Bowersock Dam - Established 1874

Water for the City of Lawrence

Bowersock Dam – History of Maintenance

- Bowersock Dam – Completed 1874
  - Southern 1/3 Masonry Block
  - Northern 2/3 Timber Crib
- 1874 – 1877 : Municipally-maintained
- 1877 - 1977: Privately-maintained
- 1977 - Present: Public/Private Partnership


Kaw WTP Raw
Water Intakes
Bowersock Dam

Kaw Water Treatment Plant
Raw Water Intakes

- Located Approx. 2,700 Feet Upstream
- 16.5 Million Gallons per Day (MGD)
- 25.73 Cubic Feet per Second (cfs)
- Water Surface Flashboards Up – 812.0
- Water Surface Flashboards Down – 807.5
- Currently can draw with flashboards down – critical issue is how to operate without a dam.
  - Decommissioning – potential repurcussions
    - Streambed degradation

City of Lawrence
Water System Master Plan – Study Period 2000 - 2025

- "The Kansas River has long been a consistent source of raw water supply to the City."
- "Lawrence participates in the Kansas River Water Assurance District and this will allow the City to rely on the Kansas River as a long-term raw water supply source."
- Early 2003 – Lawrence obtained approval to develop a new water right on the Kansas River
- Normal river water levels limit the supply capacity (taking into account recent improvements) to the Kaw Water Treatment Plant to approximately 16.5 mgd
- Clinton Water Treatment Plant = Near-term goal = 25 mgd
- Total City demand Peak Day = 28 mgd Summer Average = mid 20s.
- "The redundancy and security of having two plants of equal size provides an additional factor of safety in terms of meeting system demands if one of the two plants were out-of-service."
- Northeast Kansas reservoirs – eg Clinton Lake, face severe siltation issues.
  - "Natural lakes last for thousands of years. But man-made reservoirs, such as the ones in Kansas, have short life expectancies: 50 years to 100 years. The 93 reservoirs in Kansas used for drinking water have an average age of 51 years, according to the Kansas Water Office." – Kansas Water Office
  - "Many of our reservoirs are silting in much faster than anticipated, than their designed life." - KS Biological Survey

Condition of the Bowersock Dam
A History of Repairs Done Well

- 1978 – Coffer dam constructed during the construction of the Massachusetts Street Bridges. An impervious clay, rip rap and plastic layer constructed on upstream side to seal the face of the dam. Approx. $1 M
- 1986-87 – Bowersock improvements to top of dam to facilitate raising flashboards.
- 1993-94 – Repairs to party wall (south wall of flume) shared 50/50 (@$50,000.00). Remaining '93 flood repairs (e.g. Obermeyer doors) paid for by Bowersock – considered an improvement of the dam for the benefit of Bowersock. Repairs completed with funds from an SBA Disaster Loan.
- 1996 – Shotcrete applied to North Bank of Spillway Approx. $65,000.00 (1996 $)
- 2001 – Sheet piling and the construction of a downstream apron along the timber-crib section. Approx. $ 2.0 M
- Various efforts to seal with grout bags, etc. – up to $900,000 (high estimate)
- **Total Cost to City Under 1977 Agreement: @ $ 4 M**

Current Condition the Dam

- 30 Years Since 1st and only significant upstream repair
- 2001 downstream repairs
  - "The apron repairs completed in 2002 appear to be in excellent condition. The bond between the new and existing concrete appears to be sounds, as little to no separation of the surface was identified." B&V 2007 Report
- 2007 Black and Veatch Overall Assessment
  - "Based on the visual observations made alone it is not possible to determine if the dam is in immediate danger of failing, as significant structural concerns exist."
- FERC Response to Report
  - "The report concludes that it was not possible to determine if the dam is in immediate danger of failing."
  - Regarding proposed short term repairs: "While this design package may be included in the overall remediation, it is necessary at this time to undertake a comprehensive remediation effort that includes both of the consultant's short term and long term recommendations that will re-establish the stability of the dam."

Dam Standards

What condition does the dam need to be in?

- Federal Energy Regulatory Commission
  - Asks that repairs be made, doesn't require any form of certification, but requires that repairs be made to address stability.
- Is there a standard for good repair?
  - State of Kansas, Division of Dam Safety
    - "Chief Engineer of Division of Water Resources has dam safety requirements similar to FERC requirements – any dam must be operated and maintained in a sound and safe condition at all times to protect public and private property and public safety."

      – Matt Scherer

      Kansas Department of Agriculture, Division of Dam Safety

      Water Structures Program Manager

Course of Action

- Temporary, emergency repairs have been scheduled, but by direction of FERC, comprehensive measures must be taken up “at this time.”
- Emergency repairs, if possible, would allow Bowersock to generate, but is this the best course of action for the dam and for the City of Lawrence?
- Bowersock recommends establishing a new plan to undertake comprehensive repairs with the assistance of a coffer dam, to be scheduled for August, 2009.
  - Benefits:
    - Use of a coffer dam will ensure that work can be undertaken and completed effectively and efficiently. Without a coffer dam, it is unlikely that the “emergency repairs” will be possible. For two years high water has prevented this effort.
    - Would allow for the completion of the 2001 repairs that were delayed (and never done) due to weather-related issues.
    - A coffer dam would allow for the required work to be done in a more cost-effective manner.
      - Avoiding duplication of the proposed emergency repairs
      - Saving $ due to single mobilization of resources
    - Exposing the upstream side of the dam will provide an opportunity for thorough assessment of the condition of the dam and its long-term future.

Potential Solution

- B&V Proposed Short-Term Repair #2
  - Fill Eroded Concrete Areas
    - $100,000
- B&V Proposed Short-Term Repair #3
  - Repair Failed Shotcrete
    - $20,000
- B&V Proposed Long-Term Repair #1
  - Seal the Upstream Face of the Dam
    - $7,500,000
- Consider alternative methods and solutions.
- Provide a solid maintenance repair that will last longer than the temporary repairs currently proposed.

Future of the Bowersock Dam and Bowersock Electrical Generation

- River flows would allow Bowersock to increase production capacity by 50% via an additional plant on the north side of the river.
- Feasibility study is completed – project has solid footing based on current and projected electrical rates as well as national climate in support of renewable energy.
- Potential for expanding partnership with City of Lawrence to provide electricity.
- Challenges:
  - Dam stability is #1. Equipment procurement is a significant issue, used equipment is available now.
  - Regulatory process – achieving FERC licensure
  - Timeline – Goal: begin construction in August, 2011.

Stakeholders – The Bowersock Millpond

- The Bowersock Mills and Power Company
- City of Lawrence - @ 50% of the water supply
- University of Kansas – Boathouse recently completed - $6 M
- Kansas Department of Transportation – Massachusetts and Vermont Street Bridges depend on millpond for structural support.
- Douglas County – Lecompton Bridge – would require rip-rap, can be addressed with additional work.
- Lawrence Community – Kansas River as a braided stream
  - Impacts on proposed North Lawrence Development
- Westar Energy – 600 MW of coal-fired energy
- Kansans – Importance of renewable energy, carbon constraints, renewable portfolio standards – clean air.