GENERAL INFORMATION

LETTERS TO THE EDITOR

Microtremor Recording

G. L. EVANS

"The description of microtremor investigation given by Parton and Taylor (Vol. 6 June 1973) is most interesting and the use of this technique could have much wider application in this country for identifying the seismic behaviour of various types of ground strata.

During the measurement of pulse wave velocities to obtain in situ dynamic properties of ground materials some incidental recordings of microtremors were made by the writer using similar detecting equipment, (i.e. Wilmore Seismometer) but a different recording method. In this case the recorder used was a Rapet light beam galvonometer type, using a fast travelling paper chart (100 cm/sec). Visual inspection of the record is quite easy and any dominant period can be seen almost immediately. However, for the more complex vibrations some form of digitising and frequency analysis is needed.

The apparatus was produced for a different purpose, but has been found quite suitable as a cheap and quick way of taking short records of microtremors (over time periods of one third to 1½ seconds).

In tests with Wilmore seismometers it was found that the type of ground coupling methods had some influence on the response of the seismometer to impulse waves through the ground or directly on to the instrument. There was a characteristic strong frequency component between 50 and 110 herz depending on the nature of the material on which the instrument was sitting, e.g. for a firm clay surface the response to an impulse showed a frequency of 68/70 herz and on a concrete floor the frequency was 106/110 her . On an 8" concrete block on medium to firm ground the frequency was about 50 herz.

Various tests were made with the conclusion that the seismometer and ground surface form a coupled system with a characteristic response and the frequency varies with different types of surface conditions. Also there was a small difference between each of two instruments used (as shown by the double figures above).

In the recording of continuous microtremors this particular response characteristic may have little significance but if any microtremors were near the system response frequences it is possible that some amplification of this frequency could occur and give a false impression of the ground behaviour.

The authors of the paper do not mention anything about the influence of instrument or mounting characteristics. It would be interesting to know if any comparative records have been taken using different types of detecting seismometer or geophones and different mounting methods. Only in this way could one assess the relative influence of ground behaviour and instrument behaviour."

I. M. PARTON AND P. W. TAYLOR

"In reply to Mr. G. L. Evan's letter, the Authors agree with the conclusion that the seismometer-ground system must have its own natural frequency. This will be undoubtedly affected by the mass of the instrument and the way in which it is mounted. In the work described in the paper, the seismometer was mounted on a rigid metal plate spiked to the ground. The Authors did not record any resonant frequency which might be attributed to the seismometer-ground system. Mr. Evans mentions frequencies of 50-110 Hz observed by him. Such high frequencies would be eliminated from the record, with the Authors' apparatus, by the high frequency filter which had a cut-off point about 20 Hz.

The Authors wish to thank Mr. Evans for his interesting contribution."

Editorial Comment on Building Services

G. F. RANDS, Building Services Group, N.Z.I.E.

"Engineers are often accused of having a poor public image compared with other professions, and our friends tell us we are sometimes our own worst enemies in the way we publicise our internal professional differences.

I was therefore not unduly surprised to see your editorial of September 1973 inferring that mechanical and electrical services were normally installed by subcontractors who "... drill, chase, and cut away vital structural parts indiscriminately for their wares". You refer to the "Engineer whose careful aseismic ductile frame analysis has been carried out to a precision of 7 places of decimals". In addition to such academic exercises, one would hope that a practical design engineer would give some thought to the practical needs of the occupants of the building, even the one you quote as "getting dirty water away from a hand basin". The co-ordination of building services with structureal requirements is of prime importance in the design stages of any building.

Only in cases where the needs of the services have not been catered for in the building design will the sub-contractor have to resort to the extra time-consuming and annoying practice of drilling through concrete to install the essential pipes and ducts.

The real message of your editorial seems to be that structural designers who work to 7 decimal places of seismic design and ignore the practical requirements of co-ordinating the overall building requirements, should come out of their ivory towers and refrain from blaming other parts of the engineering profession for difficulties that arise in construction."

F. M. BLACKWELL

"After reading the editorial in the Bulletin of the N.Z. Society for Earthquake Engineering Vol. 6, No. 3, September, 1973, it is interesting to postulate the design philosophy behind the type of structural engineering proposed. Should a building frame be designed for simplified structural analysis using advanced design techniques with minimum steel and occupying the minimum building volume, to resist an earthquake whose precise magnitude is not known to 1 decimal place and may not occur for 100 years? Alternatively, should the frame be designed for the everyday needs of the occupants?

It would be most fortunate if building services designers could predict the location of all services requirements 50 years from now, it would not be too bad if they could predict the requirements for the first tenants! This is wishful thinking as is the ability of the structural engineer to predict the precise location of a steel bar so a hole can be drilled through the concrete alongside.

This whole situation would be improved if structural engineers would design frames to realistic requirements, for example, where false ceilings pass directly under beams then either a pattern of holes should be provided or areas specified where large holes can be drilled.

If structural engineers or clients are not sufficiently far sighted to provide this flexibility then perhaps Local Authorities may be persuaded to amend their by-laws."

EDITORIAL REPLY - D. S. MacKENZIE

"The interest of building services engineers in the problem of service holes in structural work is most gratifying.

The design of services unfortunately often lags behind that of the structure. This is not necessarily the fault of building services engineers. Frequently, the positions of holes are determined by subcontractors, who do not start their work until the structural design is completed.

It is not the job of the structural engineer to design the service systems - only to make provision for them after he is told what holes are needed. Often the structural engineer is not aware of the precise needs of the services until the die - or the concrete - is cast.

The intention of the Editorial was to draw attention to the dangers of cutting holes in cast concrete, often done indiscriminately in the most vital places, and to plead for design guidance in those cases where we do know the intended positions of the holes. These affect the strength and stiffness of the structure, but by what amounts is not certain.

There is a considerable need for such guidance, and it is to the Universities and the now well funded Building Research Association that practitioners look in hope."

AN EARTHQUAKE CODE FOR PLUMBING

The following is an extract from a report prepared by Mr. G. H. F. McKenzie at the request of the Management Committee. Investigation into ways and means is proceeding and comment is welcomed from readers.

REPORT TO THE NEW ZEALAND NATIONAL SOCIETY FOR EARTHQUAKE ENGINEERING, SUGGESTIONS FOR AN EARTHQUAKE CODE TO GOVERN PLUMBING IN BUILDINGS.

Adequate provisions to cover earthquake resistance already exist in the New Zealand Model Building Bylaws. However, these are put in the structural chapters, which are normally never seen by plumbers, and their applications, in many cases, require the services of a trained structural engineer.

The first requirement for a plumbing code would be to define who is responsible for the seismic adequacy of the plumbing system. This responsibility would have to be put on to the organisation responsible for the plumbing of the particular building.

In the case of larger buildings, this would be a firm of building services engineers. Such a firm may elect to employ a structural engineer to design seismic adequacy into the plumbing system, but it would have to take the responsibility in the first instance.

In the case of smaller plumbing installations, such as those in houses, which are not normally supervised by a building services engineer, the plumbing contractor would have to take the responsibility for the necessary seismic provisions in the plumbing system. To assist plumbing contractors to meet the structural requirements, there appears to be a need for the production of a manual of standard practice for commonly used arrangements and fittings. (For example, how a water tank of certain proportions should be fixed to resist seismic forces and the flexibility provisions necessary in the connected pipes.)

The code requirements for earthquake provisions for plumbing systems can be summarised as below, and this would appear to give sufficient guidance for a qualified