



Water Storage Tank Seismic Retrofit

Full Mitigation Best Practice Story

King County, Washington

Mercer Island, WA - Mercer Island in Lake Washington is a busy community with a population of 22,000 and high median income. Located east of Seattle, it is accessed only by the Interstate 90 floating bridge. The islanders are totally dependant on two above-ground steel water reservoirs, four million gallon capacity each, as their main water source. This water supply is also essential for fire fighting.



The City of Mercer Island recognized that there was a potential life safety problem due to the fact that the island is in an earthquake hazard area. Should the tanks fail due to an earthquake, 12 homes, schools, a church and several public buildings situated downstream would be inundated. The Island would lose the primary water supply and the water flow would cover I-90, the main transportation corridor.

The City of Mercer Island applied for and was granted funding through the Hazard Mitigation Grant Program (HMGP) for seismic restraints and structural improvements of the reservoirs and pump station. The pump station pressurizes all the water through a system of pipes to deliver it to the upper end of the island. Because of this critical function, an automatic generator was installed and large pieces of equipment and cabinets were bracketed to the walls. The pump station was also completely structurally retrofitted. The project was completed in March 2000.

On February 28, 2001, a 6.8 magnitude earthquake struck the Puget Sound Region. Mercer Island sustained a great deal of shaking. Those located close to the reservoirs during the earthquake say that the water in the reservoirs "sloshed for an hour." The water tanks "rode" through the earthquake with minimal to no damage and performed the way the retrofit was designed. Power went out throughout the island but the automatic generator came on maintained the function of the pumps. Overall, the power was out for over six hours. Subsequent engineering inspection has determined that there is no threat of collapse. The timely mitigation project eliminated danger to the homes and structures as well as protecting the water supply. Minimally, the project saved over \$9 million in home replacement costs.

Activity/Project Location

Geographical Area: **Single County in a State**

FEMA Region: **Region X**

State: **Washington**

County: **King County**

City/Community: **Mercer Island**

Key Activity/Project Information

Sector: **Public**
Hazard Type: **Earthquake**
Activity/Project Type: **Retrofitting, Structural**
Activity/Project Start Date: **10/1998**
Activity/Project End Date: **03/2000**
Funding Source: **Hazard Mitigation Grant Program (HMGP); Local Sources; State sources**
Funding Recipient: **Lifelines - Water/Sewer**
Funding Recipient Name: **City of Mercer Island**

Activity/Project Economic Analysis

Cost: **\$1,386,281.00 (Actual)**

Activity/Project Disaster Information

Mitigation Resulted From Federal Disaster? **Yes**
Federal Disaster #: **1159 , 01/17/1997**
Value Tested By Disaster? **Yes**
Tested By Federal Disaster #: **No Federal Disaster specified**
Year First Tested: **2001**
Repetitive Loss Property? **Unknown**

Reference URLs

Reference URL 1: <http://neic.usgs.gov/>
Reference URL 2: <http://emd.wa.gov/>

Main Points

- Installed an automatic generator and bracketed large pieces of equipment and cabinets to the walls.
- Retrofitted the pump station.
- Subsequent engineering inspection has determined that there is no threat of collapse.



One of two above ground steel water reservoirs and pump station that have been seismically retrofitted.



Critical equipment is secured by strapping. Service was not interrupted.