

TABLE OF CONTENTS

CERTIFICATION SHEET	ii
APPROVAL SHEET	iii
STATEMENT	iv
ACKNOWLEDGMENTS.....	v
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES.....	x
ABSTRACT	xiii
<i>ABSTRAK</i>	xiv
CHAPTER I	1
1.1 Background.....	1
1.2 Research Statement.....	2
1.3 Objectives	2
1.4 Limitations.....	2
1.5 Outcomes	2
CHAPTER II	4
2.1 Previous Studies	4
2.1.1 Overview of prefabricated buildings.....	4
2.1.2 Lateral resisting system for prefabricated structures.....	5
2.1.3 Existing prefabricated beam–column joint systems.....	7
2.1.4 Clamped pocket mechanism.....	9
2.2 Modeling of Preload Bolts.....	10
2.3 Research Novelty.....	11
CHAPTER III.....	13
3.1 Hysteretic and Skeleton Curve	13
3.2 Joint Stiffness	13
3.3 Ductility Coefficient.....	14
3.4 Energy Dissipation Capacity	14
3.5 Moment Frame Systems	15
3.6 Material Failure Theory.....	15
3.7 Cyclic Loading Protocol.....	16

3.8	Preload Bolt	16
3.9	Cyclic Plasticity	17
3.9.1	Bauschinger's effect	17
3.9.2	Cyclic hardening–softening.....	17
3.10	The Hardening Rule for Cyclic Loading	18
3.10.1	Isotropic hardening model.....	19
3.10.2	Kinematic hardening model	19
3.10.3	Combined (isotropic–kinematic) hardening model.....	20
CHAPTER IV		21
4.1	Research Location	21
4.2	Research Procedure	21
4.3	Experimental Setup.....	21
4.3.1	Structure of the connection	21
4.3.2	Design of specimens.....	24
4.3.3	Material properties	24
4.3.4	Test setup and loading protocol	26
4.4	Finite Element Model	27
4.4.1	Meshing technique	28
4.4.2	Interactions and constraints	29
4.4.3	Boundary and loading conditions.....	29
4.4.4	Steel material model calibration.....	29
4.4.5	Finite element model of CSPM specimens	32
4.5	Research Data and Tools	44
4.6	Research Parameters.....	44
4.7	Analytical Method	45
CHAPTER V		46
5.1	Experimental Investigations	46
5.1.1	Hysteretic behavior	46
5.1.2	Stiffness evaluation	46
5.1.3	Skeleton curves	48
5.1.4	Ductility performance	49
5.1.5	Energy dissipation	49
5.1.6	Strain analysis	52

5.1.7	Failure modes	52
5.2	Finite Element Simulations	54
5.2.1	Inelastic deformation.....	54
5.2.2	Hysteretic behavior	54
5.2.3	Stiffness evaluation	63
5.2.4	Skeleton curves	64
5.2.5	Ductility performance	66
5.2.6	Energy dissipation	68
CHAPTER VI		70
6.1	Conclusions	70
6.2	Recommendations	71
REFERENCES		72