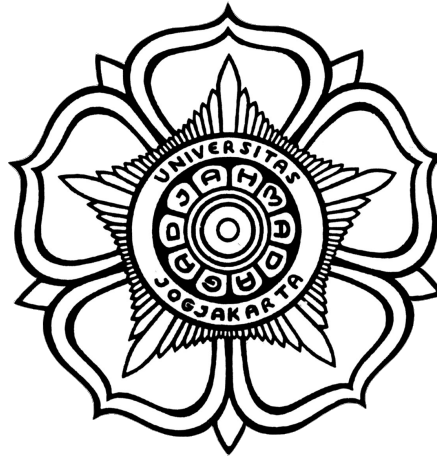


## THESIS

### **ANALYSIS OF POLYURETHANE REINFORCEMENT IN THE TRANSITION ZONE OF RAILWAY TRACK**

Thesis is submitted in partial fulfilment of the requirements for the degree of the Master of Science (M.Sc.) at Master Programme in Transport System and Engineering.



Written by:  
**WAHANA ARIS MUNANDAR**  
**21/487341/PTK/14230**

**DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING  
FACULTY OF ENGINEERING  
UNIVERSITAS GADJAH MADA  
YOGYAKARTA  
2024**

## APPROVAL SHEET

The Supervisor Team approves the thesis

### ANALYSIS OF POLYURETHANE REINFORCEMENT IN THE TRANSITION ZONE OF RAILWAY TRACK

Written by:

**WAHANA ARIS MUNANDAR**

21/487341/PTK/14230

**Supervisor:**

Ir. Latif Budi Suparma, M.Sc., Ph.D.

NIP. 19650509 199103 1 001

Date: 25.01.2024

**Co-Supervisor:**

Prof. Ir. Suryo Hapsoro Tri Utomo, Ph.D.

NIP. 19560901 198503 1 003

Date: 25.01.2024

## ACKNOWLEDGMENT SHEET

### THESIS


## ANALYSIS OF POLYURETHANE REINFORCEMENT IN THE TRANSITION ZONE OF RAILWAY TRACK

prepared and written by:  
**WAHANA ARIS MUNANDAR**  
21/487341/PTK/14230

Thesis has been defended in front of Examiners Committee  
on 22 January 2024


**Supervisor:**

Ir. Latif Budi Suparma, M.Sc., Ph.D.  
NIP. 19650509 199103 1 001

  
Date: 25.01.2024


**Co-Supervisor:**

Prof. Ir. Suryo Hapsoro Tri Utomo, Ph.D.  
NIP. 19560901 198503 1 003

  
Date: 25.01.2024

**Examiner I:**



Taqia Rahman, S.T., M.Sc., Ph.D.  
NIP. 111199007201607102

  
Date: 26.01.2024

This thesis submitted in accordance with the requirements for  
the degree of Master of Science on  
Date January 2024

Approved by,

Head of Civil and Environmental Engineering Department

  
  
**Prof. Ir. T. Faisal Fathani, S.T., M.T., Ph.D., IPU., ASEAN.Eng.**  
NIP. 197505261999031002