

## TABLE OF CONTENT

APPROVAL SHEET .....	ii
VALIDATION SHEET .....	iii
DECLARATION OF ACADEMIC INTEGRITY .....	iv
ACKNOWLEDGEMENT .....	v
PREFACE.....	vi
TABLE OF CONTENT.....	vii
LIST OF TABLES .....	ix
LIST OF FIGURES .....	x
LIST OF ABBREVIATION .....	xii
ABSTRACT.....	xiii
 CHAPTER 1 INTRODUCTION .....	 1
1.1 Background.....	1
1.2 Problem Statement.....	2
1.3 Research Questions.....	3
1.4 Research Objectives.....	3
1.5 Research Limitations .....	3
1.6 Research Benefits .....	4
 CHAPTER 2 LITERATURE REVIEW .....	 5
2.1 Railway Track Transition Zone .....	5
2.1.1 Transition zone problems.....	5
2.1.2 Track degradation causes at transition zone .....	7
2.1.3 Mitigation for track degradation at transition zone.....	9
2.2 Geotextile for Subgrade Reinforcement .....	10
2.3 Finite Element Analysis on Transition Zone Behaviour .....	11
 CHAPTER 3 THEORETICAL FRAMEWORK.....	 14
3.1 Railway Track Transition Design.....	14
3.1.1 Railway track structure .....	14
3.1.2 Ground improvement.....	14
3.1.3 Reinforcement Mechanism of Geotextile.....	15
3.2 Three-Dimensional Track Analysis and Plaxis 3D.....	17
3.3 Bearing Capacity and Track Stiffness .....	18
3.3.1 Bearing Capacity .....	18
3.3.2 Track Stiffness and Track Modulus.....	19



<b>CHAPTER 4 METHODOLOGY .....</b>	<b>23</b>
4.1 Research Procedure.....	23
4.2 Data and Model for Three-Dimensional Finite Element Analysis .....	25
4.2.1 Substructure model .....	25
4.2.2 Superstructure model .....	27
4.2.3 Moving load model.....	31
4.3 Research Instrument and Parameter .....	32
4.3.1 Model Characteristics .....	32
4.3.2 Material Behaviour of the model.....	32
4.4 Analytical Method .....	34
 <b>CHAPTER 5 RESULT AND DISCUSSION .....</b>	 <b>35</b>
5.1 Design for Geotextile Reinforced Transition Zone .....	35
5.1.1 Geotextile reinforcement on the transition zone.....	35
5.1.2 Geotextile layer arrangement.....	35
5.1.3 Geotextile type used for the design .....	37
5.2 Track Behaviour at the Transition Zone .....	39
5.2.1 Track displacement along the transition zone .....	39
5.3 Analysis of Track Displacement and Track Stiffness.....	43
5.3.1 Track comparison between approach block displacement in each condition and track displacement in the open track .....	43
5.3.2 The effect of geotextile reinforcement on track stiffness and track modulus.....	45
 <b>CHAPTER 6 CONCLUSSION AND RECOMMENDATION .....</b>	 <b>47</b>
6.1 Conclusion .....	47
6.2 Recommendations.....	48
 <b>REFERENCES .....</b>	 <b>49</b>
<b>APPENDIX A: COMPARISON OF GEOTEXTILE PROPERTIES .....</b>	<b>54</b>
<b>APPENDIX B: OBSERVATION NODE POINTS.....</b>	<b>55</b>
<b>APPENDIX C: FINITE ELEMENT ANALYSIS RESULT.....</b>	<b>56</b>