

STUDIES ON DYNAMIC BEHAVIOUR AND
EARTHQUAKE RESISTANCE OF BRIDGE PIERS

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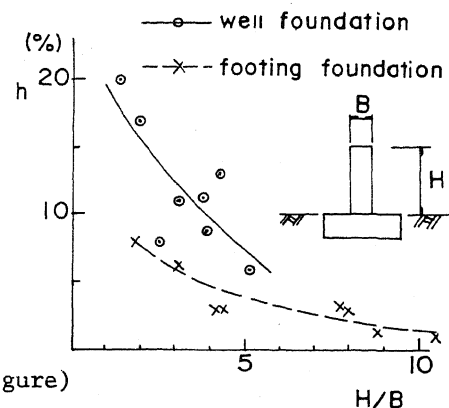
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According to our investigation concerning earthquake damage, vibration tests and dynamic analysis of bridge piers, the following points were concluded.

1. Until now, very few catastrophic failures of reinforced concrete members due to earthquakes have been observed at the earthquake-resistant-designed piers in Japan. Some of the observed catastrophic damage to the reinforced concrete seem to have been caused by the landslide around the foundation of the pier, or the falling of the girder.

2. The result of the dynamic analysis of ordinary reinforced concrete piers in the elasto plastic range shows that the main members of those reinforced concrete piers seem to have sufficient resistance to a strong earthquake.

3. The vibrational characteristics such as the natural frequency and the damping of a pier are greatly influenced by the rocking motion of the foundation. The effect of the rocking motion on the vibrational characteristics of a pier becomes stronger when the flexural rigidity of the pier itself becomes larger. The larger the flexural rigidity becomes, or the deeper the foundation is embedded in the ground, the larger the damping of the pier becomes. (see Figure)



4. The vibrational behaviour of a pier in the longitudinal direction is influenced by the frictional resistance of the movable supports of the girder.

5. The ratio of the dynamically calculated stress to the statically calculated stress at the upper part of a pier is larger than that at the lower part. Horizontal cracks are observed at the upper part of masonry piers due to earthquakes.

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