This paper presents a study on the strength properties of pervious pavement at a UCF laboratory. The strength test was performed in the laboratory and on the field. Laboratory testing was streamlined to just compressive strength and flexural strength. Evaluation of pavement performance was performed by comparing the deflection basins from Falling Weight Deflectometer test on pervious concrete and porous asphalt with conventional concrete and asphalt respectively of similar layer thickness. From literature, pervious pavements cannot withstand heavy traffic loading. They are mostly used in low traffic volume areas such as parking lots, driveways, walkways. This research investigated the relationship between the compressive strength and void ratio, unit weight and volume by carrying out laboratory testing of different pervious pavements such as pervious concrete, porous asphalt, recycled rubber tires, recycled glass and porous aggregate. Different sizes of cylinders and beams were molded for these laboratory tests. Furthermore, the in-situ resilient moduli of the twenty-four pavement sections in our research driveway were calculated by means of backcalculation analysis with the aid of a computer program known as Modulus 6.0. The calculated deflection basins were compared to that obtained from a KENPAVE computer program.

Furthermore, the pavement layer thickness design was performed by doing hand calculations using AASHTO’s method for flexible and rigid pavements and also computer software developed by Texas Transportation Institute (TTI) known as FPS 19W. The structural number for flexible pavements were calculated and tabulated for two different reliability levels (90% and 95%). Traffic loading was estimated in the absence of actual traffic count measurement devices. Clogging of pore spaces in cored pervious concrete did not increase the compressive strength since the void spaces were reduced. The maximum compressive strength of the cored pervious concrete was about 1730 psi. Backcalculated moduli values for pervious pavement were within the specified range discussed in literature. The in-situ modulus of elasticity range for pervious concrete is 740 - 1350 ksi, porous asphalt 300 - 1100 ksi, permeable pavers 45 - 320 ksi, recycled rubber tire 20 - 230 ksi, recycled glass pavement 850 ksi, porous aggregate 150 ksi. Pavement design shows that traffic loading is a fundamental parameter in its estimation. Rigid pavement evaluation depends on the modulus of rupture more than the compressive strength. For low traffic loading, the minimum layer thickness was calculated.

In conclusion, this research summarizes the result of studies performed at the University of Central Florida Stormwater Management Academy Research laboratory to study the strength properties of pervious pavement systems.

Major: CIVIL ENGINEERING, STRUCTURES AND GEOTECHNICAL ENGINEERING TRACK

Educational Career:
Bachelor’s of CIVIL ENGINEERING, BS, 2005, FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI, NIGERIA

Committee in Charge:
DR MANOJ CHOPRA, Chair, Civil, Environmental and Construction Engineering
DR L. REDDI, Civil, Environmental and Construction Engineering
DR MARTY WANIELISTA, Civil, Environmental and Construction Engineering

Approved for distribution by DR MANOJ CHOPRA, Committee Chair, on June 21, 2010.

The public is welcome to attend.