

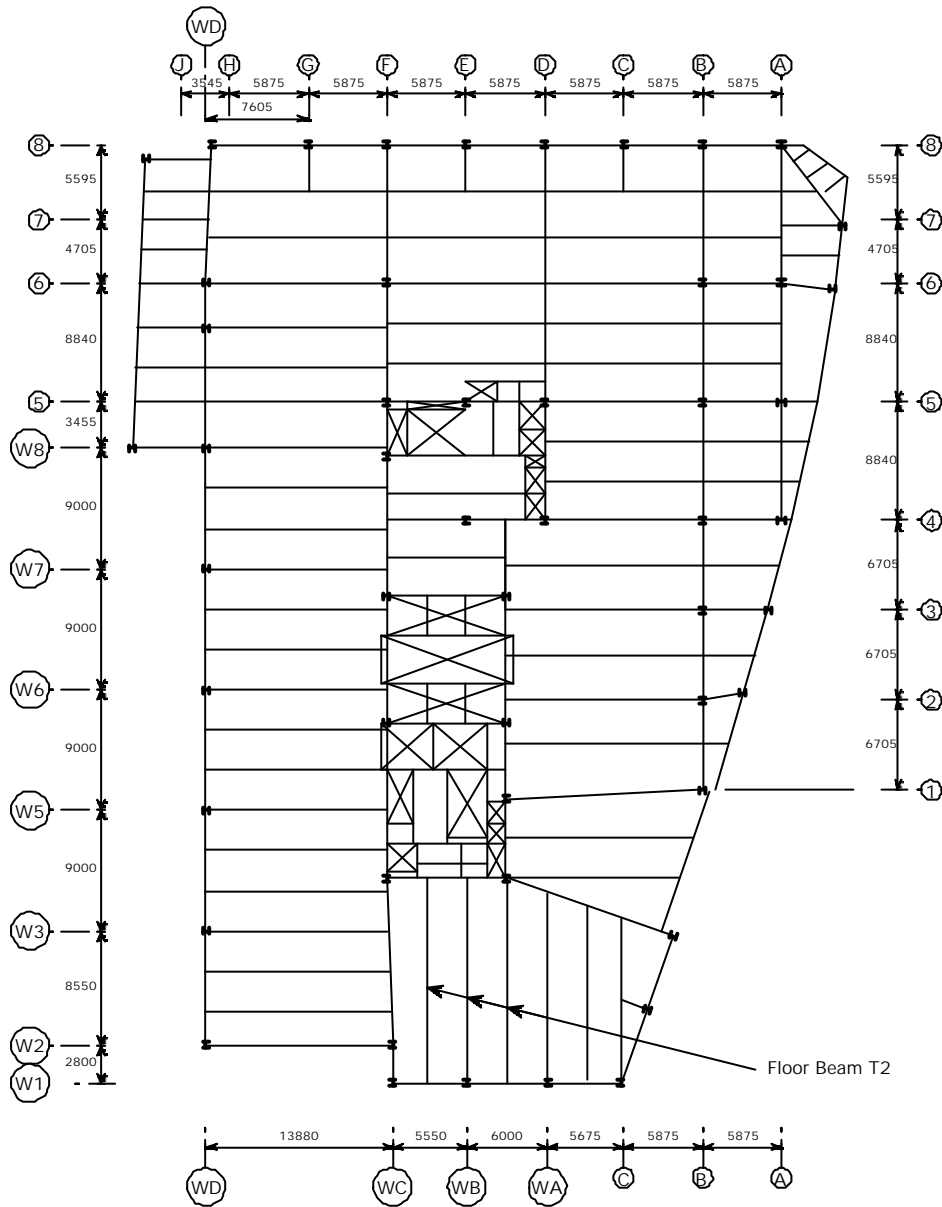
## London Office 2

London Office 2 is a typical composite steel framed building using cellular beams. On plan, the floor construction uses long-span secondary beams, which span between the central core area and the building façade, with their spacing dictated by the spanning capabilities of the composite slab. The composite floor slab consists of 140 mm deep lightweight concrete on a 0.9 mm gauge Ribdeck 60 trapezoidal decking by Richard Lees Steel Decking Ltd. A general plan arrangement of the building is shown in Figure 1.

From an analysis of the floor area using the principles given within the SCI guide (see section 1.1.2 of report of Design for Vibrations of Long Span Composite Floors), it was predicted that the vibration mode that gave the lowest frequency arose from the motion of the 15 m span secondary beams, within grid-lines WB-WC/W1-W4. From this hand analysis, using the permanent loads consistent with that which were present on the floor at the time of testing, it was estimated that the fundamental frequency would be 5.90 Hz. Also, as the floor was within its bare state, it was expected that the maximum level of damping would be below 1.5%.

Due to the beams within grid-lines WB-WC/W1-W4 being the longest spanning elements, impact tests using an instrumented hammer were restricted to this area on the seventh floor level. From the transfer function, the highest peak was found to occur at a frequency of 5.875 Hz (see Appendix G of report of Design for Vibrations of Long Span Composite Floors). Furthermore, the damping was found to be quite high, with a value of 3.4%.

From this experimental investigation, it can be seen that extremely good correlation was found between the measured frequency and the predicted fundamental frequency using the SCI guide. However, the estimated damping is very conservative (by a factor of two), compared to that which was measured *in situ*.



*Floor Beam T2*      664 mm deep cellular beam 356 × 171UB67  
 top/ 533 × 210UB109 bottom with 450 mm  
 diameter cells at 600 mm centres

**Figure 1** General arrangement of London Office 2