive approach to moving our community forward in long- and short-term goals.

Have you been satisfied with the results? What has been the overall feedback/reaction from the community and business owners?

We have been very satisfied with the results, as have our business owners. This investment in our business district shows our commitment to stormwater management and economic development. We have been asked numerous times to provide tours of the project to many outside organizations, including community development organizations and environmental groups.

What advice do you have for municipalities interested in making these changes in their communities?

The best advice I can give is to engage with partners in your watersheds, as stormwater is a regional problem and can only be addressed on a regional level. Keeping the public involved, primarily the affected business owners, was critical to the project's success. Our business owners were fantastic, and we utilized their input every step of the way.

What else is the Borough doing to incorporate green infrastructure throughout the community?

We adopted a Green Master Plan identifying numerous green infrastructure projects in areas where they can have a substantial effect on removing stormwater from our combined sewer system, including other phases of green streetscapes, larger infiltration beds, and rain barrel and rain park installations.

ETNA STREETSCAPE

STREET TREES
Studies show street trees reduce traffic speeds, create safer walking environments, improve business income streams, absorb 30% of precipitation from normal storm events, provide heat protection, add value to real estate, and screen overhead utilities.

PERVIOUS PAVERS
Parking pads on the Union Alley side of the block use permeable pavers with subsurface gravel storage/infiltration beds.

GREEN INLETS
Treatment inserts in catch basins remove pollutants associated with sediment-laden road runoff.

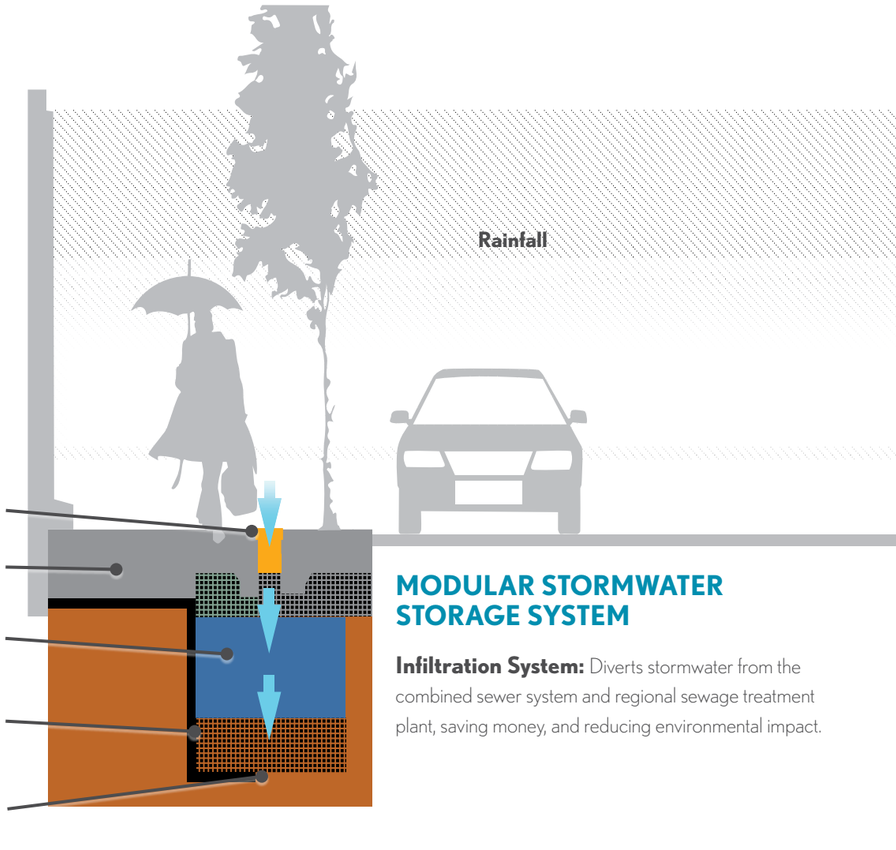
ROOF DRAIN COLLECTION
The Butler Street, Freeport Street, and Union Alley facilities collect roof runoff via channels and pipes and direct it to below-ground facilities.

IMPERVIOUS PAVEMENT
Runoff from the sidewalk within 5 feet of the existing building structures flows to the trench drain, protecting the buildings from water damage.

CURVILINEAR TRENCH DRAIN
Emulates water flow in a natural pattern, a nod to Etna's ties to the nearby Allegheny River and to its ironworks history. It also allowed the system to be built around the myriad of existing utility valves in the sidewalk.

BUMP-OUTS
Bump-outs improve pedestrian safety by reducing the distance and time that pedestrians are exposed to vehicular traffic. Bump-outs also calm traffic as drivers perceive a need to slow down to negotiate the narrow lanes.

TREE GRATE
ADA-compliant tree grates maximize pedestrian space in the commercial district and allow oxygen and water to reach the tree roots.



MODULAR STORMWATER STORAGE SYSTEM

Infiltration System: Diverts stormwater from the combined sewer system and regional sewage treatment plant, saving money, and reducing environmental impact.