

摘要

苗栗縣鹿場地區原為原住民部落，主要有鹿場、鹿湖、鹿山等部落聚集，位處偏遠山區人煙稀少風景優美，苗 21 線為苗栗縣南庄鄉鹿場地區唯一聯外道路，平時往來通行車輛甚少。近年來政府大力推動國內觀光事業發展，2001 年民宿管理辦法實施後，鹿場地區民宿亦相繼成立，讓原本寧靜的山林熱絡起來，假日除了住宿的觀光客外，前來攀登加里山(海拔 2220m)的登山客亦絡繹不絕。苗 21 線在 1990 年代初原為碎石路面，為了因應觀光客不斷的增加，部分路段改道且予以拓寬並鋪設瀝青混凝土鋪面才有今日寬敞的道路規模，並於 2000 年初期完成拓寬。道路拓寬時為了維護行車安全而大量採用擋土構造物來填築路基，但每逢地震、豪大雨與人為破壞即發生崩塌，並造成情節不同等級之災害，不但影響交通，甚至常因道路中斷而陷於癱瘓。歷年來政府投入大筆經費在此路段維修，其經費約新台幣 5 億元，其中以 2004 年艾莉颱風時受損最為嚴重，多達新台幣 2 億元。

本研究旨在利用苗 21 線道路過去相關資料的蒐集與彙整公路歷史崩塌資料資訊，結合現地調查的成果，配合苗栗縣南庄鄉苗 21 線 10K+000~14K+500 既有道路沿線自然環境、地理、地形、水文與氣象、地質鑽探資料等相關基本資訊，瞭解此路段沿線擋土牆、護欄及道路龜裂、下陷之原因，透過相關地質特性利用邊坡穩定分析程式 STEDWIN 分析結果在平時狀態安全係數平均 1.15 趨近於臨界穩定情形，地震狀態安全係數平均 0.85、暴雨狀態安全係數平均 0.87，二者皆屬於不穩定之狀態。經探討道路坍塌原因後恰逢蘇力颱風過境，也印證了道路崩塌與探討災害發生原因相符，未來若能落實防治工法，將可提昇防、救災作業效能，延長苗 21 線道路營運服務年限，達成公路建設「減災與永續經營」之政策。

關鍵詞：邊坡穩定、崩塌、永續經營

Abstract

Aboriginal tribes in Miaoli County Lu Chang district are living in sparsely populated and remote mountainous region with beautiful scenery. The tribes primarily consist of the Lu Chang, Lu Hu and Lu Shan. Miao 21-th is the only accessible road to Lu Chang district in Nan Chuang Township Miaoli County, a road with little traffic. In recent years, the government has vigorously promoted the development of domestic tourism. In 2001, after the implementation of B's management approach, Lu Chang Area B&B's established to promote a once quiet mountain into a holiday destination for tourists with accommodation and attractions such as Jiali Shan (altitude 2,220m). In the early 1990's, Miao 21-th Line was composed from gravel but due to the increase of tourists, the road was widened to be more spacious and asphalt concrete pavement was used for construction in early 2000. The road was widened and maintenance with extensive use of traffic safety to subgrade the retaining structures. Over the years, natural disasters such as earthquakes, heavy rains and landslides caused damage of varying degrees, severely reducing the level of transport services and sometimes even causing a complete road blockage. Over the years, the government has invested large sums of money on road maintenance with maintenance costs of around NT\$500 million. Typhoon Allie in 2004 did the most serious damage, with damages up to NT\$200 million.

This study aims to use Miao 21-th to record relevant information and to collect data information of the history of the road failures, combined with the results of the present investigation with Miaoli County South Township Miao 21-th 10K+000~14K+500's natural environment along the

existing road, topography, hydrology, meteorology, geological drilling data and other basic information about this road along the retaining wall, fence and road cracks, subsidence causes, through the use of relevant geological characteristics analysis of slope stability analysis program STEDWIN in times of normality. Safety factors average 1.15 tends to stabilize the critical situation, seismic safety factor of the average state of 0.85, and the average coefficient of heavy rain security state 0.87, both belong to the unstable state that coincides with the road collapse after typhoon Suri. The study also checks the collapse to investigate the causes of disasters, consistent implementation of the future of prevention engineering methods which will enhance prevention, improve disaster relief operation's performance and to extend the road operation of Miao 21-th years of service to reach a highway construction, mitigation and sustainable management policies.

Keywords: slope stability, landslides, and sustainable management