Seismic Evaluation of Wastewater System

Water Environment Services / Tri City Services District Oregon

MMI Engineering performed seismic assessments of three wastewater treatment plants in Oregon for a major earthquake on the Cascadia subduction zone.

Water Environment Services of the Tri City Services District and Clackamas County Service District No.1 in the State of Oregon owns and operates the Tri City Water Pollution Control Plant in Oregon City; the Kellogg Creek Plant located in Milwaukee; and the Hoodland Plant in Welches. The plants were built in 1986, 1982 and 1972 respectively. Detailed seismic studies in the late 1990's showed that the seismic hazard in the Pacific Northwest, which is governed by the Cascadia Subduction Zone, was underestimated in the prevailing design codes. As a result, the 1998 Oregon Specialty Code re-zoned Portland, Oregon, and its vicinity to Uniform Building Code (UBC) Zone 3 from Zone 2. This re-zonation represented a 50% increase in seismic design loads for the structures built prior to the code change. The purpose of this project was to evaluate the buildings, process structures, equipment and non-structural components at the treatment plants with performance objectives of life safety, public health, property damage and the environment.

The approach used for the seismic vulnerability assessments involved an evaluation of seismic hazards, such as strong ground shaking, liquefaction and surface fault rupture, and a vulnerability assessment of the plant facilities for the identified hazards. The structural evaluation was performed through a detailed site walkthrough and review of available structural drawings. The scope of the evaluation was to identify major seismic deficiencies, provide conceptual retrofit schemes and a cost estimate to implement the retrofit schemes. The seismic vulnerability assessment included: identification of lack of anchorage of non-structural elements and components; identification of structural vulnerabilities, such as soft story conditions and vertical and plan irregularities; identification of excessive settlement or cracking and lack of adequate structural detailing; and identification of vulnerable configurations of process tanks, such as primary and clarifiers, aeration basins and digesters.

MMI Engineering's multi-disciplinary expertise in structural and geotechnical engineering, seismology and seismic response of water and wastewater systems is invaluable for seismic vulnerability assessments of such systems, and provided the client with a comprehensive assessment of their potential risks and a means of mitigating them.

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