GREEN INITIATIVE
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SUSTAINABILITY BRIEF

Permeable Pavement

Rationale:
Permeable pavement is used to allow water to filtrate through the surface and down into the ground beneath. Permeable pavement limits disruption of natural water flows by minimizing stormwater runoff, increases on-site infiltration, and reduces contaminants, unlike other paving materials which when the water hits the surface it flows to the lowest point possible (normally a drain and thereafter the water is transported to our waterways) the use of permeable pavements allow the water to go into the earth.

Advantages & Use of permeable pavement:
They are commonly used for driveways, emergency access lanes, soil and land stabilization, public parks, parking lots and landscaping. Permeable pavements allow for incorporation of a drivable surface with grass or vegetation. For sloped land the permeable pavement can provide soil stabilization and reinforcement. Permeable pavements permit the use of vehicles. Permeable pavements control erosion of riverbanks, streambeds, reduce storm water runoff, recharge/store groundwater, and reduce levels of pollutants reaching surface water.

Using light colored pavement will reduce the heat island effect. Permeable pavements (including pavers) have been proven to have long term durability and are easy to repair. Also, they provide groundwater recharge, control erosion in streambeds and riverbanks, facilitate pollutant removal, reduce thermal pollution and eliminate standing water on pavement.

Permeable pavement can withstand freeze-thaw conditions, porous pavement experiences less effects from frost heave than impermeable pavement. The permeable pavement is actually safer in the winter because it does not accumulate icy buildup. Typical pavement puddles when snow melts, the puddles then freeze again – with permeable pavement, the periodic melt enters the pavement and is not able to refreeze on the surface. The system is designed to flow the water through it – not to have the water stay for extended periods of time. It should be designed so that the water does not stay in the base longer than 12 hours. Pavers are installed on a sand bed without mortar. They can expand and contract with the temperature with out cracking or spalling. If unsettling occurs, the displaced pavers can be removed, the base leveled and then replaced.

Types of permeable pavement:
Three common types are

(1) Grass pavers, made from plastic grids and have vegetation planted in the holes/voids;
(2) Porous concrete pavement, with small holes/pores which allow water to seep through;
(3) Interlocking Concrete pavers which have pervious material between each paver, such as sand, gravel, mulch or vegetation.

Costs/Expenses:
Permeable pavement is more expensive initially. Permeable pavement doesn't require drainage pipes or retention systems and thus are more economically advantageous in the long run. Investments in storm water piping, retention ponds and storm sewer extensions are reduced.

Comparison costs:

- Asphalt costs $0.50 - $1.00 per square foot (without costs for storm water/drainage systems, which will add approximately $7.00-$8.00 per square foot).
- Grass/gravel pavement start at $1.50 to $5.75 per square foot installed.
- Porous concrete costs are $2.00 - $6.00 per square foot.
- Interlocking concrete pavement cost $5.00 - $10.00 per square foot. Section 319 grants are available to fund these types of projects.

Strength:
The permeable pavers resist heavy loads and forces by forming an interlock between them, forcing the weight to be dispersed to the whole surface.

Maintenance:
Generally the permeable pavements require sweeping about 4 times per year and re-fill the voids when necessary.

Installation of permeable pavement:
Permeable paver systems are leveled with a vibrating plate compactor. Excavation should be 12-15 inches. Lowest level is gravel, next is a layer of Geotextile fabric, next is a layer of sand, then the pavement.

Feasibility / Limitations
Site grades, subsoils and drainage characteristics. High levels of sediment runoff and high traffic volume are likely to cause system failures. It is required to maintain effective pollutant removal in the subsoils. Drainage time is usually 24 hours. In cold weather climates care should be taken not to use sand or other porous materials which could clog the pavement. Applying salt could lead to chlorides migrating into the groundwater. Also, surface material should be able to tolerate undulations from frost movements.

Design considerations:
Consideration should be given to Porous Pavement which is permeable asphalt or concrete surface that allows storm water to quickly infiltrate an underlying stone reservoir. The runoff then percolates directly into the underlying soil, which recharges ground water and removes stormwater pollutants. Porous Pavement looks similar to conventional pavement but is formulated with larger aggregate and less fine particles.
Porous pavement areas are designed to accommodate 1-inch of design storm. Permeable Pavements are designed to accommodate rainfall depths of less than 1-inch without ponding on small sites.

Evaluation of Permeable Pavements – Olympia Washington
Study compared grass pavement, gravel pavement, impervious pavement, and standard asphalt. Results indicated that the use of permeable pavement dramatically reduced surface runoff as compared to other surfaces.

For a copy of this report and more information about Elgin's sustainability initiatives please visit www.cityofelgin.org/green.