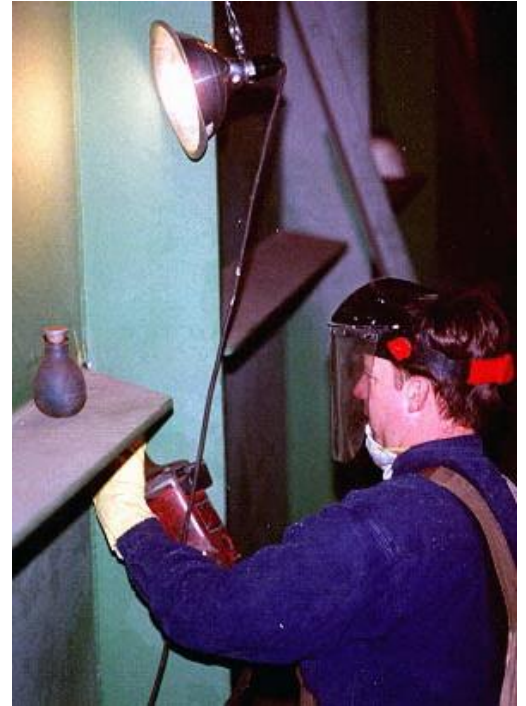
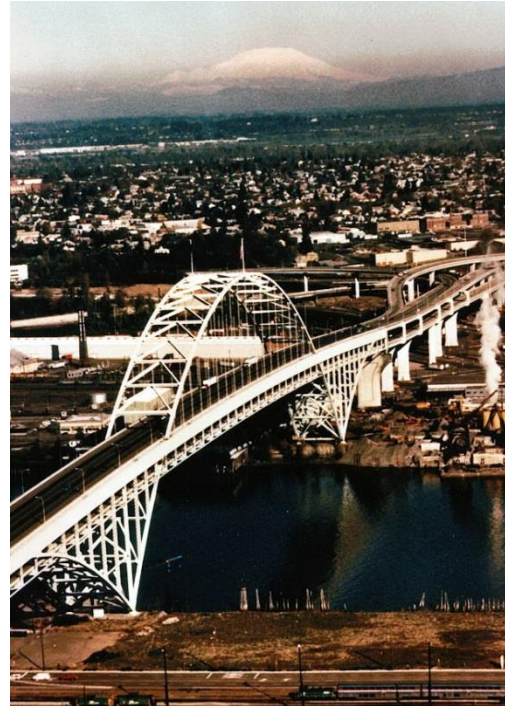




PROJECT PROFILE

Fremont Bridge over the Willamette River

Fatigue and Fracture Study | Portland, OR



CLIENT

Oregon Department of Transportation

BACKGROUND

The Fremont Bridge is a three-span, stiffened steel arch bridge crossing the Willamette River, having a total length of 2,159 feet. The arch is designed to act in compression, and the tie girder acts in tension to counteract the thrust of the arch, as well as in flexure to resist live-load bending moments. The main span consists of twenty-eight panels at 44 feet, 10 inches each for a total length of 1,255 feet 4 inches. The side spans consist of 10 panels at 44 feet, 10 inches each for a total of 448 feet, 4 inches.

As part of ongoing maintenance of the Fremont Bridge, the Oregon Department of Transportation retained WJE to conduct a comprehensive fatigue and fracture study of the three-span main arch and associated approach spans.



SOLUTION

WJE engineers conducted a fatigue and fracture study of the tied arch structure. The primary objectives included an arm's-length in-depth inspection of all fatigue sensitive details in the tie girders, a detailed inspection of the lower deck framing members, ultrasonic testing of bearing pins and hanger links and approach ramp hanger pins, magnetic particle testing of selected areas, fractographic examination, measurement of the existing load in the suspender cables, visual inspection of all approach roadway pot bearings, and an assessment of retrofitted conditions



WJE engineers inspected approximately 8,300 Category E and E' details in the interior of the two box-shaped tie girders and examined over 400 locations on the tie girder exteriors. To accomplish the inspection, weld termination areas were wire brushed or cleaned with a solvent, and crack-like indications were lightly ground using electric dye-grinders. To assess the condition of the weld toe, WJE engineers removed paint, weld splatter, weld overlap, or undercutting. Category E and E' details in the tie girders were NDT tested and any shown to be cracked were ground to remove the defect or a sample was cored for fractographic examination. The study included testing 329 approach span hanger pins for cracking or defects.