Chapter 10

Wilson Bridge in Tours

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This chapter presents the forensic investigations conducted after the partial collapse of the Wilson Bridge on the Loire River in the city of Tours in France. It reviews several papers published in French after the collapse, intending to share the main lessons with the international community. The collapse of five piers and six arches among the fifteen arches of this old masonry bridge occurred in 1978 during a strong flood of the Loire River. The main causes concluded by the experts are a general scour emphasised by a significant lowering of the river bed due to material excavations, a local scour of the alluvions, and a washout of the sand between the wooden piles through the protective rockfill, which seems to have remained in place. These causes led to the destabilisation of the foundations of the piers. This event triggered the publication of the Technical Instruction for the Surveillance and Maintenance of Bridges (ITSEOA) in 1979 and the necessity to limit the extraction of materials in French rivers.

10.1 Introduction

This bridge located in the city of Tours and dated from the 18th century, commonly called "the stone bridge" by the inhabitants of Tours, was renamed after American President Woodrow Wilson in 1918. It allows the national road n° 10, which goes from Paris to the Spanish border, to cross the Loire River. It has a total length of 440 m and comprises 15 masonry arches with a span of approximately 24.50 m, numbered from 1 to 15 going from the left bank to the right bank.

In the morning of Sunday, April 9, 1978, the pier 2 of the bridge suddenly tilted upstream, followed by a partial collapse of the upstream parts of the arches 2 and 3. Luckily, while this bridge is usually very busy, at that time only one car was present on the bridge and had just entered the left bank side; its driver, feeling the road was giving way, had the reflex to fully accelerate to cross the collapsing arches and to reach the part of the bridge that remained intact. There was, therefore, only a few material damages to the car and no people were injured.

In the hours that followed, the dislocated parts of arches 2 and 3 in turn collapsed, leading to the collapse of arches 4 to 6, and later arch 1 (Figure 10.1).