

ABSTRACT

The Porcellanite aggregate from south Trinidad has been under-utilized in civil engineering works. Many contractors and owners prefer to use the more established aggregates from the Northern Range (limestones) and the Northern Basin (quartzitic sands and gravels). The end result is an inflated cost of aggregate in the southern districts due to the high transportation costs.

In order to fully examine the quality of the porcellanite aggregate, this project looks at the existing literature regarding the physical and chemical properties of this aggregate. Laboratory tests were also carried out on the aggregate to provide additional information specific to the project aggregate.

The main thrust of the laboratory programme was to investigate the performance of concrete made with the porcellanite aggregate and Guanapo fine aggregate, and to develop a mix design procedure. The free-water/cement ratio range investigated was 0.35, 0.40, 0.45, 0.50, 0.55 and 0.60. The aggregate/cement ratio range was 3, 4, 5 and 6. The proportion of fine aggregate range was 30, 35, 40 and 45 percent.

The laboratory programme revealed that apart from the high water absorption (a property typical of lightweight aggregates), the porcellanite aggregate compares favourably in terms of engineering properties with the normal-weight limestones and quartzitic aggregates.

Also, the test data showed that the porcellanite aggregate-Guanapo fine aggregate concrete exceeds the compressive strength requirements for reinforced lightweight aggregate concrete; 28-day compressive strengths ranged from 18.8 to 59.2 N/mm².

A mix design procedure based on the ACI method was also developed.