

Bridge of the Americas

In-Depth Condition Assessment
Panama Canal, Panama



CLIENT

T. Y. Lin International

STRUCTURE

The Bridge of the Americas, completed in 1962, is a riveted tied-arch bridge that runs east to west and spans a mile and a half over the Panama Canal where it opens into the Bay of Panama in the Pacific Ocean.

CHALLENGE

WJE was retained to perform a condition evaluation of the concrete deck, in-depth vibration and fatigue analyses of the bridge superstructure, ultrasonic testing of the main hanger pins, and a condition survey of the coating covering the bridge steel.

SCOPE OF SERVICE

- In-depth condition assessment
- Structural analysis
- Coatings analysis

SOLUTION

- Chain dragged the entire deck to locate delamination and corroded areas
- Removed concrete cores from the deck and analyzed petrographically and chemically
- Made inspection openings at selected locations in the deck and performed corrosion studies
- Installed strain and deflection gages to measure static strains and deflections due to a heavily loaded test truck and to temperature changes, and also to obtain vibration data from the test truck driving over an obstacle
- Tested suspension cables to determine cable tensions
- Captured vibration data for each suspension cable and frequency response spectra were found corresponding to each cable's characteristic frequencies of vibration
- Calculated suspension cable loads from the spectrum data
- Presented recommendations for the repair and protection of the concrete deck
- Utilized the deflection and vibration studies to widen the bridge
- Examined the condition of the existing bridge coating (an oil-based primer pigmented with red lead and top coated with aluminum pigmented alkyd-based coating), and proposed a method of surface preparation and a recoating system