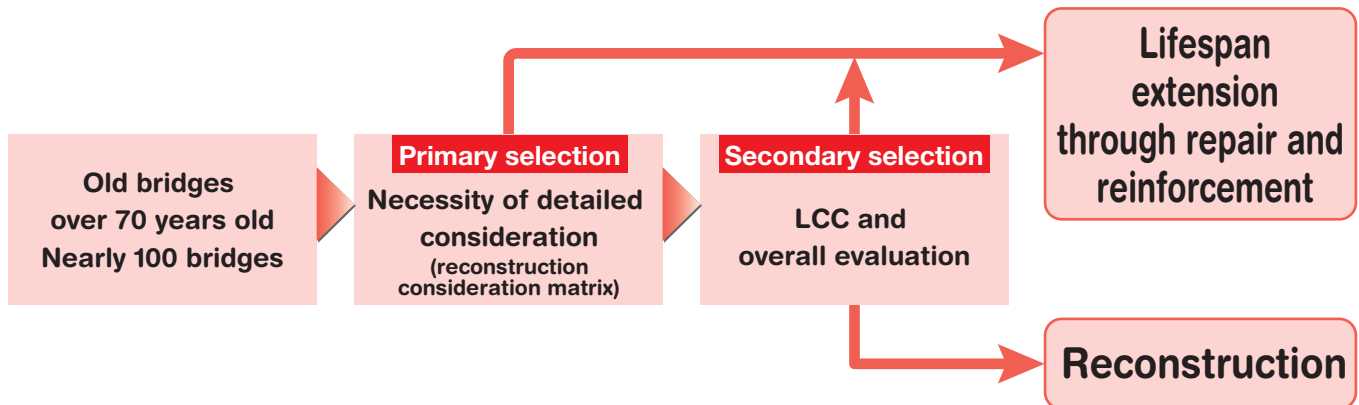


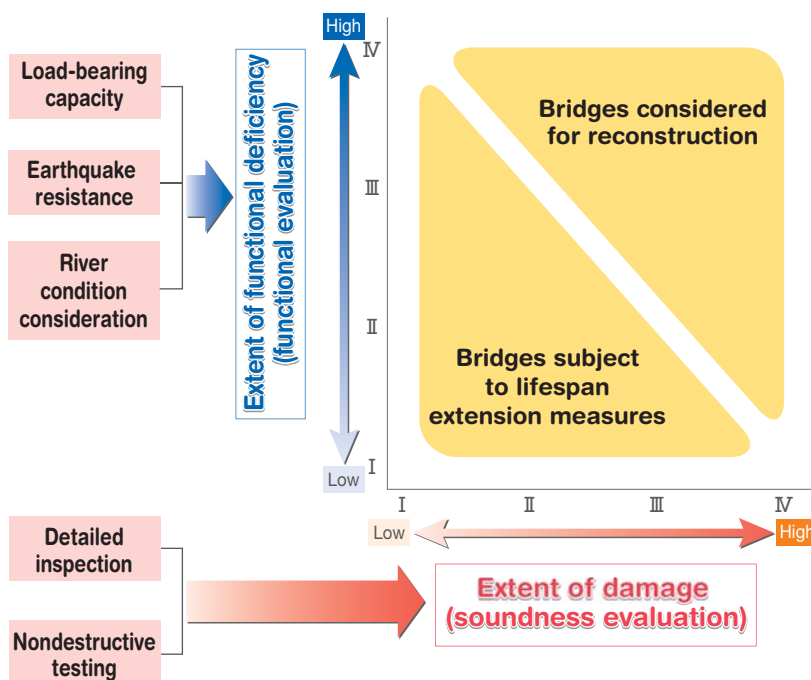
## Reconstruction of Old Bridges

The City of Osaka follows a basic policy of extending bridge lifespan by performing corrective maintenance in accordance with inspection results. However, we also reconstruct the requisite minimum of bridges when this reconstruction can be justified.

To this end, we review the construction of **100 old bridges** built before World War II, and consequently at least 70 years old, using inspection results and past structural calculations. Primary selection is performed using a **reconstruction consideration matrix** to decide which bridges warrant more detailed consideration. We then perform secondary selection to determine which bridges warrant reconstruction through an **overall evaluation based on life-cycle cost (LCC) analysis**.



### Reconstruction Consideration Matrix (Primary Selection)



Ordinarily, bridge maintenance plans are formulated by using inspection data to put together a conservation plan based on the bridge's **degree of soundness**, which incorporates an estimate of future deterioration.

However, with old bridges built before World War II, in some cases the design concept is completely different to that of modern-day bridges (especially with respect to earthquake resistance) and in other cases factors such as the design load and other conditions have changed greatly since construction. Determining the necessity of reconstruction on the simple basis of soundness may lead to incorrect judgments.

Therefore, in addition to an inspection-based **soundness degree evaluation**, we also conduct a **functional evaluation**, which examines the extent to which the bridge satisfies modern criteria for load-bearing capacity, earthquake resistance, and river conditions.

### Overall Evaluation Based on LCC Analysis (Secondary Selection)

During the detailed consideration of the necessity of reconstruction of old bridges (secondary selection), we conduct a thorough investigation of both reconstruction and lifespan-extension methods for each bridge based on structural calculations and construction plans, and consider the **life-cycle cost (LCC)** for the next 50 years by evaluating economic efficiency on the basis of construction costs, maintenance costs, and various other items.

$$\text{LCC} = [\text{Reconstruction costs}] \text{ or } [\text{Reinforcement (improvement) costs}] + [\text{Maintenance costs}] + [\text{Miscellaneous costs}^*]$$

\* Miscellaneous costs include economic losses resulting from construction work and from large earthquakes.