DEVELOPING A PERFORMANCE BASED SEISMIC DESIGN PROCESS FOR THE LOS ANGELES WATER SYSTEM

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ABSTRACT

In order to develop a resilient water system, a performance based design methodology is necessary for assessing overall system operability and functionality following earthquakes. This document outlines an initial proposed approach to implementing performance based design for the Los Angeles Department of Water and Power (LADWP) Water System. Performance-based design is a process in which the performance of the system or facility being designed is evaluated over the entire range of possible loadings rather than for one or more discrete intensities or events. The performance based design process for the water system explicitly evaluates how the system and its constituent components are likely to perform under a variety of conditions associated with potential hazard events. The process takes into consideration the uncertainties inherent in quantifying the frequency and magnitude of potential events and assessing the actual responses of the system and the potential effects on its operability and functionality. Identifying the performance capability of the system is an integral part of the system planning and component design processes and guides the many planning and design decisions that must be made. Some unique features are presented on the following: (a) how to consistently design a set of components, undertaken over a period of decades, intended to establish the future performance of regional system with notation on how this differs from common building structures located at single sites; (b) how to incorporate a large suite of earthquake hazards, within a very complex seismic environment, and properly address their potential impacts on a large complicated distributed water network; and (c) establishing performance objectives for different earthquake levels to establish system performance in support of community resilience while accounting for very rare but plausible events which can have severe and potentially unacceptable consequences to large urban environments.

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