REMARKS BY J.S. BAWA[I], CHAIRMAN

INTRODUCTION

Though the human race has made rapid strides in the different disciplines of technology, including earthquake engineering, in the last decade, the predictability of earthquake still continues to elude the earthquake engineers. It is recognised as impracticable, if not impossible, to design a structure which will withstand a severe earthquake without damage, for, otherwise, even the modest structures would be fortresses. Added to this is the uncertainty associated with the science of earthquake engineering, despite good progress towards overcoming this uncertainty. Against this background of unpredictability and uncertainty, the analysis, repair and strengthening of post-earthquake damage, assumes all the more significance, under the present circumstances.

NEED FOR ANALYSIS

2. Structural and non-structural damage should be anticipated during a severe earthquake. Immediate repair work of damaged structures after earthquakes becomes a social need. Immediate repair is necessary to prevent further loss of human life and damage during the after-shocks which continue to be experienced after a severe earthquake and the survivors are required to be housed immediately to protect them from inclement weather and spread of diseases.

3. The structural engineer faces a great challenge in assessing the damage and he has to decide whether to patch up a structure or to strengthen it or to demolish it partly or completely. He must take a decision in short time. While it may be comparatively easy to design a new structure against earthquakes, the designer may experience uncertainty in assessing an existing structure against future shocks. He will have to contend with such uncertainties as nonavailability of drawings, or reinforcement being not in the correct place or dead loads being different from those assumed in the design. He may have to be content with a crude analysis for lack of time. The quicker methods of analysis assume therefore, greater significance in assessing and rectifying the damage caused by earthquake. The analysis of damage suffered during the earthquake is vital because it enables us to find out the structural and architectural inadequacies of the existing planning and design procedures. It brings out the numerous pitfalls and mistakes which we make in the design.

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4. Strengthening. Coming to strengthening and repairs to damaged structures, a lot of research has been carried out and is still being carried out to find out the efficacy of repair techniques in restoring the original strength of the structure and in improving upon it to withstand further earthquakes without causing severe damage or collapse. Since poor performance of a repaired or strengthened area during subsequent earthquakes can result in a catastrophic collapse, there is a need for continuing research to determine the reliability of repaired structural members and their ability to sustain static and dynamic loads. Further, the repair techniques should be simple to adopt as the earthquake may occur in a remote inaccessible region where sophisticated technologies may not be available. Research in this direction, therefore, will prove to be very valuable.

ENGINEER ORGANISATION

5. Last but not the least, there should be organisational set up in countries very prone to severe earthquakes so that there is advance planning for emergency inspection and evaluation of post-earthquake damage to assess the damage and suitability for occupation of buildings. Since post-earthquake relief is a national task and requires sometimes even help from neighbouring countries, advance training of personnel and well thought out procedures are desirable if the relief can be meaningful without any waste and duplication of efforts.