DESIGN AND ANALYSIS OF A RING TYPE FOOTBRIDGE IN PALA PALA INTERSECTION, BARANGAY SAMPALOC I DASMARIÑAS CITY CAVITE

Design Project

RYAN ALEXIS B. ALBAÑEZ
MARK DIONE S. ENERIO

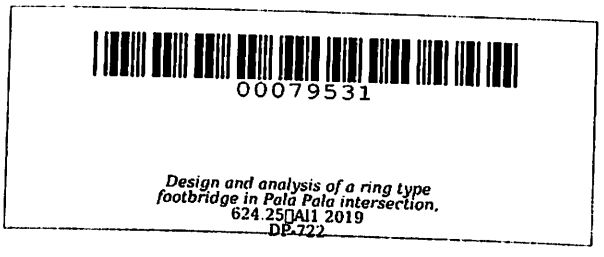
College of Engineering and Information Technology
CAVITE STATE UNIVERSITY
Indang, Cavite

June 2019

DESIGN AND ANALYSIS OF A RING TYPE FOOTBRIDGE IN PALA PALA INTERSECTION, BARANGAY SAMPALOC 1 DASMARIÑAS CITY CAVITE

Undergraduate Design Project
Submitted to the Faculty of the
College of Engineering and Information Technology
Cavite State University
Indang, Cavite

In partial fulfillment
of the requirements for the degree
Bachelor of Science in Civil Engineering



RYAN ALEXIS B. ALBAÑEZ
MARK DIONE S. ENERIO
June 2019

ABSTRACT

ALBAÑEZ, RYAN ALEXIS B. and ENERIO MARK DIONE S. Design and Analysis of a Ring Type Footbridge in Pala Pala Intersection, Barangay Sampaloc 1 Dasmariñas City Cavite Undergraduate Design Project. Bachelor of Science in Civil Engineering. Cavite State University. Indang, Cavite. June 2019. Adviser: Engr. Renato B. Cubilla.

The design project was conducted from August 2018 to March 2019. It was evaluated on April 2019 under the supervision of Engr. Renato B. Cubilla at the Department of Civil Engineering, College of Engineering and Information Technology, Cavite State University, Indang, Cavite. The study served as an application of the authors' knowledge and skills in designing structures.

The study of the Design of Steel Footbridge aimed to design a footbridge to provide faster and easier access for vehicles and pedestrian passing the Pala Pala intersection. Specifically, the design project aimed to: 1. identify the most appropriate geometric design; 2. provide architectural and structural plans; 3. perform structural analysis;4. determine the estimated cost of the structures.

The footbridge has a total length of 190.67 meters with 6 meters' vertical clearance. It connects all sides of the intersections.

The estimated cost of the footbridge is Php. 27,476,369.00

It was determined that the footbridge would be beneficial especially in the long term run and that circular footbridge would fit the proposed location pretty well. It was also concluded that the project would serve its' purpose of giving ease to the pedestrian crossers, give emphasis to the place through the footbridge's view deck and at the same time give off a nice aesthetic feel to the surroundings.

TABLE OF CONTENTS

	Page
APPOROVAL SHEET	ii
BIOGRAPHICAL DATA	iii
ACKNOWLEDGEMENT	v
PERSONAL ACKNOWLEDGEMENT	vii
ABSTRACT	xi
LIST OF APPENDIX TABLES	xv
LIST OF APPENDIX FIGURES	xvi
LIST OF APPENDICES	xviii
INTRODUCTION	1
Statement of the Problem	2
Objective of the Study	3
Significance of the Study	3
Scope and Limitation of the Study	3
Time and Place of the Study	3
Definition of Terms	4
REVIEW OF RELATED LITERATURE	6
METHODOLOGY	13
Data Gathering	13
Ocular Inspection	13
Site Inspection	13

Site Surveying 13

Structural Specification 13

Architectural design of the Project 14

Structural Design of the Project 14

Design of Steel 14

Design of Purlins..... 14

Design of Sagrod..... 15

Design of Truss..... 16

Design of Steel Post..... 18

Design of Steel Diaphragm..... 20

Design of Steel Beam and Girder 22

Design of Steel Column..... 24

Design of Bolt Connection..... 25

Design of Baseplate Anchor Bolts and Pedestal..... 26

Design of Footing..... 32

RESULTS AND DISCUSSION 35

Gathering of Imprtant Information 35

Development Plan Layout 36

Design Computation and Analysis 36

Design of Purlins..... 36

Design of Sagrod 37

Design of Truss 37

Design of Post..... 38

38

Design of Diaphragm.....

Design of Beam and Girder 39

Design of Column..... 45

Design of Bolt Connection 41

Design of Baseplate 41

Design of Anchor Bolts and Pedestal..... 42

Design of Footing..... 44

Total Estimated Project Cost..... 46

SUMMARY, CONCLUSION AND RECOMMENDATIONS 47

Summary 47

Conclusion 49

Recommendations 51

REFERENCES..... 53

APPENDICES 55

LIST OF APPENDIX TABLES

Appendix Table		Pages
1	Minimum uniform and concentrated live loads.....	58
2	Concrete proportions	59
3	Quantity of lumber for scaffolding or staging	60
4	Board foot of wood frame for post and beam per plywood form	61

21	Footbridge footing 5 details	86
22	Footbridge stair details	87
23	Footbridge stair column and footing details	89
24	Footbridge lighting layout	90
25	Footbridge lighting layout legend	91

LIST OF APPENDIX FIGURES

Appendix Figure		Pages
1	Footbridge location map	63
2	Footbridge perspective view	64
3	Footbridge front elevation	65
4	Footbridge side elevation	66
5	Footbridge roof plan	67
6	Footbridge roof framing plan	68
7	Footbridge framing plan	69
8	Footbridge deck view	70
9	Footbridge purlin detail	71
10	Footbridge truss details	72
11	Footbridge typical cross-section details	73
12	Footbridge steel post and railing details	74
13	Footbridge steel beam details	75
14	Footbridge steel column details	76
15	Footbridge pedestal column details	77
16	Footbridge pedestal column details	80
17	Footbridge footing 1 details	82
18	Footbridge footing 2 details	83
19	Footbridge footing 3 details	84
20	Footbridge footing 4 details	85

21	Footbridge footing 5 details	86
22	Footbridge stair details	87
23	Footbridge stair column and footing details	89
24	Footbridge lighting layout	90
25	Footbridge lighting layout legend	91

LIST OF APPENDICES

Appendix		Page
1	Appendix Tables.....	57
2	Appendix Figures.....	62
3	Design Computation of Footbridge.....	92
4	STAAD Analysis Results.....	254
5	Detailed Cost Estimate of Footbridge.....	256
6	Forms.....	287

DESIGN AND ANALYSIS OF A RING TYPE FOOTBRIDGE IN PALA PALA INTERSECTION, BARANGAY SAMPALOC 1 DASMARIÑAS CITY CAVITE

Ryan Alexis B. Albañez
Mark Dione S. Enerio

An undergraduate design project manuscript submitted to the faculty of Department of Civil Engineering, College of Engineering and Information Technology, Cavite State University, Indang, Cavite in partial fulfillment of the requirements for the degree of Bachelor of Science in Civil Engineering with Contribution No. CEIT-2018-19-2-113 , Prepared under the supervision of Engr. Renato B. Cubilla

INTRODUCTION

A footbridge is a bridge designed for pedestrians and in some cases cyclists, animal traffic and horse riders, rather than vehicular traffic. Footbridges complement the landscape and can be used decoratively to visually link two distinct areas or to signal a transaction. A pedestrian bridge, also called a footbridge, is simply a bridge, whether over land or water, that is designed for foot traffic. Often, footbridges are constructed to give pedestrians a safe way to cross from one side of a busy road to the other. There are also pedestrian bridges built over railroad tracks, rivers, parking lots, canyons and other areas where walking could be perilous or even impossible.

Dasmariñas, officially the City of Dasmariñas (or simply Dasma; Tagalog: Lungsod ng Dasmariñas), is the largest city in terms of population in the province of Cavite, Philippines. According to the 2015 census, it has