

ATTACHMENT J
48-INCH LOW FLOW PIPE REVIEW



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July 22, 2009

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Mr. Ron Mentzer, Director
Community Development Department
City of Warrenville
38258 Manning Avenue
Warrenville, Illinois 60555

Re: September 2008 Flood Investigation
48-Inch Low Flow Pipe Review--Revised

Dear Mr. Mentzer:

www.strand.com

We have investigated DuPage County's reason for abandoning (grouting full) the 48-inch diameter low flow pipe as part of the County's Fawell Dam Modifications in 2000-2002. As described below we found that the pipe was grouted to address dam safety requirements and did result in impacts to the flood pool storage volume and flow capacity of the dam spillway system.

According to the September 10, 1996 memorandum by Christine Klepp of the DuPage County Department of Environmental Concerns (DEC), there were concerns with the stability of the dam embankment based on observed seepage during a site inspection conducted by the County's consultant Woodward-Clyde on September 5, 1996. The County and Woodward-Clyde determined the seepage was likely occurring around the low flow pipe through the dam.

As documented in both the May 29, 1997 memorandum by Christine Klepp of the DEC and the October 1997 Draft Design Report, Fawell Dam Modifications by Woodward-Clyde, the low flow pipe was proposed to be grouted to address the seepage concerns and meet the requirements for obtaining a dam safety permit from the Illinois Department of Natural Resources. To date we have been unable to obtain a copy of the final approved dam safety permit. Construction documents indicate the interior and exterior of the low flow pipe were pumped full of concrete grout and sealed at both ends with steel plates.

Grouting the 48-inch low flow pipe impacted both the flood pool storage volume and the discharge rates of the dam spillway system. The low flow pipe invert was three feet lower than the main dam spillway. When the pipe was grouted the water level in the flood pool had to reach an elevation three feet higher before it was able to flow through the dam. In addition, the flow capacity of the 48-inch diameter pipe was no longer available, reducing the overall flow capacity through the dam spillway system.



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The loss of flood storage capacity in the flood pool upstream of Fawell Dam is estimated to be approximately 9.5 acre-feet or 0.3% of the total estimated flood pool storage volume of 3,170 acre-feet at an elevation of 673 feet.

Grouting the 48-inch diameter low flow pipe reduced the flow capacity of the Fawell Dam spillway system. The October 1986 Illinois Department of Transportation-Division of Water Resources "*Strategic Planning Study For Flood Control, West Branch DuPage River, Fawell Dam*" presents the dam spillway rating table considering the low flow pipe functioning and the May 2001 URS Greiner Woodward Clyde "*Operation and Maintenance Plan, Fawell Dam and Saddle Dike*" presents the proposed spillway rating curve considering the 48-inch pipe being abandoned. The information presented in these documents are summarized in the attached figure showing the differences in the calculated flows through the dam spillway. Please note that the calculations used to develop the information presented in each of the reports have not been reviewed as part of our investigation.

Differences in the rating curves can be attributed to the 48-inch pipe being open vs. grouted, the emergency spillway being lowered to 693 feet, and that different methods were used to calculate the spillway flows. The analyzed/designed function of the dam in each of these reports appear to consider the appropriate spillway configuration which includes both the flood pool storage volume change and 48-inch pipe impacts. It appears the greatest differences in the spillway discharge rates due to the grouting of the 48-inch pipe are for the smaller flood events and there is less of an impact as the flood event increases.

The documentation reviewed does not provide the individual capacity of the 48-inch low flow pipe. The theoretical capacity of the low flow pipe varies based on both the flood pool elevation and the downstream river elevations. From the available information, it appears that the 48-inch low flow pipe had a capacity of approximately 100 cubic feet per second (cfs) when the flood pool elevations was roughly 678 feet. This elevation is over three feet above the gated spillway, indicating that during river flows of 100 cfs a portion of the flow would pass through the gates.

According to the USGS data for the gauge station on the West Branch DuPage River near Warrenville, the average flow rate from 1969 to 2007 was approximately 108 cfs. As described above, it appears that to convey this average flow rate the flood pool would reach the three gate openings. The loss in potential flood pool storage volume discussed above addresses a worst case scenario. During dry periods the flow rates could be well below 108 cfs, and it is possible some previously available flood pool storage would be unavailable after the 48-inch pipe was abandoned.



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In conclusion, we found that the 48-inch diameter low flow pipe was grouted to address safety concerns. Based on our review of the available information, the impact to the function of Fawell Dam from both the flood pool storage volume and flow capacity appears small, and it is our opinion that the abandonment of the 48-inch diameter low flow pipe does not have an appreciable impact on flood elevations upstream of I-88.

Please feel free to contact us if you should have any questions or wish to discuss our comments.

Sincerely,

STRAND ASSOCIATES, INC.

A handwritten signature in black ink, appearing to read 'Michael R. Waldron'.

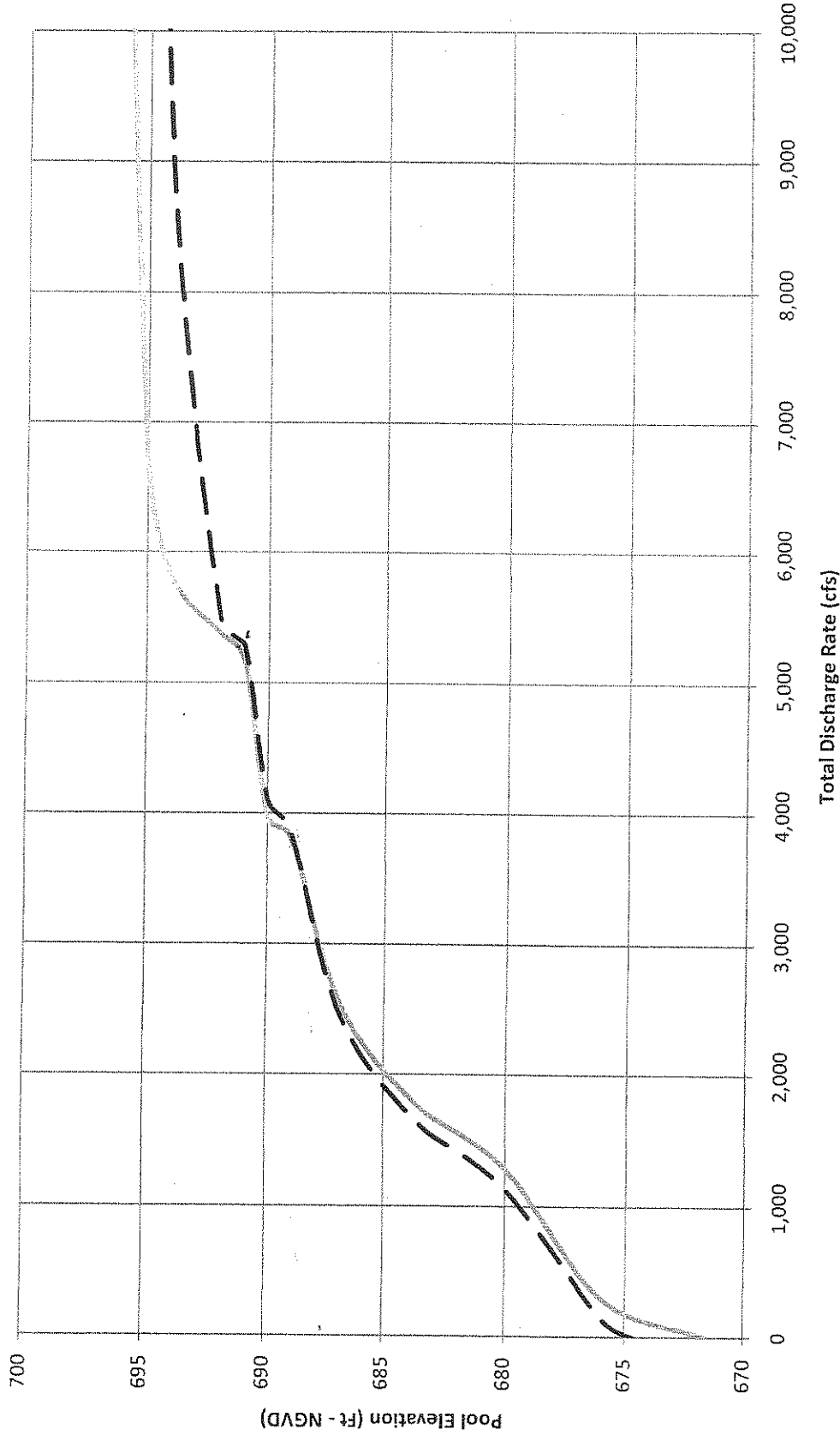
Michael R. Waldron, P.E.

A handwritten signature in black ink, appearing to read 'Nicholas J. Orf'.

Nicholas J. Orf, P.E., CFM

Enclosure

Fawell Dam Spillway Rating Curve



1986 Rating Curve (With 48" Pipe Open) 2001 Rating Curve (Grouted 48" Pipe)