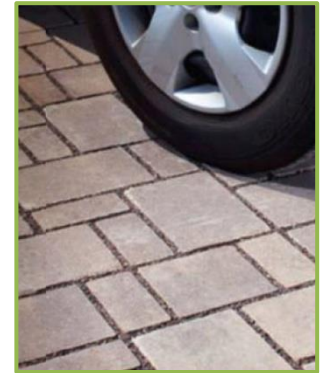




## PERMEABLE PAVERS

Permeable pavers are an alternative to traditional paving surfaces which can decrease stormwater runoff around your home. They are well-suited for use when constructing sidewalks, parking areas, patios, and driveways. Permeable pavers consist of permeable interlocking or grid concrete pavers underlain by a drainage layer. A permeable paver system allows stormwater runoff to pass between the paver surfaces into an underlying stone reservoir, where it is temporarily stored and allowed to infiltrate into the underlying soil. Permeable pavers can provide significant reductions in stormwater runoff and pollutant loads in your watershed.



## LOCATION

- Maximum contributing drainage area ratio to surface area is 4:1.
- Permeable paver systems should be located at least 5 feet from building foundations and 10 feet from buildings with basements.
- NOTE: Permeable pavers should not be located: (1) above an area with a water table or bedrock less than two feet below the gravel bottom; (2) over other utility lines; or, (3) above a septic field. Always call Missouri One Call to locate utility lines before you dig.
- Permeable pavers should drain only impervious areas. Drainage from other areas onto the pavers will eventually clog them.
- Permeable paver systems should be installed on slopes less than 6% to help ensure even distribution of runoff over the infiltration surface; pavers should slope away from structures.

## CONSTRUCTION

The table at the right provides Permeable Paver area size requirements for different depths of the ASTM No. 57 stone layer. This stone averages in size from ½” to 1-½”. Example: A roof top measures 1000 square feet. For a stone depth of 8 inches the required area of permeable pavers 310 sq ft.

Contributing Drainage Area (square feet)	Depth of Lower Stone Storage Layer (inches)				
	4	5	6	8	12
	Area of Pavers (square feet)				
100	60	50	40	40	30
500	260	230	200	160	120
1000	520	450	390	310	230
2000	1040	890	780	620	450
3000	1550	1330	1170	930	670
4000	2070	1770	1550	1240	890
5000	2580	2220	1940	1550	1110

- Permeable paver systems require multiple layers. Manufacturer’s instructions, if available, should be followed in lieu of these guidelines.
- The top course consists of the pavers and a crushed aggregate material swept between the paver joints, such as ASTM No. 8 stone or 1/8” to 3/8” pea gravel. The thickness of this layer varies depending upon the depth of the paver.
- The bedding course consists of 2 to 3 inches of No. 8 stone, or 1/8” to 3/8” pea gravel. The bedding course provides a level bed for setting the pavers evenly.
- The aggregate base course consists of a minimum of 4 inches of No. 57 stone. The aggregate base course acts as a reservoir to provide stormwater storage capacity.
- A permeable drainage fabric must be used to separate the aggregate base course from the subgrade. This fabric must be a needle-punched nonwoven polypropylene geotextile with Grab Tensile Strength greater than or equal to 120 lbs (MSD Type 4 or equivalent).
- The subgrade layer is the layer of native soils below the gravel and the permeable drainage fabric. Prepare the subgrade soil layer by scarifying or tilling to a depth of 3-4 inches.
- Care should be taken to avoid compaction of the soil in the location planned for the permeable pavers



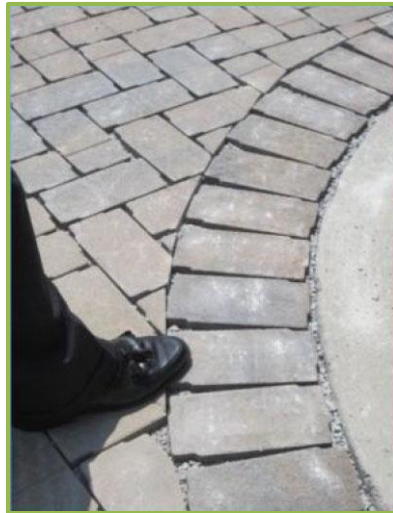
during home construction.

- Excavation to final subgrade elevation should not take place until the pavers are ready to be installed.
- Even though the permeable pavement surface is sloped, the sub-grade of the treatment measure should be flat and in some cases, terraced where the driveway has a steep slope, in order to promote infiltration, Additionally, this will prevent the stormwater from running along the bottom of the subgrade and discharging at the bottom of the slope.
- NOTE: The soil infiltration rate suitable for a paver system is 0.25 inches per hour (in/hr) or greater. Conduct a soil infiltration test per Appendix A, if the rate is less than 0.25 in/hr, provide an underdrain leading to daylight or discharged with a pop up emitter as described in Appendix D. Professional assistance shall be obtained in this case.

## MAINTENANCE

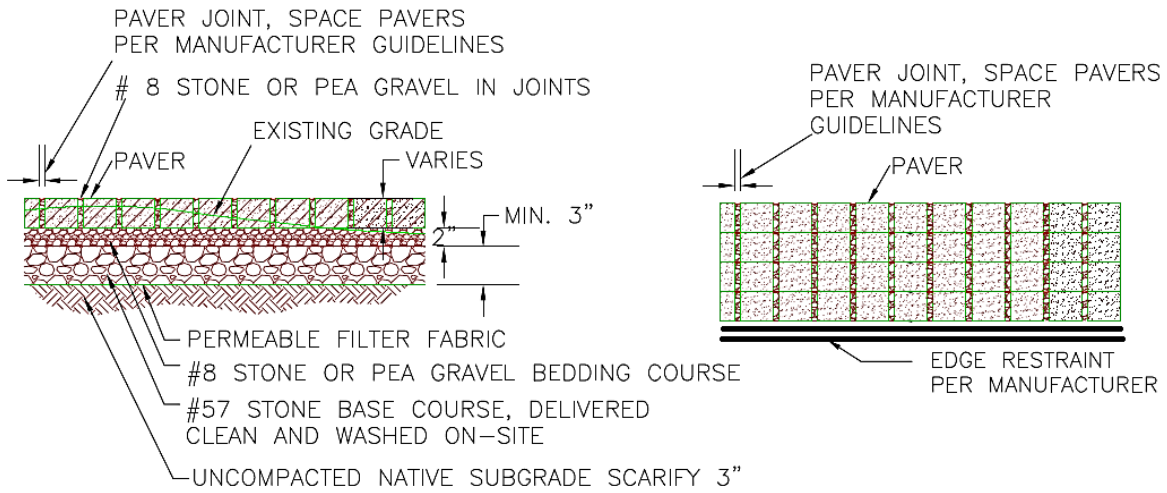
Maintenance is very important for permeable pavers systems, particularly in terms of ensuring that they continue to provide measurable stormwater management benefits over time.

- Remove accumulated sediment and debris from joint spaces monthly.
- Monitor the permeable paver system for excessive ponding during storm events and repair as needed.
- Vacuum, sweep, or blow permeable paver surfaces quarterly to keep the surface free of sediment.
- Sweep new No. 8 stone into the spaces between stones as needed. Inspect permeable paver surface for deterioration annually. Repair or replace any damaged areas as needed.





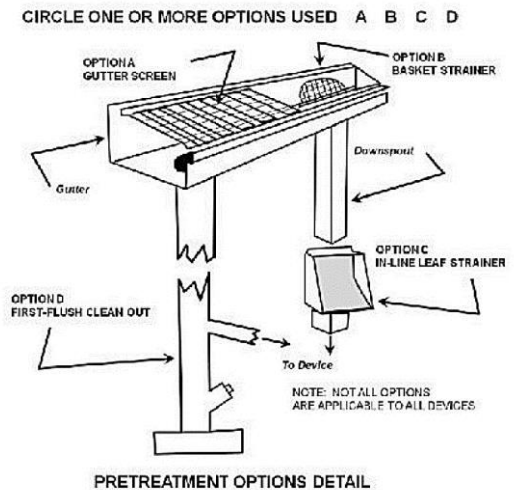
**PERMEABLE PAVERS – LAYOUT SKETCH**



TYPICAL COMPONENTS (ATTACH MANUFACTURER’S SPECIFICATIONS)

**CONSTRUCTION STEPS:**

1. Review potential paver areas and layout. Pavers should slope less than 6% away from the structure and should not be located: (1) above an area with a water table or bedrock less than two feet below the trench bottom; (2) over other utility lines; or, (3) above a septic field.
2. Measure the area draining to the pavers and determine required paver area from the table on the next page based on the depth of the lower stone storage layer.
3. Perform an infiltration test according to Appendix A. If the rate is less than 0.25 in/hr this method can only be used with an underdrain as described in Appendix D. If the rate is more than 0.50 in/hr the paver area may be decreased 10% for every 0.50 in/hr of infiltration rate increase above 0.50 in/hr.
4. Excavate area to appropriate depth and scarify soil to 3-4 inches.
5. Place and tamp gravel to planned depth in no more than 6" lifts. Three-inch minimum depth.
6. Place and tamp No. 8 stone or pea gravel bedding layer. Two-inch minimum depth.
7. Lay paving stone one at a time or using mechanical placement as applicable. Cut stone at edges to fit.
8. Install edge restraints per manufacturer’s specifications.
9. Sweep more No. 8 stone or pea gravel into stone joints until filled and even.
10. Cut and route downspouts or other rainwater delivery components, leaf screen option(s) chosen (circle selected options in Pretreatment Options Detail figure). Strap and support as needed.



CITY OF KIRKWOOD	NAME/ADDRESS:	PERMEABLE PAVER SPECIFICATIONS PAGE 1 OF 2
------------------	---------------	---



**PERMEABLE PAVERS – LAYOUT SKETCH**

PROVIDE PLAN AND ELEVATION VIEWS OF PERMEABLE PAVER SYSTEM AND STRUCTURES/HOUSE SHOWING ROOF AREA DIRECTED TO PAVERS AND KEY DIMENSIONS, CONNECTIONS AND ANY APPLICABLE OVERFLOW RELATIVE TO PROPERTY LINE. ATTACH MANUFACTURER’S SPECIFICATIONS IF APPLICABLE.

**SIZING CALCULATION:**

SITE INFILTRATION RATE= \_\_\_\_\_ IN/HR

- IS UNDERDRAIN REQUIRED? YES NO N/A
- CAN BMP SIZE BE REDUCED? YES NO N/A

Contributing Drainage Area (square feet)	Depth of Lower Stone Storage Layer (inches)				
	4	5	6	8	12
	Area of Pavers (square feet)				
100	60	50	40	40	30
500	260	230	200	160	120
1000	520	450	390	310	230
2000	1040	890	780	620	450
3000	1550	1330	1170	930	670
4000	2070	1770	1550	1240	890
5000	2580	2220	1940	1550	1110

MEASURE CONTRIBUTING DRAINAGE AREA AND READ AREA FOR GIVEN MEDIA DEPTH.

CONTRIBUTING DRAINAGE AREA= \_\_\_\_\_ SQ FT

DEPTH OF STONE MEDIA= \_\_\_\_\_ INCHES

PAVER AREA= \_\_\_\_\_ SQ FT

**MAINTENANCE:**

1. REMOVE ACCUMULATED SEDIMENT AND DEBRIS FROM JOINT SPACE MONTHLY.
2. MONITOR THE PERMEABLE PAVER SYSTEM FOR EXCESSIVE PONDING DURING STORM EVENTS AND REPAIR AS NEEDED.
3. VACUUM, SWEEP, OR BLOW PERMEABLE PAVER SURFACE QUARTERLY TO KEEP THE SURFACE FREE OF SEDIMENT. SWEEP NEW STONE INTO THE JOINTS AS NEEDED.
4. INSPECT PERMEABLE PAVER SURFACE FOR DETERIORATION ANNUALLY. REPAIR OR REPLACE ANY DAMAGED AREAS AS NEEDED.

CITY OF KIRKWOOD

ATTACH THIS TWO-PAGE SPECIFICATION TO HOUSE PLAN SUBMITTAL

PERMEABLE PAVER SPECIFICATIONS PAGE 2 OF 2