

TEST PROGRAM
"WIND LOAD RESISTANCE"
"STONETILE" CLADDING SYSTEM

Submitted To:

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1.0 INTRODUCTION

AGRA Earth & Environmental Limited (AEE) was retained by Stonetile (Canada) Ltd. to conduct a test program to evaluate the "Wind Load Resistance" of the "Stonetile" cladding system. All testing was conducted in accordance with evaluation requirements specified by the Canadian Construction Materials Centre (CCMC). The "Stonetile" system is an innovative cladding system designed by Stonetile (Canada) Ltd. to compete with the existing cladding systems on the basis of performance and cost. Testing was conducted in December 1996 and was viewed by Mr. Alan Dalglish, P.Eng..

2.0 DESCRIPTION OF "STONETILE" SYSTEM

The "Stonetile" system consists of concrete tiles with embedded steel inserts on the back side which are fastened to the substrate. The tile is produced in two sizes of 450x300x16 mm and 450x450x16 mm, and in various finishes and colours. Various other architectural shapes (i.e corbels, cornices, etc.) are also available.

The fasteners are made of 0.5 mm thick, 25 mm wide galvanized steel strips. These strips are punched out to have a spine 6 mm wide and 3 mm deep and gang nails protruding into the concrete. The gang nails are embedded in concrete during casting. The top of the fasteners protrude about 10 mm above the tile with a hole for a screw that will fasten the tile to the substrate. The bottom part of the insert protrude about 5 mm below the tile so that it will slide into the fastener of the tile below it. Steel channels made out of 30 gauge galvanized metal are provided at the base and top. These channels are perforated to ensure adequate ventilation between the tiles and the substrate.

Detailed drawings of the "Stonetile" wall system attached as Appendix 'A', were submitted by Stonetile (Canada) Ltd. and reviewed by (AEE).

3.0 MATERIALS

3.1 CONCRETE

The concrete used to cast the Stonetile was designed to meet the following specifications:

Compressive Strength	20 MPa
Slump	100 mm

The following mix proportion was used to achieve the above specification:

	<u>kg/m²</u>
Cement	335
Water	185
Aggregate - Coarse	878
Aggregate - Fine	799

Superplasticizer was used to achieve the design slump and air content. All the material used in producing this concrete conformed to CSA-A23.1 - "Concrete Materials and Methods of Concrete Construction".

1. Sustained Wind Load
2. Cyclic Load Wind Load
3. Gust Wind Load
4. Maximum Deflection

Diagram #2 illustrates this test regime.

5.0 TEST RESULTS

For monitoring purposes, five linear digital deflection gauges were installed mid-span on the vertical 2x4s to measure horizontal deflection during the testing procedure. Please note that the manometer monitoring the pressure behind the "Stonetile" cladding indicated little or no pressure difference across the cladding system.

5.1 SUSTAINED WIND LOAD TEST

The specimen was subjected to the "Sustained Load Test" regime shown in Diagram #2. Inspection of the specimen at the completion of this phase indicated no damage to the "Stonetile" system. The maximum measured mid-span deflection of the 2x4 wall members was 2.81 mm @ 600 Pa (110 km/h) and 3.31mm @ -600 Pa.

5.2 CYCLIC WIND LOAD TEST

The specimen was subjected to the "Cyclic Load Test" regime shown in Diagram #2. Inspection of the specimen at the completion of this phase indicated no damage to the "Stonetile" system. At the end of the 2000 cycles, the maximum measured mid-span deflection of the 2x4 wall members was 2.72 mm at 800 Pa (130 km/h) positive wind load and 9.28 mm at -800 Pa negative wind load.

5.3 GUST WIND LOAD TEST

The specimen was subjected to the "Gust Load Test" regime shown in Diagram #2. Inspection of the specimen at the completion of this phase indicated no damage to the "Stonetile" system. The maximum measured mid-span deflection of the 2x4 wall members was 4.11 mm @ 1200 Pa (150 km/h) and 7.93 mm @ -1200 Pa.

5.4 MAXIMUM DEFLECTION TEST

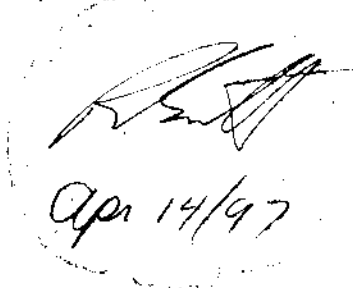
The specimen was subjected to the "Deflection Test" regime shown in Diagram #2. The maximum deflection of the 2x4 wall members was 5.44 mm @ 1440 Pa (170 km/h) and 9.29 mm @ -1440 Pa.

6.0 DISCUSSION

The "Stonetile" system appeared to be unaffected by any of the wind load test procedures. No visible deterioration was noted. Although pressure equalization vents are normally installed, the lack of grout in the test specimen enhanced the pressure equalization observed in the system. This level of pressure equalization performance would not be expected in an actual installation.

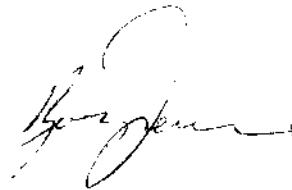
AGRA Earth & Environmental Limited

Prepared by:

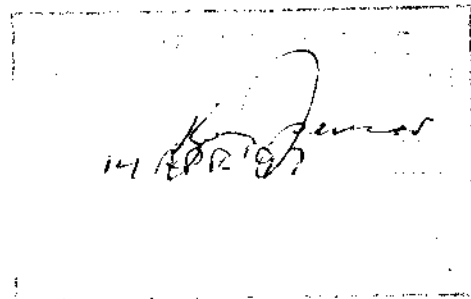


Randy Smith, P. Eng.
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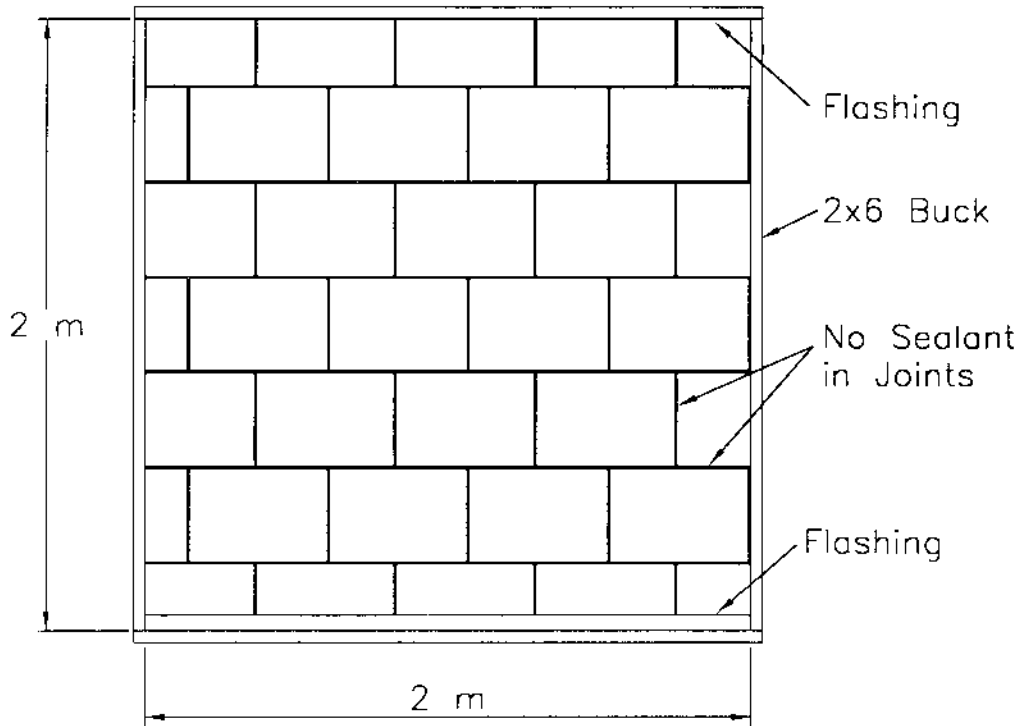
Reviewed by:



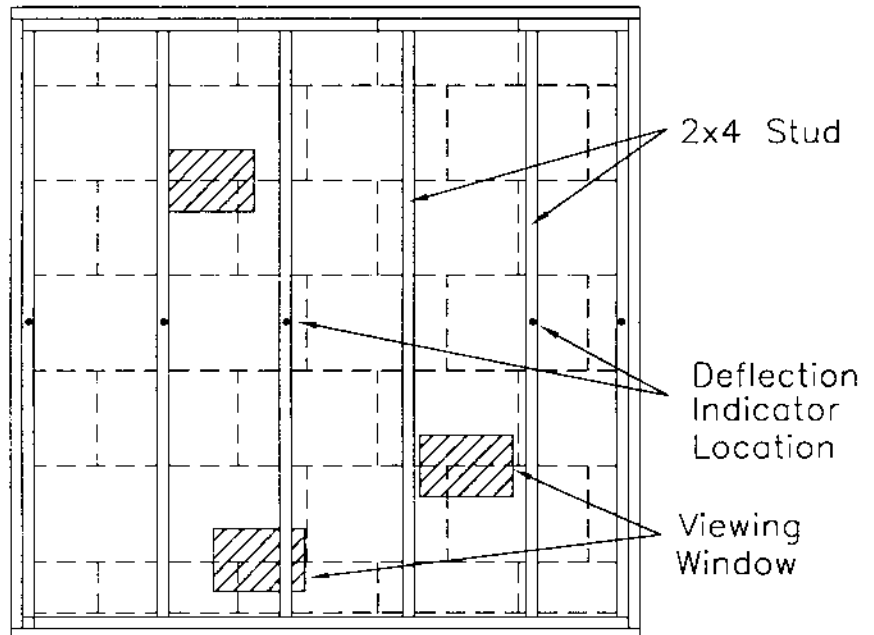
Kevin Spencer, P.Eng.

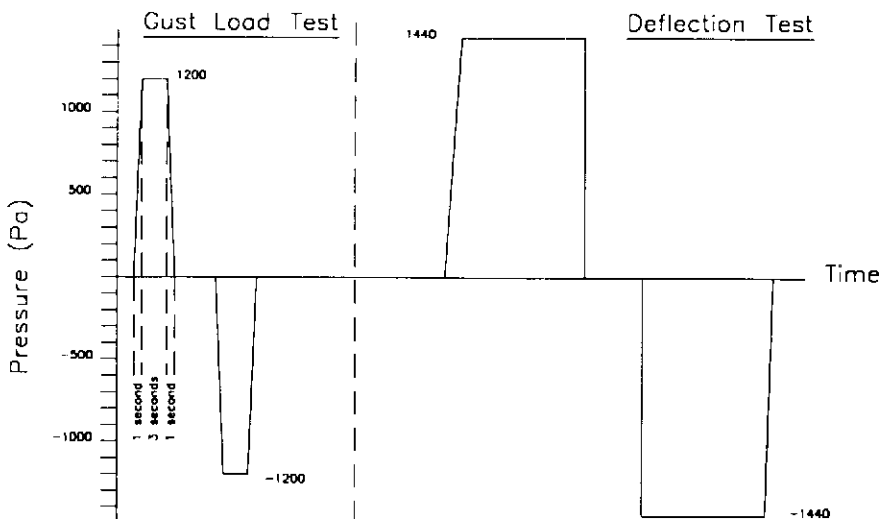
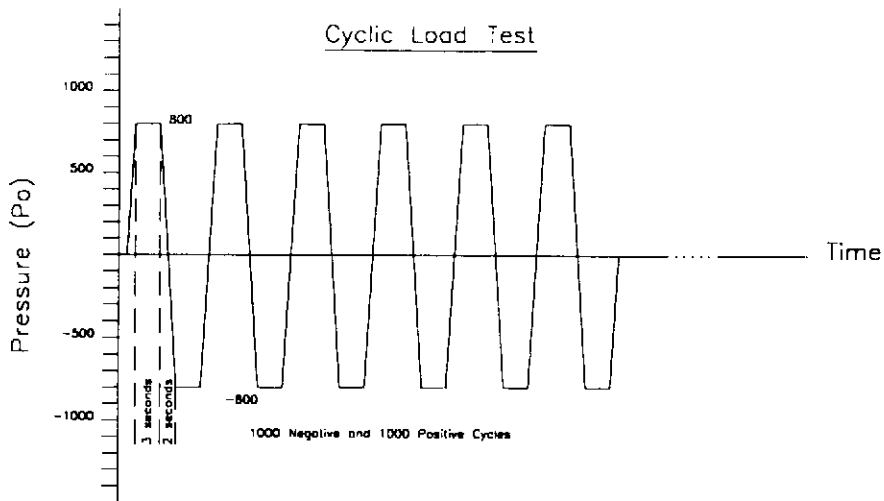
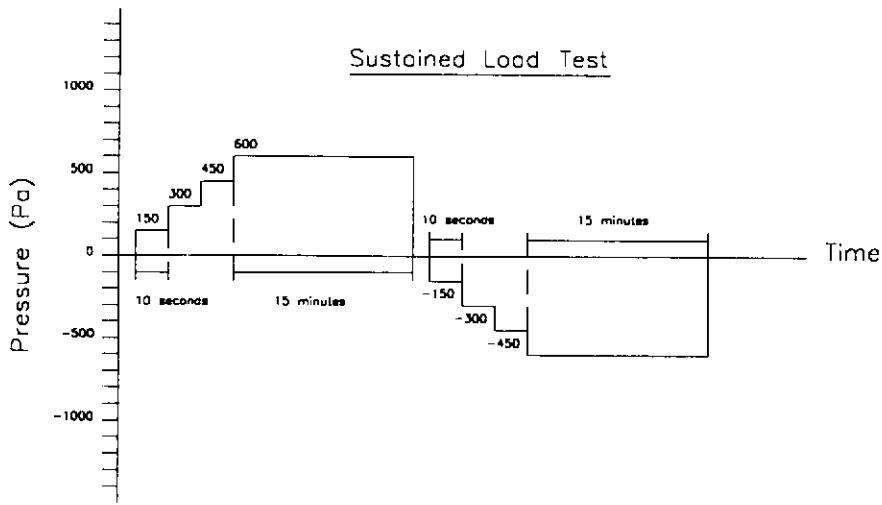


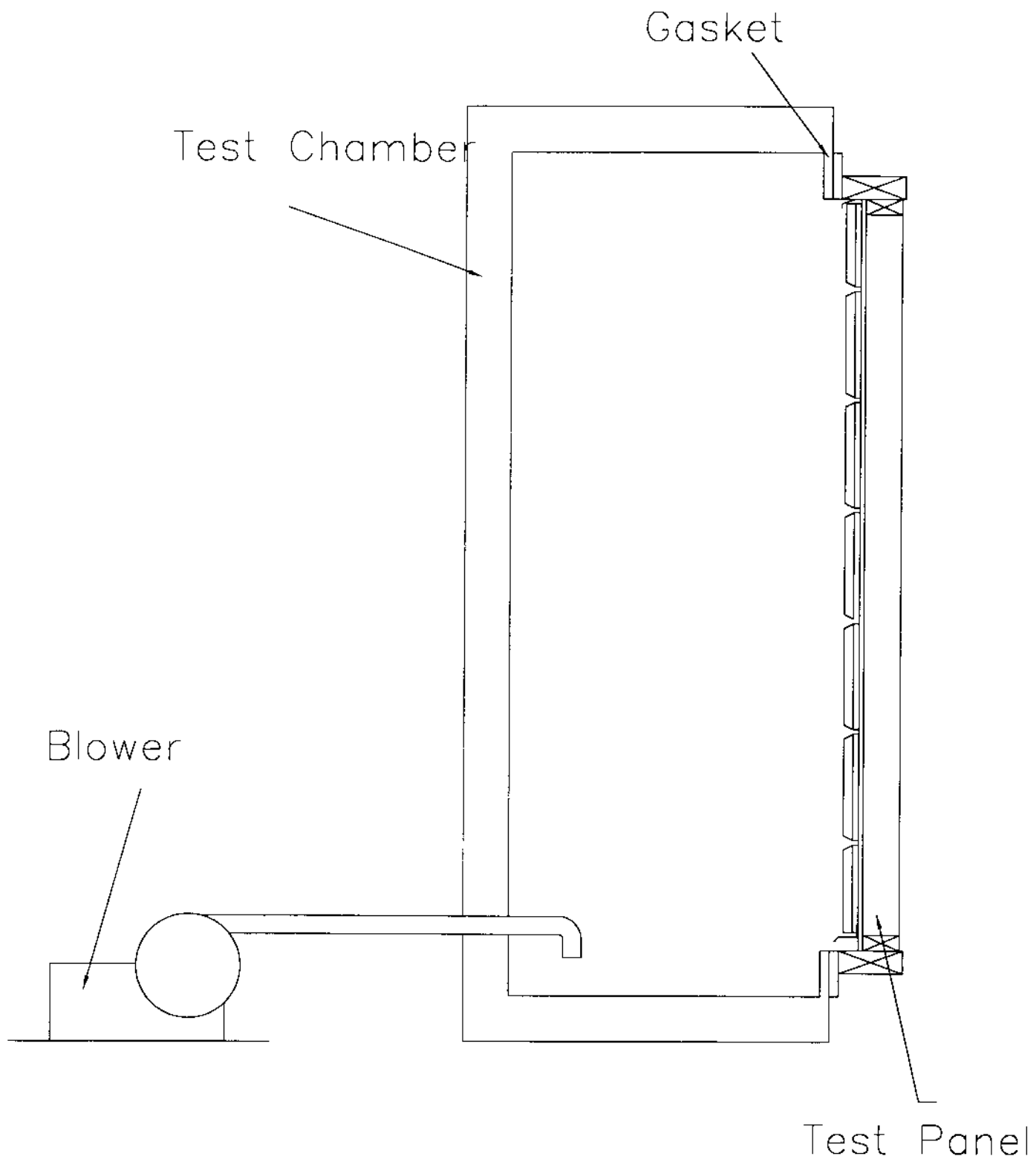
Front View



Rear View







CLIENT:	Stonetile (Canada) Ltd.
PROJECT:	C.C.M.C. Panel Evaluation
Wind Load Resistance Test	

DATE:	Mar 10 1997
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CAD FILE:	
Diagram #3	REV. -