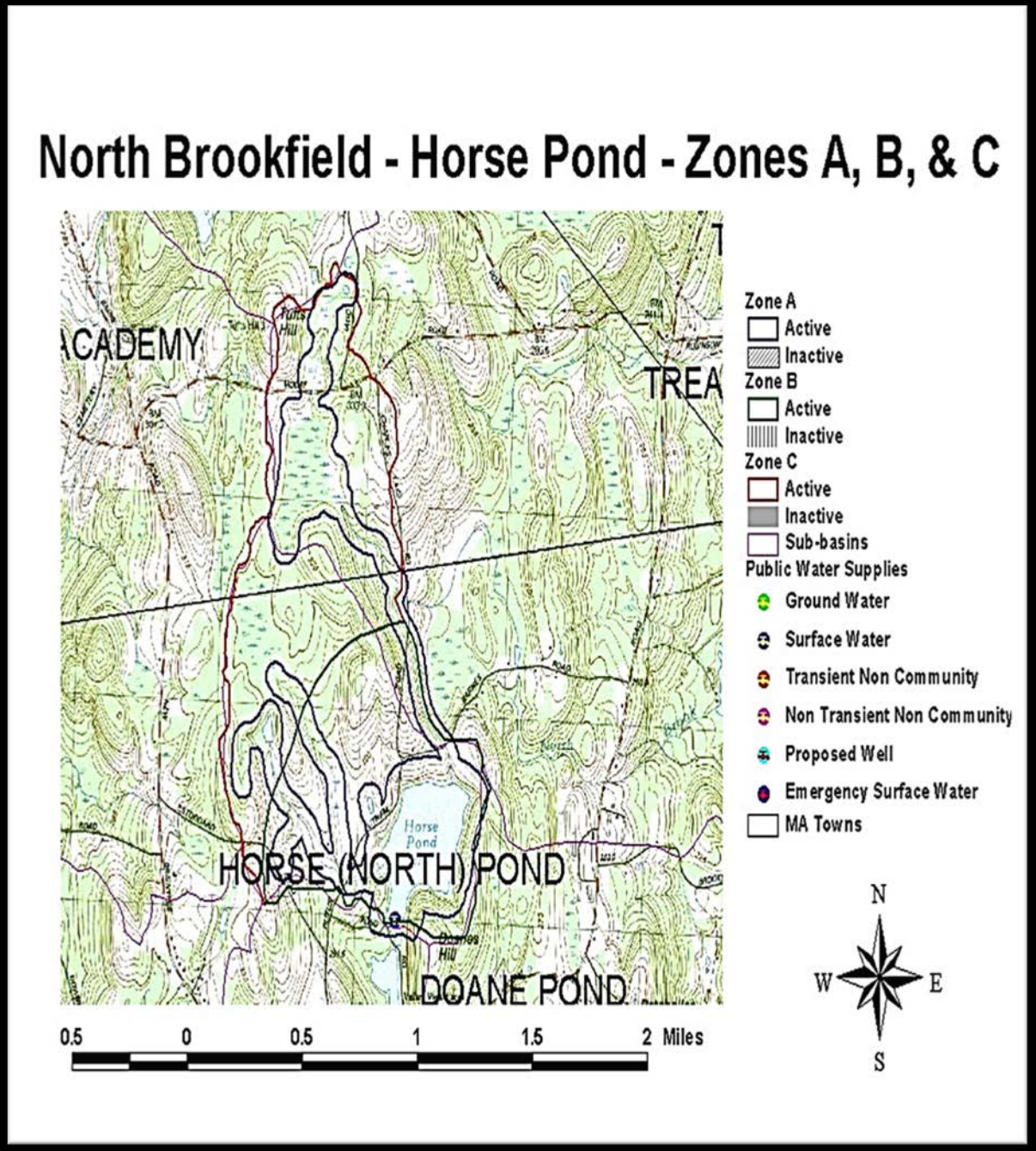
HORSE POND DAM

REPAIR PROJECT

- The Horse (North) Pond reservoir is located north of the town center.
- It has a storage capacity of 380 million gallons of which 248 million gallons can be used for the municipal water supply.
- Approximately 100 million gallons are used by the town annually.

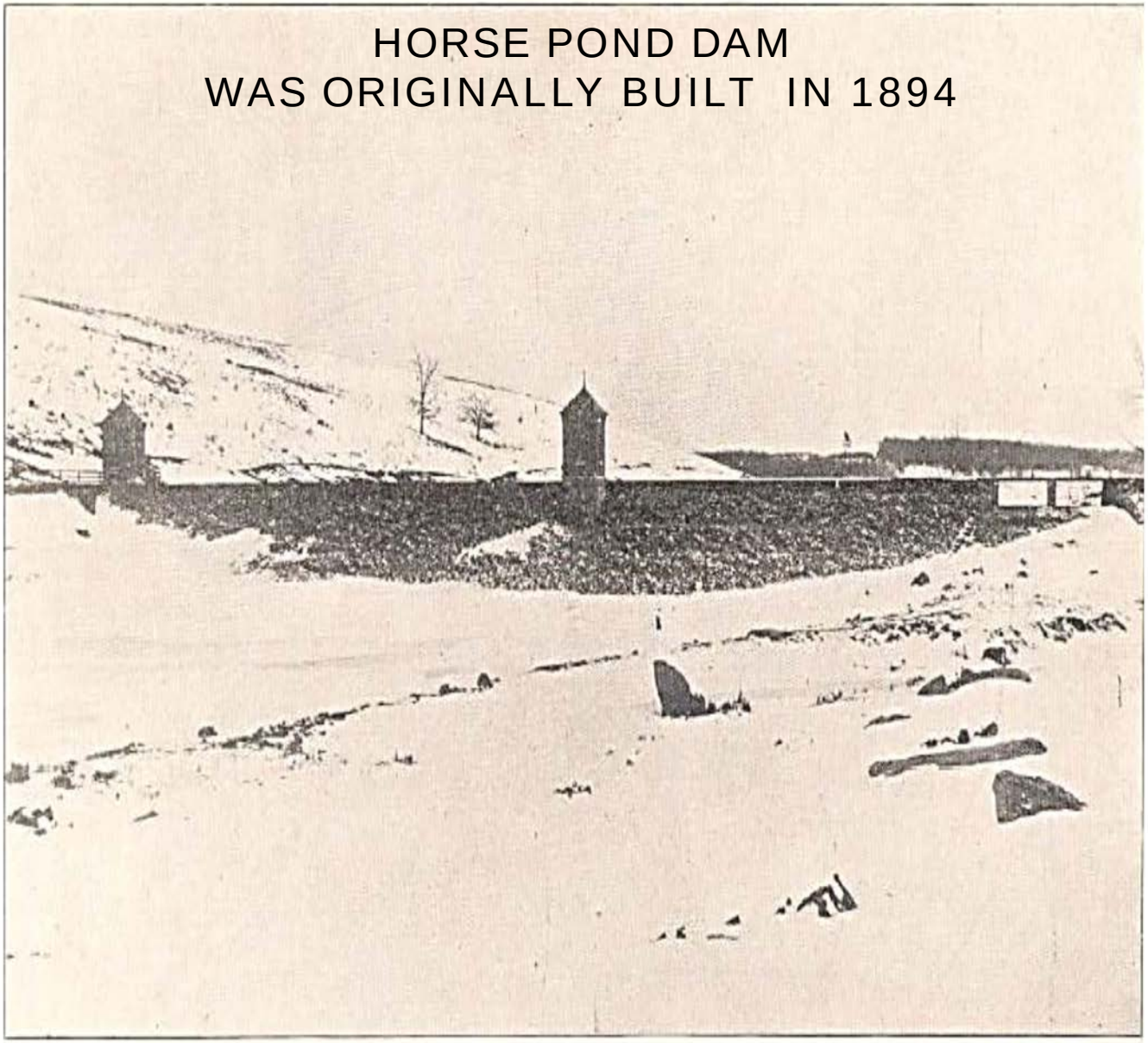
- The Horse Pond reservoir is North Brookfield's only municipal water source.
- The watershed extends northward into New Braintree.
- It supplies water for 3,875 residents of North Brookfield, 84% of the population.
- Horse Pond also supplies the water for the town’s fire protection system.



- Doane Pond was the original reservoir for the municipal system.

- Horse Pond was originally the power supply reservoir. Water flowed from the pond along a “power canal” to the pump station where it ran the water wheel that produced electricity for the pumps.

HORSE POND DAM
WAS ORIGINALLY BUILT IN 1894



North View of North Dam and Gate House. Also Waste-Way at West End of the Dam, and Gate House at East End of North Dam and at North End of Power Canal.

- Over the years, the dam spillway had been repaired but by 2000 the walls were cracked and leaning.

- The spillway masonry was deteriorating. This allowed vegetation to grow which caused more deterioration.

- Two large pine trees were growing into the dam. Water was seeping through the dam by these trees.

- All earthen dams seep to some extent but uncontrolled seepage is not good in that it can carry out particles of soil from the dam, thereby weakening the dam.

- The 36” low level outlet gate valve at the bottom of the dam, was inoperable.

- In 2006, GZA Engineering was hired to conduct a Phase 1 inspection of the dam. The inspection resulted in a “Poor” rating which brought an Administrative Consent Order from the Massachusetts Office of Dam Safety to repair the problems.

- Lenard Engineering was hired to conduct a Phase 2 inspection.
- This inspection was much more thorough and included borings into the dam itself.

10. View of the dam from the south looking north.

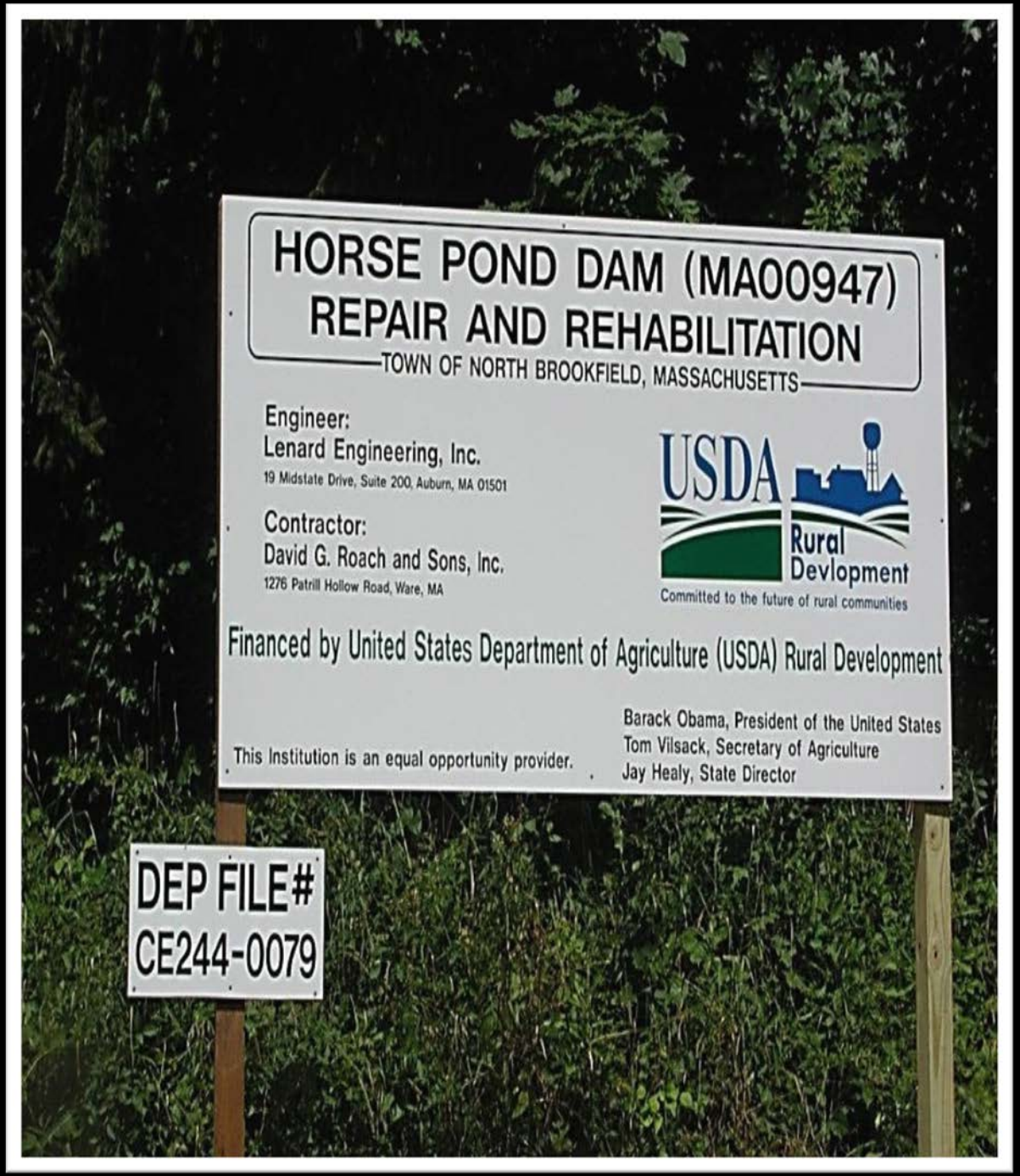
- Divers inspected the base of the gatehouse, the low level influent pipe, and the condition of the upstream slope of the dam.

- Lenard Engineering was then hired to design the repairs that were needed.

- The design called for buttressing the downstream slope of the dam to address stability issues, installing drains to address the seepage, removal of the trees, and complete replacement of the low level gate valve and the spillway.

- The cost to do this work was projected to be 1.2 million dollars.

- Funding was acquired through USDA that included a low interest loan and a 20% grant.



- David G. Roach & Sons Construction of Hardwick was awarded the construction bid.
- Tree clearing began in August of 2011.

- The design plan was to address the buttressing of the downstream slope first.

- An access road was built for the equipment to get down to the base of the dam.

- A coffer dam was installed to keep water from working back into the construction area.
- Material was excavated to form a trench for the foundation of the block wall.

- Blast rock was used for the bottom of the trench.

- The blast rock was covered by filter fabric, which was then covered by gravel.

- Since the back of the dam was being extended, the 36” cast iron low level outlet pipe had to also be extended.

- The bell end of the pipe was cut off so the new pipe could be connected.

- A 15’ piece of ductile iron pipe was brought in.

- The ductile iron pipe was then connected to the original cast iron pipe.

- A drainage system was installed at the base, or toe, of the dam at the same time.

- The drainage system consisted of perforated 4” PVC pipe laid in stone, covered with filter fabric and then backfilled with sand.

- A toe drain is used to collect the inevitable seepage that occurs without allowing any sediment transport.

- Vertical pipes were added to be used as cleanouts.

- A cement block wall was constructed as the final part of the buttress.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- The wall was backfilled with more gravel and loam was added.

- The area was then hydroseeded.

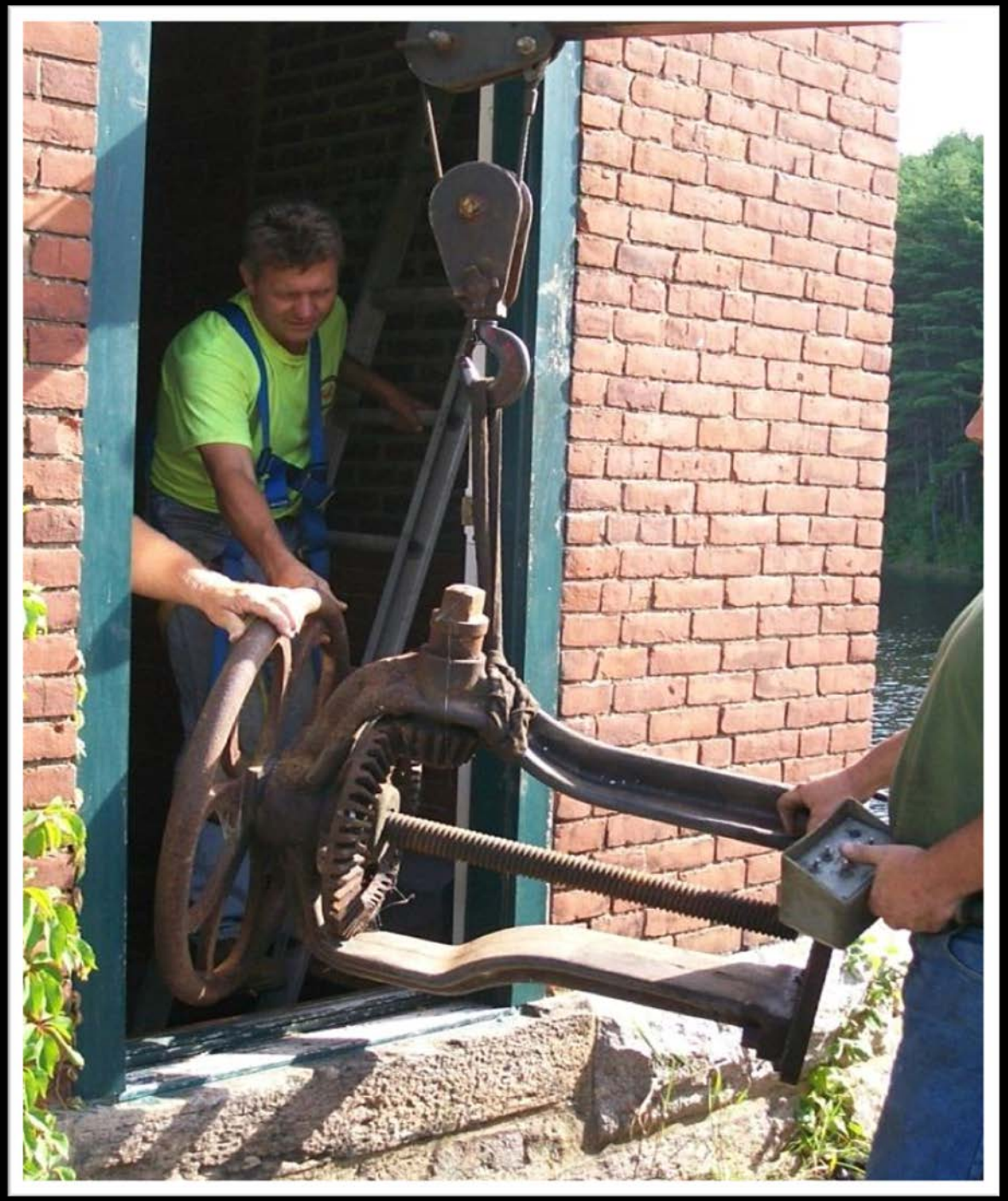
- While the buttress was being built, work had also started on the gate valve replacement. A sandbag and plastic sheeting coffer dam was built around the gatehouse.

- A 2” pump was used to de-water the area behind the coffer dam.

- Divers were brought in to install an inflatable plug in the influent low level pipe.
- This plug was inflated through a hose that ran from the gate house and was connected to a tank to ensure it would stay inflated.
- A low pressure alarm was installed in case of a leak.

- Water was then pumped out of the gatehouse.

- The old gate wheel and shaft were removed.

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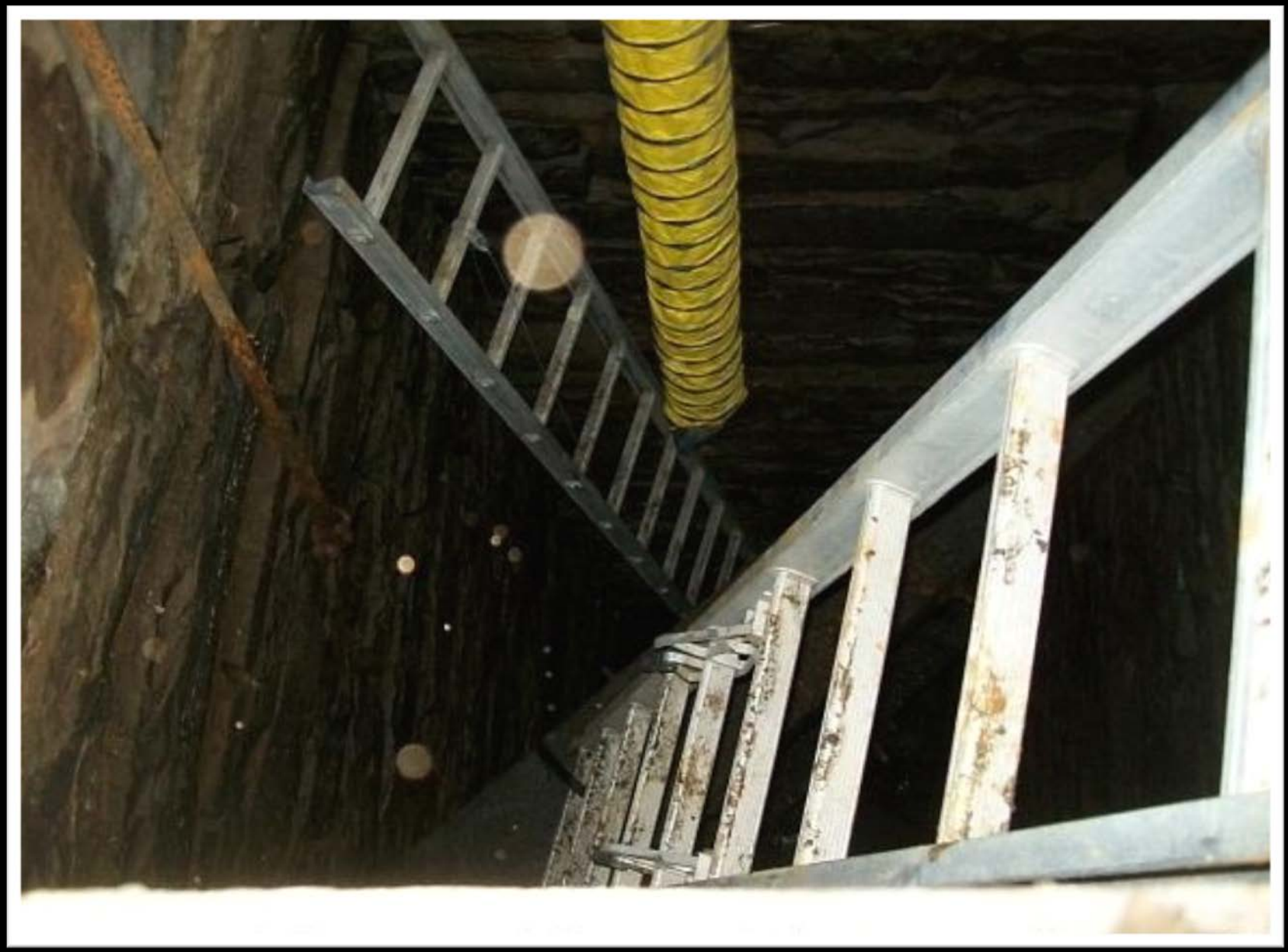
- Ladders were lowered down for access to the gate valve at the bottom of the gatehouse.



- The valve is 28’ down and was totally encased in cement.
- One man would go to the bottom with a small jackhammer and chip away at the cement.
- A rope and bucket system was used to carry the cement pieces up to be dumped outside. It took weeks to get the cement out.

- The roof was unbolted from the brick structure and lifted off.

- The pipe connecting the old gate valve was cut on both sides.
- It took most of the day to complete the cutting.
- Once the pipe was cut, it was decided to keep a monitor at the dam overnight in case a leak occurred.
- A crane came the next day and lifted the old gate valve out.

- The replacement valve was lifted up by the crane and lowered to the bottom where it was connected to the existing piping.

- A stainless steel shaft was added along with a new valve wheel and floor.

- The valve was opened and closed to test it.

- The roof was reshingled before it was lifted back on. Everything was then buttoned up for the winter.

- Starting in February of 2012 we lowered the reservoir by 2 feet so the spillway replacement could begin.
- Since we did not want to lower the water level too far, a coffer dam was installed to hold back the water.
- Large sand bags were filled and stacked near the spillway.

- The walkway was removed and a trench was dug for the first row of bags.

- The sandbags were moved to the spillway.

- The sandbags were then picked up and laid in place.

- There were 3 layers of sandbags, the bottom layer being a double layer.

- A view of the coffer dam from the back

- Once the sandbags were in place the spillway was removed.

- Forms were built for the footings. The footings were designed to connect to the existing core wall.

- Rebar was added to the forms to add strength. The cement was poured into the forms and worked by the crew.

- The cement was tested by an independent company to insure the quality.

- The forms for the footings were removed and forms for the wing walls and training walls were built.

- The cement was poured into the forms from the top of the dam on both sides.

- When the cement was dry the forms were removed.

- The spillway was constructed in sections. Rebar is formed in each section before the cement is poured.

- The top portion of the spillway was poured next.

- After each section was poured and allowed to dry, the walls were formed and poured.

- Sheets of burlap were placed on top of the cement after pouring to hold in moisture so it would dry slower and prevent cracking.

- Once the cement work began on the spillway, the cement was pumped from a truck and directed to where it was needed.

- Once the spillway was completed, the walls were backfilled and the removal of the coffer dam began.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- Once the coffer dam had been removed, the area was loamed and seeded.

- Construction of the new walkway.


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- The weir board was connected to the walkway and spillway. This set of 3 aluminum “boards” allows the reservoir to be raised an extra foot in the spring. This adds twenty million gallons to the usable storage in the reservoir.

- The center board is raised or lowered using a crank from the walkway.

- We lower the board in the spring to have the extra water during the summer months and then raise it in the fall when the extra water isn’t needed.

- The reservoir road on the Oakham Road end was paved up to the gate and the road to the dam was graded.

THE END

CREATED BY STEPHEN JONES, SUPT NBWD

EDITED BY ANDREW LALASHIUS OPERATOR NBWD

SHIELA LEBLANC ADMIN ASST NBWD

MATTHEW JONES SOS

01/29/2013