

## LOCATING AND DESIGNING FACILITIES IN SEISMICALLY ACTIVE AREAS

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### SYNOPSIS

The planning process of locating industrial, military, administrative, and/or residential facilities in seismically active regions involves selecting sites for the various facilities and designing for adequate seismic resistance. An approach based on formal decision analysis provides a ranking of all the options available to the decision maker on the basis of their overall expected desirability in terms of cost, safety, and other pertinent criteria.

### TEXT

In locating facilities in a seismically active area, the planners/designers must design safe structures and also select sites for them. In a general sense, the requirement is to develop the most suitable facility-site combinations.

At present, planners generally locate facilities on the basis of economic and functional considerations, and the designer is then given the responsibility to design a safe structure. The two requirements are often not integrated; for example, additional costs for safety are not balanced against functional advantages of locating a facility at a particular location.

An approach based on formal decision analysis can be used to determine optimum sites for various facilities by considering the cost of construction, the consequences associated with failure, and the economic and functional characteristics of a site. The analysis can explicitly consider the uncertainties associated with the consequences of failure of a facility due to seismic events at a particular site; possible facilities that can be located at a site (the competition for a site); and multiple and often conflicting performance objectives (e.g., cost and safety). A multiattribute utility function consistent with the decision maker's preferences and general attitudes towards risk is established, and a probabilistic assessment of consequences of an action (locating a facility at a particular site) is made on the basis of available data, current scientific knowledge, and the decision maker's judgments. The options available to the decision maker are then ranked on the basis of their expected utilities, which are calculated by combining the utilities of the consequences of an action with the likelihood of occurrence of the consequences. This procedure provides a consistent basis for selecting the most suitable set of site-design combinations for the facilities under consideration.

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