5.4 AVOIDING DISPROPORTIONATE COLLAPSE

There are in general three alternate approaches to designing structures to reduce their susceptibility to disproportionate collapse:

- Redundancy or alternate load paths
- Local Resistance
- Interior or continuity

Redundancy or Alternate paths:

- In this approach the structure is designed such that if any one component fails, alternate paths are available for the load in that component and the general collapse does not occur.
- This approaches the benefit of simplicity and directness in its most common applications, design for redundancy requires that a building structure be able to tolerate loss of any one column without collapse this is an objective easily understood performance requirements the problem with the redundancy approach as typically practiced is that it does not account for difference in vulnerability .
- Clearly one column redundancy when each column is a W8x35 does not provide the same level of safety as when each column is a 2000 I/ft build up section.
- Indeed and explosion that cloud take out the 2000 I/ft column would likely destroy several of the W8 columns making one column redundancy inadequate to prevent collapse in that case.
- And ate codes and standards mandate redundancy do not distinguish between two situation they threat every column as equally likely to be destroy d in fact since it is generally much easier to design for redundancy of a small and lightly loaded column redundancy requirements may have the unfortunate consequence of encouraging design with small(and vulnerable) columns rather than fewer larger column.
- For safety against deliberate attacks (as opposed to random accidence) this may

be a step in wrong direction.

Local Residence

In this approach susceptibility to progressive /disproportionate collapse is reduced by providing critical compound dence that might be subject to attack with additional resistance to such attacks this requires some knowledge of the nature of potential attacks. And it is very difficult to codify in a simple and object way.

Interconnection or continuity

This is strictly speaking not a third approach separate from redundancy and local residence. But a means of improving either redundancy of or local residence (or both).Studies of many recent building collapses have shown that the figure could have been Avoided or at least reduced in scale, at fairly small additional cost if structural components had been interconnecting more effectively. This is the basis of the structural integrity requirement in the ACI 318 specification (ACI 2002)