

City of Mercedes Low Impact Development Permeable Pavement Facility

TCEQ Supplemental Environmental Project Program

TCEQ Contract 2017-0398-WQ-E

Final Report

Project Team

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Executive Summary

In this project, the University of Texas Rio Grande Valley (UTRGV) and Research, Applied Technology, Education and Service – Rio Grande Valley, Inc. (RATES-RGV) collaborated with the City of Mercedes and Lower Rio Grande Valley (LRGV) TPDES Stormwater Task Force and local stakeholders to design and construct a permeable pavement system at the West Fifth Street and South Illinois Avenue in the City of Mercedes. The objective of the permeable pavement system implementation was to manage and improve non-point source (NPS) flows, help mitigate flooding and drainage issues, and address water quality concerns; this volume of runoff reduction would also remove pollutants from stormwater runoff and enhance the quality of water in and around the selected site.

The permeable system was designed and constructed in September 2019 at the intersection between Fifth Street and Illinois Avenue in Mercedes, Texas (Figure 1) to collect the stormwater runoff from surroundings to provide some treatment before discharge to the stormwater sewer system. Each section is planned to be tested to measure the effectiveness of the permeable pavement system in reducing the runoff volume and pollutants associated with the runoff for research purposes. UTRGV and RATES-RGV civil engineering students helped in designing and observed the construction progress to demonstrate LID technology and practice applications.

Task 1: Planning

UTRGV assisted the City of Mercedes is planning several meetings to engage students and provide project information and technical guidance. The planning and design activities for this project were conducted through the participation of:

- City of Mercedes: Project leader
- UTRGV: subcontractor, civil design team and technical advisors.
- LRGV SWTF and RATES-RGV: technical advisors.
- Millennium Engineers Group, INC.: Geotechnical consultants

UTRGV and the City of Mercedes coordinated a geotechnical study to test the infiltration capacity of natural soils at the site. For the study, it was found that the project location soil characteristics are sandy lean clay.

Using the soil characterization and the survey conducted by the City of Mercedes, UTRGV

developed the engineering design of the permeable pavement system. Table 1 is a listing of the planning and design meetings conducted for the project.

Table 1. Summary of planning and design meetings for the SEP Mercedes Project

Date	Participants	Topics discussed
October 17, 2018	UTRGV City of Mercedes	Site visit to decide the exact location of the permeable pavement location
December 18, 2018	UTRGV City of Mercedes	Discuss the city drainage policy and design guidelines
February 6, 2019	Millennium Engineers Group	The geo-tech study results
February 14, 2019	UTRGV City of Mercedes	Discuss the geotech study results and initial project design.

Task 2: Design

UTRGV and RATES-RGV designed the permeable pavement system for the City of Mercedes. Before construction, field site visits were conducted by the project stakeholders to discuss and decide the optimum location for the permeable pavement system. Each pavement section has a top layer of permeable pavement with joints filled with gravels to allow surface runoff infiltration. Underneath the top layer there is a bedding layer and high porous aggregates that serve as a drainage layer to store and hold the stormwater runoff for a period of time before infiltration to the native soil or collected in the perforated underdrain to discharge it to the detention system. A cross-section of the permeable sidewalk is shown in Figure 2.



Figure 1. Plan view of three treatment cells and cross-section view of each cell showing the type of media used in the project.

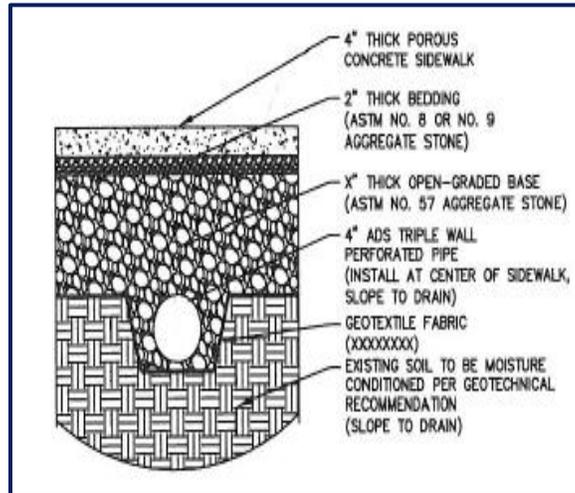


Figure 2. Cross Section of the permeable pavement design

Task 3: Construction

In December 2019, the construction started based on a design developed by UTRGV and approved by the City. Figure 3 shows the permeable pavement system location before construction. The construction was completed by the end of December 2019, Figures 4 and 5 show the different phases during and after the construction.



Figure 3. Permeable pavement location and site before the construction starts.



Figure 4. Construction starts at the site.



Figure 5. The two sides of the Permeable pavement after the construction.



Figure 6. The permeable pavement joints filled with gravel to increase the runoff infiltration.