



Pervious Concrete

Environmentally Sound, Economically Smart

PRAIRIE
MATERIAL





Natural Stormwater Management

Pervious concrete has the same water management characteristics as grass and other ground covers. Pervious concrete parking lots, driveways, sidewalks and roads allow the rain to wash directly into the ground or sub-base, naturally filtering out pollutants while replenishing the water tables and aquifers and watering surrounding vegetation. Pervious concrete is a unique mix of cementitious materials, coarse aggregates (gravel or crushed stone) and water with little or no sand. The exclusive use of coarse aggregates creates 15-25% air voids throughout the concrete. These large gaps allow water to pass directly through the pavement and into the soil or base rather than collecting on or running off the surface. Pervious concrete can pass 3 to 5 gallons of water per minute through its open cells for each square foot of surface area. This works out to more than 200 inches per hour which is far greater than most rain events.

Why Use Pervious Concrete?

To meet federal and local clean water regulations.

The U. S. Environmental Protection Agency Phase II regulations require owners of newly developed (or redeveloped) sites of 1 acre or more to have an on-site management system or treating storm water. The EPA has recognized pervious concrete as a Best Management Practice (BMP) for meeting its requirements.

To reduce costs.

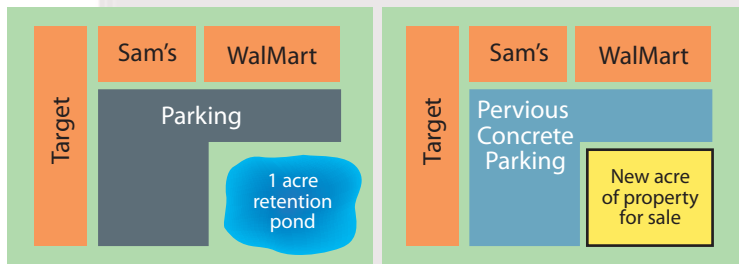
Although pervious concrete pavement may be more expensive than typical concrete pavement, the project cost can be offset by reducing or eliminating the need for drainage systems and retention ponds and their associated construction and maintenance costs. Other project cost savings include:

- **Reduced Grading.** With no storm drains there is no need to slope the parking area. Pervious Concrete accepts the existing topography of the area.
- **No storm sewer tie-ins.** Eliminating the cost of underground piping and drain inverts can be a substantial savings.
- **No additional stormwater pollution prevention devices.** For example, sewer invert filtration systems are unnecessary. Costs savings here are both up front and long term.

To gain green building LEED credits.

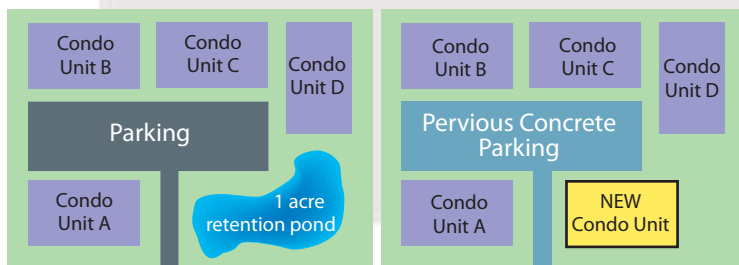
Using pervious concrete can be part of a strategy that helps a project meet sustainability goals and gain valuable LEED credits. Possible contributions include:

- **Stormwater Management.** Pervious paving reduces stormwater flow and pollutant loads. Can contribute to LEED Credit 6.
- **Heat Island Effect.** The light colored surface can increase reflectivity and reduce heat build up. May contribute to LEED Credit SS 7.
- **Minimize Site Disturbance.** By integrating paving and drainage, less site area may need to be used, allowing a more compact site development footprint. May contribute to LEED Credit SS 5.
- **Recycled content.** Fly ash, slag cement, or silica fume can substitute partially for cement, and recycled aggregates can replace new gravel in the subgrade. Recycled content may contribute to LEED Credit M 4.



Before

After



Before

After

Profitable Ecology

Pervious concrete can also help to increase profitability while providing environmental benefits. Traditional stormwater management system can take up 10 to 20 percent of the overall site for retention sites and bio-swales.

Pervious concrete can double as a parking facility and stormwater treatment system, so this valuable space can be used to increase the density of development. In addition, tree wells can be very small since pervious concrete provides air and water to the tree roots. This increases the amount of usable space for parking while encouraging tree growth that cools the lot and improves the air quality. The durability of concrete also lowers the overall lifecycle cost with an expected life span of 20-40 years.

Applications

The most common use of pervious concrete is for parking lots, where its ability to reduce water runoff and increase the usable development footprint provides the biggest benefit. But designers and engineers are using pervious concrete for a surprising number of other applications including:



- Low-volume pavements
- Residential roads, alleys, and driveways
- Low-water crossings
- Sidewalks and pathways
- Patios
- Tennis courts
- Swimming pool decks
- Pavement edge drains
- Foundations/floors for greenhouses, fish hatcheries, aquatic amusement centers and zoos
- Load bearing and other walls
- Sound barriers

Benefits

Beyond direct costs, pervious concrete offers a number of benefits to both the community and the owner/developer.

For the City, county or village responsible for storm water in the area:

- Recharges ground water to maintain sufficient Aquifer levels
- Eliminates the need to construct new storm sewer facilities or enlarge existing lines
- Improves tree growth and reduces sidewalk maintenance
- Eliminates hydrocarbon pollution from asphalt pavement and sealers
- Provides a quieter concrete surface to reduce noise pollution

For the owner or developer:

- Increases land usage per square foot by developing the area set aside for a retention pond
- Reduces lighting needs and costs due to brighter surfaces
- Eliminates resealing and keeps parking lots open
- Drastically reduces stormwater maintenance costs
- Lowers lifecycle costs
- Allows easier compliance with tree shading ordinances
- Provides brighter, safer lots for customers or tenants
- Contributes to LEED credits

Design Considerations

Pervious concrete is part of a stormwater management system that is designed specifically for a development site. Good design practice requires a soils survey and stormwater calculation that factors in the storage capacity and other characteristics of the soil at the site. The resulting design needs to specify the appropriate porous aggregate base to meet the requirements for proper infiltration and retention and to accommodate the freeze thaw characteristics of the local environment. Any supplementary retention and dissipation structures, like perforated pipes or retention beds will need to be addressed.

Construction Considerations

Proper placement and curing are crucial for the success of pervious concrete structures. Pervious concrete is a low slump, fast drying concrete that typically needs to be placed within 60 minutes of mixing. In addition to good concrete practice, special techniques for striking off and compacting the surface are required. Curing is essential, requiring a minimum of 7 days of tight plastic sheeting.



Frequently Asked Questions

• Can pervious concrete handle traffic loads greater than a parking lot?

Pervious concretes can develop compressive strengths in the range of 500 to 4000 psi, which can handle most traffic except for heavy truck traffic. The flexural strength ranges between 150 and 550 psi.

• Is the freeze-thaw cycle a problem?

Pervious concrete has been placed in freeze-thaw climates for more than 15 years. It is inherently resistant to freeze-thaw damage since water is not retained in the structure. For wet freeze climates like those in the Midwest, it is recommended that the cement be air-entrained and that the pervious concrete be placed on 6-12 inches of drainable aggregate base. Pervious concrete is also gaining recognition for its snow-handling characteristics. As snow melts on pervious concrete, helped somewhat by the circulating air in its voids, the melt immediately passes through the pavement. This reduces the safety concerns associated with slipping and sliding, and filters salts and de-icers that would normally run off to sewers.

Parking lots after a snowfall on the same day within then same hour:



Pervious concrete allows water to pass through the pavement



Standard asphalt does not allow water to drain, pooling occurs

• What about clogging?

Clogging is not a big issue. If the site allows stormwater from outside of the parking lot to flow across and introduce fines onto the pavement, sweeping, blowing, or vacuuming will be enough to maintain the pavement. Also, with the rate of flow inherent in pervious concrete, even 90% clogging would still allow enough water to pass through to be effective for most rain events. Coring studies indicate that, on well-designed pervious concrete parking lots, less than 10% loss of internal volume has occurred due to infiltration of fines after 12 years

Pervious Concrete at Prairie

Prairie is taking a leadership role in the development and promotion of pervious concrete for the Midwest market.

- **Training and Education.** Prairie is partnering with the Illinois Ready Mix Concrete Association to provide NRMCA training and certification for contractors to ensure they learn the proper placement, testing, finishing and curing techniques for pervious concrete.
- **Pilot Programs.** Prairie is actively working with the City of Chicago to provide pervious concrete for its Green Alley program. Chicago's DOT is investigating alternative sustainable solutions for flooding and stormwater management in its 1,900 miles of public alleys.
- **Research.** Prairie is one of 10 concrete producers across the country chosen by CTL Group to submit pervious concrete samples to determine if pervious concrete will be able to achieve the LEEDS 2.2 reflectivity credit.

For more information on pervious concrete at Prairie contact

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Your strongest partner from the ground up.

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