

## **Installation of an Inflatable Bladder and Sill Walls for Riverbank Erosion Protection and Improved Water Intake Zone Smokey Hill River - Salina, Kansas**

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**Abstract :** Environmental, Limited Liability Corporation (EMR) provided civil construction services to the U.S. Army Corps of Engineers, Kansas City District, for the placement of a protective riprap blanket on the west bank of the Smoky Hill River, construction of 2 shore abutments and the construction of a 140 foot long sill wall spanning the Smoky Hill River in Salina, Kansas. The purpose of the project was to protect the riverbank from erosion and hold back water to a specified elevation, creating a pool to ensure adequate water intake for the municipal water supply. Geotextile matting and riprap were installed for streambank erosion protection. An inflatable bladder (AquaDam®) was designed to the specific river dimension and installed to divert the river and allow for dewatering during the construction of the sill walls and cofferdam. AquaDam® consists of water filled polyethylene tubes to create aqua barriers and divert water flow or prevent flooding. A challenge of the project was the fact that 100% of the sill wall was constructed within an active river channel. The threat of flooding of the work area, damage to the aqua dam by debris, and potential difficulty of water removal presented a unique set of challenges to the construction team. Upon completion of the West Sill Wall, floating debris punctured the AquaDam®. The manufacturing and delivery of a new AquaDam® would delay project completion by at least 6 weeks. To keep the project ahead of schedule, the decision was made to construct an earthen cofferdam reinforced with rip rap for the construction of the East Abutment and East Sill Wall section. During construction of the west sill wall section, a deep scour hole was encountered in the wall alignment that prevented EMR from using the natural rock formation as a concrete form for the lower section of the sill wall. A formwork system was constructed, that allowed the west sill wall section to be placed in two horizontal lifts of concrete poured on separate occasions. The first sectional lift was poured to fill in the scour hole and act as a footing for the second sectional lift. Concrete wall forms were set on the first lift and anchored to the surrounding riverbed in a manner that the second lift was poured in a similar fashion as a basement wall. EMR's timely decision to keep the project moving toward completion in the face of changing conditions enabled project completion two (2) months ahead of schedule. The use of inflatable bladders is an effective and cost-efficient technology to divert river flow during construction. However, a secondary plan should be part of project design in the event debris transported by river punctures or damages the bladders.

**Keywords :** abutment, AquaDam®, riverbed, scour

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