

Evaluation of Concrete Block Pavement in Terms of Functional and Structural Performance

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Abstract :

The porous concrete block pavement systems used for the minor roads, which are subjected to a low or medium volume of heavy traffics, were evaluated through this study in order to carry out the drainage performance evaluation of block material. Due to the expansion of city areas, the permeable ground is reduced, resulting in the increased impermeable roads of major cities therefore, a heat island can be dominant. In addition, rainfall that would have been naturally absorbed and retained by the permeable ground is possiblyoverflowed due to large volumes of run-off water, resulting in more sewer failures and increased erosionin cold winter seasons. In terms of permeable pavement system, block paving has been used anywhere as well as provides many years of service. The permeable block paving is an effective alternative material compared to the more traditional asphalt or plain concrete for minor roads; thus, it looks a lot better than other pavements. In this study, the functional drainage evaluation of block paving was carried out, considering the usage of experimental sludge and wheel tracking test, in order to simulate the field condition of roads. Finally, the comparison study between asphalt concrete and block pavements was studied through rehabilitation efficiency, traffic noise measurement, surface friction test, longitudinal roughness analysis, permeability test, surface temperature measurement, and infrared thermal imaging analysis.

Key Words : porous block pavement, subgrade, asphalt concrete pavement, mechanical test, geotextile

1. Introdouction

The porous concrete block pavement systems used for the minor roads, which are subjected to a low or medium volume of heavy traffics, were evaluated through this study in order to carry out the drainageperformance evaluation of block material. Due to the expansion of city areas, the permeable ground is reduced, resulting in the increased impermeable roads of major cities; therefore, a heat island can be dominant. In addition, rainfall that would have been naturally absorbed and retained by the permeable ground is possibly overflowed due to large volumes of run-off water, resulting in more sewer failures and increased erosion in cold winter seasons. In terms of permeable pavement system, block paving has been used anywhere as well as provides many years of service. The permeable block paving is an effective alternative material compared to the more traditional asphalt or plain concrete for minor roads; thus, it looks a lot better than other pavements. In this study, the functional drainage evaluation of block paving was carried out,

considering the usage of experimental sludge and wheel tracking test, in order to simulate the field condition of roads. Finally, the comparison study between asphalt concrete and block pavements was studied through rehabilitation efficiency, traffic noise measurement, surface friction test, longitudinal roughness analysis, permeability test, surface temperature measurement, and infrared thermal imaging analysis.

2. Method

As shown in Figures 1 and 2, we used the typical wheel tracking test in order to evaluate the performance of permeability. Thus, the sludge can be added into the tested porous block; then, the permeability tests were conducted, depending on various porous block materials.

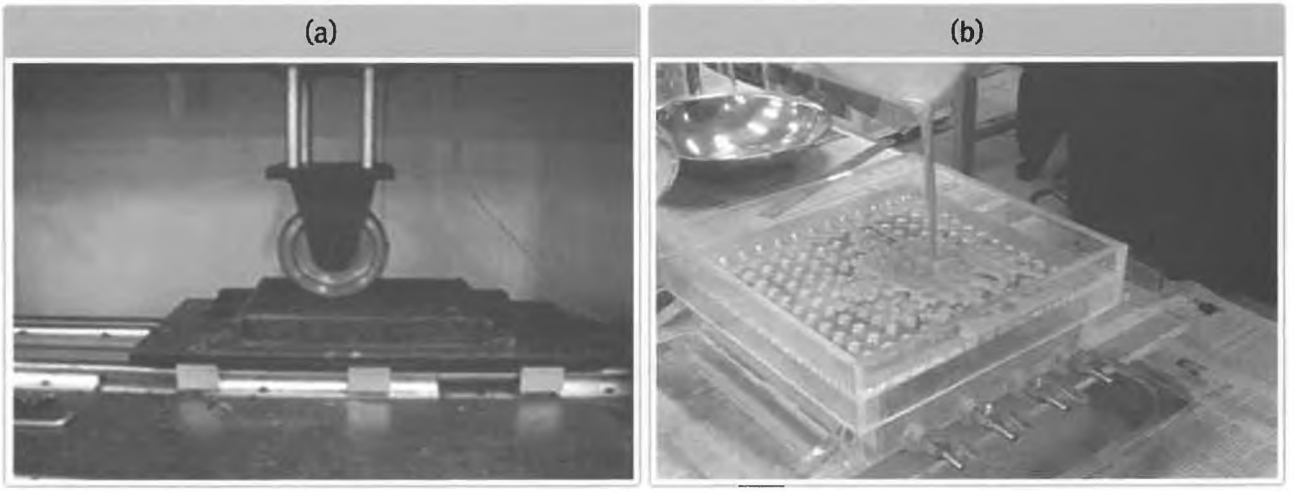


Figure 1. Typical wheel tracking test and sludge application

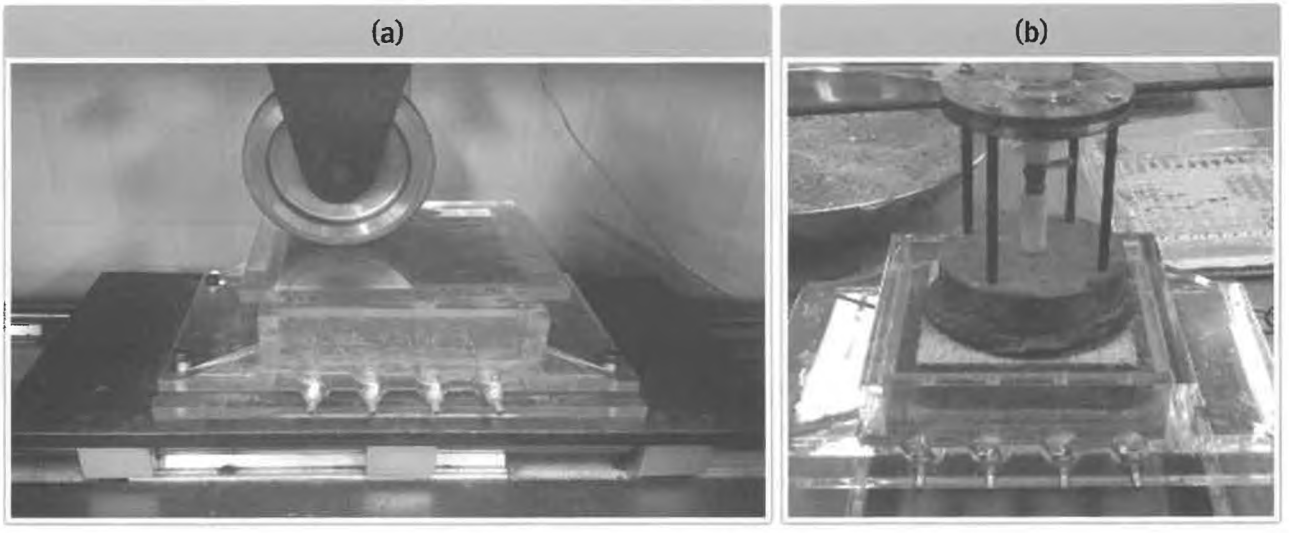


Figure 2. Wheel tracking on the applied sludge to porous block and permeable test

3. Result

As shown in Figures 3 to 5, various sludge thicknesses were applied in order to determine the performance of permeability. In this study, four different blocks were used to tell whether the different permeability performance can be checked.

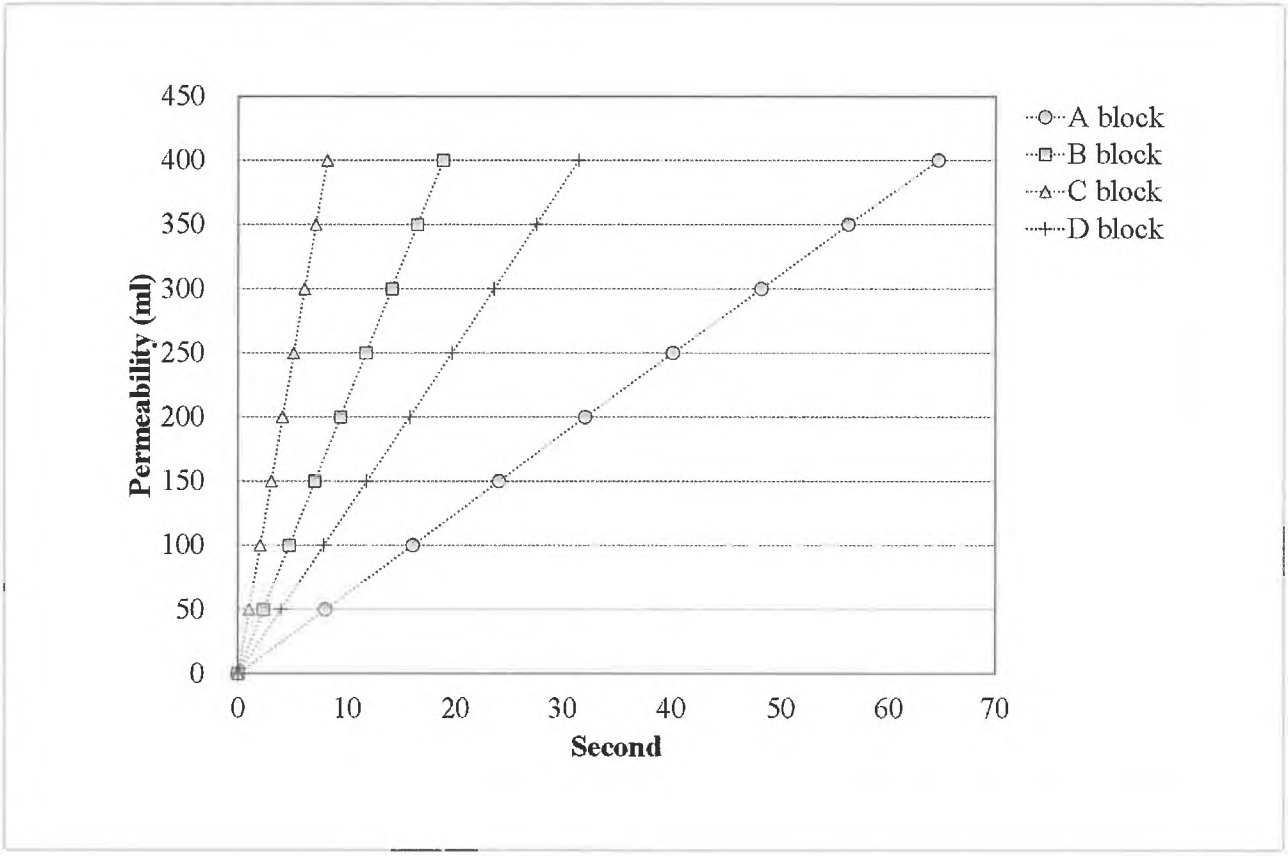


Figure 3. Permeability test at the condition of 0.5 cm sludge thickness

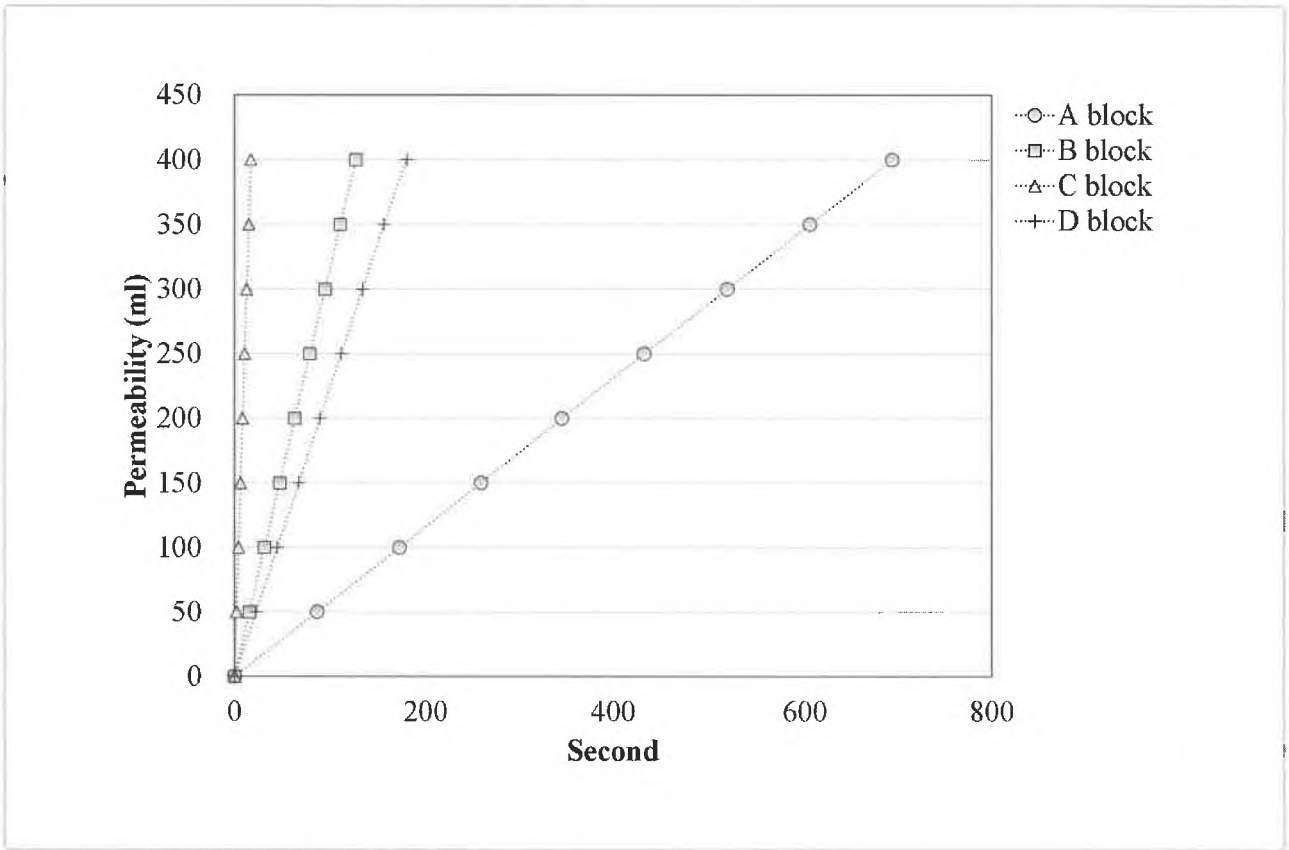


Figure 4. Permeability test at the condition of 1 cm sludge thickness

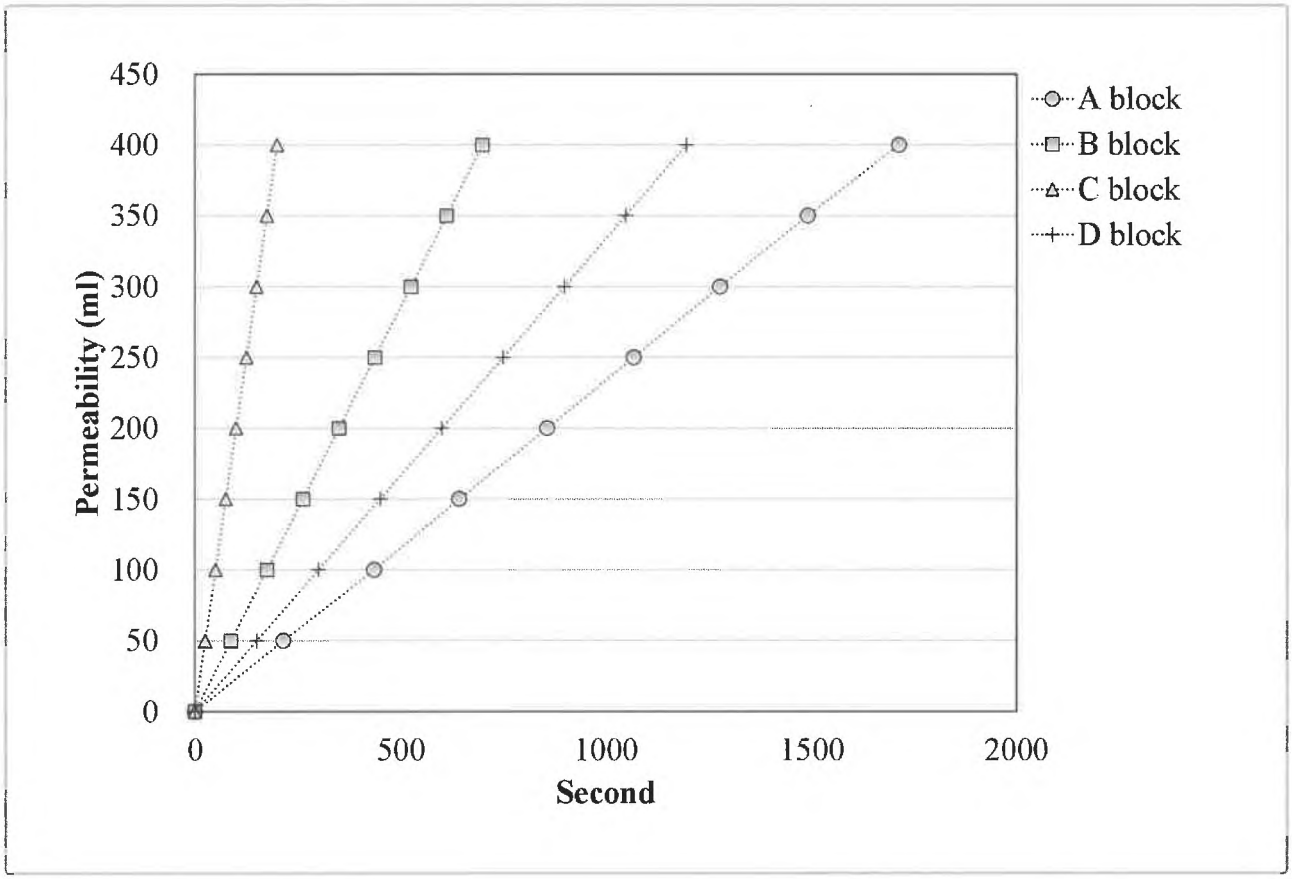


Figure 5. Permeability test at the condition of 1.5 cm sludge thickness

4. Conclusion

The permeable block paving is an effective alternative material compared to the more traditional asphalt or plain concrete for minor roads; thus, we conducted the permeability test using four different blocks. Finally, we can evaluate the permeability performance of block pavements.