ANALYSIS OF PRECAST DRAINAGE MODELING APPLICATION (U-DITCH)

(Case Study: Pekan Baru - Padang Toll Road Section, Bangkinang - Pangkalan, Kampar Regency, STA 59+570)

Name	: Nutfahnul Amin
Student ID Number	: 420421414
Supervisor	: Oni Febriani, S.T., M.T.

Abstract

The development of toll road infrastructure requires a reliable drainage system to ensure structural longevity and safety. One of the critical components of this system is the precast U-shaped drainage channel (U-Ditch). However, standard U-Ditch design guidelines often do not adequately consider site-specific conditions, such as soil type and the impact of heavy vehicular loads. This study aims to evaluate the structural strength and stability of U-Ditch elements under earth pressure and truck load influences on the Trans-Sumatra Toll Road Project, Bangkinang–Pangkalan Section. The analysis was carried out using both manual calculations and numerical simulation through Plaxis 2D software. The results show that the induced bending moment on the wall is 1,39 kN·m and on the base is 2,22 kN·m, which are significantly below the design flexural capacities of 5,59 kN·m and 18,70 kN·m, respectively. Furthermore, the maximum vertical soil deformation is 0,6862 mm and the maximum lateral displacement is 17,67 mm, both of which are within acceptable safety limits. Based on these findings, the U-Ditch's dimensional and reinforcement design are concluded to meet technical requirements and are structurally stable under existing field conditions.

Keywords**:** *earth pressure, Plaxis 2D, structural stability, Truck load, U-Ditch.*