Village of Oak Park
Illinois Green Infrastructure Grant
Financial Assistance Agreement IGIG 1305

Oak Park Green Alleys Program

Final Report

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Summary

The Village of Oak Park, given its urban environment, has impervious areas that require surface runoff to be collected by the municipality's sewer network rather than infiltrating into the local groundwater table. Effects associated with this condition include sediment that enters the sewer network and flows directly to the water treatment system.

In order to reduce the amount of sediment collected by the sewer network, several alleys were identified within Oak Park to be constructed of permeable pavers. Permeable pavers were selected for these alleys because they have soils suitable for infiltration of surface runoff. The Village of Oak Park has had positive experiences with previous projects involving permeable paver installation. The permeable paver system will help to filter out sediments prior to the surface runoff recharging into the groundwater system.

Installation of the permeable pavers was successfully accomplished in the fall of 2014 as part of the subject IGIG project. The continued success of the project will also depend on proper upkeep of the pavers. The Village of Oak Park already has a program in place for maintenance of green alleys and shall extend that effort to the new alleys constructed.

Introduction

The Village of Oak Park plans and executes a number of capital improvement projects each year. In 2014 the Village identified various alleys that were in need of maintenance. Through this process they developed a list of alleys that were good candidates for the proposed Green Alleys Program (See Figure 1).

The Village of Oak Park continually promotes and practices effective approaches to sustainable living. With success on a past green alley initiative it was determined that this approach is an effective way to improve sustainability and encourage the implementation of green construction practices.

Alley locations were selected based on the soil types found in these alleys. The alleys all are located over the ancient Lake Michigan shoreline which contains a layer of sand near the surface allowing the diversion of storm water in to the groundwater.

The pavement structure for the permeable paver design includes clay permeable interlocking pavers, a 4 inch CA-7 base course underlain by an 18 inch thick sub-base of CA-1 with a 6" perforated pipe trench below the sub-base that then ties into the underlying sand layer (See Appendix B).

Figure 1 - Oak Park Alley Improvement Locations

Discussion

Advantages to the use of permeable pavers are the filtration of pollutants and diversion of storm water runoff into the municipality's storm sewer system. These benefits were determined by the Village of Oak Park through various analysis on the effectiveness of permeable pavers. Using a WinSLAMM model they determined that this construction would result in a 25% reduction in phosphorus and nitrogen, a 66% reduction in sediment, and a 39% reduction in storm water runoff on an annual basis.

Disadvantages of the permeable paver alleys is the special attention to maintenance that will be required to maintain the functionality of the system.

Special maintenance will include repairs required due to settlement or structural failure and any work to replenish the aggregate. The alleys will need to be cleaned with a broom street sweeper – without water - a minimum of two (2) times per year (May, August). The green alleys will be swept after the winter snow season and following fall leaf season (usually March, November).

Green alleys or alley segments considered clogged shall be scheduled for restorative cleaning. Areas of ponding or clogging shall have the openings between pavers cleaned with a vacuum. Joints will be refilled with new clean aggregate matching the existing aggregate gradation. Aggregate between pavers shall be replenished when there is more than a ½-inch between the bottom of the paver chamfer and the top of the aggregate.

For snow removal, no sand shall be used and no snow shall be stockpiled on the permeable pavers.

Fortunately the village already has experience constructing and maintaining permeable pavers. The Department of Public Works in Oak Park has put together a comprehensive standard operating procedure for the operation and maintenance of the green alleys (see Appendix C). This includes all of the aforementioned criteria.

Results

The overall project was completed successfully in the spring of 2015. All green alleys were installed as planned without any major construction issues. The Village of Oak Park was also able to successfully promote their sustainability goals throughout the community through their website and other media outlets.

While it is difficult to estimate the actual reduction in storm water runoff to the village's combined sewer systems, successful construction indicates that the design will operate as planned.

Final costs for the project are found in Table 1.

Table 1 - Total Costs of Green Alley Project

	Total Cost	IEPA IGIG	Village Cost
Design/Engineering	$34,309.50	$24,063.47	$10,264.03
Permitting	$3,812.20	$825.00	$2,987.20
Construction	$1,271,176.12	$702,005.03	$569,171.09
Construction Oversight	$48,578.00	$36,433.50	$12,144.50
	$1,357,875.82	$763,327.00	$594,548.82

Appendix A

Photos

Figure 2 - Existing Alley

Figure 3 - PCC Pavement Installed and Ready for Pavers

Figure 4 - Paver Installation

Figure 5 - Paver Installation

Figure 6 - Driveway Tie-Ins

Figure 7 – Substantial Completion

Appendix B

Paver Details

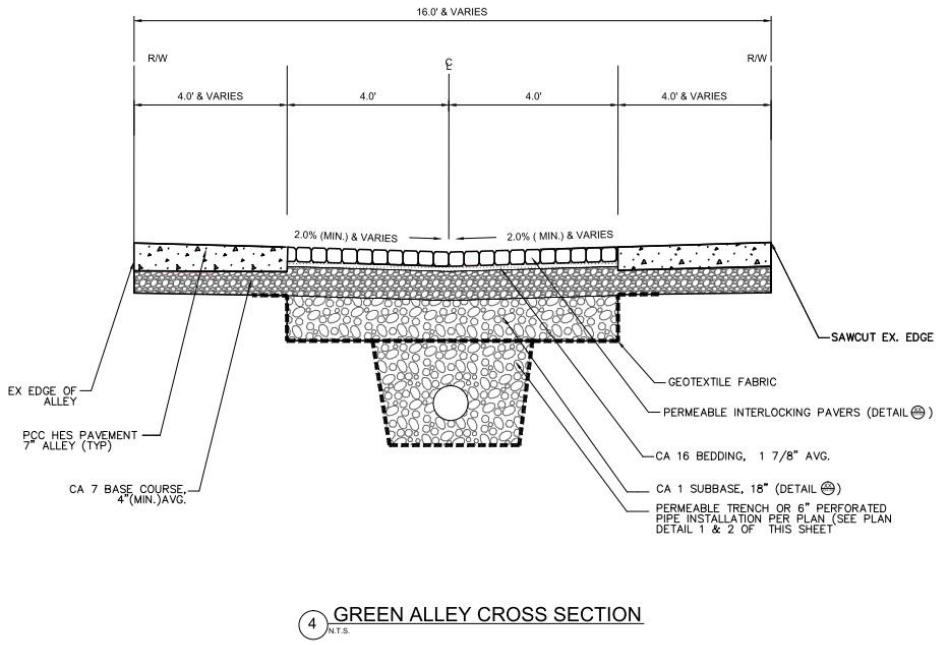

Figure 8 - Green Alley Cross Section

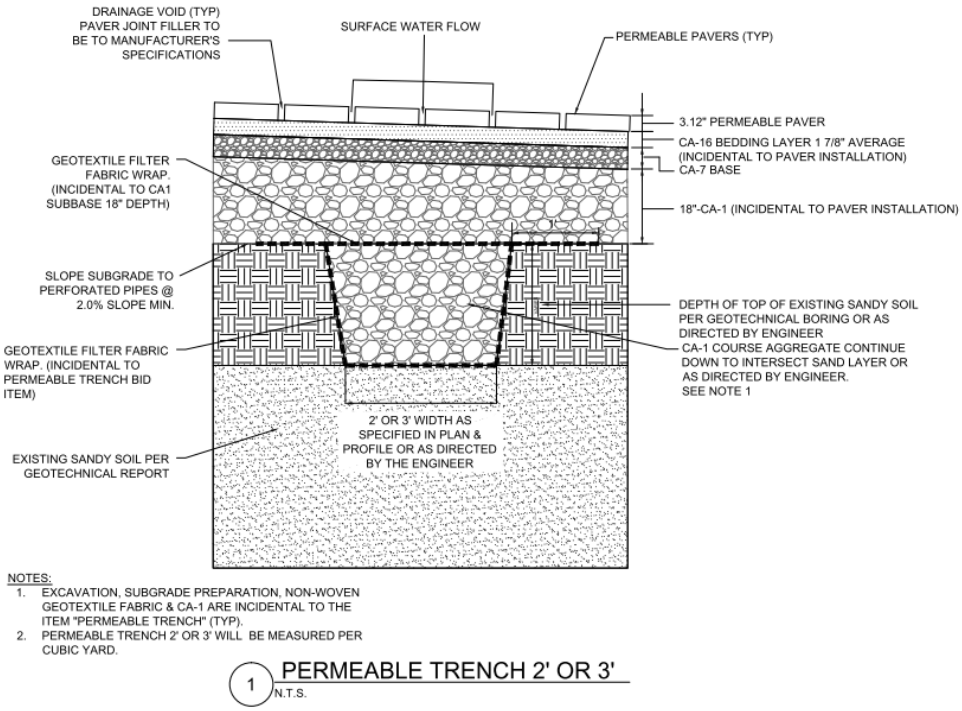

Figure 9 - Permeable Trench

Appendix C

Village of Oak Park
Green Alley Standard Operation and Maintenance Policy

Department of Public Works
Standard Operating Procedures

Date Issued
December 31, 2013

By John P. Wielebnicki
Director of Public Works

Title
Green Alley Standard Operation and Maintenance Policy

Purpose
The purpose of this policy is to ensure the long term pavement life and permeability of Oak Park's Green Alleys by preventing the openings and joints between pavers from being clogged with debris.

Procedure
The Public Works Street Department will provide inspection and maintenance to the Village's Green Alleys. The Public Works Engineering Department will provide any infiltration or other testing required to verify permeability of the Green Alleys.

The Village of Oak Park shall maintain its green alley system to function as a storm water best management practice (BMP) to reduce storm water volume and non-point pollution to the Des Plaines River or other receiving bodies of water.

Visual Inspection: The Public Works Street Department shall visually inspect the green alleys to verify clogging of the aggregate between the pavers has not occurred. Visual inspection shall be performed every three months from spring to fall (April, July, October). Pavers and the aggregate between pavers shall be examined for any staining associated with ponding water, accumulated sediment and debris, missing aggregate between pavers, and any cracked or displaced pavers. Green alleys shall also be annually inspected immediately after a storm event to check for areas of ponding.

Pavers shall be considered clogged when the open space between aggregate particles is no longer visible or when other evidence of ponding water exists. If there is evidence that the aggregate is clogged then the Street Department shall confirm this by performing a simple test of pouring water from a bucket over the pavers. The water should rapidly and completely disappear into the first joint or opening it finds. Alleys or segments that are considered clogged shall be forwarded to the Engineering Department for further testing.

Green alleys with underdrains shall have the underdrain inspected on an annual basis following a storm event. Underdrain cleanouts/access points shall be inspected for signs of flowing water following a rain event. Clogged underdrains shall be reported to the Engineering Department for further maintenance.

Green Alley Maintenance: Paver repairs required due to settlement or structural failure and any work to replenish the aggregate shall be done by the Public Works Department. Replacement pavers and aggregate shall match existing materials. Aggregate between pavers shall be replenished when there is more than a ½-inch between the bottom of the paver chamfer and the top of the aggregate.

Cleaning: The Public Works Street Department shall use its broom street sweeper to clean the surface of the green alleys a minimum of two (2) times per year (May, August). The green alleys shall be swept after the winter snow season and following fall leaf season (usually March, November). Street sweepers shall not use water when cleaning green alleys.

Restorative Cleaning: Green alleys or alley segments initially determined to be clogged by the Street Department shall be forwarded to the Engineering Department for infiltration testing. The Engineering Department shall test the infiltration of the alley to determine if the permeability has reduced below the minimum design infiltration rate for the given alley and the alley requires restorative vacuum sweeping. Minimum design infiltration rates shall be labeled for each alley on the attached green alley location map. Infiltration testing methods shall be determined by the Engineer.

Green alleys or alley segments considered clogged by the Engineering Department shall be scheduled for restorative cleaning. Small areas of isolated ponding or clogging shall have the openings between pavers cleaned with a shop vacuum by the Street Department. Joints shall be refilled with new clean aggregate matching the existing aggregate gradation.

Larger areas, entire alleys, or multiple alleys needing restorative cleaning shall be cleaned by a pure vacuum sweeper capable of generating a vacuum level of 70”-80” of water. The Department of Public Works shall utilize contractors to perform the vacuum sweeping when required. Aggregate between pavers shall be replenished by the Public Works department following vacuum sweeping.

Infiltration testing shall be performed by the Engineering Department following vacuum sweeping to ensure infiltration rates have been restored.

Winter Snow Removal: Green Alleys shall not have sand applied to them. The Public Works Department shall remove snow according to its standard operating policy for snow removal. Snow shall not be piled on top of permeable pavements.

Financial Impacts/Budget Considerations: Street sweeping and inspection of the green alleys shall be performed by Public Works staff and equipment with no budgetary cost impact. Maintenance, cleaning, and testing shall be budgeted for annually from the general fund for Public Work's street services pavement management program. Replacement aggregate and pavers shall have $2,000.00 budgeted for annually in the roadway maintenance account 1001-43740-761-560633. Vacuum sweeping shall have $1,200.00 budgeted for annually in the general contractual account 1001-43740-761-530660. Infiltration testing shall have $600.00 budgeted for annually in the external support account 1001-43740-761-530667. Budget dollar amounts shall be reviewed annually and revised based on anticipated operation and maintenance needs of the green alley system.

Financial Impacts/Budget Considerations: The attached map shall be updated by the Engineering Department whenever new green alleys are constructed or abandoned.