INFRASTRUCTURE DESIGN PRACTICE OF BUILDING, ROAD, WATER STRUCTURE, AND COST AND TIME PLANNING

Final report

As one of the requirements to obtain a Bachelor's degree from

Atma Jaya University Yogyakarta

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INTERNATIONAL CIVIL ENGINEERING PROGRAM

FACULTY OF ENGINEERING

UNIVERSITAS ATMA JAYA YOGYAKARTA

2022

DECLARATION PAGE

I, the one who signed this, solemnly declare that this Final Project with the title:

INFRASTRUCTRE DESIGN PRACTICE OF BUILDING, ROAD, WATER STRUCTURE, AND COST AND TIME PLANNING

It is truly the result of one's own work and is not plagiarism from the work of others. All ideas, design data, and quotations, either directly or indirectly originating from other people's writings or ideas, are stated and included in writing in this Final Project Report. If it is proven in the future that this final project is the result of plagiarism, then the certificate that I obtained will be declared null and void and I will return it to the Rector of Universitas Atma Jaya Yogyakarta.

Yogyakarta, 8 May 2022

(Alvin Tresnohadi)

ABSTRACT

Infrastructure Design Practice of Building, Road, Water Structure and Cost and Time Planning is a recapitulation of project practice that has been conducted during the study of civil engineering program at Universitas Atma Jaya Yogyakarta. This recapitulation consists of design calculation and planning estimation. Each practice has different objective, so the practitioner has to learn to analyze and design of each different infrastructure practice.

In building design practice, analyzing and designing of a 4-story building is the main focus. Its aim is to design and calculate whether the building is stable or not. The term stable refers to meet the standards of SNI. In this practice the method used was by using ETABS program to design the whole structure, AutoCAD program to assist in detailing process of building structure design, and PCACOL program to assist calculating for column structure reinforcements, also manual calculations by analyzing of each structure are needed to ensure that the whole structure is stable by referring to the standards of SNI. In conclusion from the problems and methods of this practice that is done, the author can conclude that in this practice the designed building and its structures has met valid standards that refers to SNI (Standar Nasional Indonesia).

In the practice of road design, the main focus is to analyze a certain intersection that uses traffic light to control the movement of vehicles that passes through the intersection. The aim of this practice is to design the traffic lights time period and calculate the delay of vehicles. The method used was recording and count the vehicles that is passing through the intersection and calculating the data by using Webster's method. From the practice that is done the author can conclude that the design that has been calculated by using Webster's method can be used to determine the traffic lights period and delay of vehicles.

The main focus of water building design practice is to analyze the Kadirejo weir to use the average daily precipitation as the data and estimate the upcoming flood discharge of a weir building. This practice also studied about determining whether the weir is safe and stable. While the method used is Frequency Analysis

method to find the probability distribution, then using the normal logarithm method to estimate the upcoming rainfall date and using the Haspers' method to estimate the weir flood discharge. By studying this practice, the author can conclude the weir flood discharge of 200 years' future return period is 720,068 m^3/s and the weir structure is stable and safe against different factors of safety.

The last practice summary is cost and time planning, its focus is to calculate the total cost required of the project and estimate the time to completely finish a building construction project. Manual calculation method is conducted by referencing the SNI to estimate the project cost and time is the method used for this practice. By calculating the work volume of the project and the unit cost of materials and labor, the total cost of the project can be obtained. Continue to the calculation of work duration estimation, then proceed to create network diagram, bar chart, and s-curve. After the author has completed this practice, the conclusion is that the calculations made for cost and time estimation used to build the project can differ from the actual field, because some factors including weather, and the others may happen outside of SNI reference calculations.

KEYWORDS: ETABS, AutoCAD, PCACOL, Structure, SNI, Webster's method, Frequency Analysis method, Normal Logarithm distribution, Rainfall data analysis, Flood discharge, Work volume, Unit cost, Network diagram, Bar chart, S-curve.

VALIDATION

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VALIDATION

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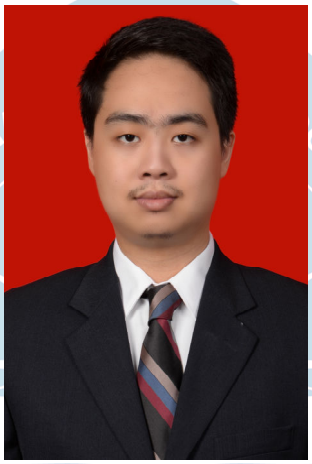

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PREFACE

The writer would like to express gratitude to all people who have been very helpful during writer's composing Final Project Infrastructure Design Exam. In the preparation of this final project the writer encountered many obstacles, but thanks to suggestions, criticism, support, and encouragement from various parties. The writer would like to express gratitude, especially to:

1. Mr. Dr. Eng. Luky Handoko, S.T., M.Eng., as the Dean of the Faculty of Engineering, Universitas Atma Jaya Yogyakarta.
2. Mr. Imam Basuki, Ir., M.T., Dr., as the Head of the Department of Civil Engineering, Faculty of Engineering, Universitas Atma Jaya Yogyakarta.
3. Mr. Johan Ardianto, S.T., M.T., as the Coordinator of the Department of International Civil Engineering Program, Faculty of Engineering, Universitas Atma Jaya Yogyakarta.
4. Mr. Dinar Gumilang Jati, S.T., M. Eng., as the coordinator of the Final Project of the Civil Engineering Study Program, Faculty of Engineering, Universitas Atma Jaya Yogyakarta.
5. Baskoro Abdi Praja S.T.M.Eng., Who is the Writer's Assigned Supervisor of this Final Project from Universitas Atma Jaya Yogyakarta.
6. Prof. Dr. Ir. A.M. Ade Lisantono, M.Eng. as Lecturer of Building Design Practice course from Universitas Atma Jaya Yogyakarta.
7. Ir. Y. Lulie, M.T. as Lecturer of Road Design Practice course from Universitas Atma Jaya Yogyakarta.
8. Agatha Padma Laksitaningtyas S.T.M.Eng., as Lecturer of Water Building Structure Design Practice course from Universitas Atma Jaya Yogyakarta.
9. Mr. Ir. AY. Harijanto Setiawan, M.Eng., Ph.D., as Lecturer of Cost and Time Management Practice course from Universitas Atma Jaya Yogyakarta.

10. All the Lecturers of the International Civil Engineering Program, Universitas Atma Jaya Yogyakarta who have been willing to teach in the field of civil engineering.
11. My parents, who were the writer's best supports during composing this final project.
12. My friends, who were the writer's group member of all this infrastructure design practice.

The writer may not be able to mention all party who have helped during composing this final project and giving their guidance. Finally, the writer hopes this report can be useful to everyone who uses it.

Surakarta, 8 May 2022

Alvin Tresnohadi

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LIST OF ABBREVIATIONS

Unit and Symbol	Complete Terms
SNI	Standar Nasional Indonesia
pcu	Passenger Car Unit
∑	Sum of
q	Flow of Vehicles
S	Saturation Flow
y	Critical value
Co	Cycle Time
q	Traffic Flow
λ	lambda
x	Degree of Saturation
d	Total Delay (pcu)
CH	Curah Hujan / Rainfall
S	Standard Deviation
Cs	Skewness Coefficient
Ck	Kurtosis Coefficient
Cv	Variation Coefficient
KT	Frequency Factor Value
P or 10^{XT}	Rainfall Plan
Rt	Rain Intensity
q	Maximum Intensity of Average Rain
α	Rainwater Flow Coefficient

β	Rain Area Reduction Coefficient
f	Area of River Catchment
Q	Flood Discharge
T	Shear Resistance
Fz	Horizontal Shear Force (Passive)
Fx	Horizontal Shear Force (Active)
Fy	Vertical Shear Force
W	Weight of Weir
∑Mp	Holding Moment against Overturning
∑Mg	Overturning Moment
C_L	Lane Seepage Rate
∑LV	Total Vertical Length
∑LH	Total Horizontal Length
H	Water Level Difference
E	Earthquake Coefficient