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## Carefully balancing

When engineers design a new bridge they account for the loads that bridge has to carry as well as the weight of the bridge itself. But when the bridge is almost 90 years old and the repair contractor is going to be loading it up with construction equipment and materials, some extra consideration is called for.

When the Illinois DOT let the repair contract for the Joe Page Bridge over the Illinois River at Hardin, the contractor had to carefully allow for the additional loads of access platforms, heavy machinery and painting equipment while ensuring the bridge remained safe to carry one lane of traffic. They called on WHKS to help.



The historic bridge carries about 3,000 vehicles each day across the river and years of traffic and weather had deteriorated the structure and reduced its load-carrying capacity. Making this significantly more complicated is the fact that its longest span - at a length of 309 feet - is a lift bridge that raises multiple times each day to allow river traffic to pass below and was required to remain operational while under repair. While many moveable bridges hinge up at an angle, this one raises the entire span vertically. Unlike a venetian blind that is merely annoying when the two ends occasionally go askew, serious things happen should hundreds of tons of steel get out of balance.



Lifting of the span is aided by massive counterweights that go down as the bridge goes up. As the contractor worked on the bridge, at times they had to dismantle parts of it and equipment and materials were continuously loaded and unloaded on the span. With each addition or removal, the bridge and its counterweights had to remain in balance if the lift was to remain operational. WHKS engineers prepared and maintained an online spreadsheet to track the adding and removing of materials and to guide the contractor through repairs as they maintained the balance of the lift span.



Initial analysis showed that the lift span had been outside the intended tolerance for balance. But it was restored during the repairs to ensure it travels up and down smoothly and evenly.