

# GG159-14

## 408.2.4

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### Revise as follows:

**408.2.4 Pervious and permeable Permeable pavement.** ~~Pervious and permeable Permeable~~ pavements including open grid paving systems and open-graded asphalt, concrete and aggregate systems shall have a ~~percolation rate~~ percent air void of not less than 2 gallons per minute per square foot (100 L/min ~ m2) 15 percent. ~~Pervious and permeable Permeable~~ pavement shall be permitted where the use of these types of hardscapes does not interfere with fire and emergency apparatus or vehicle or personnel access and egress, utilities, or telecommunications lines. ~~Aggregate used shall be of uniform size.~~

**Reason:** Recent research has identified that permeable pavements can mitigate urban heat island (UHI) effect due to their high air void nature. Furthermore, these pavement systems can reduce stored pavement energy which also helps mitigate the UHI effect. Permeable pavements have an insulating capacity that allows for rapid cooling via evaporation due to their air voids structure (Kevern 2012). The code section 408.2.4, as written, identifies permeable pavements as a strategy to mitigate UHI but sets a minimum percolation rate as the criterion to qualify. However, the percolation rate of permeable pavements is not commonly tested due to limitations in current test procedures (FHWA). In fact, due to the test procedures' ambiguous results, percolation rate metrics are rarely, if ever, used as a requirement for permeable pavement installation. Instead, the most common metric used to specify permeable pavements is percent air voids. Typical permeable pavements have approximately 15%-20% air voids which allow pavement strength for heavy traffic while still allowing ample rainwater percolation and evaporation (FHWA, EPA). Measuring the amount of air voids is a common analysis following ASTM C1688 for pervious concrete and ASTM D6752 or ASTM D3203 for porous asphalt (FHWA, APAI).

In addition, to keep wordage consistent, eliminate the term pervious pavements and use only permeable pavements. The statement "aggregate used shall be a uniform size" is unclear. Permeable pavements use an aggregate structure that is open-graded meaning the aggregates are of near uniform size with little or no fine particles. Recommend removing this sentence. The air void requirement will ensure the use of near uniform aggregate sizes. The definition for permeable pavement as stands is not clear to users that this includes pervious concrete and porous asphalt mixtures. Therefore, suggest revising current definition to: open-graded asphalt, concrete, and aggregate systems.

### Bibliography:

"Hot Weather Comparative Heat Balances in Pervious Concrete and Impervious Concrete Pavement Systems." Journal of Heat Island Institute International Vol. 7-2. Kevern, J.T., Haselback, L. and Schaefer, V.R. 2012. 231-237.

"Porous Asphalt Pavement." Environmental Protection Agency (EPA). 2009. Available Online at: <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=135>

"Tech Brief: Pervious Concrete." Federal Highway Association (FHWA). 2012. Available Online at: <http://www.fhwa.dot.gov/pavement/concrete/pubs/hif13006/index.cfm>

"Porous Asphalt." Asphalt Pavement Association. (2009). Available Online at: <http://www.asphaltindiana.org/docs/2009%20Porous%20Asphalt%20Spec.pdf>

**Cost Impact:** Will not increase the cost of construction.

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