※Josei Measurement Technology;②-2

Repair Measures for Existing Bridges

Innovative Approaches to Seismic Retrofit of Existing Multi-Span Bridges ——The Significance of Continuous Superstructure Construction——

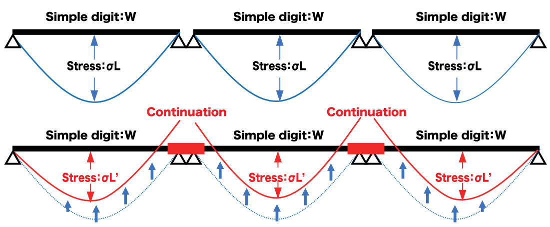
In Japan, which experienced the Great Hanshin-Awaji Earthquake and the Great East Japan Earthquake, seismic retrofitting of existing bridges is being actively implemented. Bridges spanning large rivers require access via temporary piers or barges to reach piers located within the river channel, resulting in enormous time and cost expenditures. At Joesi, we focus on the technology of continuous super-structures, challenging ourselves to minimize or eliminate the need for reinforcement of piers within rivers whenever possible. This approach contributes to ensuring seismic performance aligned with societal needs.


Temporary closure work using temporary jetties
Temporary closure work using a barge

The Appeal of Continuous Superstructure

During the period of rapid economic growth, many multi-span simple girder bridges were constructed. Weaknesses of multi-span simple girder bridges include: ① Noise, vibration, and poor ride quality originating from expansion joints ② Leakage beneath the girders from expansion joints ③ Risk of bridge collapse during major earthquakes To overcome these weaknesses, continuous simple girders became widely adopted. In addition to improving points ① to ③, this approach offers the advantages of: ④ enhancing the overall seismic performance of the bridge structure, and ⑤ reducing the stress on the main girder at the mid-span under live loads.

[The Appeal of Continuity - 1: Reducing Bending Stress at the Center of Main Beam Spans]



Introduction to Design Projects at Josei

During the period of rapid economic growth, many multi-span simple girder bridges were constructed. Weaknesses of multi-span simple girder bridges include: ① Noise, vibration, and poor ride quality originating from expansion joints; ② Water leakage beneath the girders from expansion joints; and ③ The risk of bridge collapse during major earthquakes. To overcome these weaknesses, continuous simple girders became widely adopted. In addition to improving points ① to ③, this approach offers the advantages of: ④ Enhancing the overall seismic performance of the bridge structure, ⑤ Reducing the main girder stress at the mid-span under live loads.

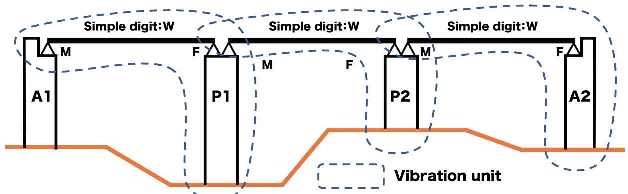

Photo ①: Continuous Main Girder


Photo 2: Support Bearing Mobilization


Photo 3: A2 Abutment Seismic Reinforcement

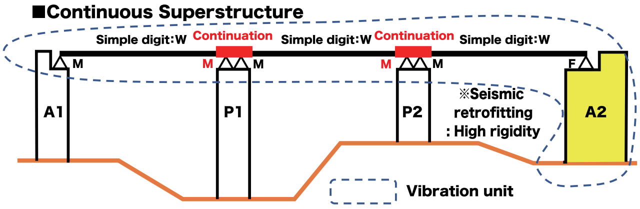
[The Appeal of Continuity - 2: Proposing a Minimal Seismic Reinforcement Plan]

■Current Structural System



⇒ Fixed (F) substructure supports one span of superstructure
⇒ Total weight: 3W supported by substructures of 3 units (P1, P2, A2)

■Continuous Superstructure



⇒ Conversion of fixed bearings at P1 and P2 to movable bearings (F ⇒ M)
⇒ Total weight: 3W supported by the substructure of one unit (A2)
⇒ No seismic reinforcement required for P1 and P2 piers

At Josei, we are also engaged in the continuous connection of numerous multi-span bridges. Seismic retrofitting of piers within Class 1 rivers requires enormous time and cost. We believe that continuous connection of superstructures is a meaningful measure not only to meet customer needs but also to use limited finances effectively and efficiently.


Continuousization of a Three-Span Simple Girder


Continuous Five-Span Simple Girder

Click here for details and to contact us.