

## LIST OF CONTENTS

<b>TITLE PAGE</b> .....	i
<b>APROVAL PAGE</b> .....	ii
<b>BERITA ACARA</b> .....	iii
<b>STATEMENT</b> .....	iv
<b>ABSTRACT</b> .....	v
<b>ABSTRAK</b> .....	vi
<b>MOTTO</b> .....	vii
<b>DEDICATION</b> .....	viii
<b>ACKNOWLEDGEMENT</b> .....	ix
<b>LIST OF CONTENTS</b> .....	xiii
<b>LIST OF FIGURE</b> .....	xviii
<b>LIST OF TABLE</b> .....	xxii

### CHAPTER I

<b>INTRODUCTION</b> .....	1
1.1 Background .....	1
1.2 Pedestrian Suspension Bridge .....	4
1.3 Objectives of the study .....	4
1.4 Scope of the study .....	4

### CHAPTER II

<b>LITERATUR REVIEW</b> .....	5
2.1 Introduction .....	5
2.2 Pedestrian Suspension Bridge .....	5
2.2.1 Wire Cable .....	6
2.2.2 Advantage .....	7
2.2.3 Disadvantages .....	8

2.3	Structural Analysis.....	8
2.4	Component of A Pedestrian Suspension Bridge.....	9
2.5	Constructions Sequence of Pedestrian Suspension Bridge.....	10
2.5.1	Stages Mounting Suspension Bridge as following .....	11
2.5.2	Making Blocks of Anchor.....	12
2.5.3	Making Tower Foundations .....	12
2.5.4	Main Cables and Saddles Installation .....	13
2.5.5	Hanger Rod Installation .....	13
2.5.6	Installation of Transverse and Longitudinal Girder .....	13
2.5.7	Setting the Main Cables on the Angkur Block .....	14
2.5.8	Tuning Stress Cables Top in Block Anchor .....	14
2.5.9	Inputing wind and earthquake forces.....	14
2.6	Main Cable .....	15
2.7	Wind Cable.....	17
2.8	Standart Widths Pedestrian Suspension Bridge .....	18
2.9	Load of Plans .....	19
2.10	Summary of literature review .....	19

### **CHAPTER III**

	<b>RESEARCH DESIGN AND METODOLOGY .....</b>	<b>21</b>
3.1	Introduction.....	21
3.2	Preliminary Design.....	21
3.3	Pedestrian Suspension Bridge Design.....	23
3.4	Design of Upper Structure .....	24
3.5	Design of Loads .....	24
3.5.1	Additional Live Load .....	25
3.5.2	Additional Dead Load .....	26
3.6	Material requirement .....	27
3.6.1	Steel .....	27
3.6.2	Cable .....	27

3.6.3	Wood.....	28
3.7	Determination.....	28
3.7.1	Main Cable .....	29
3.7.2	Deflection .....	30
3.7.3	Maximum moment stiffener structure and the horizontal force component cable .....	31
3.7.4	Main cable length .....	31
3.7.5	Slope of the elongated bridge .....	32
3.7.6	Wind Load.....	33
3.7.7	Earthquake Load .....	33
3.8	Bridge Modeling.....	34
3.8.1	Structural modeling .....	34
3.8.2	Identifying Materials.....	34
3.8.3	Identify Section Size .....	35
3.8.4	Identifying Case Load .....	36
3.8.5	Identify Load Combinations .....	37
3.8.6	Identify the Load .....	38
3.8.7	Structural Analysis Results .....	40
3.9	Classification Program Design Manual with 3D Finite Element Modeling.....	44
3.9.1	Enter structure Data for 3 Dimensional Modeling.....	46
3.9.2	Identify Material .....	46
3.9.3	Identify Section Size .....	47
3.9.4	Identifying Case Load .....	48
3.9.5	Identify Load Combinations .....	49
3.9.6	Identify the Load .....	50
3.9.7	The Result of Structural Analysis .....	52

## **CHAPTER IV**

<b>DESIGN CALCULATION AND ANALYSIS .....</b>	<b>56</b>
--	-----------

4.1	Introduction .....	56
4.2	Preliminary Design .....	56
4.3	Structural Calculations .....	57
4.3.1	Beams Dimension .....	57
4.3.2	Cable .....	58
4.3.3	Main Cable Stress .....	59
4.3.4	Determining Deflection.....	60
4.3.5	Checking the Maximum Moment / Stress on the Beam...	62
4.3.6	Checking the Stress on the Tower.....	62
4.4	Wind Load .....	63
4.4.1	Calculation .....	64
4.5	Earthquake Load.....	65
4.6	Design and modeling .....	71
4.6.1	Modeling .....	71
4.6.2	Structural Modeling .....	72
4.6.3	Identifies the Cross-Section Size .....	73
4.6.4	Identify Load Cases .....	75
4.6.5	Identify a Combination of Loads .....	76
4.6.6	Identify the Load .....	77
4.6.7	Results of Structural Calculation Analysis Program.....	81
4.7	Analyze Wind Load .....	84
4.8	Analyze Earthquake Load .....	88
4.8.1	Define Response Spectrum Functions .....	88
4.8.2	Load Cases .....	90
4.8.3	Default Design Combos .....	92
4.8.4	Analyze .....	92
4.8.5	Result .....	94

**CHAPTER V**

<b>CONCLUSION AND RECCOMENDATION .....</b>	<b>96</b>
5.1 Conclusion .....	96
5.2 Recommendation .....	97
<b>REFERENCES .....</b>	<b>99</b>
<b>APPENDICES .....</b>	<b>101</b>

## LIST OF FIGURES

Number of Figure	Description	Page
1.1.	Basic concept of simple bridge .....	1
1.2.	Simple Beam Bridge .....	2
1.3.	Steel-Truss bridge .....	2
1.4.	Modern Steel-Truss Arch Bridge .....	2
1.5.	Suspension Bridge .....	3
1.6.	Cable-Stayed Bridge .....	3
2.1.	Scheme and section of pedestrian suspension bridge .....	10
2.2.	wind wire ties .....	15
2.3.	A typical Cables on Suspension Bridge .....	16
2.4.	Side span free scheme .....	16
2.5.	Side suspended span scheme .....	17
2.6.	Pedestrian bridge cross section for various users (according to width) .....	18
3.1.	Flowchart .....	22
3.2.	Longitudinal of pedestrian suspension bridge .....	23
3.3.	Structure and loading .....	28
3.4.	Selection Type Model .....	34
3.5.	Data input (N, mm, c) .....	35
3.6.	Data Input (N, mm, C) for profile W36X194 (tower) .....	36
3.7.	load input data identification section (N, mm, C) .....	36
3.8.	Load input data .....	37
3.9.	Data input dead load identification .....	38
3.10.	Data input identification of live load 1 (asymmetric) .....	39

<b>3.11.</b>	Data input identification of live load 2 (symmetric) .....	39
<b>3.12.</b>	Load location for dead load and symmetrical live load .....	40
<b>3.13.</b>	The location of loading for asymmetric live load .....	40
<b>3.14.</b>	The loading location for the symmetrical live load .....	40
<b>3.15.</b>	Results of analysis .....	41
<b>3.16.</b>	Variety first vibrating back and forth motion .....	41
<b>3.17.</b>	The result of axial stress due to combination 2 .....	42
<b>3.18.</b>	3-3 moments result from a combination of 1 .....	42
<b>3.19.</b>	The layout of the Model Nodes Point Bridge.....	43
<b>3.20.</b>	Model Structure Looks Longer Bridge .....	45
<b>3.21.</b>	Dimensional Structure Model .....	45
<b>3.22.</b>	Long and transverse girder .....	46
<b>3.23.</b>	Data Input (N, mm, C) .....	46
<b>3.24.</b>	Data input (N, mm, C) .....	47
<b>3.25.</b>	Data input (N, mm, C) Wood 100 x 150 .....	48
<b>3.26.</b>	Load load identification input data (N, mm, C) .....	48
<b>3.27.</b>	Data input load combination .....	49
<b>3.28.</b>	Data input dead load identification .....	50
<b>3.29.</b>	Data input identification of live load1 (asymmetric) .....	51
<b>3.30.</b>	Data input identification of live load 2 (symmetric) .....	51
<b>3.31.</b>	Load location for dead load and symmetrical live load.....	52
<b>3.32.</b>	Load location for asymmetric live load .....	52
<b>3.33.</b>	Position loading for symmetrical live load .....	52
<b>3.34.</b>	Analysis results .....	53
<b>3.35.</b>	First vibration range of back and forth motion .....	53
<b>3.36.</b>	Axial stress results from combination 2.....	54
<b>3.37.</b>	Results of 3-3 omen due to combination 1 .....	54
<b>3.38.</b>	The location of node points on the bridge model .....	55
<b>4.1.</b>	Structure and loading .....	57
<b>4.2.</b>	Inputing Koordinat for Design spectra Indonesia .....	66

4.3.	Location of Spectra design results .....	66
4.4.	Spectral Acceleration Value On Surface Of Earthquake .....	67
4.5.	Spectral acceleration .....	70
4.6.	The model of the structure appears to extend the bridge .....	71
4.7.	Selection of model type .....	72
4.8.	Selection of model type .....	72
4.9.	Data input (KN, m, C) .....	73
4.10.	Data input (KN, m, C) for W18x45 profile .....	74
4.11.	Data input (KN, m, C) for W24x130 profile .....	74
4.12.	Data input (KN, m, C) for W36x194 profile .....	75
4.13.	Load identification input data (KN, m, C) .....	75
4.14.	Load load input data 1 .....	76
4.15.	Load input data 2 .....	77
4.16.	Data Input dead load identification .....	78
4.17.	Data input identification of live load 1 (asymmetric) .....	78
4.18.	Data input identification of live load 2 (symmetric) .....	79
4.19.	Load location for dead load .....	79
4.20.	Load location for asymmetric live load .....	80
4.21.	The loading location for the symmetrical live load .....	80
4.22.	Results of analysis .....	81
4.23.	First vibration range backward motion .....	81
4.24.	Result of axial stress due to combination 1 .....	82
4.25.	Result of axial stress due to combination 2 .....	82
4.26.	3-3 moments result from a combination of 1.....	82
4.27.	3-3 moments result from a combination of 2 .....	83
4.28.	The location of the node point on the bridge model .....	84
4.29.	Load location wind load .....	84
4.30.	Data input of identification of wind load .....	85
4.31.	The location of wind load .....	86
4.32.	Aksial force .....	86



<b>4.33.</b>	Torsion .....	87
<b>4.34.</b>	Shear 2-2 .....	87
<b>4.35.</b>	Momen 3-3 .....	87
<b>4.36.</b>	Response Spectrum .....	88
<b>4.37.</b>	Define Response Spectrum Functions .....	89
<b>4.38.</b>	Response Spectrum IBC 2006 Function Definition .....	90
<b>4.39.</b>	Load Cases .....	91
<b>4.40.</b>	Load Case Data.....	92
<b>4.41.</b>	Define Load Case .....	92
<b>4.42.</b>	Generated User Load Combination .....	93
<b>4.43.</b>	Analysis Options .....	94
<b>4.44.</b>	Set Load Cases To Run .....	94
<b>4.45.</b>	Results of analysis .....	95
<b>4.46.</b>	Deformation of the structure in the combination of loading...	95
<b>4.47.</b>	The bending moment diagram of the loading combination ...	96
<b>4.48.</b>	Image result .....	96

## LIST OF TABLE

Number of Table	Description	Page
3.1.	Live load and which was deflection allowed pedestrian bridge .....	25
3.2.	Load factor table for additional dead load source: RSNI T-02-2005..	26
3.3.	Mechanical properties of structural steel .....	27
3.4.	Deflection of Node Points .....	43
3.5.	Deflection at nodes .....	55
4.1.	Coefficient drag $C_w$ .....	64
4.2.	Wind speed plan .....	64