COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD NO. 1967/115

ST JOHN'S CHURCH, REID, A.C.T., VIBRATION TEST, 1967

by

G. HART

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SUMMARY

Vibrations caused by a bell, an organ, and strong winds were measured at St John's Church, Reid, A.C.T. The recorded vibration magnitudes were found to be well within the safe limit.

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1. INTRODUCTION

This report describes a short vibration test carried out by the Bureau of Mineral Resources, Geology and Geophysics at St. John's Church, Reid, A.C.T., at the request of the architects Luker, Thompson, and Goldsmith.

The church, which is about 140 years old, has developed cracks in some of its walls (Plate 1). The purpose of the test was to find out if bell ringing and organ playing could produce vibrations large enough to be the cause of the damage.

The test was made by G. Hart on 23rd May 1967.

2. INSTRUMENTS AND METHODS

The instrument used was a Sprengnether Portable Blast and Vibration Seismograph, Serial No. 1577, recording three orthogonal components of vibration on photographic paper. The instrument has a magnification of approximately 50 and a time scale on the record of 1 second equals 3 inches.

The maximum velocity is $2\pi fA$ where f is the frequency and A is the amplitude.

3. RESULTS

Plate 1 shows the locations where measurements were made and the following table shows the results:

Station	Source	Amplitude (in)			Frequency (c/s)			Velocity (in/s)		
		V	N	E	V	N	E	V	N	E
1	Organ	*	-	*	80	-	25	*	-	*
1	Bell	.0001	.0004	.0002	80	10	25	.03	.03	.04
2	Bell	.0002	.0003	.0004	80	10	5	.1	.02	.01
3	Bell	*	.0002	* / .0002	80	10	80 / 5	*	.01	* / .01
4	Bell	*	-	*	80	-	30	.02	-	.01
5	Bell	-	-	-	-	-	-	-	-	-
5	Back-ground	*	-	-	80	-	-	*	-	-

Components: V = vertical; N = North-south; E = East-west

* amplitude .0005 inch or less

Following Duvall and Fogelson (1962) the ground velocity which may just cause damage to a building is taken as 2in/s. This may be called the safety limit for ground movement.

The table shows that all recorded vibration components have maximum velocities less than 0.05 of the safety limit.

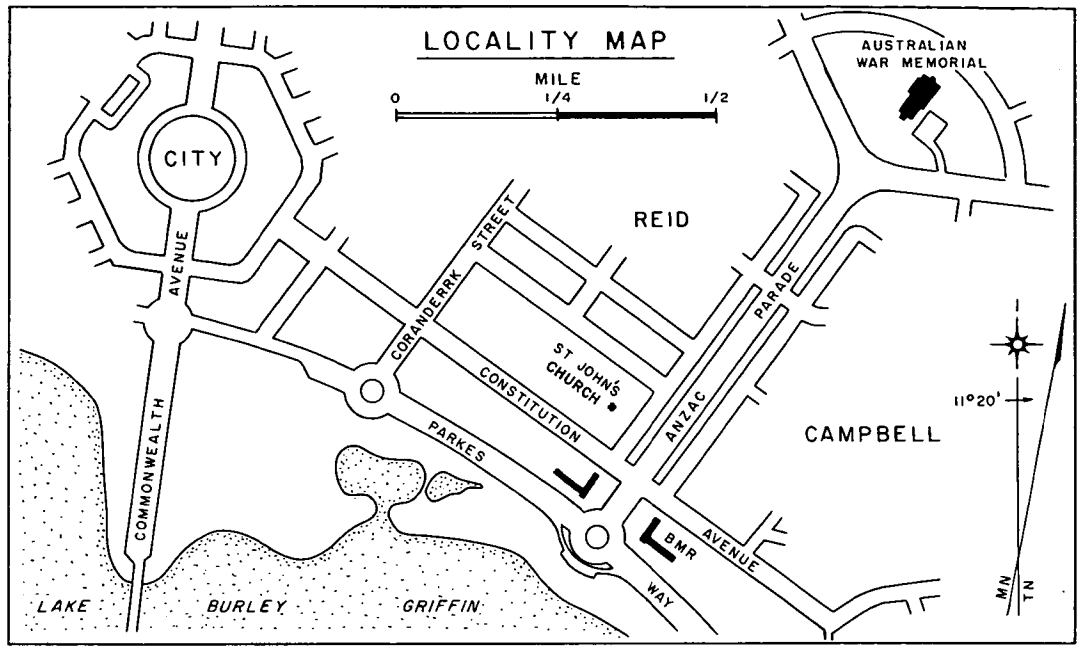
4. CONCLUSIONS

The vibrations caused by the organ are negligible at station 1. The amplitude of the vibrations caused by the bell are equal to or less than the figures given in the table. It seems likely that some of the vibrations recorded were due to the effects of wind on the tower and nearby trees. At the time the records were taken, wind velocity was greater than 15 m.p.h.

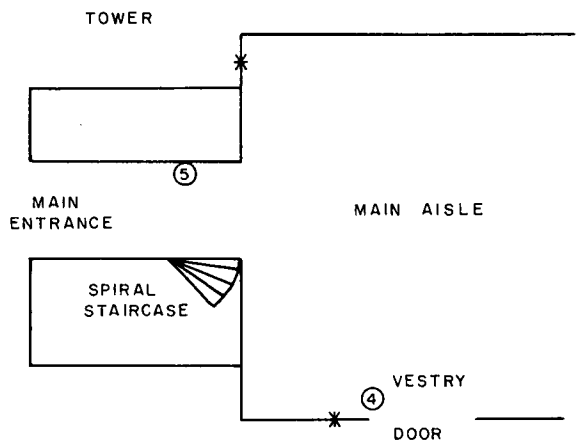
The vibrations caused by the bell and the organ are not expected to cause damage to the church. To explain the cracks in the walls of the church, other causes should be sought.

5. REFERENCES

DUVALL, W.I. and FOGELSON, D.E. 1962 Review of criteria for estimating damage to residences from blasting vibrations. U.S. Bureau of Mines Report No. 5968.



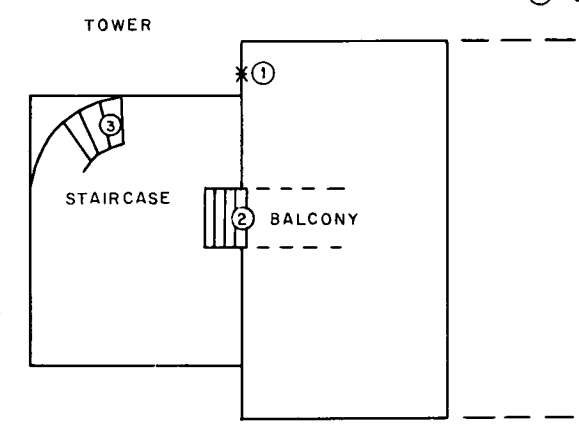
GROUND LEVEL PLAN



✱ Crack

② Station number

UPPER LEVEL PLAN



NOT TO SCALE

ST JOHN'S CHURCH, REID, A.C.T.
SEISMOGRAPH STATIONS

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics. 155/B5-46

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