

# PERMEABLE INTERLOCKING CONCRETE PAVEMENT (PICP) MUNICIPAL OFFICIALS FACT SHEET

## Stormwater Benefits

- Reduces pollutants from rainwater runoff
- Complements buildings and visually unifies streetscape, many colors available
- LEED® points eligible for Sustainable Sites, Water Efficiency, Materials & Resources and/or Innovative Design; Earns Green Globe points
- Meets U.S. Environmental Protection Agency stormwater performance criteria as a structural best management practice (BMP) while providing parking, road and pedestrian surfaces
- Helps meet local, state and provincial stormwater drainage design criteria and provides compliance with the U.S. National Pollutant Discharge Elimination System (NPDES) regulations
- Reduces runoff from common rainstorms by as much as 100%; eliminates surface puddles and local flooding
- Promotes street tree survival
- Snow melts faster on permeable pavement and drains, reducing ice hazards
- Snow plow with typical snow removal equipment; reduce winter ice hazards, de-icing salt use and snow removal costs.
- 50 year life-cycle for surface
- Compatible with underground stormwater storage systems, many slower-draining clay soils and cold climates
- Governments may offer tax incentives, utility fee reductions, expedited permitting or a demonstration project to encourage use.



- ← 3 1/8 in. (80 mm) thick pavers with permeable joints
- ← Open-graded bedding course
- ← Open-graded base course (OGB)
- ← Open-graded subbase on non-compacted soil subgrade

**Permeable interlocking concrete pavement (PICP) with base and subbase for infiltration and storage**

**PICP supports sustainable development and livable green communities**



**Parking at this recreation site on South Whidbey Island, WA eliminates runoff during most rainstorms.**



**PICP's can eliminate street storm drains and sewer pipes as in this redevelopment project in Seattle, WA.**

## APPLICATION OPPORTUNITIES

- **Public Projects:** Office plazas, parks, sidewalk replacement, street tree planting areas, parking lots and outdoor seating areas
- **Private Projects:** Parking lots, parks, driveways, parking bays on roadways, subdivision roads and sidewalks
- **Public-Private Partnerships & Redevelopment Sites:** Parking areas, plazas and public spaces and sidewalks

# LID INTEGRATED WITH PICP

## PICP Meets LID Goals

- Conserves on-site space: roads, parking, stormwater infiltration and retention all combined into the same space creating more green space or building opportunities
- Preserves wooded areas that would otherwise be cleared for stormwater detention or retention ponds
- Increases site infiltration that helps maintain pre-development runoff volumes, peak flows and time of concentration
- Promotes tree survival and growth
- Contributes to urban heat island reduction through evaporation and reflective, light colored pavers
- Highly visible, cost-effective exemplary demonstration of a cornerstone LID technique for public and private development

## Permeable Interlocking Concrete Pavement: A Low Impact Development Tool

### PICP Supports LID Principles

1. Conserve vital ecological and natural resources: trees, streams, wetlands and drainage courses
2. Minimize hydrologic impacts by reducing imperviousness, conserving natural drainage courses, reducing clearing, grading and pipes
3. Maintain pre-development time of concentration for runoff by routing flows to maintain travel times and discharge control
4. Provide runoff storage and infiltration uniformly throughout the landscape with small, on-site decentralized infiltration, detention and retention practices such as permeable pavement, bioretention, rain gardens, open swales and roof gardens
5. Educate the public and property owners on runoff and pollution prevention measures and benefits

**Municipal civic goals may be met using PICP as part of an integrated approach to development and redevelopment.**

Extensive green roof retrofit

Disconnected downspout waters infiltration planter

Intensive green roof retrofit

Awning retrofit cools sidewalk, directs water to permeable interlocking concrete pavement

Permeable interlocking concrete pavers (PICP) in travel lanes with storage capacity built into the pavement system

Permeable interlocking concrete pavers in parking lanes with storage capability built into the pavement system

Street tree in infiltration trench 2.5 feet (.75 m) deep with 4 in. (100 mm) underdrain tied to storm sewer



Utilities in center lane under water storage media

Curbs with curb cuts directed to street planters (Planter width varies, 3 ft. (.9 m) minimum)

Gutter flows directed into bioretention media along the gutter route

Bioretention cell adjacent to PICP

**PICP as part of an LID approach to streetscape development**

# CONSTRUCTION AND PROJECT EXAMPLES



**Prepared subgrade for 20,000 sf (2000 m<sup>2</sup>) Portland, OR street retrofit with PICP**



**Portland, OR street project with PICP parking lanes**

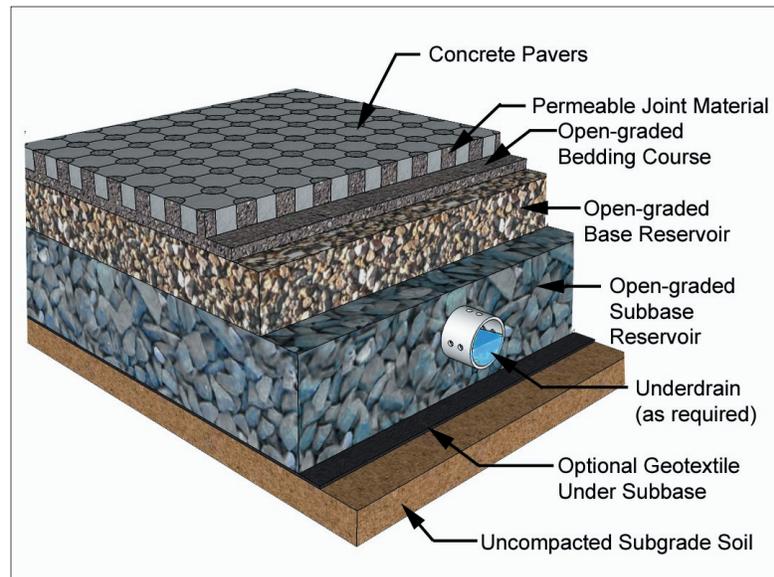


**Base construction uses locally available materials.**

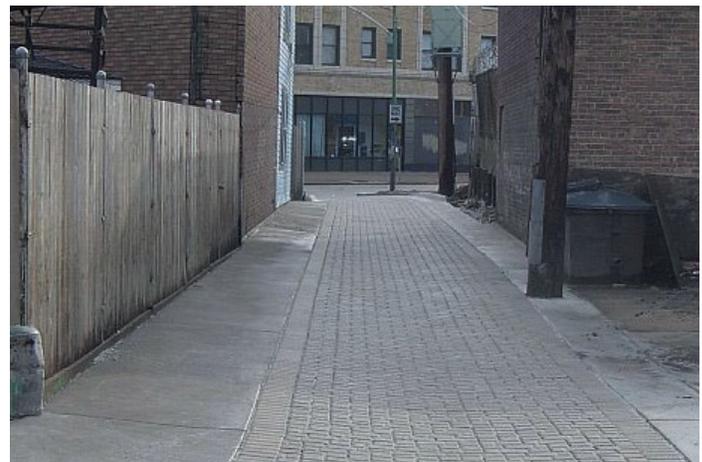
**Mechanical installation speeds construction.**



**Aggregate base is spread and compacted; pavers are delivered ready to install. After placement of bedding course, joints and/or openings are filled with small aggregate and the pavers are compacted. Joints may be filled mechanically as shown.**



**Typical PICP cross section**



## **Chicago Green Alley Program before and after PICP installation**

Green Alleys are being implemented to manage stormwater, reduce combined sewer overflows, reduce urban heat in urban areas, and conserve energy. Photos: Courtesy of the City of Chicago

# PERFORMANCE

## Volume Reduction

- PICP significantly reduces runoff from most storms.
- Runoff volume reductions relieve flooding in storm sewers operating at capacity and relieve sewage treatment plants receiving combined storm and sanitary waste flows.
- Reduced runoff can reduce sewer overflows and stream bank erosion.

## Peak Flow Reduction

- Promotes stream and lake health with decreased erosion
- Reduces water pollution by reducing combined sewer overflow frequency
- Reduces the need for continuous expansion of drainage infrastructure

## Additional Benefits

- Cooler than conventional pavements
- ADA compliant
- May be used on sloped site with proper design
- Simplified surface and subsurface repairs by reinstating the same paving units; no unsightly patches or weakened pavement from utility cuts
- Can be used for traffic calming

## Water Quality Improvement

- 80% or greater TSS removal
- Preserve and increase drinking and recreational water supplies; preserve aquatic and wildlife habitats.
- Gain recognition for innovative design through sustainable BMPs

## FAQs

**Can PICP be used on clay soils?** *Yes. Even in clay soils, PICP reduces runoff and helps to capture "first flush" runoff and reduce pollution.*

**Can PICP be used to replace every kind of pavement?** *PICP is best suited for use in areas of low speed traffic such as parking lots, residential streets, driveways, patios, plazas, sidewalks and parking lanes on busier travelways. Nevertheless, PICP has been successfully used even under heavy commercial loads.*

**Will PICP enhance property values?** *The data from installed PICP projects indicates that PICP meets multiple criteria for project success including enhancing property values.*

**Is Maintaining PICP difficult?** *No. PICP can be maintained through street sweeping and vacuuming based on periodic inspection.*

## REFERENCES

Ferguson, B. K. *Porous Pavements*. Boca Raton, FL: CRC Press, 2005.

Smith, David R. *Permeable Interlocking Concrete Pavements: Selection • Design • Construction • Maintenance*, Washington, DC: ICPI 3rd ed., 2006. [www.icpi.org](http://www.icpi.org).

For more information pertaining to permeable interlocking concrete pavement, please visit the Interlocking Concrete Pavement Institute ([icpi.org](http://icpi.org)) or the Low Impact Development Center ([lowimpactdevelopment.org](http://lowimpactdevelopment.org)).

**Other Fact Sheets available for Developers, Design Professionals and Schools/ Universities**



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