xylem
Let's Solve Water

Case study
Stream Diversion

Creek Culvert Bypass Helps New York State Avoid a Major Road Closure

Unique solution provides access for critical repair work

Mayfield Creek in Fulton County, New York, is an arterial body that flows out of Great Sacandaga Lake for approximately four miles through farmland and the upstate countryside. At several points along the way, the creek runs through culverts and under bridge structures, as highways and local roads intersect its path.

During an inspection, it became clear that one major culvert – 140 feet long, 15 feet tall and running under heavily traveled Route 30 – had outlived its expected life. The 10-guage corrugated steel structure was deteriorated and needed to be repaired – with as little disruption to Route 30 traffic patterns as possible.

Solution

For this repair project, New York State Department of Transportation (NYSDOT) made two key assumptions. Number one: contractors would have to install a cofferdam or waterway diversion structure in the very limited space on either side of the culvert. Number two: traffic on Route 30 would need to be disrupted.

Working with the bidding general contractor DH Smith, Xylem engineers found a creative way to avoid both of those troublesome issues. The proposed solution featured a single rental pump that would divert creek flow through a bypass pipe elevated within the culvert and enable dewatering of the culvert floor for the repairs. With this innovative design, the cofferdam structure would not be needed and there would be no lane closures on the heavily traveled Route 30.

"We had worked with Xylem in the past, and their bypass expertise, innovative design and rental pump option helped to win the bid," says Dave Smith, president of DH Smith. "They were able to provide a unique solution with significant cost savings."

The DH Smith solution required a complete temporary bypass, with the piping passing through the culvert and rigging to hang the pipe off the side of the culvert.

The Godwin Heidra 600AX Axial Flow dewatering pump provided enough flow capabilities to move the Mayfield Creek water from one end of the culvert to the other.

Customer: New York State Department of Transportation (NYSDOT)

Challenge: Repair a deteriorating culvert with stream diversion structures, and without traffic impairment.

Products:

- 1 Godwin Heidra 600AX Axial Flow diesel-driven dewatering pump
- 200 feet of 18" HDPE piping
- 1 level transducer

Result: Using just a single rented Godwin Heidra 600AX Axial Flow dewatering pump, Xylem and DH Smith provided a unique solution that allowed the culvert repair plan to be completed with significant savings in time and money - $20,000 in diesel fuel savings alone – and without any disruptions to road traffic.

For a bypass like this, a typical solution would be to push the flow – which could reach 14,000 gallons-per-minute (GPM) during the dry summer months of the project – with three or four Godwin diesel-driven Dri-Prime pumps. However, the limited areas at each end of the culvert didn't allow enough room for this approach.

The Xylem solution reduced the flow rate to 7,000 GPM and used one rental Godwin Heidra 600AX Axial Flow diesel-driven dewatering pump to push the flow through an 18-inch high-density polypropylene (HDPE) pipe. Sitting on the bottom of the creek, this hydraulic-submersible pump – which was equipped with a level transducer to regulate revolutions-per-minute based on creek flow levels – pushed the flow through the pipe, through the culvert and back into Mayfield Creek. Since the Godwin Heidra Axial Flow pump is known for low head and high capacity pumping, this was the right pump for the job.

The length of the bypass was approximately 200 feet, and the DH Smith team built rigging to hang the pipe along the inside wall of the culvert. Xylem flanged and connected 50-foot lengths of HDPE piping ahead of time at their rental dispatch and maintenance yard, so they could be easily lowered into the culvert, bolted together and slid into place in the rigging.

The entire installation process went off without a hitch in under three days, less than the original time estimate. With the bottom of the culvert dry, the DH Smith team moved ahead on the repair plan to build a concrete invert into the bottom of the culvert. During the construction, Xylem's rental pump ran 24/7 for two weeks straight without an issue.

Results

Running the bypass piping through the culvert versus up and over the road avoided significant headaches for the NYSDOT – and saved both the time and effort that lane closures would have required. In addition, using one Godwin Heidra 600AX Axial Flow diesel-driven dewatering pump instead of multiple pumps and a level transducer optimized fuel efficiency. During the two weeks of construction, the savings on diesel fuel alone was over $20,000.

"The rental option from Xylem is the way to go. We get top-of-line equipment, expertly serviced and maintained, and only have to pay for the actual time that we're using it. It allows us to provide very competitive bids for customers like the NYSDOT," says Dave Smith. "It's really a win-win for everyone."

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The Godwin power pack was situated 150 feet from the creek, addressing environmental concerns.

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