



JAMES COOK CYCLONE STRUCTURAL TESTING STATION

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REPORT ON DAMAGE CAUSED BY

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CYCLONE ISAAC IN TONGA

G.F. Reardon

and

J. Oliver

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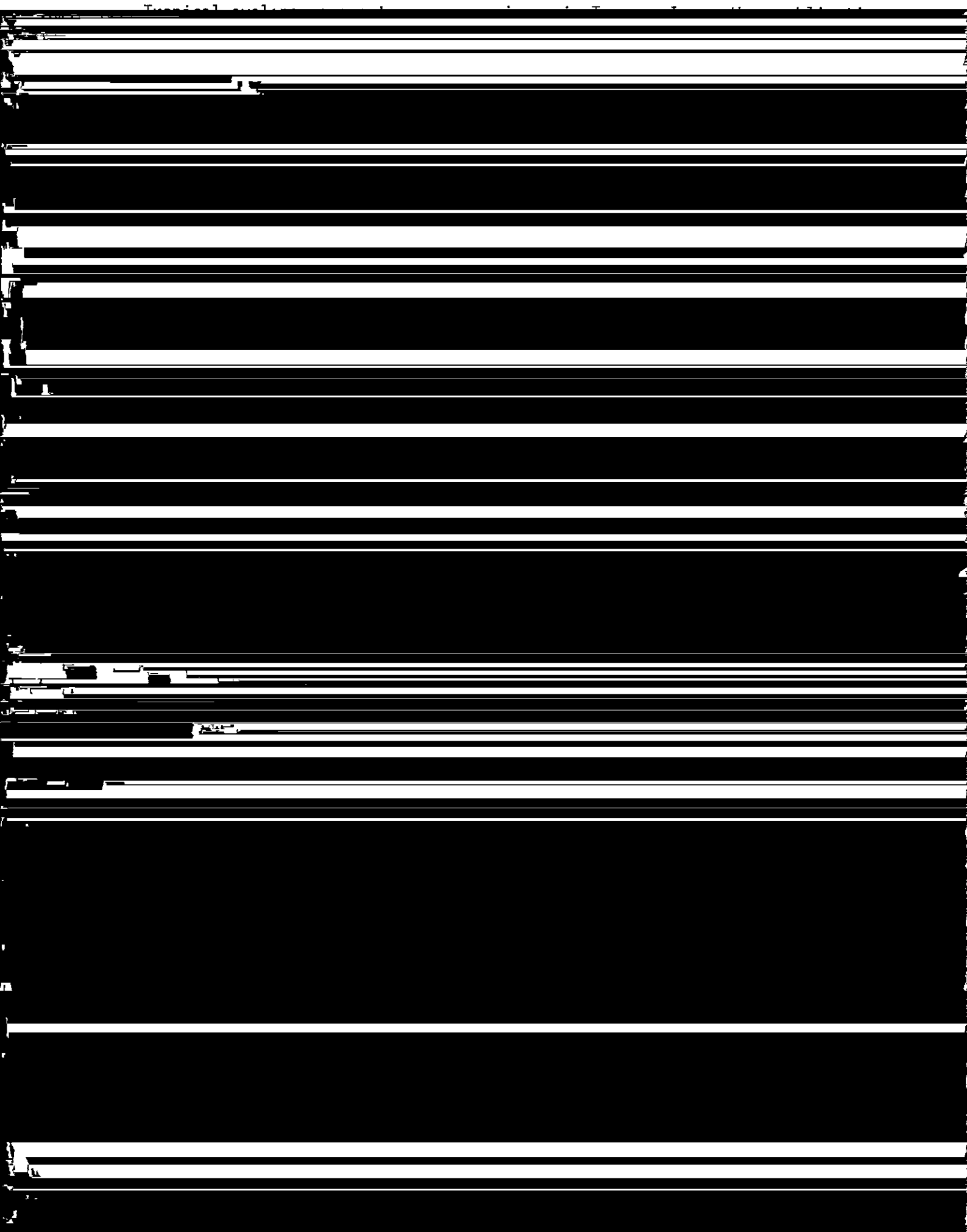
G.F. Reardon^{*}

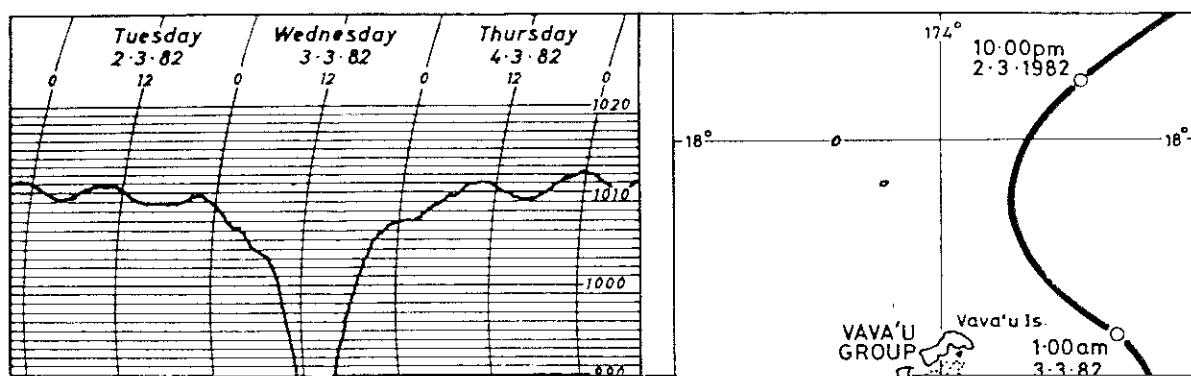
and

J. Oliver^{**}

1. INTRODUCTION

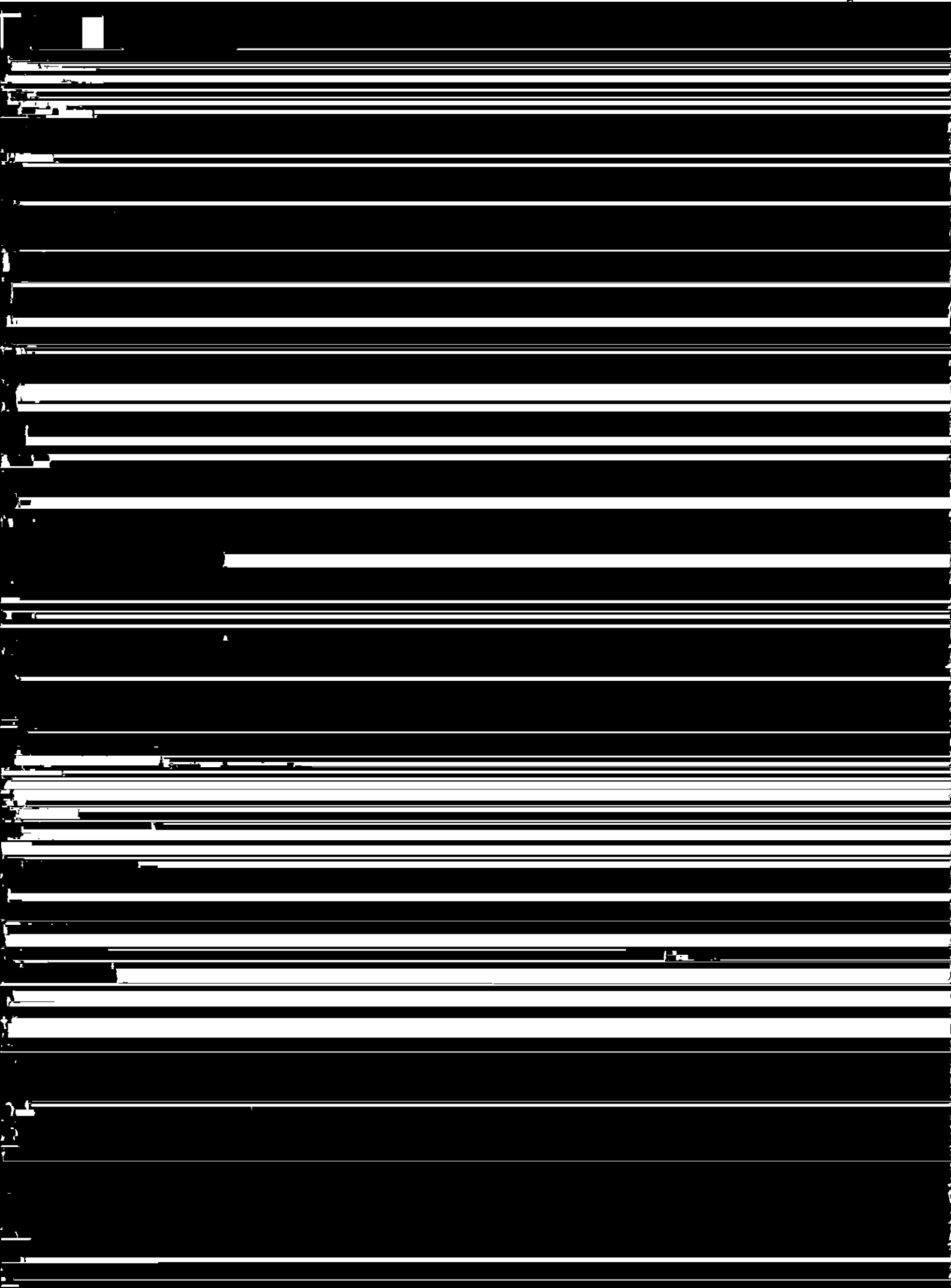
The Kingdom of Tonga is comprised of about 169 islands varying in size
from more than 300 square kilometres to less than one square kilometre.





Matuku, each of which experienced a lull varying from ten to twenty minutes' duration. This evidence, together with the damage pattern, confirmed the report that the eye passed directly over the Ha'apai group. Figure 2 shows the butts of two large trees on Ha'afeva, felled in opposite directions by the wind, indicating that there was a complete reversal of wind direction and that the intensity from each direction was severe.

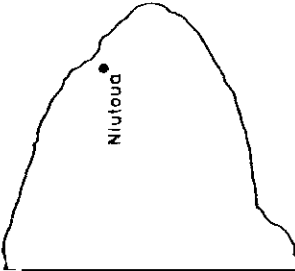
Cyclone Isaac continued on its south-westerly track and was placed 24 km to the north-west of Nukunono (Fiji Meteorological Service, Town of



This situation occurred at a commercial building in Los Angeles.

areas. None of the basic building techniques used in Australia. Adams

As Toronto is the centre of regulation and government, official damage

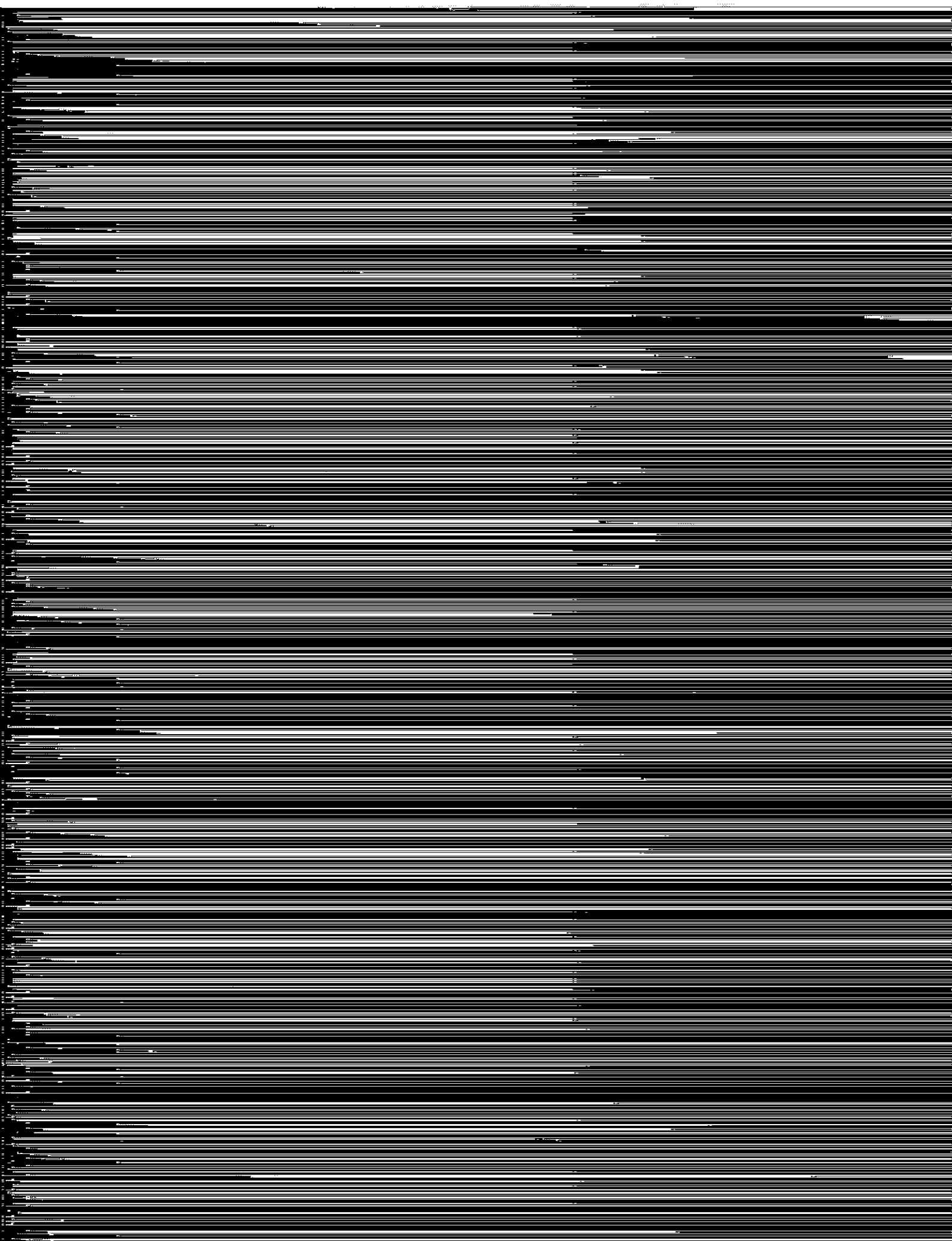


Niutoua

Unaware of the Ministry of Works survey, the authors conducted their own survey of the north western peninsula, using the categorization of damage outlined in Leicester and Reardon (1976). These seven categories are more definitive than those used by Works, for example "half roofing off"

At Pangai, principal village on Lifuka, the main island in the Ha'apai group, the extent of devastation would be similar to that of north-western





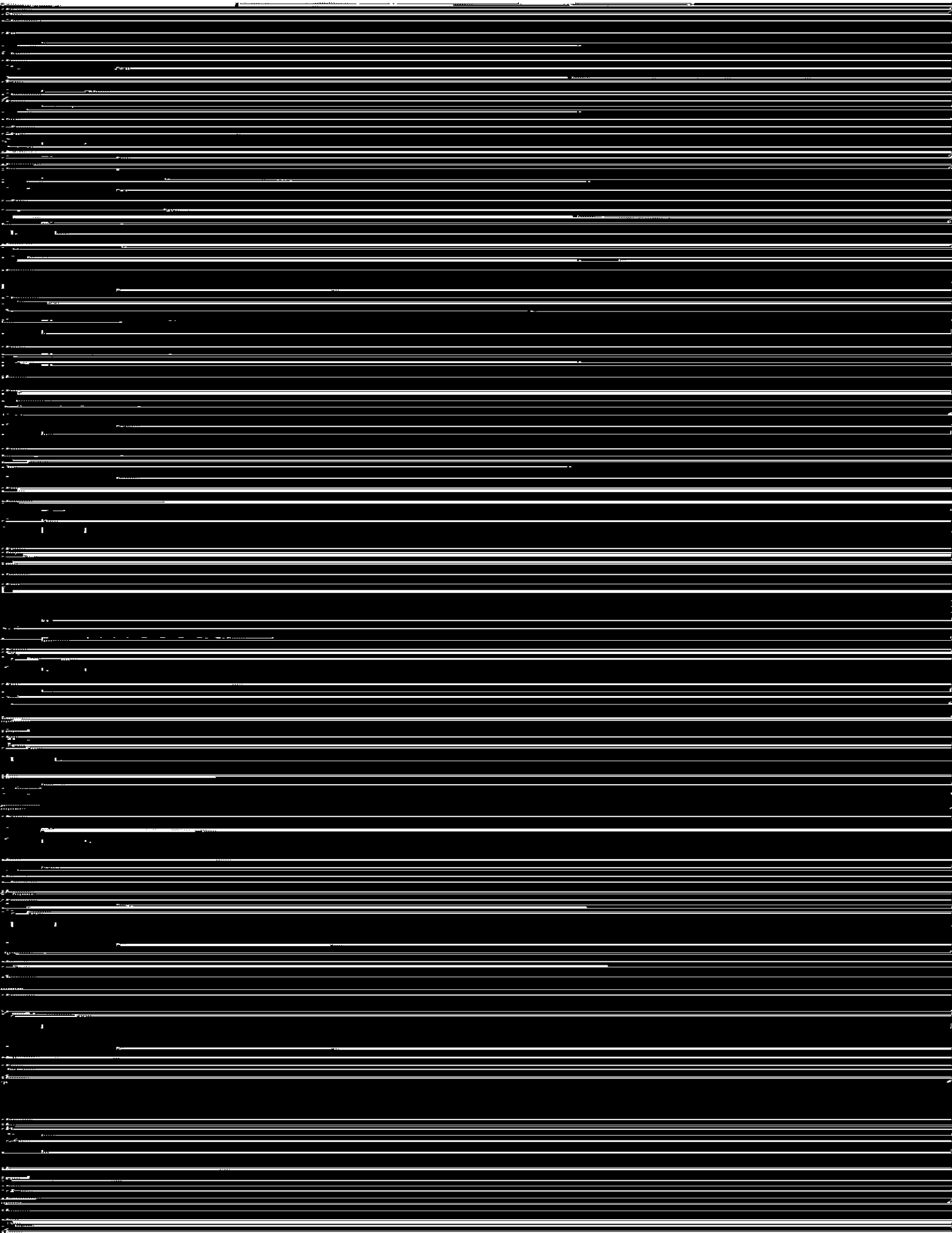
In the European style houses roof trusses not only supported the roofing, but helped to tie the outside walls together, as there were often few internal walls. Thus the loss of trusses made the walls vulnerable to lateral collapse. Figure 11 shows such a wall failure resulting from damage to roof structure.

Total wall failure occurred on a number of occasions. Figure 12. This

noted that only 45% of the 594 timber framed houses in the 11-year time

the roof structure. Figures 17, 18 and 19 show three different aspects of



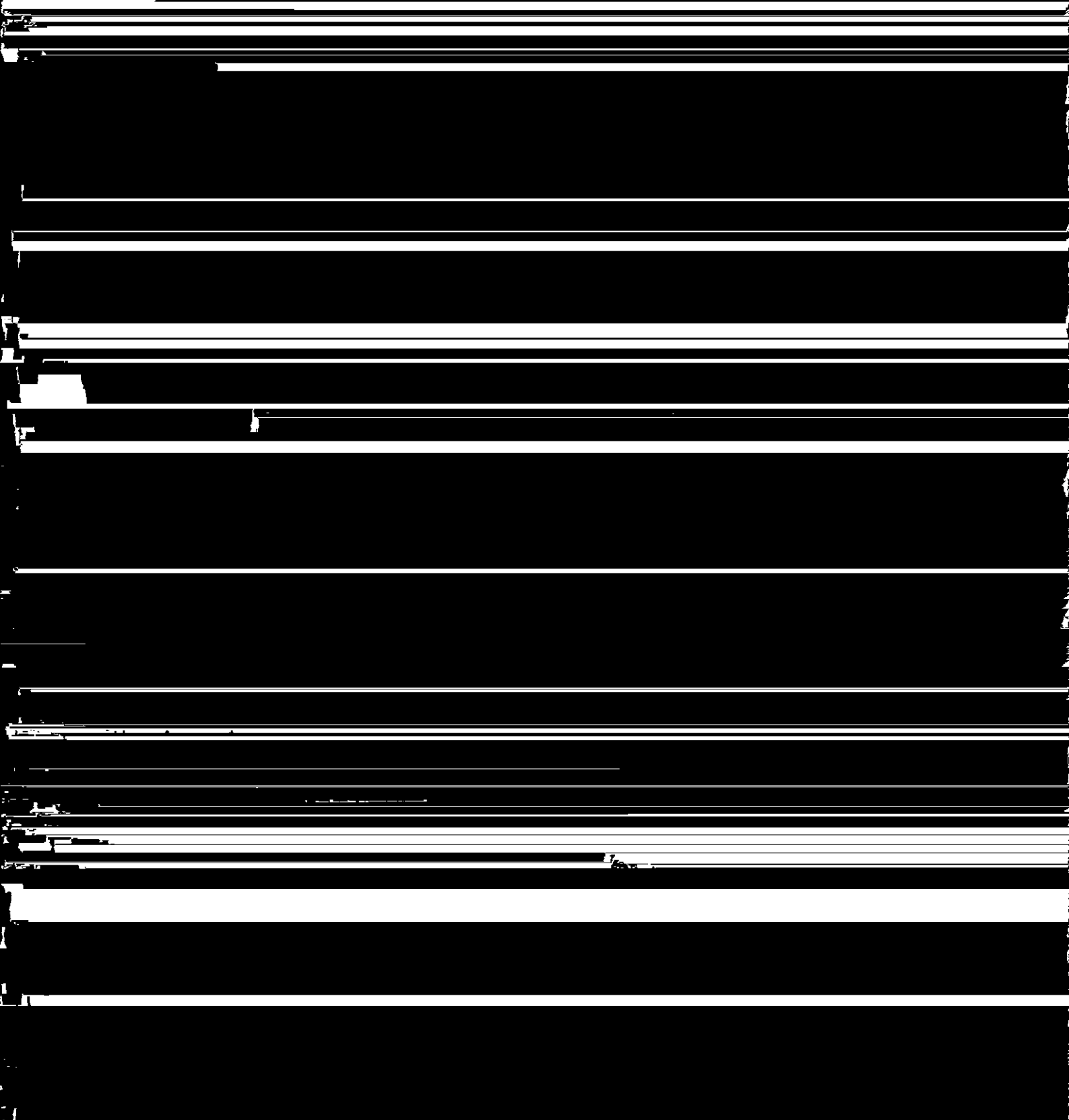


the sea can circumvent the island, meant that surge was not a problem on the islands visited.

7. SOCIO-ECONOMIC EFFECTS

7.1 General

~~A comprehensive report on the effects of cyclone Tracy on the population~~



damaged material. There was also a serious shortage of nails and building tools.

Apart from shelter and building materials, other items needed were cooking

piping feeding rainwater into the tanks. Thus even though it rained after

the rain had been collected efficiently collected to use for

supplies.

SCREW

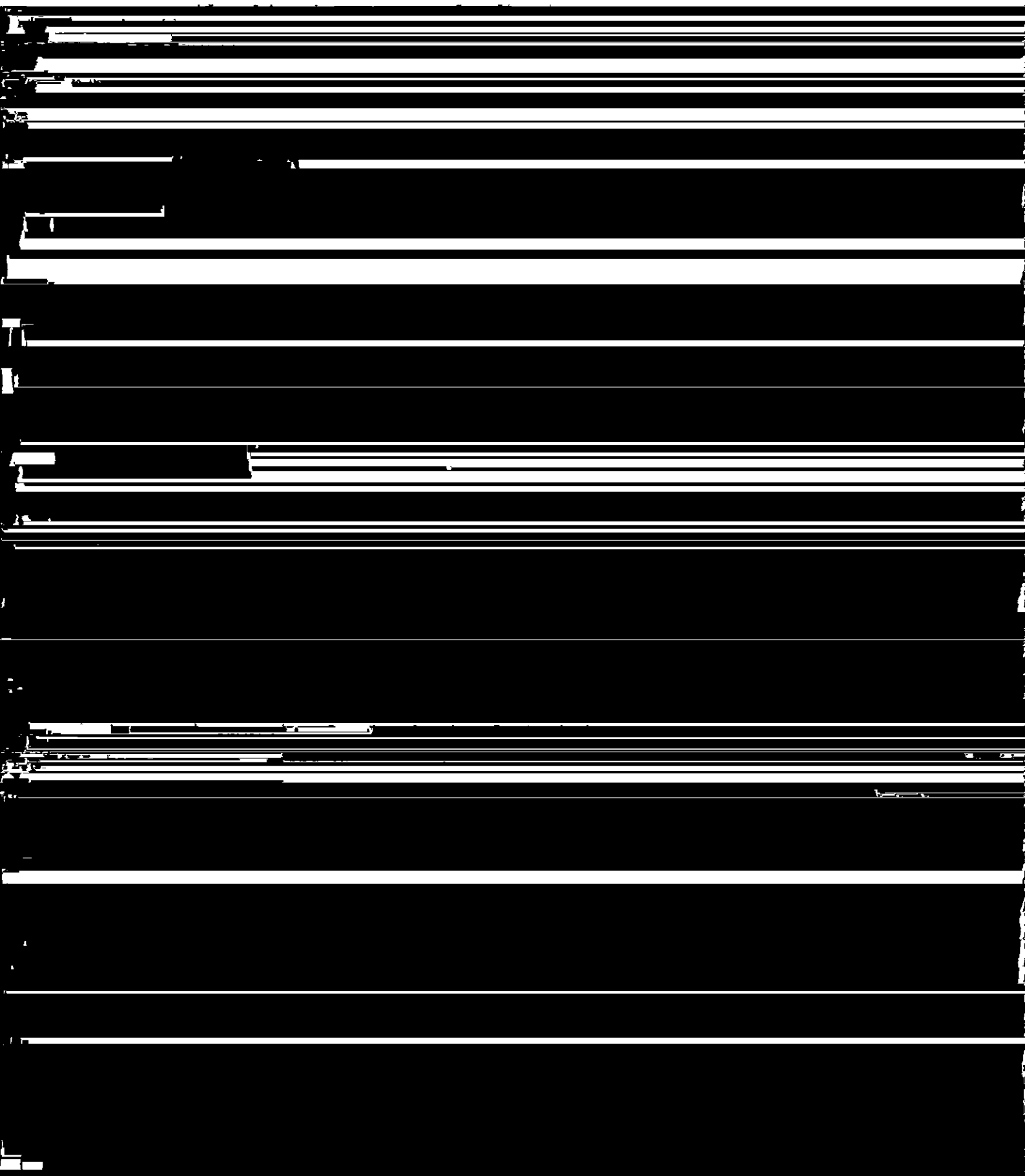
SCREW

SLIDING DOOR FIXING
SEE DWG 18
WINDOW FIXING DETAIL
12" DWG 18

BOND BEAM OVER OPENING -
4 S12 BARS FOR OPENINGS
OVER 1000 WIDE

8.1.3 Bracing

The horizontal forces caused by wind on a building must be transferred to ground by bracing members or bracing walls. An internal or end wall



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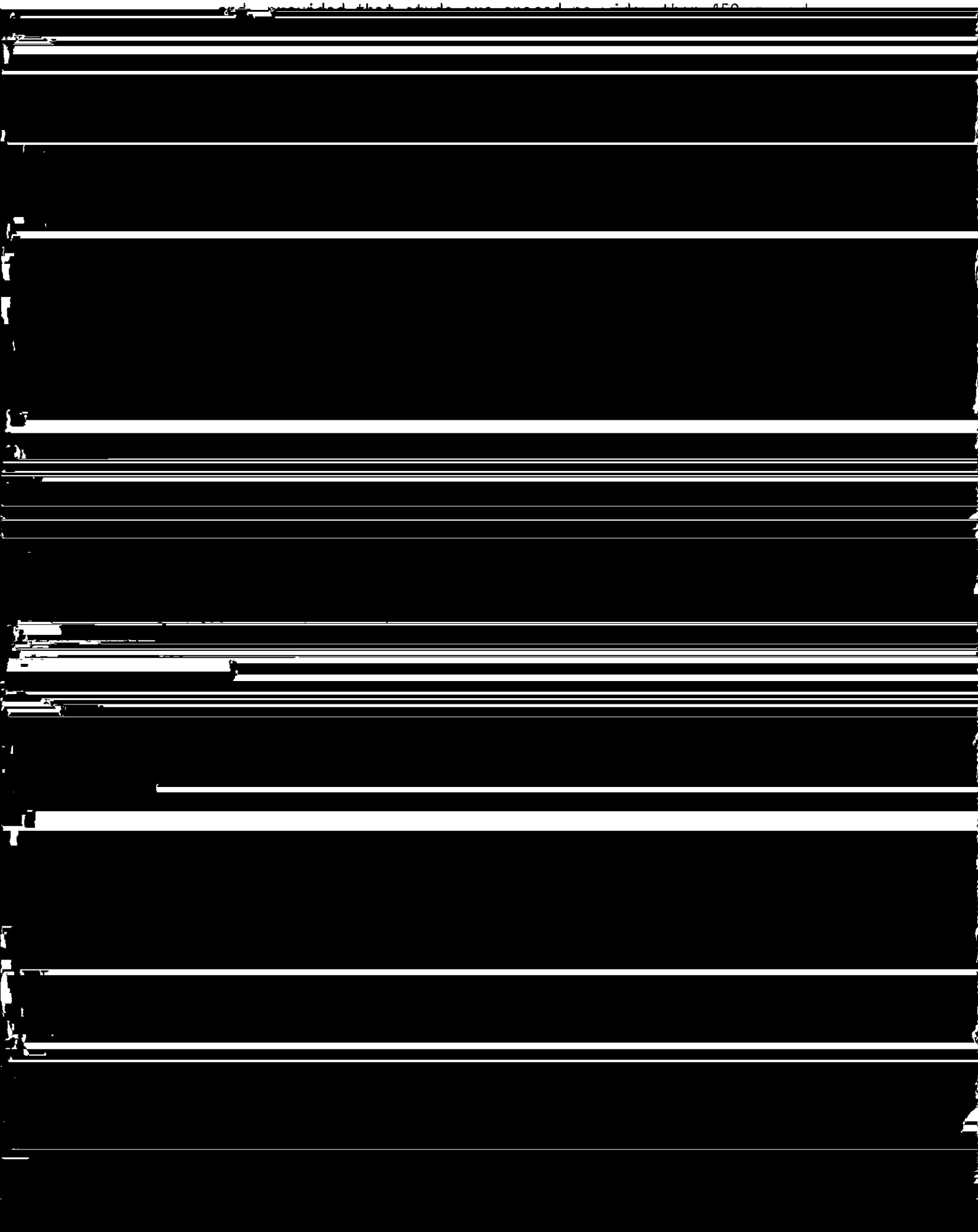
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During the damage investigation the authors noted a distinct lack of bolts in domestic construction. This could have been associated with the lack of electricity to building sites, and thus the need to use hand tools to drill holes. But as labour is far cheaper than materials in Togo

6. Top plate/stud joints may be made as shown, with two nails each



After a cyclone there is always a rush to repair damage as quickly as possible. Sometimes interim measures are taken so that shelter can be obtained in a relatively short time. This is quite understandable, and

By consideration should be given to the fact that the following are the

1)

Standards Association of Australia (1979) "Draft Manual for Guidance on