NEWS

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JAPANESE HAVE YEN FOR METRO RED LINE SUBWAY; SAY SAYONARA TO OWN SEISMIC DESIGN, EMBRACE MTA METHODS

Three years ago tomorrow, the costliest natural disaster ever to strike the United States hit Los Angeles. As severe as the Northridge Earthquake was, its fury would be eclipsed one year later to the day when the Kobe, Japan earthquake left that city in ruins and claimed thousands of lives.

In the wake of those two cataclysms, and impressed by the structural fortitude demonstrated by the Metro Red Line subway during the 1994 Northridge Earthquake, engineers in Japan are modifying the country's future subway design to resemble the one used to build the still under construction Los Angeles system.

According to Dr. Jim Monsees, chief tunnel engineer of the Engineering Management Consultant group (EMC), the consultant group that designed the Metro Red Line, the Japanese are working on new seismic criteria that are similar to that of the 5.6-mile Metro Red Line, using a two-level design approach instead of a one-level design.

The Kobe subway system sustained serious damage primarily because the Japanese built lightly reinforced "cut and cover boxes" instead of a round tunnel, Monsees said, which made it more vulnerable during seismic events.

"The Japanese, whom we've long admired for their ingenuity, are developing design guidelines similar to those followed by the MTA. In a way, this pays the men and women who built the MTA's subway system a real compliment," Monsees said. "It just confirms what we've been saying from

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the very beginning. Our subway is the safest place to be during an earthquake.

"Subways in Mexico City and San Francisco experienced as severe or greater magnitude earthquakes as Kobe, but because they were designed with round tunnels did not suffer any appreciable damage and neither did the Metro Red Line, which suffered no damage in the Northridge Earthquake in 1994," Monsees said. The 1985 Mexico City earthquake measured 8.1 on the Richter Scale, while the 1989 San Francisco (Loma Prieta Earthquake) registered 7.1

"In fact, the Mexico City subway was shut down for only one hour because the power was off," continued Monsees. "There was no structural damage to underground portions of the subway. Similarly, no structural damage requiring other than routine maintenance occurred in the San Francisco subway."

Monsees also noted that "it appears that the Metro Red Line can handle, without damage, almost three times the kinds of shaking velocities that had been used in the design of the original Kobe system.

In a report entitled: "Proposal on Earthquake Resistance of Civil Engineering Structures," published by the Japan Society of Civil Engineers, seismic design criteria are proposed for two levels of earthquakes. The MTA follows a similar process.

"This proposal is a confirmation from a respected, independent body of engineers that the Japanese and Americans are approaching things similarly," said Cornell University Prof. Tom O'Rourke, School of Civil & Environmental Engineering.

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Other EMC officials also argue the MTA's Metro Rail subway system is one of the safest places to be during an earthquake.

In a paper entitled: "Design and Behavior of the Los Angeles Metro During Seismic Events," published by PB DMJM (Parsons Brinckerhoff Quade & Douglas, Inc., and Daniel, Mann, Johnson & Mendenhall) - two of six consultants that make up EMC group - and presented recently at an international conference in Vienna, Austria, engineers report the Metro Red Line tunnel could sustain an earthquake of larger magnitude than at Kobe.

PB DMJM engineers also believe that any damage resulting from a Northridge Earthquake-type seismic event beneath the subway would be limited to minor cracks, said PB DMJM Deputy Program Director K.N. Murthy.

The Los Angeles subway suffered "zero" structural damage during the January 17, 1994 Northridge Earthquake, which had a magnitude of 6.7.

"Our basic assumptions were validated following the Northridge Earthquake. We've been on the right track since day one on how underground structures should be designed," Murthy said.

Monsees said current Metro Red Line seismic construction standards have been upgraded to reflect the lessons learned from ongoing studies of seismic activity in Los Angeles. As a result, certain portions of segments 2 and 3 of the Red Line, located near faults, have received extra reinforcement. The same seismic information will be utilized in the construction of the Eastside extension of the Metro Red Line, he said.

Subways generally have an excellent performance record during earthquakes.

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