"Your Project is Our Priority"

Maintenance Plan Rocky Fork Lake Dam
State ID 61-1

2017 through 2027

Prepared for:

Rocky Fork Club Incorporated

Prepared By:

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Scope of Services

- Review of existing dam records
- Prioritization of needed maintenance work with budgetary cost estimates
- Preliminary principal spillway capacity analysis to approximate capacity
- Work with Rocky Fork Club, Inc. to formulate timing of needed maintenance work based on available financial resources
- Upon approved plan by Rocky Fork Club, Inc. meet with club and State of Indiana to pass along 10-year maintenance plan
- Conduct (2) site visits with Club members

History of Dam

1. October 1957 – Construction in Floodway application submitted Docket No. D-594
    a. Calculated Hydraulic Capacity (1,260 CFS)
        i. 20 foot wide spillway w/ vertical walls
    b. Normal Pool (710.0 feet)
    c. Flood Stage (718.0 feet)
    d. Storage (605 Acre*ft) (runoff of 9.5 inches from 1.2 square mile watershed)
    e. Height 53 feet
    f. Upstream Slope 2.5:1 w/ 10 foot berm
    g. Downstream 2:1 w 10 foot berm
    h. Compaction 97% standard proctor
    i. Chimney toe drain 35 feet from toe of dam @ 45 degree angle against clay core
2. March 1958 – Minor modifications to design (unclear scan of modifications)
3. May 1958 – Application approved
4. August 1958 – Inspection of Construction Activities
    a. Fill being placed by competent contractor
    b. (2) compaction tests a day…All satisfactory to this point
    c. Keyway 8-10 foot wide into sandstone
    d. 8 inch iron conduit for dewater laid through the dam (pressure tested)
        i. Noted possibility of future rust out of this pipe
        ii. Valve noted to be on downstream side of dam
    e. Rock not found at principal spillway
5. September / October 1959 – Several issues were noted at the dam during an inspection
    a. Downstream slope is very steep and will be difficult to maintain (noted as a question during design, but not changed)
    b. Riprap on front face decaying / calcifying, being replaced with glazed tile
    c. Downstream slope has 1.5 foot gullies of erosion, appeared to be constructed without topsoil. No grass growing.
    d. Numerous other areas of erosion noted.
    e. Principal Spillway appears to be smaller than planned
    f. The berm drain, if installed has been filled with silt
6. April 1960 – Inspection
    a. Erosion areas filled with straw
    b. Crest of the spillway raised due to siltation
7. April 1964 – Inspection
    a. Erosion of spillway noted
8. November 1965 – Inspection
    a. Erosion still noted on downstream slope
    b. Burrowing animals noted
9. December 1966 – Inspection
    a. Downstream slope erosion noted as filled and seeded
    b. Spillway erosion still present

10. November 1967 – Inspection
    a. Mentions downstream slope still trying to get grass established
    b. Recommends spray program for woody vegetation
11. October 1968 – Inspection
    a. Mentions downstream slope still trying to get grass established
    b. Recommends spray program for woody vegetation
12. December 1969 – Inspection
    a. Recommends spraying woody vegetation
    b. Still struggling to get grass fully established on upstream and downstream slopes
    c. Recommends repairs to concrete principal spillway
13. November 1970 – Inspection
    a. Still struggling to get grass fully established on upstream and downstream slopes
    b. Recommends mowing more frequently
14. November 1971 – Inspection
    a. Still struggling to get grass fully established on upstream and downstream slopes
    b. Recommends removing trees near principal spillway
15. December 1972 – Inspection
    a. Still struggling to get grass fully established on upstream and downstream slopes
    b. Recommends removing trees near principal spillway
16. December 1973 – Inspection
    a. No specific maintenance items noted
17. December 1974 – Inspection
    a. Notes more erosion on downstream slope, but not as significant as previous
        i. Recommends some riprap on downstream continued erosion problems
18. December 1975 – Inspection
    a. Notes more erosion on downstream slope, but not as significant as previous
        i. Recommends some riprap on downstream continued erosion problems
19. February 1977 – Inspection
    a. Notes more erosion on downstream slope, but not as significant as previous
        i. Recommends some riprap on downstream continued erosion problems
20. May 1978 – Inspection
    a. Notes more erosion on downstream slope, but not as significant as previous
        i. Recommends some riprap on downstream continued erosion problems
21. May 1979 – Inspection
    a. Noted erosion repairs made
22. April 1980 – Inspection
    a. No specific maintenance issues noted
23. June 1986 – Inspection
    a. No specific maintenance issues noted
24. July 1987 – Inspection
    a. Significant erosion noted in principal spillway outlet channel
        i. Recommends more riprap and concrete slurry to hold riprap in place
25. July 1989 – Inspection
    a. No specific maintenance issues noted
    b. Corrective measures for downstream spillway noted as in place
26. June 1992 – Inspection
    a. No specific maintenance issues noted
27. August 1993 – Inspection
    a. No specific maintenance issues noted

    b. Makes reference to principal and emergency spillway as the same structure
28. August 1995 – Inspection
    a. Recommends removing trees from left abutment
29. September 1997 – Inspection
    a. Recommends removing trees from left abutment
    b. Mentions some cracks in concrete of principal spillway
30. October 1999 – Inspection
    a. Recommends removing fence in principal spillway chute
31. December 2002 – Inspection
    a. Plans noted to repair concrete in principal spillway
    b. Plans noted to repair principal spillway outlet channel
    c. Recommends removing fence in principal spillway chute
32. October 2005 – Inspection
    a. Recommends removing woody vegetation from upstream and downstream slopes
    b. Recommends engineering documentation to verify 50% PMP spillway capacity
33. October 2008 – Inspection
    a. No specific maintenance issues noted
34. October 2011 – Inspection
    a. Principal spillway concrete left wall cracked
        i. First note of cutoff wall in principal spillway
        ii. First mention of downstream mobile home ~4,100 LFT downstream of dam
35. September 2014 – Inspection
    a. Recommends breach analysis and hydraulic study
        i. Recommends a minimum of 50% PMP capacity
    b. Notes principal spillway concrete has been repaired

2014 Hazard Designation: Significant
2014 Condition Designation: Conditionally Poor (Noted for Inadequate data for spillway capacity)

Preliminary Principal Spillway Capacity Analysis

- Watershed
  - 865 Acres (1.35 Square Miles)
  - Runoff Curve Number
    - 77
  - Time of Concentration
    - 101 Minutes
  - Probably Maximum Precipitation Depth 27.2 Inches
  - SCS Type B hydrograph
- Outlet 19’ x 6’ Box (Concrete)
- Normal Pool Area (Elevation 710)
  - 60 Acres
- Maximum Pool Area Prior to Overtopping (Elevation 720)
  - 90 Acres
- Approximate Flood Storage Available
  - Computed with available LIDAR topography
  - 730 Acre * Feet
    - Design 605 Acre * Feet
  - ~9.8 inches of runoff for entire watershed
    - Nearly identical to 9.5 inches of runoff for entire watershed noted in design
- Inflow / Outflow
  - Inflow Peak 4,200 CFS
  - Outflow Peak 1,100 CFS
    - Design 1,260 CFS
- Preliminary Analysis Results
  - Passes 60% PMP routes to elevation 719 +/-
  - Rainfall Depth: 16.32 Inches
  - Runoff Depth: 13.2 Inches
- 100-Year Preliminary Results
  - Staging to ~712.5 feet (2.5 feet above normal pool)
  - Inflow Peak 900 CFS
  - Outflow Peak 190 CFS

*Study Based on LIDAR topography and field visit to confirm principal spillway structure opening size. A more detailed hydraulic study could be conducted if detailed survey information were obtained.

Primary Maintenance & Condition Project Recommendations and Timeline

1. Certified diver investigation of drawdown structure. ($6,000 +/-) (2017)
2. Decommission 8 inch drawdown valve & line (this could mean placing a new valve on the upstream face and lining the existing pipe, or installing a permanent siphon for drawdown and plugging existing pipe) ($20,000 to $60,000) (2017 / 2018)
    a. The existing pipe is under constant pressure.
    b. Current design standards do not recommend downstream valves on drawdown pipes because of this pressure.
    c. A failure in this line could result in a sudden dramatic failure of the dam.
    d. This failure could occur with little or no warning.
    e. Rule of thumb lifespan for steel plumbing pipes if 50 years.
        i. Lifespan can be less depending on PH and mineral composition of water.
    f. This drawdown pipe was installed almost 60 years ago.
3. Updated Geotechnical analysis ($25,000 +/-) (2022)
    a. Many advances have occurred since the original analysis was completed 60 years ago. An updated analysis is recommended.
    b. At the time it was built, the structure's downstream slope was considered steeper than ideal.
    c. It is not known whether the chimney toe drain was ever installed
    d. Rock is very prevalent in the area. Any potential work should take that into account. Geotechnical information is critical for this planning
4. Detailed topographic and land rights survey of dam and surrounding area ($7,500 +/-) (2024)
    a. A land rights survey will confirm ownership boundaries for Club
    b. A detailed topographic survey will provide necessary information for all future decisions.
    c. It will provide necessary information to finalize the hydraulic capacity analysis.
    d. Shots could be taken on structures downstream that are thought to potentially be in the potential breach inundation area to assist in confirming hazard level for structure.
5. Finalize Hydraulic Capacity Study for existing conditions ($2,500 +/-) (2025)
    a. This would be updated based on the detailed survey.
    b. Final report to submitted IDNR
6. Incident Emergency Action Plan ($7,500 +/-) (2026)
    a. Formalize incident emergency action plan.
    b. This would include a breach analysis and mapping.
    c. This would also verify the hazard classification for the dam.

*Timelines may adjust slightly if costs come in lower or higher than preliminarily estimated. Initial estimates of timeline based on $10,000 per year in expenses towards plan.