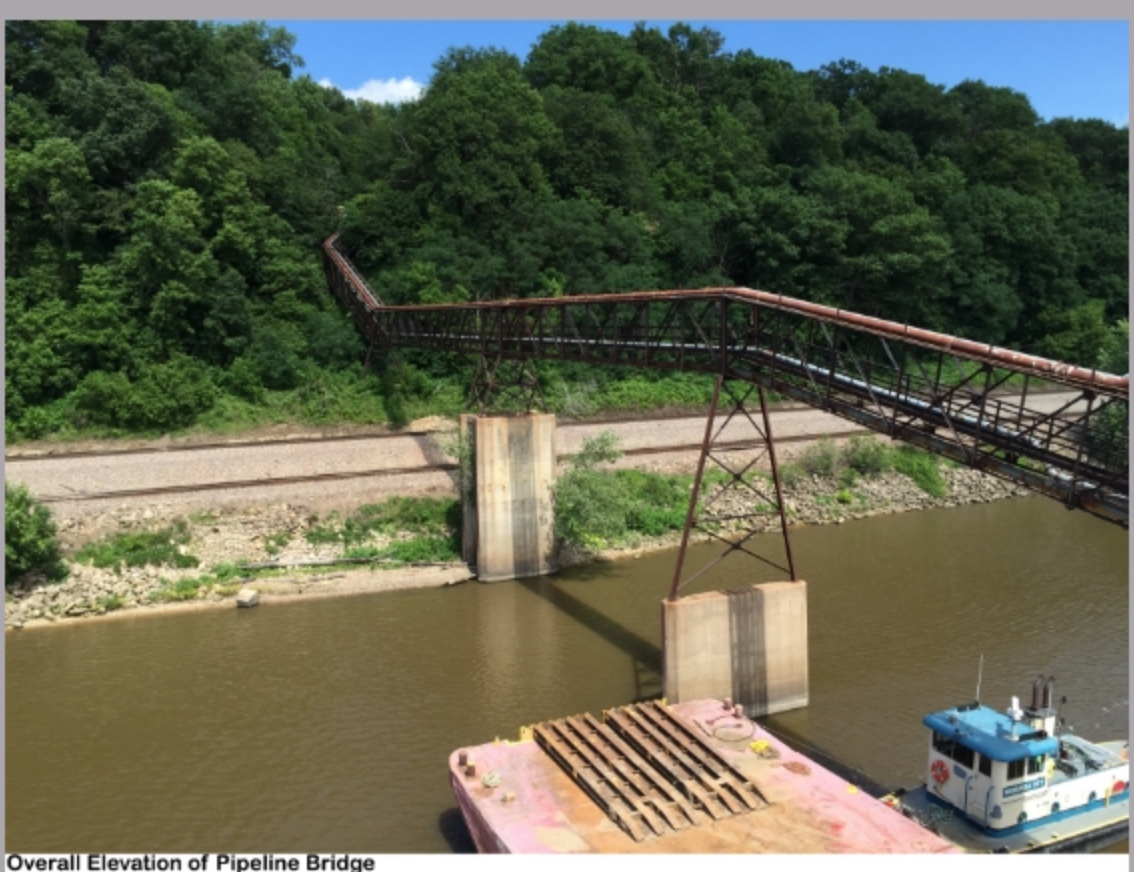
March 7, 2017

Pipeline Bridge

Trains, barges, and overhead pipelines

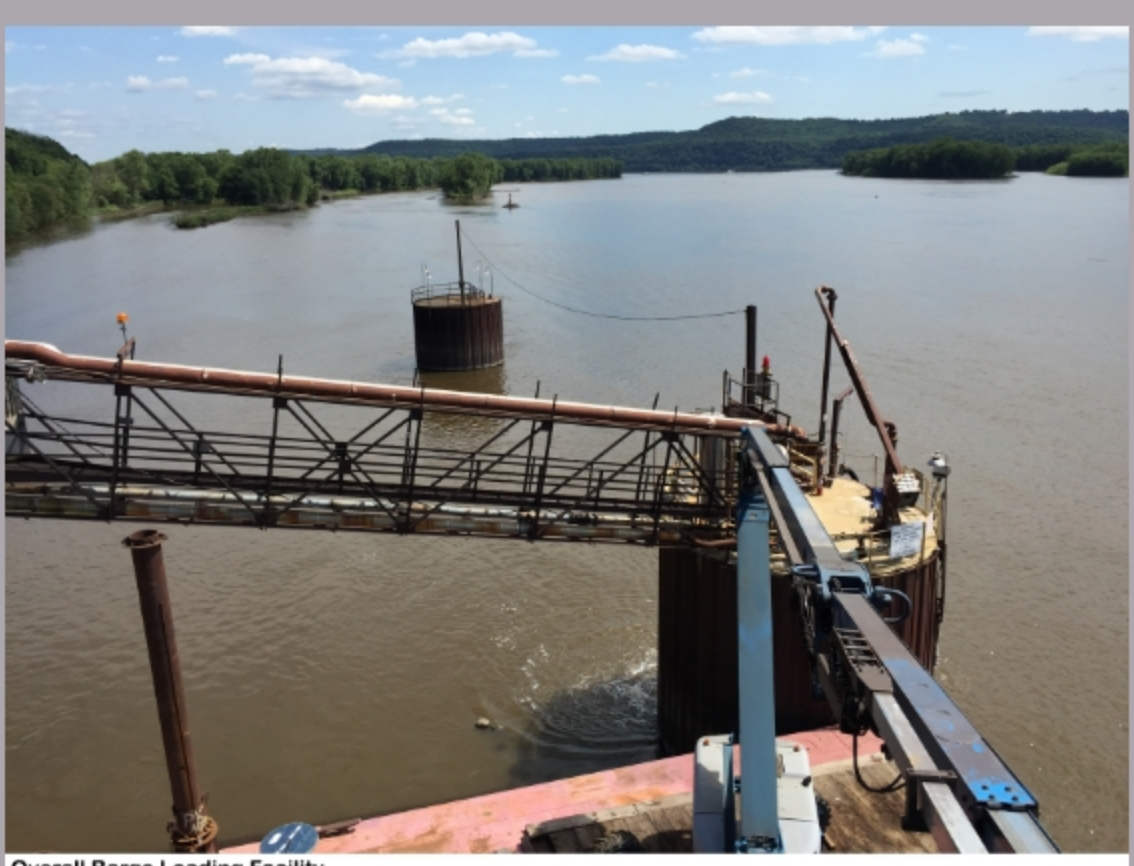


Overall Elevation of Pipeline Bridge

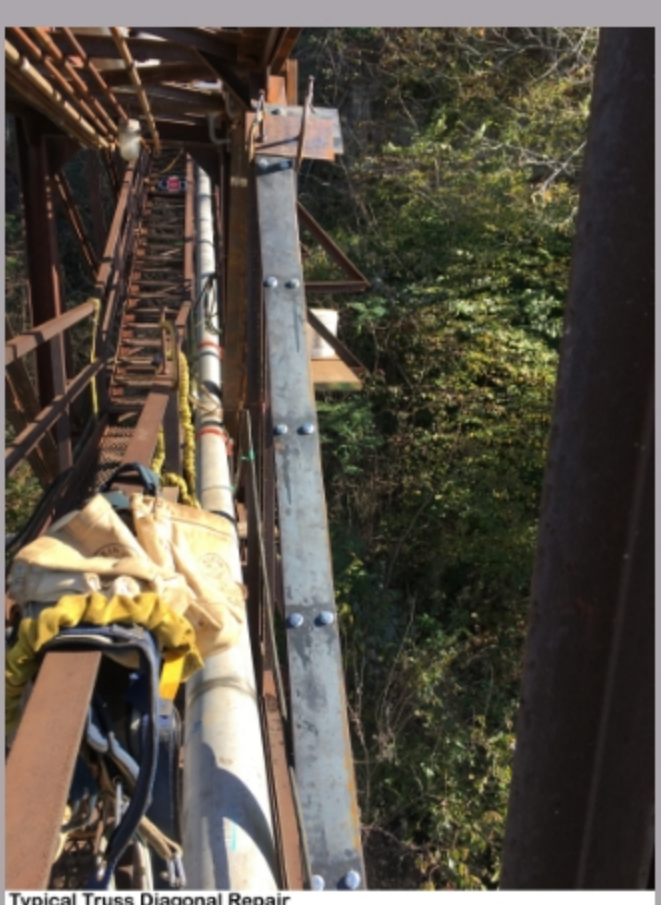
The plant is located adjacent to the Mississippi River and has been loading and unloading its primary products used to make fertilizer onto barges for almost 50 years. The overhead pipeline that carries UAN, ammonia and other chemicals are supported by a bridge structure that extends 300 feet into the river. On the way from the plant to the barge loading facility, the pipeline bridge crosses over a 140-foot bluff and an active railway.

During a routine inspection triggered by an air rights contract renewal, the bridge was found to have significant deterioration due to rust and general aging. A contractor was brought in to make the repairs and everything seemed fine.

But nothing is quite as simple as it seems.



Overall Barge Loading Facility



Typical Truss Diagonal Repair

When it was originally built, large sections of the bridge had been prefabricated, with welded joints, then lifted and assembled into place using bolted connections. But, while simple and fast, the contractor's suggestion of using welding to repair the bridge deterioration would have introduced a whole new set of residual stresses that the original design didn't account for. The structure could have risked collapse from the very repairs meant to fix it.

After a complete review of the bridge using complex modeling, analysis, and a variety of loading scenarios, WHKS engineers developed a repair strategy that would return the bridge to a condition acceptable to the railway, minimize temporary support structures and keep costs reasonable.

Close coordination with the repair contractor to ensure strict adherence to the rehab strategy resulted in the pipeline bridge now being in fair overall condition with sufficient reserve capacity to safely carry the anticipated loads.