# DESIGN AND STABILITY CONSIDERATION OF SHALLOW FOUNDATION OF SULFURIC ACID TANK CONSTRUCTION

**UNDERGRADUATE THESIS**

**Submitted as one of requirements to**
**Obtain Sarjana Teknik**

**By:**

**MAGDALENA NOVEMBRINE NGANTU**
**022202000009**

**FACULTY OF ENGINEERING**
**CIVIL ENGINEERING STUDY PROGRAM**
**CIKARANG**

**OCTOBER, 2023**

# THESIS APPROVAL PAGE

**This approval page is for the thesis in titled:**

## Design and Stability Consideration of Shallow Foundation of Sulfuric Acid Tank Construction

**By:**
**MAGDALENA NOVEMBRINE NGANTU**
**022202000009**

Approved by:

| | |
|---|---|
| Prof. Ir. Binsar Hariandja, M.Eng., M.S., Ph.D | Dr. Ir. B. M. A. S. Anaconda Bangkara, M.T., M.SM. |
| Thesis Advisor | Head of Civil Engineering Study Program |

# PANEL OF EXAMINERS' APPROVAL

The Panel of Examiners declares that the undergraduate thesis entitled **Design and Stability Consideration of Shallow Foundation of Sulfuric Acid Tank Construction** that was submitted by Magdalena Novembrine Ngantu majoring in Civil Engineering from the faculty of Engineering was assessed and approved to have passed the Oral Examination on Oct 06th, 2023

**Panel of Examiners**

**Dr. Ir. B. M. A. S. Anaconda Bangkara, M.T., M.SM.**
**Chairman**

**Ir. Prihartono, M. Eng. Sc**
**Member**

# STATEMENT OF ORIGINALITY

In my capacity as an active student of President University and as the author of the thesis/final project/business plan stated below:

| | |
|---|---|
| Name | : Magdalena Novembrine Ngantu |
| Student ID number | : 022202000009 |
| Study Program | : Civil Engineering |
| School | : Engineering |

The Author hereby declare that author thesis/final project/business plan entitled **" Design and Stability Consideration of Shallow Foundation of Sulfuric Acid Tank Construction "**, to the best of my knowledge and belief, is an original piece of work based on sound academic principles. If there is any plagiarism detected in this thesis/final project/business plan, author willing to be personally responsible for the consequences of these acts of plagiarism and will accept the sanctions against these acts in accordance with the rules and policies of President University.

The Author also hereby declare that this work, either in whole or in part, has not been submitted to another university to obtain a degree.

Cikarang, October 2023

Magdalena Novembrine Ngantu

## SCIENTIFIC PUBLICATION APPROVAL

## FOR ACADEMIC INTEREST

As a student of the President University, The Author, the undersigned:

| | |
|---|---|
| Name | : Magdalena Novembrine Ngantu |
| Student ID number | : 022202000009 |
| Study Program | : Civil Engineering |

for the purpose of development of science and technology, certify, and approve to give President University a non-exclusive royalty-free right upon my final report with the title:

**" Design and Stability Consideration of Shallow Foundation of Sulfuric Acid Tank Construction "**

With this non-exclusive royalty-free right, President University is entitled to converse, convert, manage in a database, maintain, and publish my final report. There are to be done with the obligation from President University to mention my name as the copyright owner of my final report.

This statement The Author made in truth.

Cikarang, October 2023

Magdalena Novembrine Ngantu

# ADVISOR'S APPROVAL FOR PUBLICATION

As an academic community member of the President's University, The Author, the undersigned:

| | |
|---|---|
| Name | : Prof. Ir. Binsar Hariandja, M.Eng., M.S., Ph.D |
| ID Number | : 882 489 0019 |
| Study Program | : Civil Engineering |
| School | : Engineering |

declare that the following thesis :

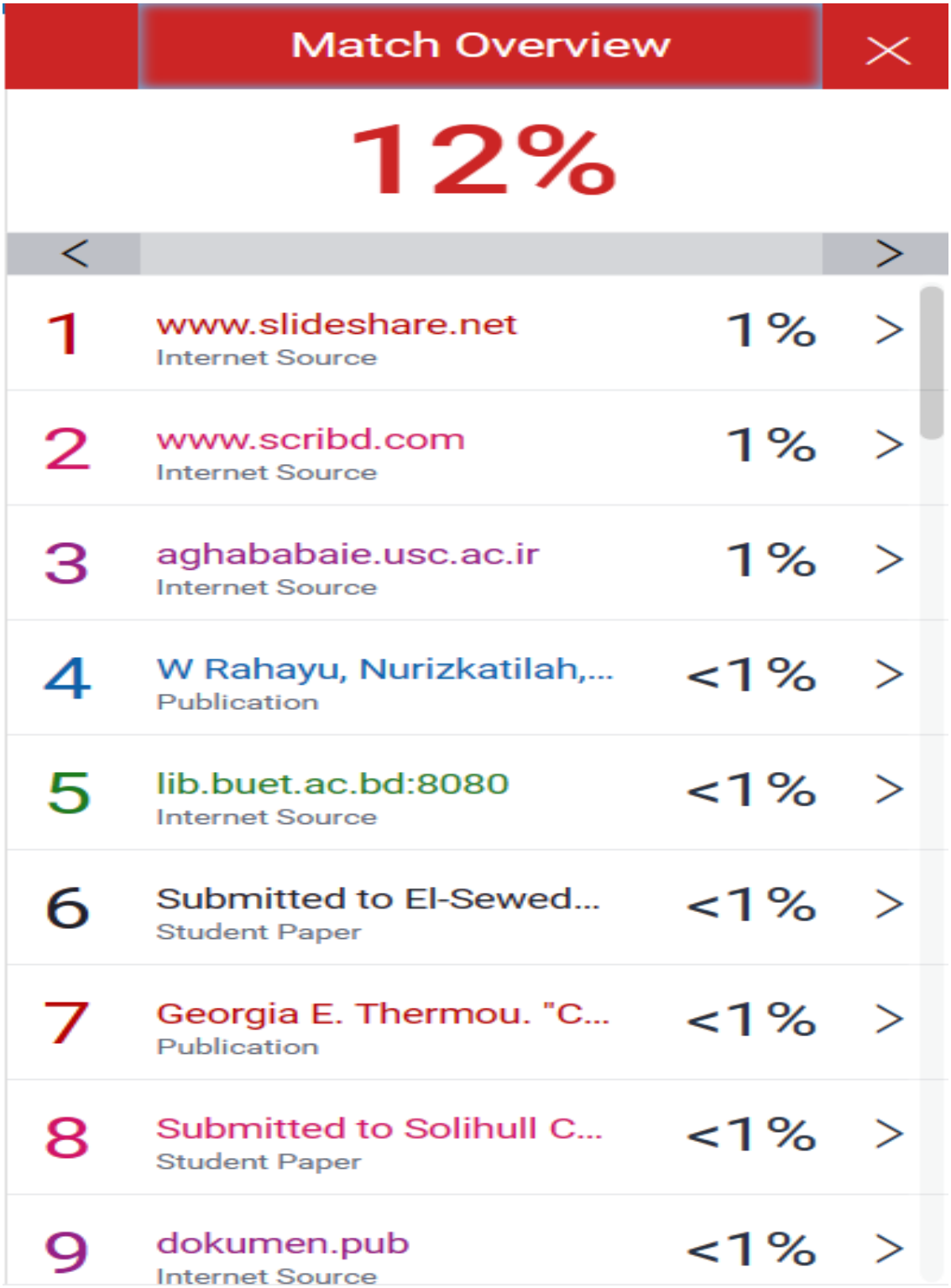
| | |
|---|---|
| Title of Thesis | : Design and Stability Consideration of Shallow Foundation of Sulfuric Acid Tank Construction |
| Thesis Author | : Magdalena Novembrine Ngantu |
| Student ID number | : 022202000009 |

will be published in **journal / institution's repository / Proceeding / Unpublish**

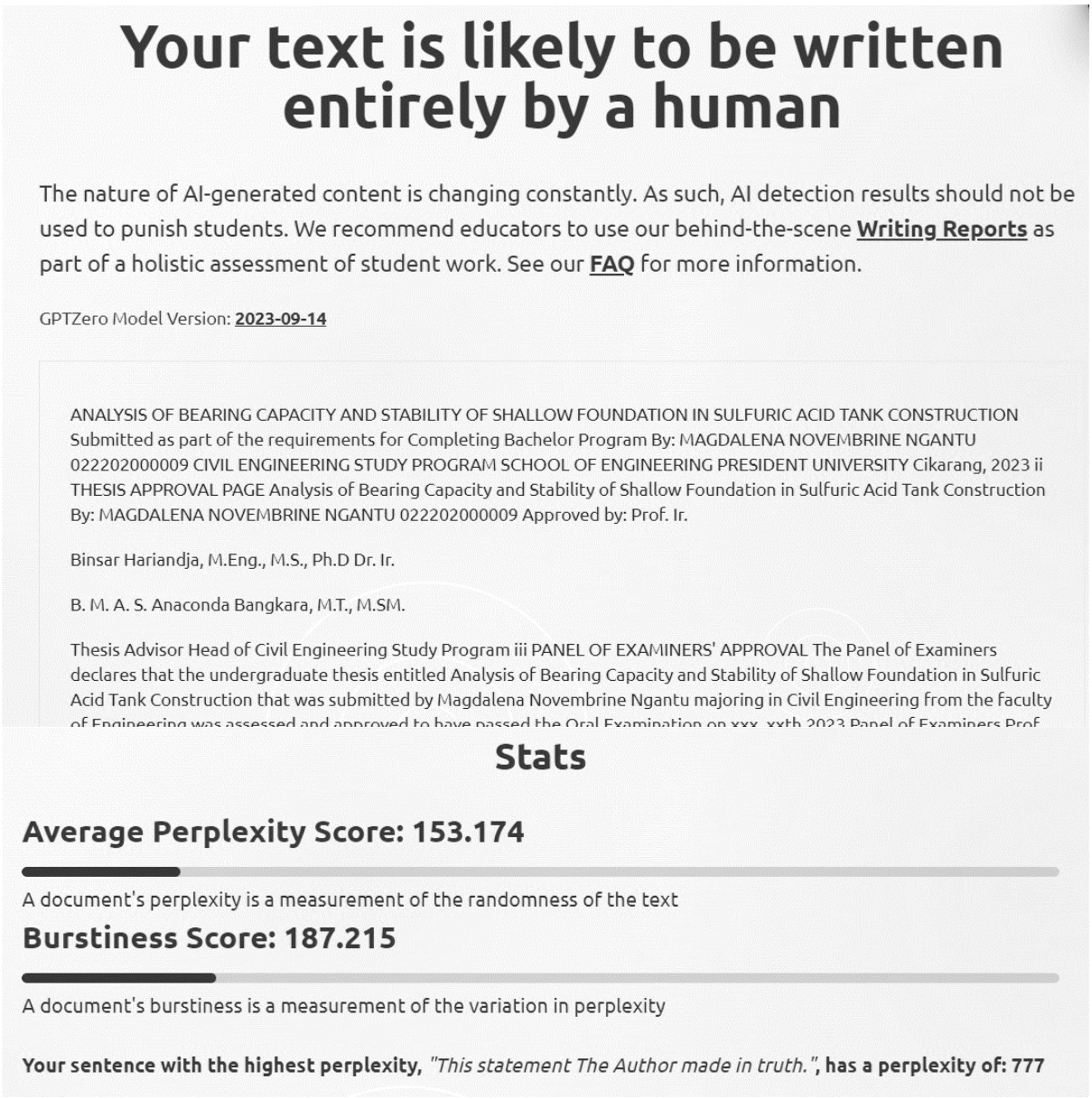
Cikarang, October 2023

Prof. Ir. Binsar Hariandja, M.Eng., M.S., Ph.D

**TURNITIN TEST RESULT**



# GPT ZERO TEST RESULT



## Your text is likely to be written entirely by a human

The nature of AI-generated content is changing constantly. As such, AI detection results should not be used to punish students. We recommend educators to use our behind-the-scene **Writing Reports** as part of a holistic assessment of student work. See our **FAQ** for more information.

GPTZero Model Version: **2023-09-14**

ANALYSIS OF BEARING CAPACITY AND STABILITY OF SHALLOW FOUNDATION IN SULFURIC ACID TANK CONSTRUCTION Submitted as part of the requirements for Completing Bachelor Program By: MAGDALENA NOVEMBRINE NGANTU 022202000009 CIVIL ENGINEERING STUDY PROGRAM SCHOOL OF ENGINEERING PRESIDENT UNIVERSITY Cikarang, 2023 ii THESIS APPROVAL PAGE Analysis of Bearing Capacity and Stability of Shallow Foundation in Sulfuric Acid Tank Construction By: MAGDALENA NOVEMBRINE NGANTU 022202000009 Approved by: Prof. Ir.

Binsar Hariandja, M.Eng., M.S., Ph.D Dr. Ir.

B. M. A. S. Anaconda Bangkara, M.T., M.SM.

Thesis Advisor Head of Civil Engineering Study Program iii PANEL OF EXAMINERS' APPROVAL The Panel of Examiners declares that the undergraduate thesis entitled Analysis of Bearing Capacity and Stability of Shallow Foundation in Sulfuric Acid Tank Construction that was submitted by Magdalena Novembrine Ngantu majoring in Civil Engineering from the faculty of Engineering was assessed and approved to have passed the Oral Examination on xxx, xxth 2023 Panel of Examiners Prof

## Stats

**Average Perplexity Score: 153.174**

A document's perplexity is a measurement of the randomness of the text

**Burstiness Score: 187.215**

A document's burstiness is a measurement of the variation in perplexity

**Your sentence with the highest perplexity,** *"This statement The Author made in truth."*, **has a perplexity of: 777**

# ABSTRACT

This final project presents the bearing capacity, settlement and rotation that occurs in the shallow foundations that are analyzed. This shallow foundation will support a tank load of 780,6 kN with a diameter of 3 m and a height of 6 m. The use of this shallow foundation is another alternative in foundation construction because in carrying out a project it will be better if the costs incurred can be minimized with a foundation design that remains optimal. Foundations are one of the most important elements in a building. Its function is to distribute structural loads and building floor loads to the ground below. Choosing the right type of foundation is very crucial because it can affect the stability, strength and overall performance of the building. Calculations of bearing capacity, settlement and rotation were analyzed on a foundation with a width of 4 m and a length of 6 meters with a depth of 0,5 m.

Based on SPT data using the Meyerhof method, The bearing capacity of a shallow foundation is 255,5 kN/m2. This is said to be safe because the soil tension is 66,4 kN. Based on the results of calculations using Coduto foundation design principles, it was found that the decrease that occurred in shallow foundations was 0,02 mm. This is said to be safe because the allowable settlement in the tank structure is 25 mm. then regarding the rotation that occurs in shallow foundations with predetermined dimensions. The analysis used uses the Bowles method, then the rotation that occurs in the rectangular foundation analyzed is quite low with a value of 0,06 radians.

*Keyword: Shallow foundation, SPT, Bearing capacity, Settlement, Rotation*

# ACKNOWLEDGEMENT

First of all, the author prays to God for the blessings and guidance you have given to her. Your grace has been my strength and my source of hope in difficult times. The author is truly grateful for your love and mercy so that the author can complete the thesis entitled *" Design and Stability Consideration of Shallow Foundation of Sulfuric Acid Tank Construction "* smoothly.

In completing this thesis, the author is aware that this thesis would not be completed without the guidance various parties' guidance, support, and assistance or wishes Dr-Ing. Erwin Sitompul, M.Sc as the Dean School of Engineering. Dr. Ir. B.M.A.S Anaconda Bangkara,M.T.,M.S.M as the Head of Civil Engineering Department. The author would also like to thank Prof. Ir. Binsar Hariandja, M.Eng., M.S., Ph.D as her first thesis advisor for his guidance, encouragement, and valuable time in guiding her throughout the process of preparing this thesis. The same appreciation for all Civil Engineering lecturers who have provided valuable material and knowledge during this lecture. The author also wants to thank her self, for the hard work, perseverance, and dedication that the author has shown throughout this journey. It's not always easy, but the author stayed committed and got through the challenges. So, the author really appreciates, for believing in her self and making this achievement possible

The author always want to express her deepest gratitude to all of her family, especially her father, her mother, for their unwavering love, support and encouragement which has been the strength of her life journey. Thank you for the sacrifices you have made, and the endless trust you have in me.

Last but not least, hopefully, the results of this research can provide benefits and can be a reference for students who will make a similar report. Of course, there are still shortcomings and errors in completing this final project. For this reason, constructive criticism and suggestions are highly expected so that they can be useful in the progress of the world of education.

Cikarang, October 2023

Magdalena Novembrine Ngantu

# TABLE OF CONTENT

**CHAPTER** **TITLE** **PAGE**

**CHAPTER** **TITLE** **PAGE**

# LIST OF FIGURES

**FIGURE** **TITLE** **PAGE**

# LIST OF TABLES

**TABLE** **TITLE** **PAGE**