

December 15, 2016

A Special Board meeting of the Electric and Water Plant Board of the City of Frankfort, Kentucky, was held at the FPB Clubhouse, located at 98 Tanglewood Drive, Frankfort, Kentucky, on Thursday, December 15, 2016, at 4:30 p.m.

**ATTENDANCE:**

Ralph Ludwig, Board Chair  
Anna Marie Pavlik Rosen, Board Member  
Walt Baldwin, Board Member  
Brian Bourne, Asst. Water Distribution Superintendent  
John Cubine, Board Member  
David Billings, Chief Water Engineer  
Sharmista Dutta, Water Engineer  
Vent Foster, Chief Electrical Engineer/Asst. GM Operations  
Zach Hubbard, FPB Media Services  
Gary Grider, FPB Media Services  
Casey Jones, IT Director  
Kim Phillips, Safety Director  
Julie Roney, WTP Superintendent  
Alan Smith, Water Distribution Superintendent  
Adam Weber, Strand Associates, Inc.

**AGENDA**

The Agenda for the Board Meeting was received and entered into the Minute Book as follows:

**DECEMBER 15, 2016 SPECIAL BOARD MEETING AGENDA**

1. **Information Item:** FPB will be hosting a walking tour and public meeting to discuss the upcoming water reservoir project and solicit input from the public on the design of the new reservoir. This information sharing meeting will include FPB Staff and its team of consultants. The walking tour will begin at the reservoir facility at 4:30 p.m. The public presentation and discussion will begin at 5:30 p.m.

**BOARD ACTION**

Mr. Ludwig noted that there was a quorum of Board members present. For the record he noted that along with himself, Member Walt Baldwin, Member Anna Marie Rosen, and Member John Cubine were present at the meeting.

Mr. Ludwig noted that the purpose of the meeting was to inform the public of the issues and to allow them the opportunity to ask questions with regard to the replacement of the reservoir. He further advised that the meeting would be completed in two (2) parts: (1) a walking tour of the property; and (2) explanation of issues with reservoir and solicit public comments.

Mr. Ludwig further noted that the walking tour had been video-taped for later viewing for those who did not wish to participate in that portion. He further advised that the meeting was strictly informational and that no action would be taken.

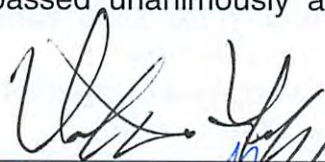
Mr. Ludwig turned the meeting over to Mr. David Billings.

Mr. Billings led a walking tour of the reservoir facilities. Those not wishing to participate in the walking tour were able to view a video of the walking tour.

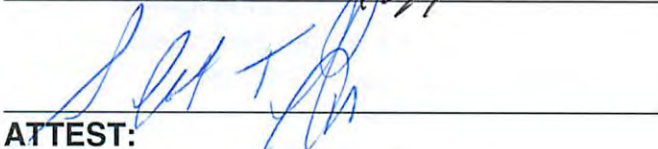
Mr. Billings and Mr. Weber discussed presentations as well as issues with the reservoir and design option for replacement of the reservoir. The presentation is attached and is incorporated in these minutes.

The floor was opened for questions and/or comments. Mr. Billings and Mr. Foster of FPB, and Mr. Adam Weber of Strand Associates addressed questions and concerns. Mr. Billings discussed comment forms available and discussed both email and street addresses where those comments could be provided to FPB. He further advised that any comments, questions and concerns would be vetted.

Mr. Cubine moved to adjourn the special meeting. Mr. Baldwin seconded. Mr. Ludwig called for the vote. The motion passed unanimously and the meeting adjourned.



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**ATTEST:**



# AERIAL VIEW



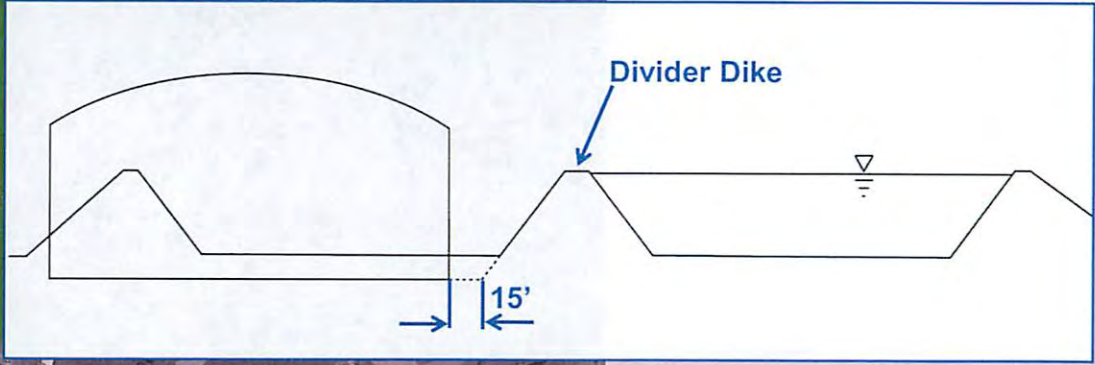
Google earth

© 2016 Google





**PROPOSED  
SITE PLAN**  
*(Rendered View)*





**PROPOSED  
SITE PLAN**  
*(Photo View Locations)*







**EXISTING VIEW**







RENDERED VIEW





**EXISTING VIEW**







**EXISTING VIEW**





**RENDERED VIEW**





**EXISTING VIEW**







**EXISTING VIEW**

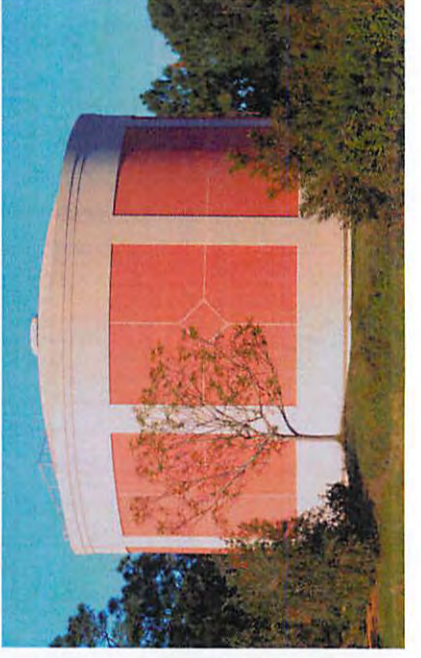
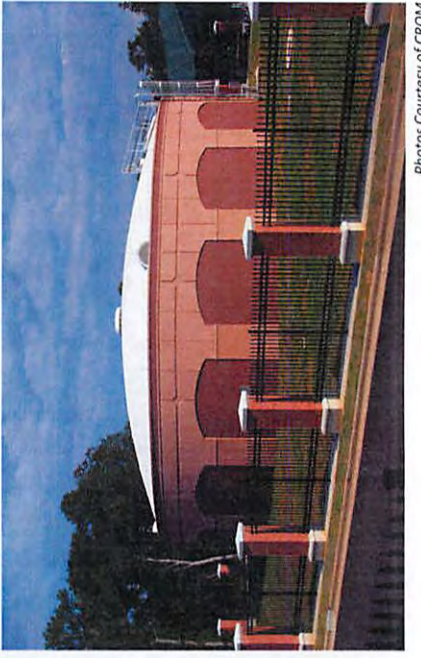






**RENDERED VIEW**





Photos Courtesy of CROM



# QUESTIONS?





# FRANKFORT PLANT BOARD

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317 W. 2nd Street

502.352.4372

## FPB Reservoir Discussion

Frankfort Electric and Water Plant Board

Frankfort, Kentucky

David Billings, Chief Water Engineer



# Agenda

- History
- Issues
- Decision to Replace the Reservoir
- Physical Constraints
- Design Constraints
- Going Forward





# FPB Water History

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- 1804, City of Frankfort established first water works in KY – Frankfort Water Company. First water source was Cedar Cove Spring
- 1839, Improvements to Cedar Cove Spring and new gravity piping system installed which supplied an adequate water supply till 1880's

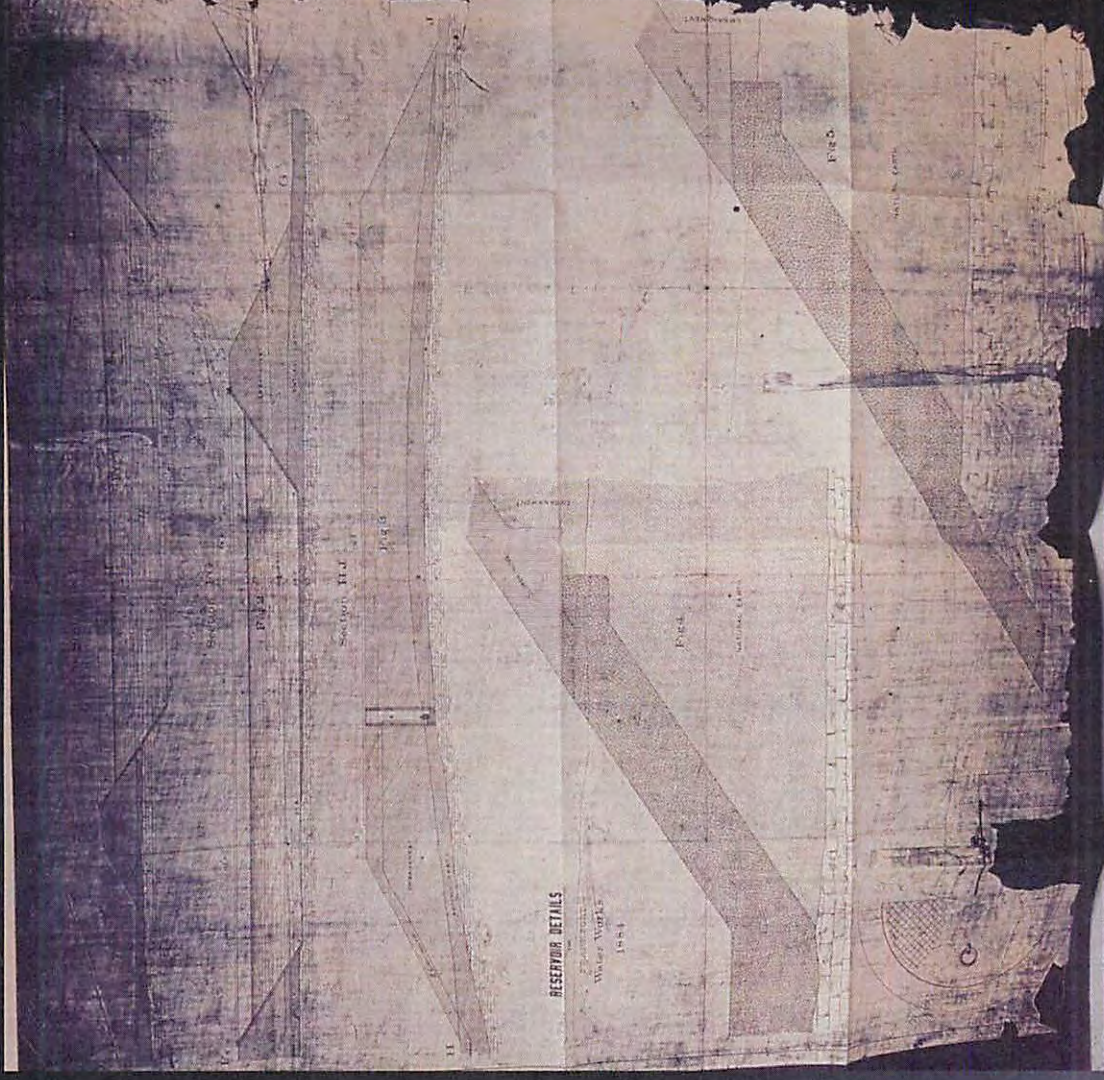




# Reservoir History

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- Circa 1885, the Kentucky River becomes our water source with the construction of a new pumping plant and the Reservoir. Original capacity was approximately 6.5 MG.

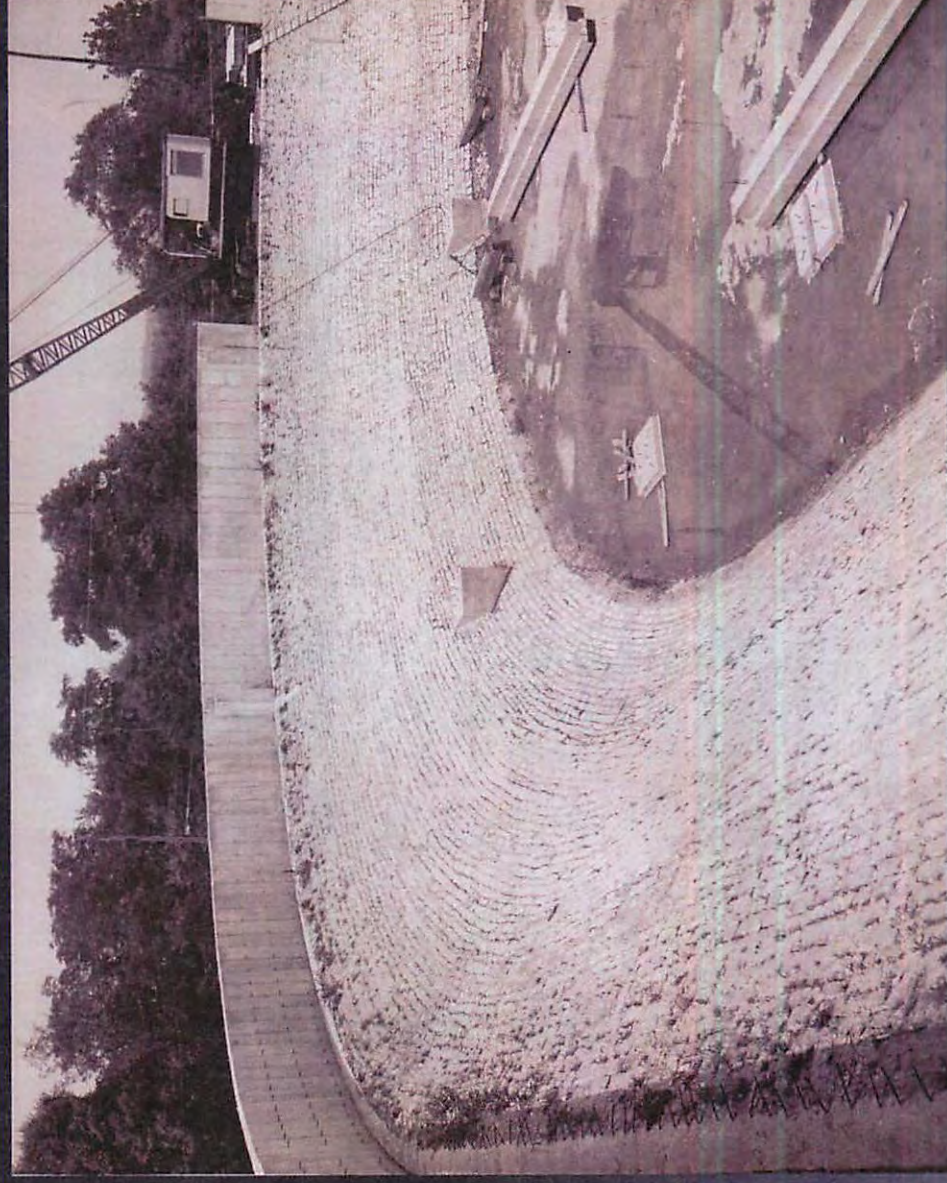




# Reservoir History (cont.)

5

1962 -  
Vertical wall  
section (ring  
wall being  
added to  
increase  
overall  
capacity to  
9.2 MG





## Reservoir History (cont.)

6

1962 -Roof system consisting of columns, support beams, and roof system added for health concerns and to provide limited nuclear fallout protection.

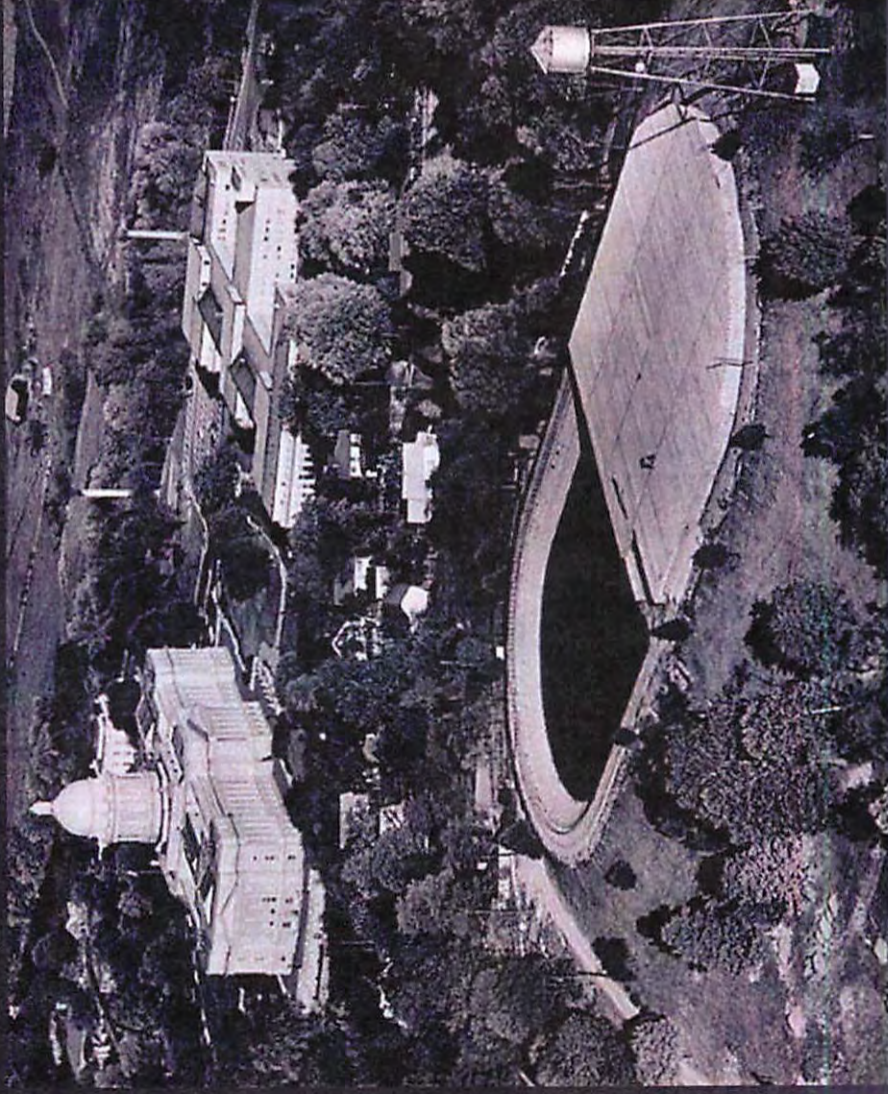
Gunitite (thin layer of concrete) applied over limestone pavers.





## Reservoir History (cont.)

7

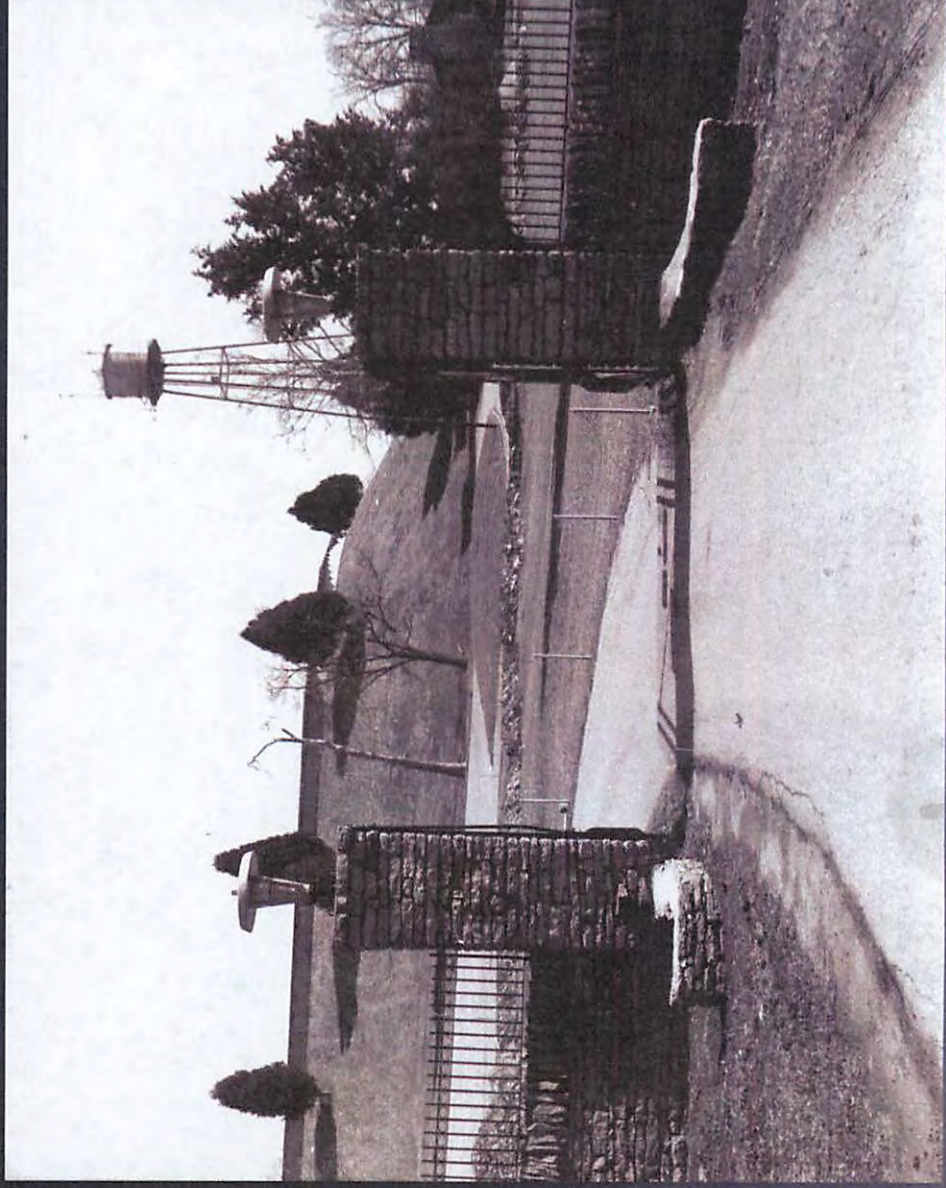


1961 – During construction photo showing 1/2 work complete.



## Reservoir History (cont.)

8



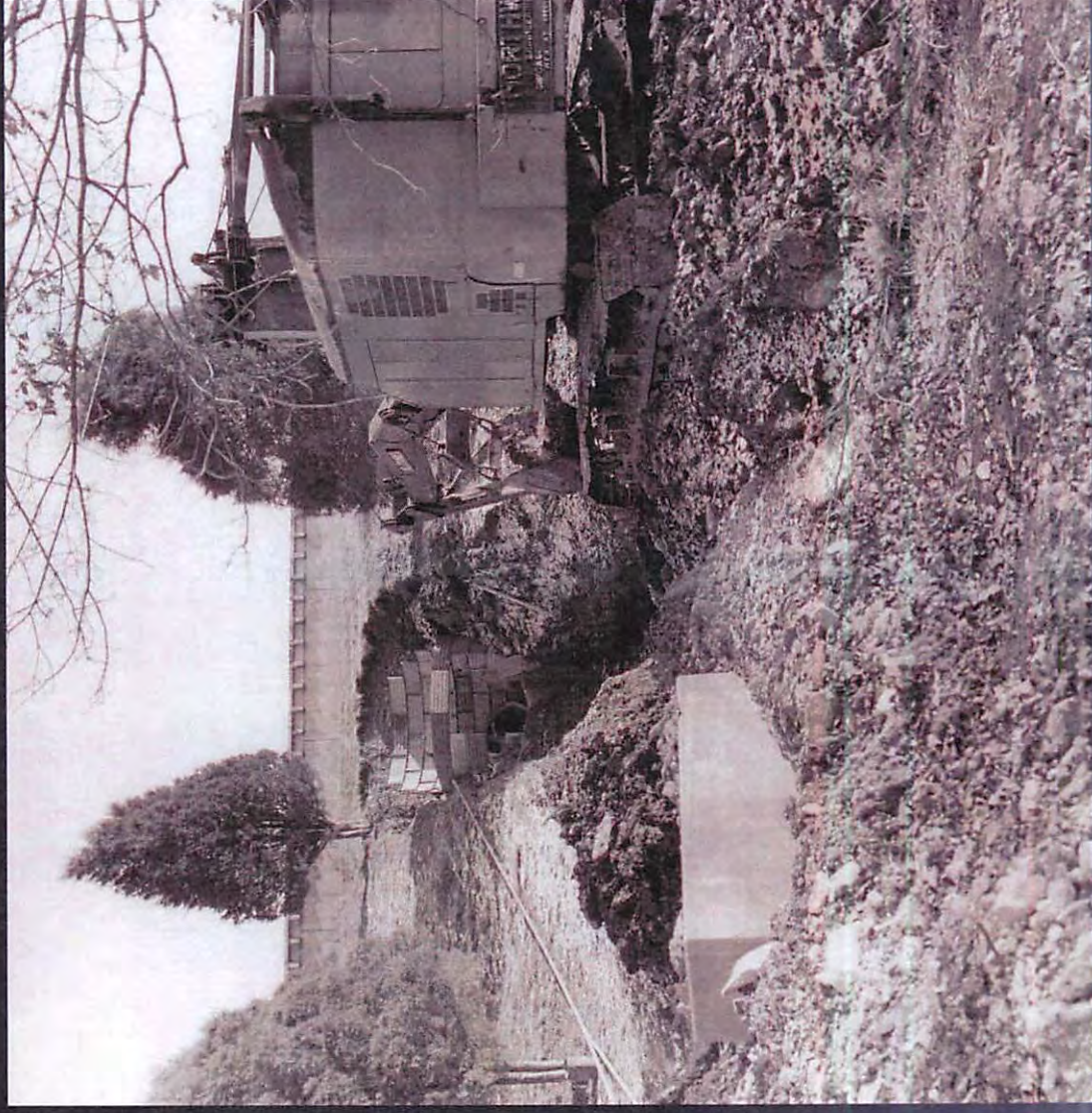
Since 1961, Reservoir has remained relatively unchanged and represents 60% of our total system storage.

Lifespan  
1886 – 2016  
(130 years)



## Reservoir History (cont.)

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1974, New treatment plant and 36" water line constructed to the Reservoir. In total, there are 36", 20", 14", and 12" water lines on the existing Reservoir site.



## Issues with Reservoir

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- Age (130 years old)
- Increasing Maintenance Issues
  - Ongoing deterioration of roof system components
  - Ongoing deterioration of gunite lining
- Seepage



## Issues with Reservoir (cont.)

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- Inherent Design Shortfalls
- Earthen Embankment
- No seismic design incorporated
- Interior sloped walls (not efficient cross section)
- Steep exterior side slopes
- Flat roof
- Requires separate support structure (majority of current issues)
- Higher potential for roof leaks



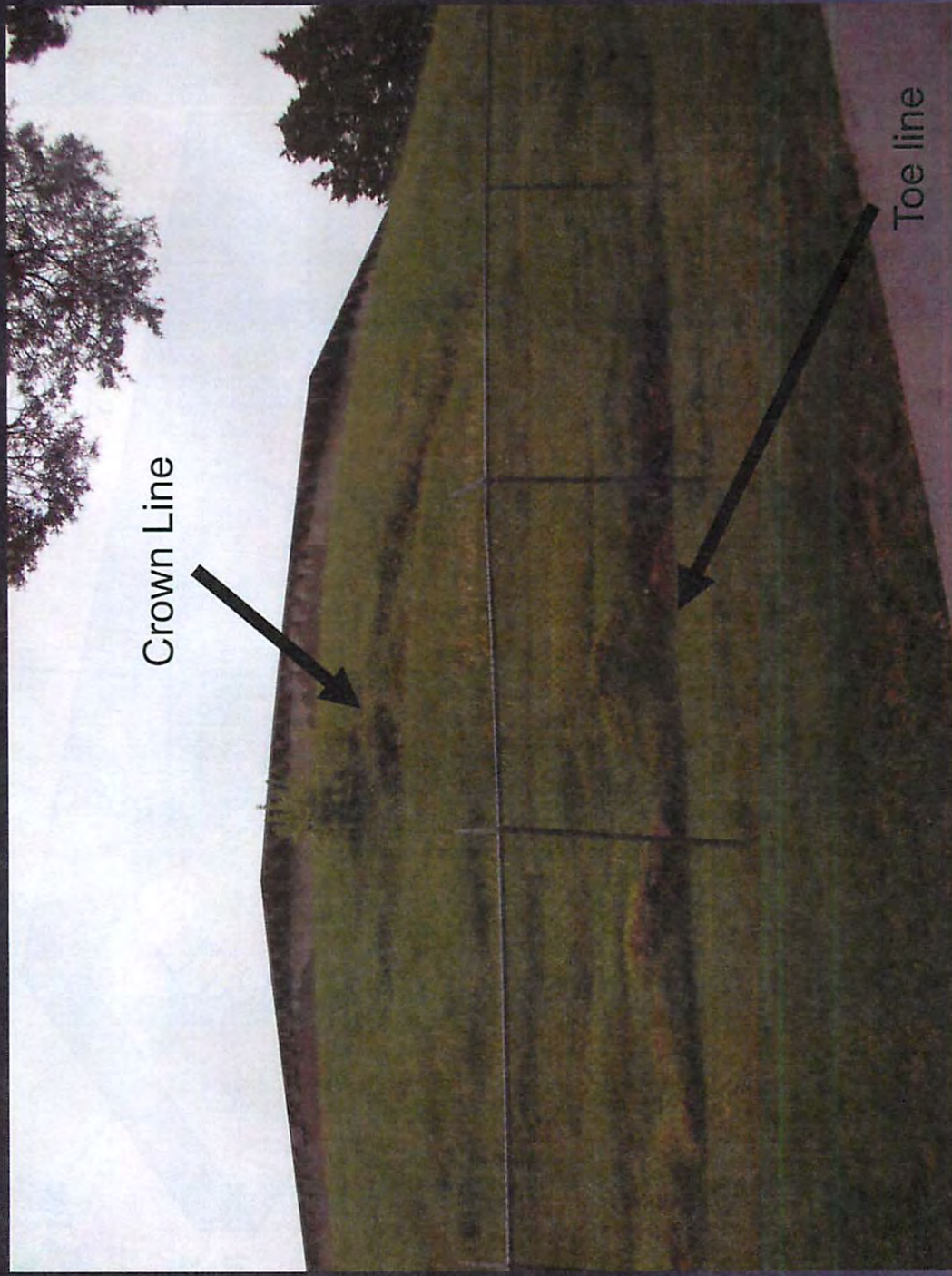
# Maintenance Issues

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- Recent History
  - 2011 - Slippage repair on South Basin
    - Steeper side slopes more prone to soil failures
  - 2013 - Interim repairs
  - Conducted various repairs following annual inspections in 2014, 2015, 2016
  - Dec 2015 - Exterior seepage event

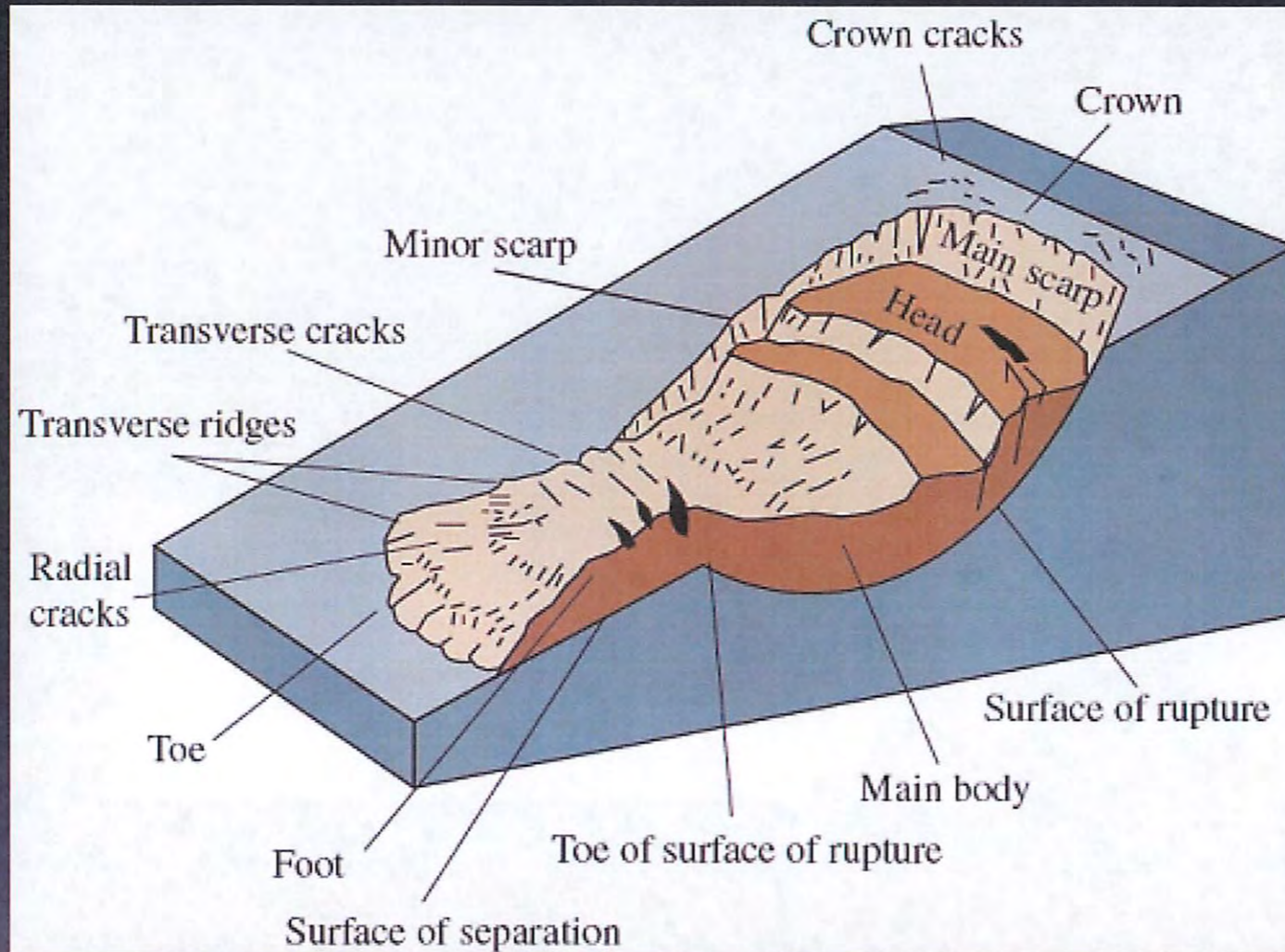


# Slope Slippage (Earth Slump) 2011<sup>13</sup>



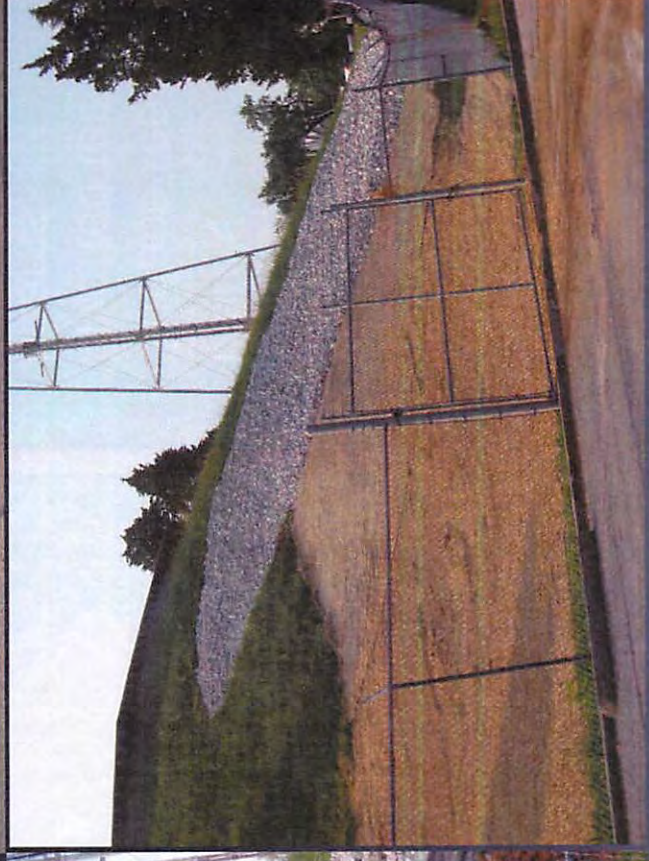


# Slope Slippage (Earth Slump) 2011<sup>14</sup>





# Slope Repair 2011

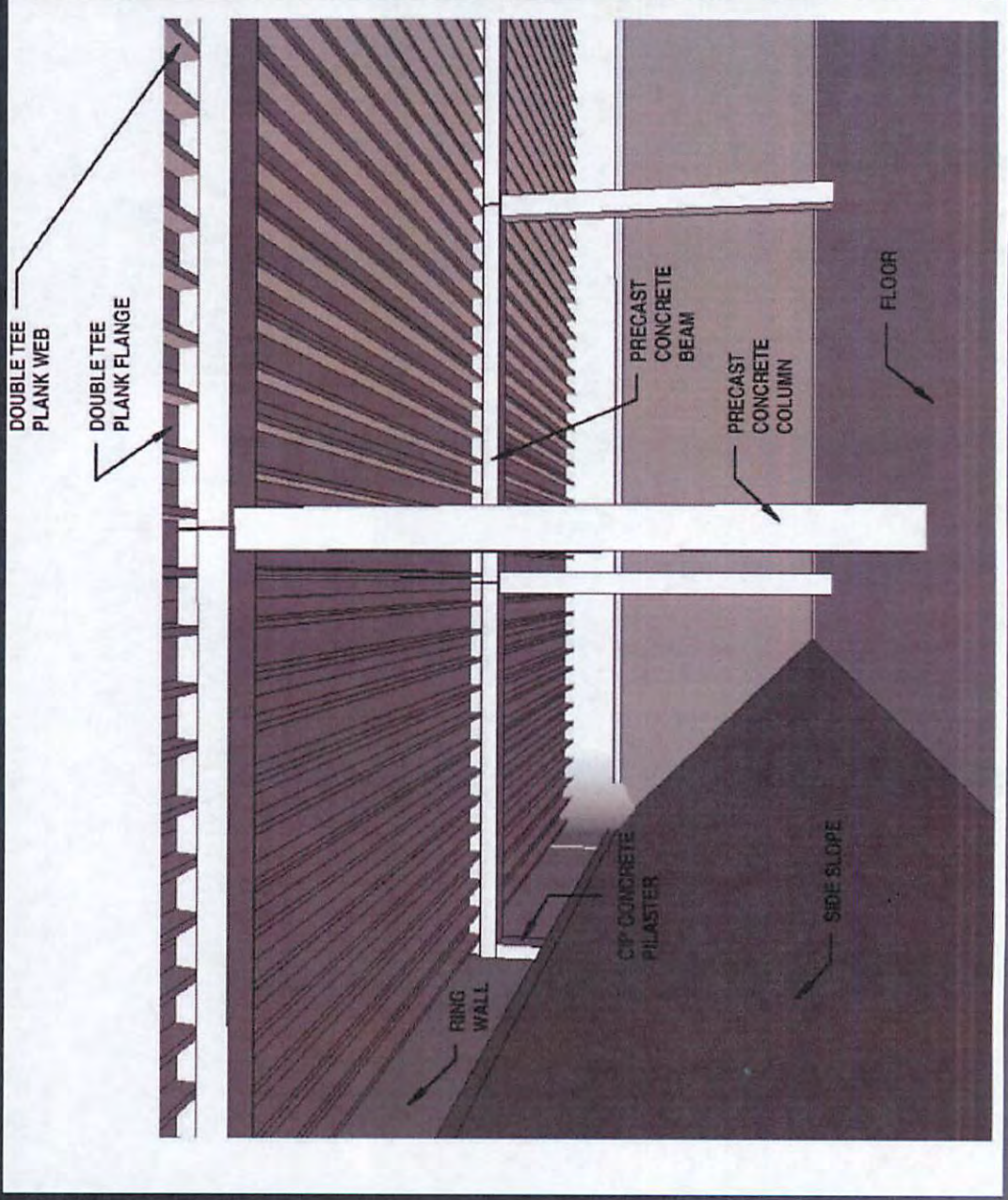




# Interim Repairs 2013

16

- Surface repairs to double tee roof planks
- Surface repairs to inverted tee beams
- Pilaster repairs
- Bearing surface repairs
- Added additional support brackets
- Crack injection repairs





# Seepage 2015

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## Exterior embankment leakage event

- The situation was effectively mitigated but could have developed into a potentially serious situation had it continued unnoticed (piping)
- Event occurred on the South Basin on the Reservoir Rd side





# Seepage 2015

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## What is Piping?

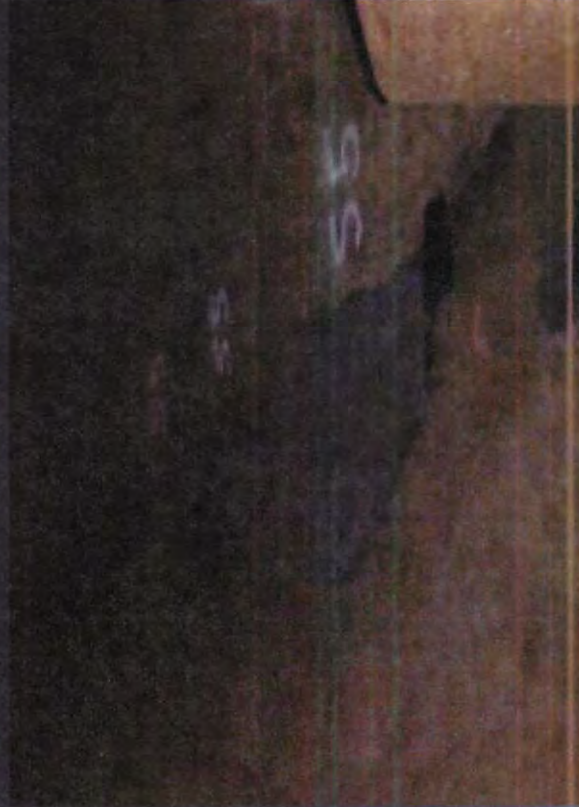
- Piping is internal erosion of the embankment or foundation material caused by seepage





# Mitigating the seepage required internal repairs to stop leakage

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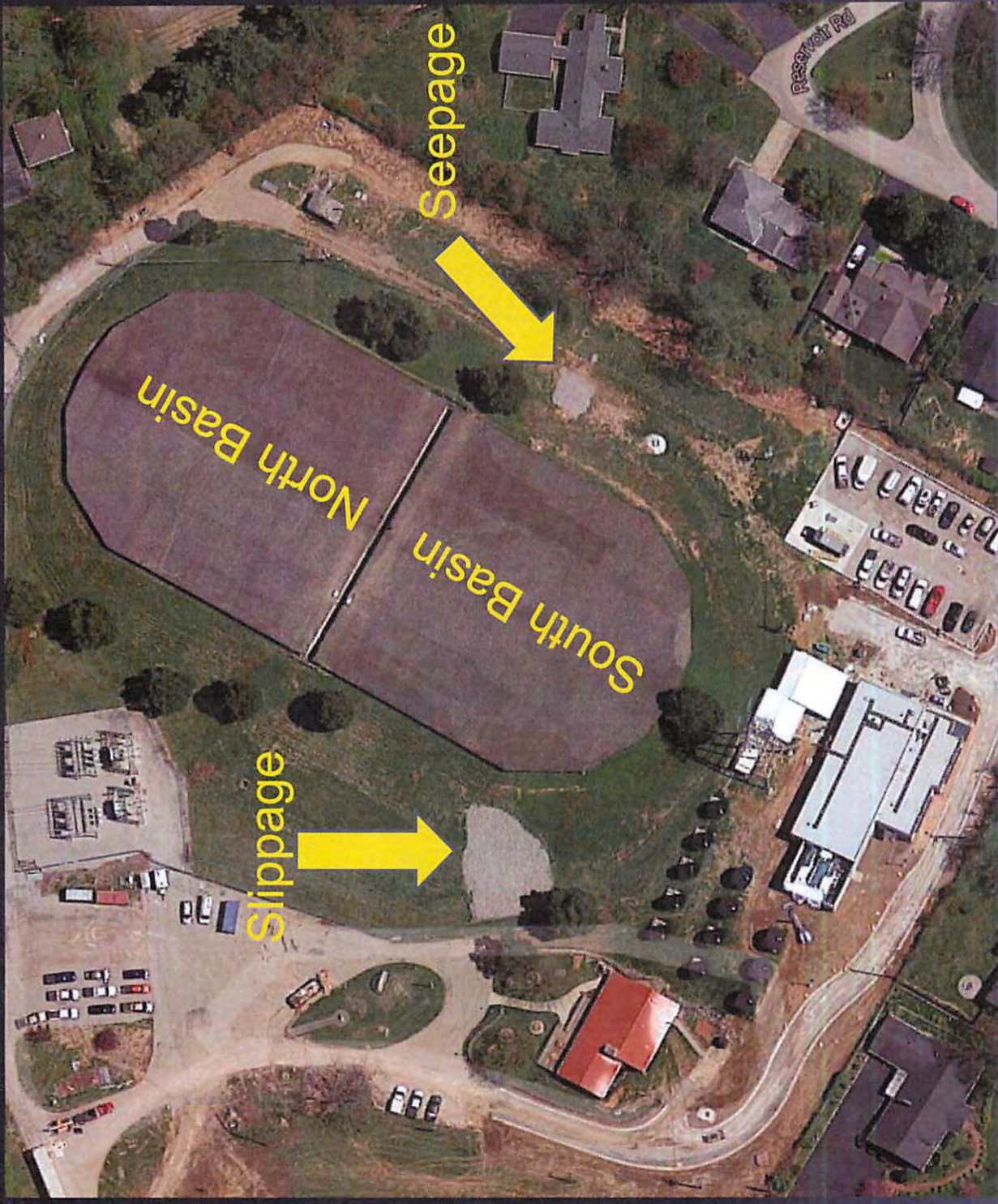
## Mitigating required external repairs to control leakage



### Seepage Mat

A seepage mat was installed in the affected area to control seepage that might continue. The seepage mat allows any remaining leakage to be released at a controlled manner such that piping doesn't occur. Piezometric monitoring wells were also installed near the seepage area to gauge water levels in the earthen embankment.







## Additional maintenance as result of the monitoring program

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- Monitoring program began following the 2013 Interim Improvements Project
- Every Spring, the Reservoir is taken out of service and inspected
- Additional various repairs have been completed following the inspection (2014, 2015, 2016)
- Increasing number of maintenance issues in recent years (age related)



## What does all this mean?

- Reservoir has reached the end of its useful life
- Been scheduled for replacement since 2010
- Replacement was delayed because of the Cable Head End
- Currently in preliminary design phase for replacement (as of Aug 2016)

## How did we get to this point?



# Past Options Considered

24

- Do Nothing
- Repair
- Move
- Replace



# Do Nothing?

25





# Repair? - Strand Evaluated Alternatives in 2010

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## Repair Existing Structure (15-20 year fix)

- Structural improvements
- Roof repairs
- Lining system
- Total Estimated Budget    \$2.8M – \$4.2M

## Complete Roof Replacement

- New ring wall and foundation
- New support system
- New roof system
- Still have earthen embankment with no seismic protection
- Not a cost effective solution



## New Tanks Were Recommended (50+ year fix)

- Partially buried
- Low maintenance costs
- Improved safety
- Designed in accordance with current codes (seismic protection)
- Total Estimated Budget    \$3.5M – \$3.75M (two 4.5 MG Tanks)
- New tanks are more cost effective, provide better assurances, and longer service life



# Move? – Staff Evaluated Alternative Locations

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Before we discuss location alternatives we need to understand design constraints

- Tank type
- Elevation (tank type and subsequent pumping systems)
- Costs



# Move? – Tank type is a factor

28

Two basic types of water tanks, elevated storage and ground storage.

## Elevated Storage

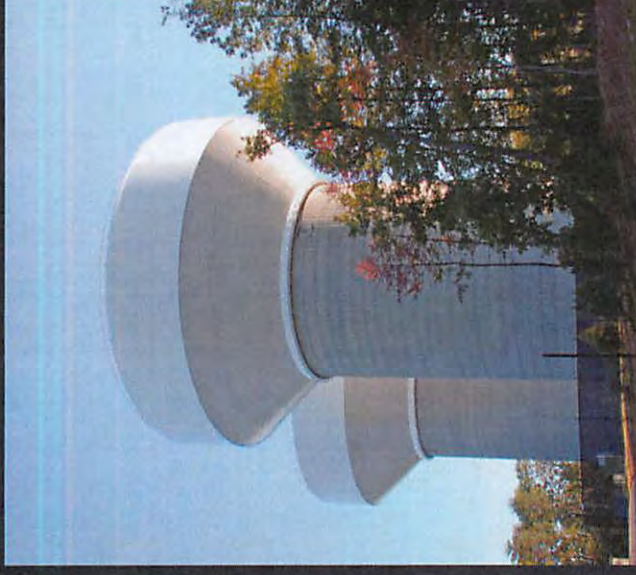
Size limitations up to approx. 3 MG max  
Height up to 230 feet

Costs **\$2.00-\$3.75**  
(per gallon)

## Ground Storage

Size limitations up to approx. 30 MG max  
Height up to 70 feet

Costs **\$0.25-\$0.50**  
(per gallon)





# Move? – Water elevation is a significant factor

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Sullivan Tank  
972 O.E.  
East Side  
Pressure  
Zone

SULLIVAN  
PS

Reservoir  
811 O.E.

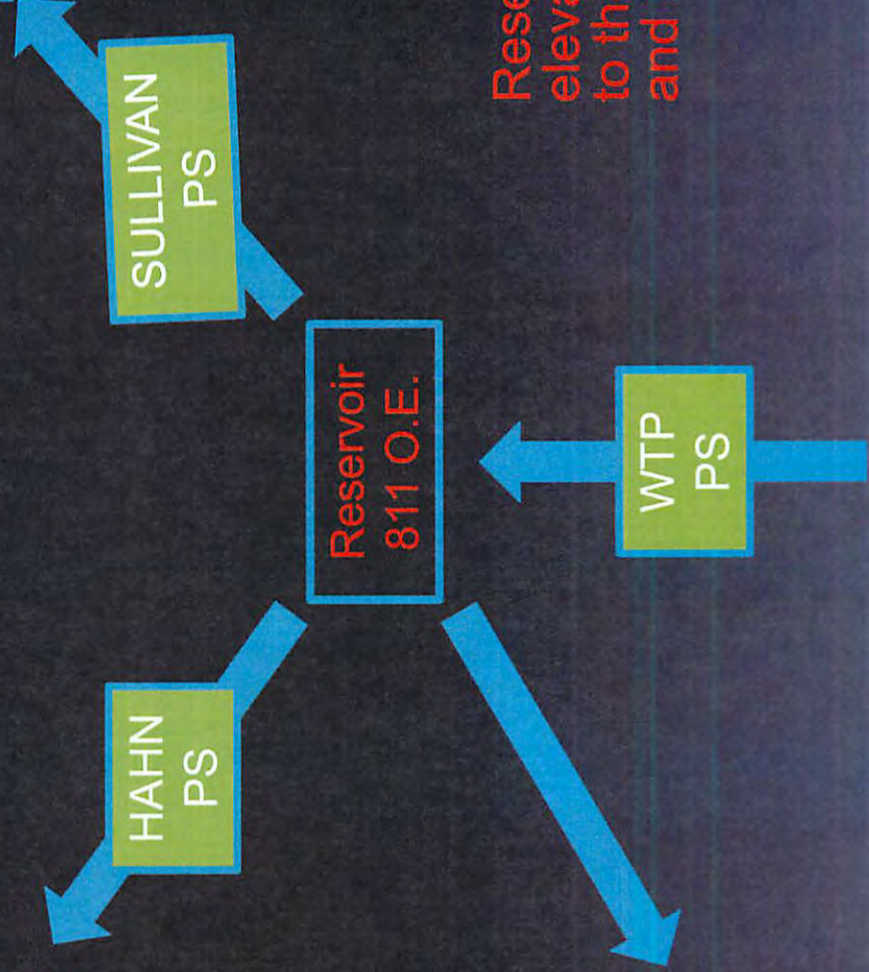
WTP  
PS

HAHN  
PS

Hahn Tank  
935 O.E.  
West Side  
Pressure  
Zone

Downtown  
Pressure  
Zone

Reservoir overflow  
elevation is critical  
to the water system  
and how it works





## Move? – Limited Choices

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Potential undeveloped areas with necessary ground elevation of approximately 780 ft.

- Existing location
- Berry Hill / Golf course area
- Behind Franklin Square area
- Next to AT&T tower site off Sower BLVD



# Move? – Limited Choices

31






# Move? – What are the costs?

32

## Costs for each site considered (Infrastructure + Land)

- |   |        |            |
|---|--------|------------|
| ▪ Option 1 - behind Franklin Square                 | \$8.9M | additional |
| ▪ Option 2 - Next to AT&T tower site off Sower BLVD | \$5.8M | additional |
| ▪ Option 3 - Berry Hill / Golf course area          | \$1.6M | additional |
| ▪ Stay at existing location                         | N/A    | N/A        |
- 

### Notes:

Tank costs for each option not included. Moving from existing location would require 36" pipe for all options plus new pump station for options 2 & 3. 36" pipe costs approx. \$288 per ft or \$1.5M per mile



# Past Options Recap

33

- Do Nothing



- Repair

Not Cost Effective

- Move

Limited Options and Very Costly

- Replace

Most Cost Effective and Best Option



## Where Are We Now?

34

- Currently in design phase (as of Aug 2016)
- Design Guidelines
  - Existing Site
  - Ground Storage
  - One 7 MG tank (Second 7 MG tank at some point in the future)
  - Smaller footprint (approx. 22% less)
  - Less runoff
  - More efficient cross section
  - Improved drainage







# What is Next??

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## Going Forward

- Install temporary liner in the existing North Basin before construction
- Meeting (December 15<sup>th</sup> at Clubhouse)
  - 4:30 – walking tour
  - 5:30 – Public meeting to solicit input
- Take suggestions back to engineering firm for consideration
- Presentation to Optimist Club on Jan 17<sup>th</sup>, possibly others (Rotary / Kiwanis / Etc.)
- Estimated construction beginning Summer 2017



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317 W. 2nd Street  
502.352.4372

## Questions

- David Billings
- Frankfort Plant Board
- [dbillings@fewpb.com](mailto:dbillings@fewpb.com)