PROJECT PROFILE

Title	**Optimisation of design of earthworks operations for road schemes**	NRA An tÚdarás um Bóithre Náisiúnta National Roads Authority
Contractor	Trinity College Dublin	
Contact details	Eric Farrell Department of Civil, Structural and Environmental Engineering Trinity College Dublin Dublin 2 efarrell@tcd.ie	
NRA Mentor	Michael Nolan	
Start date	Jan-10	
End date	Dec-12	
Status	On-going	
Type of project	Research Fellowship: PhD programme (Kevin Stephens)	
Project reference	NR/250/04 RFP015	

Description	Road construction is very expensive and costs are very sensitive to vertical and horizontal alignments due to the large material transport costs involved. The current approach to preliminary alignment design is largely intuitive and iterative whereby alignments are developed and costed at the planning stage, with the optimisation of alignment design unproven. Currently, there is no systematic way of optimising road design by balancing and minimising the movement of the cut and fill materials on a construction site. There is scope for considerable savings by adjusting alignments to reduce earthworks and associated transport costs. The research will help achieve better overall design, will minimise the cost of earthworks, reduce energy consumption, provide certainty of best result and achieve maximum benefit from the investigation of topography, ground conditions and geotechnical advice. The research will consist of a review of current practice, an evaluation of approaches adopted by different road authorities, a study of any existing relevant software used internationally and an assessment of data required to optimise the process. The research wi
Objectives	The objective of the research is to assist in the achievement of an optimal design solution by establishing a vertical/horizontal profile which minimises the cost of earthworks operations taking various contraints into account (design standards, topography, geotechnical information, haul barriers, environmental restrictions, and other aspects). The research will include guidelines on how this design optimisation would be implemented in Ireland, an indication of the data requirements and the potential for cost savings for typical road schemes. The project output will include the development of software to facilitate the achievement of these objectives.
Benefits	The research will enable preliminary alignment design to be optimised in terms of the movement of materials on site. It will help the NRA to move towards its strategic objective of sustainable construction by adopting greener solutions, reducing costs and maximising the benefits from investment.
Outputs	Best Practice guide for optimisation of road design. Integrated software solution, with NRA licence.