

FINAL PROJECT INFRASTRUCTURE DESIGN II
ROAD DESIGN PRACTICE ON JALAN RAYA UTAMA

Final Project Report

As one of the requirements to receive
bachelor's degree of Universitas Atma Jaya
Yogyakarta

By:

Fernando Revaldo Martua Situmeang

16 13 16605



INTERNATIONAL CIVIL ENGINEERING PROGRAM

FACULTY OF ENGINEERING

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STATEMENT

Name : Fernando Revaldo Martua Situmeang

Student Number : 16 13 16605

Declare truly that the Final Project is under the title

FINAL PROJECT INFRASTRUCTURE DESIGN II

It's really my own work and not the result of plagiarism from other people's work. Ideas, research data, direct and indirect quotations from other people's writings or ideas are stated in writing in this Final Project. If it is proven later that this Final Project is the result of plagiarism, then the certificate I obtained was declared null and void and I will return it to the Chancellor of University of Atma Jaya Yogyakarta.

Yogyakarta,

(.....)

ABSTRACT

INFRASTRUCTURE DESIGN PRACTICE II Fernando Revaldo Martua Situmeang, NPM : 16 13 16605, International Civil Engineering Study Program, Faculty of Engineering, Atma Jaya University Yogyakarta.

Infrastructure design practice II is a summary that includes the design and planning of several infrastructure works that are combined into one consisting of building design, road design, water structure design and cost and time planning. Because each design and planning has different goals, students are expected to be able to design, analyze and also evaluate an infrastructure design and planning that has been done before.

In principle, each design has a different focus from one design to another, such as building design practices that focus on analyzing a building, with the aim of re-checking whether the building meets the safety standards applicable to building construction by referring to SNI. The practice of road design has a focus on analyzing a road that has been selected for a review which aims to get the value of the volume of vehicles and road facilities. The practice of water structure design focuses on calculating the average daily rain and calculating the design rain discharge used to design a weir building. The practice of cost and time planning focuses on calculating the cost and time planning of a project and can also estimate the cost budget and the volume of work to be done.

In this summary there are several problems studied such as in building design, namely determining whether the construction of the office building is in accordance with Indonesian national standards in its construction, in road design there are problems that are studied, namely determining the level of volume and feasibility of facilities and other supporting factors on the road. The research location, in the design of the water structure, the problems studied are determining whether the weir and stilling pond are safe against flooding and the factors of damage to the stilling pond and in the cost and time planning of the problems

studied, namely determining the costs required in the construction project of the Widyaishwara training building. , so that from the problems studied the authors can use several methods to help solve the problems studied.

In the final project of infrastructure design II, it was found that several methods were used such as building construction using Etabs software to assist in the calculation process, on the topic of road design using the method published by Bina Marga to determine the volume of vehicles, on the topic of water building design using two The method is the Thiessen polygon method for calculating the average daily rainfall analysis and using the Wer Weduwen method in calculating the planned flood discharge and on the topic of cost and time planning using the SMM (Standard method of measurement) method which aims to determine the volume calculation in the work.

From the problems studied and the methods used, the author can conclude several results such as in the design of buildings that the design carried out has met applicable standards, namely those that refer to SNI (Indonesian national standard) which states that the building is safe from earthquakes, on the topic of road design. it can be concluded that the volume of vehicles towards Rejowinangun at peak hours is 1,950.5 SMP/hour and on the results of a review of the research location there are pavement facilities on the road that do not meet the standards in the size of the pavement in general, while for street lighting facilities are adequate because there are 3 lighting lamps on the road. road within a radius of 100 meters and on the road markings there are colors that have started to fade and there are only parking signs, on the topic of designing the Bangeran weir it can be concluded that it has a watershed area of 44,1875 km² and has a return period discharge of 25 years 182,9857 m³/second.

KEYWORDS : Safety standards, SNI standards, volume of vehicles, road facilities, average daily rain, rain discharge plans, estimated costs, volume of work, design, planning, volume of work

ABSTRAK

PRAKTIK PERANCANGAN INFRASTRUKTUR II, Fernando Revaldo Martua Situmeang NPM : 16 13 16605, Program Studi Teknik Sipil Internasional, Fakultas Teknik, Universitas Atma Jaya Yogyakarta.

Praktik perancangan infrastruktur II adalah sebuah ringkasan yang meliputi perancangan dan perencanaan beberapa pengerjaan infrastruktur yang dipadukan menjadi satu yang terdiri dari perancangan bangunan gedung, perancangan jalan, perancangan bangunan air dan perencanaan biaya dan waktu. Dikarenakan setiap perancangan dan perencanaan tersebut memiliki tujuan yang berbeda-beda maka mahasiswa diharapkan mampu untuk mendesain, menganalisis dan juga mengevaluasi sebuah perancangan dan perencanaan infrastruktur yang sudah pernah dikerjakan sebelumnya.

Pada prinsipnya setiap perancangan memiliki fokus yang berbeda antara satu perancangan dengan perancangan lainnya, seperti praktik perancangan gedung yang berfokus pada menganalisa sebuah bangunan, dengan tujuan memeriksa kembali apakah bangunan gedung tersebut sudah memenuhi standar keamanan yang berlaku pada pembangunan gedung dengan beracuan pada SNI. Praktik perancangan jalan mempunyai fokus dalam menganalisa sebuah jalan yang sudah dipilih untuk dilakukan tinjauan yang bertujuan mendapatkan nilai volume kendaraan dan fasilitas jalan tersebut. Praktik perancangan bangunan air berfokus pada perhitungan hujan harian rerata dan penghitungan debit hujan rencana yang digunakan untuk merancang sebuah bangunan bendung. Praktik perencanaan biaya dan waktu berfokus pada perhitungan dari perencanaan biaya dan waktu pada sebuah proyek dan juga dapat mengestimasi anggaran biaya serta volume pekerjaan yang akan dilakukan.

Pada ringkasan ini terdapat beberapa permasalahan yang dikaji seperti pada perancangan bangunan gedung yaitu menentukan apakah pembangunan pada gedung perkantoran tersebut apakah sudah sesuai standar nasional Indonesia dalam pengerjaan nya, pada perancangan jalan terdapat permasalahan yang dikaji yaitu

menentukan tingkat volume serta kelayakan fasilitas dan factor pendukung lainnya pada lokasi penelitian, pada perancangan bangunan air permasalahan yang dikaji yaitu menentukan bendung dan kolam olak tersebut apakah sudah aman terhadap banjir dan faktor – faktor kerusakan pada kolam olak dan pada perancangan biaya dan waktu masalah yang dikaji yaitu menentukan biaya yang dibutuhkan dalam proyek pembangunan Gedung diklat Widyaiswara, sehingga dari permasalahan yang dikaji penulis dapat menggunakan beberapa metode untuk membantu menyelesaikan permasalahan yang dikaji.

Pada pengerjaan tugas akhir perancangan infrastruktur II ini didapati beberapa metode yang digunakan seperti pengerjaan bangunan gedung yang menggunakan *software Etabs* untuk membantu dalam proses perhitungan, pada topik perancangan jalan menggunakan metode yang diterbitkan oleh Bina marga untuk menentukan volume kendaraan, pada topik perancangan bangunan air menggunakan dua metode yaitu metode poligon *Thiessen* untuk perhitungan analisis rerata hujan harian dan menggunakan metode *Wer Weduwen* dalam perhitungan debit banjir rencana dan pada topik perencanaan biaya dan waktu menggunakan metode *SMM (Standart method of measurement)* yang bertujuan untuk menentukan perhitungan volume pada pengerjaan.

Dari permasalahan yang dikaji dan metode yang digunakan penulis dapat menyimpulkan beberapa hasil seperti pada perancangan bangunan gedung bahwa perancangan yang dilakukan sudah memenuhi standar yang berlaku yaitu yang mengacu pada SNI (standar nasional Indonesia) dimana dinyatakan bahwa bangunan sudah aman dari gempa, pada topik perancangan jalan dapat disimpulkan bahwa volume kendaraan kearah Rejowinangun pada jam puncak sebanyak 1.950,5 SMP/jam dan pada hasil tinjauan kelokasi penelitian terdapat fasilitas trotoar pada jalan tersebut belum memenuhi standar dalam ukuran trotoar pada umumnya sementara untuk fasilitas lampu jalan sudah memadai dikarenakan terdapat 3 lampu penerangan pada malam dalam radius 100 meter dan pada marka jalan terdapat warna yang sudah mulai memudar serta hanya terdapat rambu parkir , pada topik perancangan bendung bangeran dapat disimpulkan memiliki Luas DAS sebesar 44,1875 km² dan memiliki debit periode ulang 25 tahun 182,9857 m³/detik.

KATA KUNCI : Standar keamanan, standar SNI, Volume kendaraan, fasilitas jalan, hujan harian rerata, debit hujan rencana, estimasi biaya, volume pekerjaan, perancangan, perencanaan, volume pekerjaan

APPROVAL SHEET

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Yogyakarta, October 2021

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At the end of the word, author realizes that the final task report is not yet perfect, so the authors need constructive criticism and advice and the author also hopes that this task is beneficial for everyone.

Yogyakarta, October 2021

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LIST OF ABBREVIATIONS AND SYMBOLS

Unit and Symbol	Complete Terms
MPa	Megapascal
m	meters
o	Level
±	Plus-Minus
kN	kilo Newton
∅	phi
mm	Millimeter
M _{lx}	X direction field moment
M _{tx}	Moment of support in the direction X
M _{ly}	Y direction field moment
M _{ty}	Y direction support moment
L _y	Plate distance on Y axis
L _x	Plate distance on X . axis
H _t	Plate thickness
V _u	Maximum shear stress
V _c	The shear stress that the concrete can withstand
Δ	bend angle
V _r	Plan speed
g	Gravity
f	Friction coefficient

cm	Centimeter
CBR	California Bearing Ratio
LS	South latitude
BT	East longitude
km	Kilometers
DAS	Watershed
Cs	Stiffness coefficient
Ck	Sharpness coefficient
Cv	Coefficient of variation
R	Daily rainfall
β	Reduction coefficient
qn	Maximum rain approx.
Qn	Flood discharge
ha	hectares
l	Liter
s	Second
lp	The distance along the contact area from the hick to the point p