

台北貓空纜車 T-16 塔柱邊坡整治工法之有效性評估

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摘要 本研究採用 2008 年蕃蜜颱風之降雨歷線，針對台北市貓空纜車 T-16 塔柱崩塌不穩定邊坡（以下簡稱 T-16 塔柱邊坡）進行崩塌數值模擬，並藉由崩塌前、後之地形比對，來驗證降雨入滲及穩定性數值分析程序及輸入參數之可靠性。同時，再針對 T-16 塔柱邊坡，輸入木柵地區 5、10、25 及 50 年不同回歸期之 48 小時設計雨型，來評估所採用四種整治工法之有效性。在 T-16 塔柱邊坡整治工法，施作後之降雨穩定性分析結果顯示：於未降雨之情況下，T-16 塔柱邊坡，複合型整治工法(由坡頂往坡趾方向，共配置四種工法：即上段之 RC-擋土牆及微型樁工法、中上段之地錨工法、中段之土釘工法、及下段之排樁工法)之施作，對整體邊坡之穩定性確實有大幅提升之效果(對穩定性安全係數值 FS 而言，施作前，FS=1.297；施作後，FS= 1.659)。然而，在 50 年回歸期之降雨條件下，整治工法施作前、後之 FS 值分別為 1.004 及 1.191（約提升 1.186 倍），此說明在強降雨情況下，雖然整治工法對 FS 之提升有限，但依然可發揮其應有之穩定功能，並防止邊坡在短時間內快速趨於不穩定之臨界狀態(FS ≤ 1)。

關鍵詞：T-16 塔柱邊坡、複合型整治工法、降雨穩定性分析、安全係數。

Evaluation on the Effectiveness of Stabilization Works for T-16 Tower Pier Slope of Taipei Mao-Kong Gondola

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ABSTRACT In this study, the failure mechanism of the stabilization works constructed at the down slope of T-16 tower pier, Mao-Kong gondola (or T-16 Slope) at the hillside of Taipei City was simulated using the rainfall hyetograph of Jang-Mi typhoon in 2008 and the numerical procedures and various input parameters in the rainfall-stability analyses were also verified through the comparisons of topography before and after slope failures. In addition, a series of 48 hrs design rainfalls corresponding to 5, 10, 25 and 50 years return periods were prepared using the rainfall data of Mu-Zha rainfall observation station, for the rainfall-stability analyses of T-16 Slope to evaluate the effects of the stabilization works on the overall stability of the slope. At T-16 Slope, there totally 4 types of stabilization works were constructed to stabilize the slope. From the slope top to the slope toe, the stabilization works of T-16 Slope consist of RC-retaining wall with micro-pile foundation at the up-slope, earth anchor at the up/middle-slope, soil nailing at the middle-slope and retaining pile (shear pile) at the down-slope. The stability analyses of T-16 Slope after stabilization demonstrate that the multiple stabilization works (4 types of stabilization works) can greatly improve the slope stability under dry condition and the corresponding FS value can be promoted from 1.297 before stabilization to 1.659 after stabilization. In addition, the rainfall-stability analyses from return period of 50 years indicate that the FS value can be promoted from 1.004 before stabilization to 1.191 after stabilization (increase of 1.186 times). This demonstrates that although the promotion of FS value under torrential rainfall condition is limited, the stabilization works can still function well to prevent the slope from reaching critical state (FS ≤ 1) within a short rainfall duration.

Key Words: T-16 Slope, multiple stabilization works, rainfall stability analyses, FS value

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