

## ABSTRACT

For a highway project in which earthmoving is a high cost item, the intelligent selection and efficient utilization of earthmoving plant and equipment are quite often the factors which determine the profitability of a contract and may be the determining factors in a Firm's continuing viability. Labour and materials costs are in general fixed by labour agreements and market forces/prices controls regulations respectively. Thus, it is in the area of plant and equipment costs that profits or losses can be made.

Many difficulties of plant and equipment operation with consequent increases in costs and reduced profits arise because of the mis-match of Earthworks Construction Machines to the conditions on the earthworks sites. Significant benefits are likely to be gained therefore from an increased knowledge of the cost effectiveness of different types and sizes of machines working in various soil conditions and locations. In the local context, virtually no information has been published on this subject which should be of crucial importance to earthworks Contractors.

In this project report, the author examines the factors involved in the determination of the optimum selection of earthmoving plant and equipment for a project. To illustrate the method of approach suggested, the upgrading of a 1.8km long section of the Churchill Roosevelt Highway to dual carriageway standard has been selected. The report examines the economics of the total earthmoving system in the light of the requirements of the site and the efficient utilization of available resources, so as to enable the work to be carried out effectively and at the least cost.

The study does not deal with the manufacture, transportation and placing of asphaltic and portland cement concrete. It does not cover the selection of compaction plant. For earthmoving, it assumes that plant and equipment will be made available from an equipment pool or will be rented, leased or purchased when required for use on earthworks sites, these decisions being taken according to availability and commitment of resources as dictated by priorities established in relation to other projects during the construction phase.

The nature, quantities and disposition of the materials to be excavated and compacted, the distance of haulage, availability of plant (Company-wise, nationally, regionally), the cost and time implications of alternative construction

methods, contract specifications and environmental factors were crucial in the determination of suitable plant and equipment for the project within the legal and contractual restraints.