

Test Report

“Airbag Testing of a One-way Out-of-plane Unreinforced Masonry (URM) Wall-Testing With Pre-compression Load”

Performed: 23th July 2008

Laboratory: Civil Test Hall, The University of Auckland

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Airbag Testing of a One-way Out-of-plane Unreinforced Masonry (URM) Wall - Testing With Pre-Compression Load

Introduction: This report presents details of supplementary airbag testing performed in the Civil Test Hall, The University of Auckland on 23th of July. This testing provides additional data on how pre-compression loading affect the out-of-plane behaviour of URM walls. The wall specimen used in the previous program (airbag testing on 17th of July) was used in this testing. Prior to testing, the wall specimen had only a horizontal crack above its mid-height, which was a result of the previous testing.

1. Setup Description

The same setup as in the previous testing was used. It is shown in Figure 1(a). Axial load was applied through the pre-compression lever shown in the setup. Figure 1(b) shows the weight suspended from the pre-compression lever. The lever amplifies the suspended weight by a factor of 2.60. The test was performed with two axial load levels with an increment of about 2 kN. Table 1 gives the corresponding axial stresses resulting from the axial loading.



Figure 1: (a) Test Setup



(b) Pre-compression load

Table 1: Pre-compression load

Test	Axial load, (kN)	Axial stress, (MPa)
1	1.92	0.02
2	3.86	0.04

2. Observation of the Test

The test was performed with the same procedure as what used on 17th July testing. No other damage was observed to the wall. It was surprising that how the axial pre-compression could affect the behaviour of the wall. The maximum lateral pressure for testing with 0.04 MPa overburden was as high as 1.6 kPa comparing with 1.15 kPa, which corresponds to testing with zero pre-compression.

3. Test Results

The displacement and load histories and the force-displacement curve derived from the results from the testing can be found in Figure 2 through 7. Figure 8 illustrate the dependence of the behaviour chart on the level of the pre-compression.

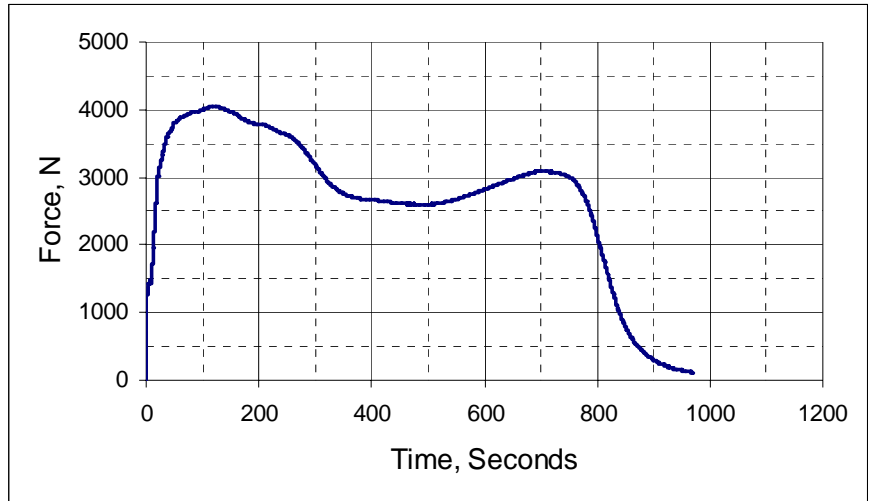


Figure 2: Loading History (0.02 MPa Overburden)

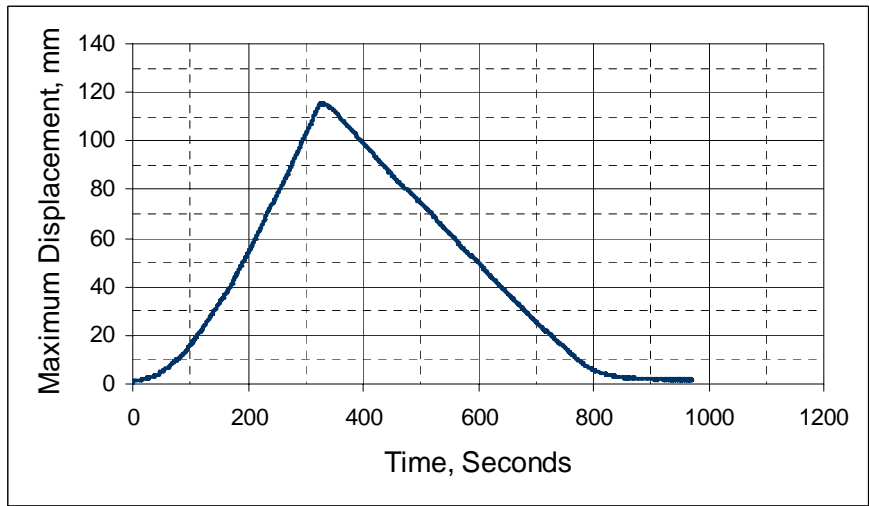


Figure 3: Displacement History (0.02 MPa Overburden)

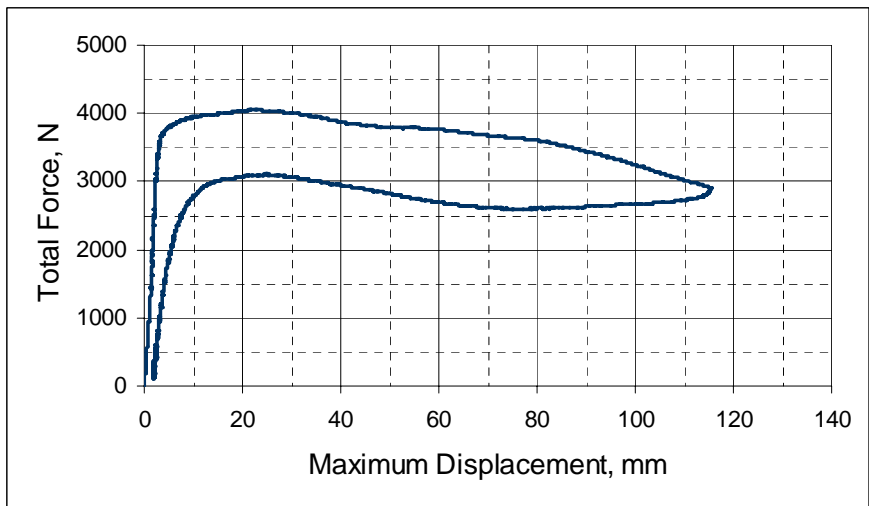


Figure 4: Force-Displacement Curve (0.02 MPa Overburden)

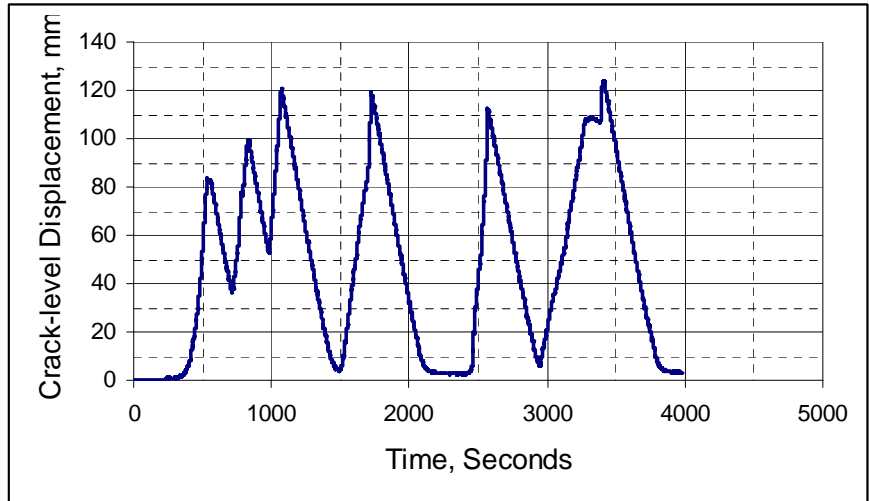


Figure 5: Loading History (0.04 MPa Overburden)

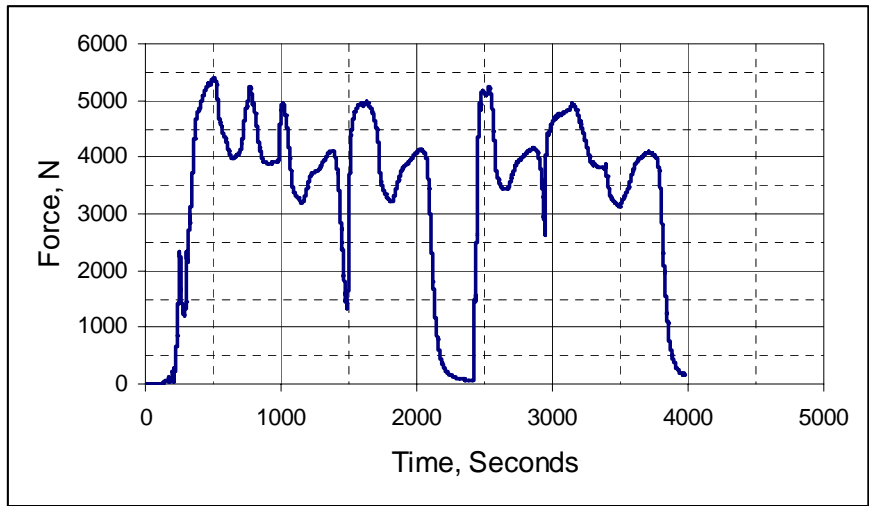


Figure 6: Displacement History (0.04 MPa Overburden)

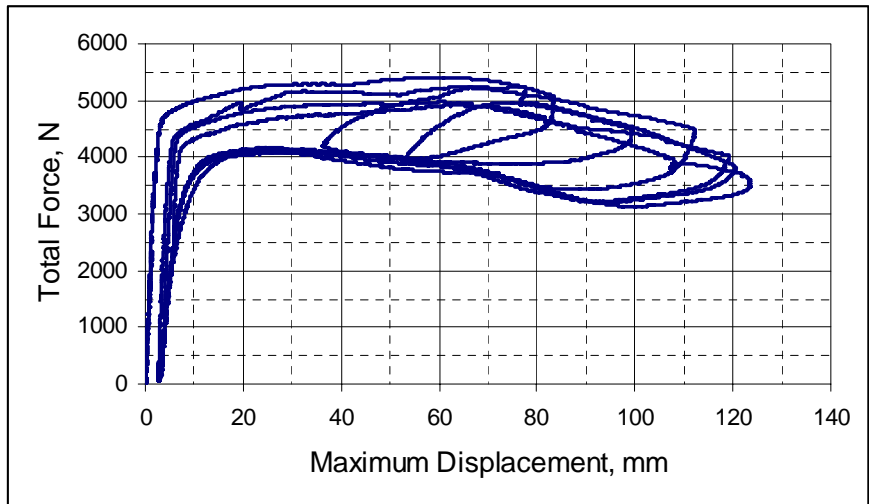


Figure 7: Force-Displacement Curve (0.04 MPa Overburden)

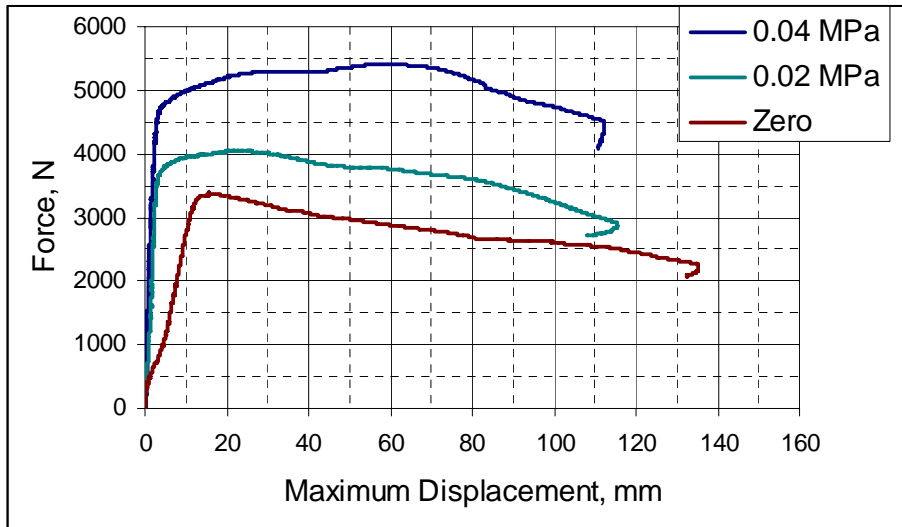


Figure 8: Dependence of Force-Displacement Curve on Overburden