

TABLE OF CONTENTS

COVER	i
APPROVAL PAGE	ii
APPROVAL PAGE	iii
STATEMENT PAGE.....	iv
PREFACE	v
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES.....	xi
ABSTRACT	xiv
CHAPTER 1 INTRODUCTION.....	1
1.1 Background	1
1.2 Problem Statement	2
1.3 Objectives of Research.....	2
1.4 Limitations of Research	2
1.5 Benefits of Research	2
CHAPTER 2 LITERATURE REVIEW.....	4
2.1 Slope Movement	4
2.2 Landslide Triggering Factors	5
2.3 Rainfall Modeling	8
2.4 Effect of Rainfall on Safety Factor	10
2.5 Infiltration	11
2.6 Effect of Infiltration on Slope Stability.....	12
2.7 Unsaturated Soil Concept.....	14
2.8 Soil Water Characteristic Curve (SWCC).....	14
2.9 Mitigation Measures.....	16
2.10 Originality	18
CHAPTER 3 THEORETICAL FRAMEWORK	19
3.1 Hydrological Analysis.....	19
3.1.1 Frequency analysis	19
3.1.2 Dominant rainfall duration	20
3.2 Soil Water Characteristic Curve (SWCC) Estimation	21



3.2.1	Grain size distribution fitting	21
3.2.2	Soil Water Characteristic Curve (SWCC) fittings	22
3.3	Hydraulic Conductivity Estimation.....	23
3.4	Infiltration Analysis	23
3.4.1	Green-Ampt Equation	24
3.4.2	Ponding time	27
3.5	Slope Stability Analysis	28
3.6	Geosynthetic Reinforced Slope Design	30
3.6.1	Design concept	30
3.6.2	Calculation of geosynthetic requirements	31
CHAPTER 4 RESEARCH METHODOLOGY		35
4.1	Research Sites	35
4.2	Research Procedure	35
4.3	Data	37
4.4	Research Methods	37
CHAPTER 5 RESULT AND DISCUSSION		39
5.1	General Description of Research Site	39
5.1.1	Standard Penetration Test (SPT) results.....	39
5.1.2	Geoelectrical survey results	41
5.1.3	Regional geology.....	43
5.2	Landslide Triggering Factors	44
5.2.1	Geomorphology and lithology	44
5.2.2	Hydrogeology.....	46
5.2.3	Rainfall history.....	47
5.2.4	Train load	50
5.3	Landslide Potential.....	51
5.3.1	Soil Water Characteristic Curve (SWCC) Fitting	52
5.3.2	Rainfall analysis	56
5.3.3	Rainfall duration.....	57
5.3.4	Rainfall intensity	58
5.3.5	Infiltration capacity	60
5.3.6	Depth of slip surface and factor of safety	64
5.3.7	2D infiltration analysis	69



5.3.8 Comparison of 1D and 2D infiltration analysis	70
5.4 Back analysis.....	72
5.5 Landslide Mitigation	77
5.5.1 Train loads design	78
5.5.2 Hydrological analysis	79
5.5.3 Designing geosynthetics.....	80
5.5.4 Stability of geosynthetics reinforcement slope stability	82
5.5.5 Stability of landslide mitigation using sheet piles.....	85
5.5.6 Final design	88
5.5.7 The effectiveness of landslide mitigation designs.....	90
CHAPTER 6 CONCLUSION AND RECOMMENDATION	94
6.1 Conclusion	94
6.2 Recommendation.....	95
REFERENCES	96
APPENDIX A	108
APPENDIX B.....	110
APPENDIX C.....	116
APPENDIX D	122
APPENDIX E.....	128
APPENDIX F	144