MONOTONIC AND CYCLIC PERFORMANCE OF STRUCTURALLY INSULATED PANEL SHEAR WALLS

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(ABSTRACT)

The majority of residential construction and a significant portion of light commercial and industrial construction has been, and will continue to be light-framed timber construction. In recent years, innovations have surfaced to improve upon light-framed construction. Structurally insulated panels (SIPS) are gaining popularity due to their superior energy efficiency and ease of construction. Light-framed timber construction has proven to be trustworthy in high-wind and seismic regions due to its lightweight construction and numerous redundancies. Shear walls, along with floor and roof diaphragms, resist lateral loads in a timber structure. In the past, research has focused on the static racking performance of light-framed shear walls. More recently, research has been focused on the cyclic and dynamic performance of shear walls.

To the author’s knowledge, no other research is reported in the literature on the cyclic performance of SIPS shear walls. It is important to understand and quantify the monotonic and cyclic response of shear walls. In this study, twenty-three full-scale shear walls were tested under monotonic loading and sequential phased displacement cyclic loading. Four different wall configurations were examined. Monotonic and cyclic performance of the shear walls and monotonic and cyclic testing procedures are compared. Response of SIPS shear walls is also compared to the response of light-framed shear walls based on capacity, stiffness, ductility, energy dissipation, damping characteristics, and overall behavior. Results of this study will provide useful information regarding the performance of SIPS shear walls and similar systems subjected to static, cyclic, and dynamic lateral loads.
DEDICATION

This thesis is dedicated to my parents, Jerry and Betty Jamison. Thank you for always being there and for teaching me the importance of hard work and determination.
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3.6.1 Monotonic Testing Procedures ........................................................... 22
3.6.2 Definition of Properties....................................................................... 22
  3.6.2.1 Load-Deflection Parameters....................................................... 22
  3.6.2.2 Equivalent Elastic-Plastic Curve Analysis................................. 23
3.7 Cyclic Tests ............................................................................................ 24
  3.7.1 Cyclic Testing Procedure ............................................................... 24
  3.7.2 Definition of Properties................................................................... 26
    3.7.2.1 Test Parameters ....................................................................... 26
    3.7.2.2 Equivalent Elastic-Plastic Curve Analysis................................. 27
    3.7.2.3 Cyclic Energy Analysis........................................................... 29
3.8 Summary .................................................................................................. 31

4. Monotonic Shear Wall Test Results ............................................................. 32
  4.1 Introduction ............................................................................................ 32
  4.2 Results ................................................................................................... 32
    4.2.1 Strength and Deflection .............................................................. 35
    4.2.2 Elastic Stiffness .......................................................................... 38
    4.2.3 Ductility ...................................................................................... 40
  4.3 Wall Behavior ....................................................................................... 41
    4.3.1 Uplift of Wall Ends ...................................................................... 41
    4.3.2 General Wall Behavior ............................................................... 42
    4.3.3 Failure Modes ............................................................................. 43
  4.4 Conclusions ........................................................................................... 44
  4.5 Summary ................................................................................................ 45

5. Cyclic Shear Wall Test Results ................................................................. 46
  5.1 Introduction ............................................................................................ 46
  5.2 Results ................................................................................................... 46
    5.2.1 Envelope Curve Data ................................................................. 46
      5.2.1.1 Strength and Deflection ......................................................... 47
      5.2.1.2 Elastic Stiffness .................................................................... 51
5.2.1.3 Ductility

5.2.2 Cyclic Data

5.2.2.1 Cyclic Stiffness

5.2.2.2 Hysteretic Energy

5.2.2.3 Potential Energy

5.2.2.4 Equivalent Viscous Damping Ratio

5.3 Wall Behavior

5.3.1 Uplift of Wall Ends

5.3.2 Failure Modes

5.4 Conclusions

5.5 Summary

6. Comparisons Between Monotonic and Cyclic Tests

6.1 Introduction

6.2 Test Parameters

6.2.1 Capacity and Drift

6.2.2 Elastic Stiffness

6.2.3 Ductility

6.3 Wall Behavior

6.4 Conclusions

6.5 Summary

7. Comparisons With Light-Frame Construction

7.1 Introduction

7.2 Light-Framed Construction Data

7.3 Test Parameters

7.3.1 Capacity

7.3.2 Elastic Stiffness

7.3.3 Ductility

7.3.4 Hysteretic Energy

7.3.5 Equivalent Viscous Damping Ratio
# LIST OF TABLES

Table 3.1 – Description of Four Wall Configurations Tested.......................... 15
Table 4.1 – Monotonic Values for Load Resistance, Drift, Elastic Stiffness, and
            Ductility at Maximum, Failure, and Yield. ....................................... 36
Table 4.2 – Maximum Wall End Displacements Through Failure of Walls........ 41
Table 4.3 – Values of Set and Set Ratio after ASTM E564 Load Removal.......... 42
Table 5.1 - Initial Cycle Values for Load Resistance, Drift, Elastic Stiffness, and
            Ductility at Maximum, Failure, and Yield. ....................................... 48
Table 5.2 - Stabilized Cycle Values for Load Resistance, Drift, Elastic Stiffness,
            and Ductility at Maximum, Failure, and Yield. .............................. 49
Table 5.3 - Initial Values of Load Resistance, Cyclic Stiffness, Hysteretic Energy,
            Potential Energy, and Equivalent Viscous Damping Ratio at Yield and
            Max. .................................................................................................. 55
Table 5.4 - Stabilized Values of Load Resistance, Cyclic Stiffness, Hysteretic
            Energy, Potential Energy, and equivalent Viscous Damping Ratio at
            Yield and Max.................................................................................. 56
Table 5.5 - Maximum Wall End Displacements Through Failure of Wall........... 66
Table 6.1 – Values of Strength and Deflection at Capacity for Initial and Stabilized
            Cyclic and Monotonic Load Cases. ..................................................... 70
Table 6.2 – Values of Elastic Stiffness for Initial and Stabilized Cyclic and
            Monotonic Load Cases......................................................................... 72
Table 6.3 – Values of Ductility Ratio for Initial and Stabilized Cyclic and
            Monotonic Load Cases......................................................................... 73
Table 6.4 – Values of Drift at Yield and Failure for Initial and Stabilized Cyclic and
            Monotonic Load Cases......................................................................... 74
Table 7.1 – Monotonic and Cyclic Results for Peak Load and Initial Stiffness from
            Dolan (1989). ..................................................................................... 78
Table 7.2 – Monotonic and Cyclic Results For Peak Load, Elastic Stiffness, Ductility, Hysteretic and Potential Energies, and Equivalent Viscous Elastic Damping Ratio From Johnson (1997)................................. 79
Table 7.3 – Monotonic Results of Peak Load, Elastic Stiffness, and Ductility for Walls With and Without Tie-down Anchors From Heine (1997)........... 80
Table 7.4 – Cyclic Results of Peak Load, Elastic Stiffness, Ductility, Hysteretic Energy, and Equivalent Viscous Damping Ratio for Initial and Stabilized Cycles from Heine (1997).......................................................... 81
Table 7.5 – Values of Capacity per Foot of Length of Wall for SIPS Compared with Perforated, Conventional, and Engineered Construction.............. 83
Table 7.6 – Values of Elastic Stiffness per Foot of Length of Wall for SIPS Compared with Perforated, Conventional, and Engineered Construction................................................................. 86
Table 7.6 – Values of Ductility Ratio of Wall for SIPS Compared with Perforated, Conventional, and Engineered Construction. .............................. 88
Table 7.7 – Values of Ductility Ratio of Wall for SIPS Compared with Perforated, Conventional, and Engineered Construction. .............................. 90
Table 7.8 – Values of Equivalent Viscous Damping Ratio of Wall for SIPS Compared with Perforated, Conventional, and Engineered Construction. ................................................................. 91
LIST OF FIGURES

Figure 3.1 – Boundary Conditions of Four Different Wall Configurations ............ 17
Figure 3.2 – Top and Bottom Plate Connection to Test Frame Detail ..................... 20
Figure 3.3 – Location of 6 Channels of Data Collection ...................................... 21
Figure 3.4 – Equivalent Elastic Plastic Curve Analysis ........................................ 23
Figure 3.5 – Displacement History for Cyclic Loading Procedure ......................... 25
Figure 3.6 - Initial and Stabilized Cycles from Displacement History ..................... 26
Figure 3.7 – Typical Hysteretic Response and Initial and Stabilized Envelope
Curves .............................................................................................................. 28
Figure 3.8 - Typical Hysteresis Loop .................................................................... 29
Figure 4.1 – Load-Drift Curves for Wall A .............................................................. 33
Figure 4.2 – Load-Drift Curves for Wall B ............................................................. 34
Figure 4.3 – Load-Drift Curves for Wall C ............................................................. 34
Figure 4.4 – Load-Drift Curves for Wall D ............................................................. 35
Figure 4.5 – Monotonic Capacities for the Four Different Wall Configurations .... 37
Figure 4.6 – Average values of Elastic Stiffness for Four Different Wall
Configurations .................................................................................................. 39
Figure 4.7 – Average Values of Ductility for the Four Different Wall
Configurations .................................................................................................. 40
Figure 5.1 – Average Initial and Stabilized Capacities for Walls ......................... 50
Figure 5.2 – Average Initial and Stabilized Elastic Stiffness Values for Walls ...... 52
Figure 5.3 – Average Initial and Stabilized Ductility Ratios for Walls ................. 53
Figure 5.4 – Average Initial and Stabilized Cyclic Stiffness Values at Yield and
Maximum Load Resistance for Walls ............................................................... 57
Figure 5.5 – Average Initial Cyclic Stiffness at Average Interstory Drifts for the
Four Wall Configurations ................................................................................. 57
Figure 5.6 – Average Stabilized Cyclic Stiffness At Average Interstory Drifts for
the Four Wall Configurations .......................................................................... 58
Figure 5.7 – Average Initial and Stabilized Hysteretic Energy Values at Yield and Maximum Load Resistance for Walls. ...................................................................... 59
Figure 5.8 – Average Initial Hysteretic Energies at Average Interstory Drift for the Four Wall Configurations...................................................................... 60
Figure 5.9 – Average Stabilized Hysteretic Energies at Average Interstory Drift for the Four Wall Configurations. ............................................................... 60
Figure 5.10 – Average Initial and Stabilized Potential Energy Values at Yield and Maximum Load Resistance for Walls. ................................................... 62
Figure 5.11 – Average Initial and Stabilized Equivalent Viscous Damping Ratios at Yield and Maximum Load Resistance for Walls............................... 64
Figure 5.12 – Average Equivalent Viscous Damping Ratio at Average Interstory Drifts for the Four Wall Configurations......................................................... 64
Figure 5.13 – Average Stabilized Equivalent Viscous Damping Ratio At Average Interstory Drifts for the Four Wall Configurations. .............................. 65
Figure 6.1 – Comparison of Capacities for Initial and Stabilized Cyclic and Monotonic Testing Procedures.............................................................. 71
Figure 6.2 – Comparison of Ductility for Initial and Stabilized Cyclic and Monotonic Testing Procedures. ................................................................. 73
Figure 7.1 – Values of Capacity Compared for the Four SIPS Walls and Perforated Conventional, and Engineered Construction Values......................... 84
Figure 7.2 – Values of Elastic Stiffness Compared for the Four SIPS Walls and Perforated, Conventional, and Engineered Construction Values ........... 87
Figure 7.3 – Values of Ductility Ratio Compared for the Four SIPS Walls and Perforated, Conventional, and Engineered Construction Values. ....... 89