MONTCLAIR PROPERTY OWNERS ASSOCIATION
DAM AND SPILLWAY TOWN HALL MEETING

Wednesday, March 1, 2017
7 p.m. at the MPOA Building

TOPIC

To discuss the status of the impending Spillway Project and to share information regarding the scope of the project and potential impact to the community.

AGENDA

Introduction/Opening Remarks (Tracy Hansen, President)

Presentation by Buck Arvin (Lake Management Committee Chairman)

Presentation by Ned Greene (Board Member, Precinct 3 Representative)

Audience Questions

Town Hall Meeting

1 March 2017

Montclair Dam and Spillways

We Own a Lake

- 108 acre lake with an **earthen dam** on Powells Creek built in 1964.
- Earthen dam with the spillways is 650 ft long and 72 ft high
- Top elevation ~ 205 feet above mean sea level (MSL)
- Primary spillway is rectangular concrete inlet tower with a manual gate valve tied to an outflow conduit that discharges directly into Powells Creek
- Auxiliary spillway is Dolphin Beach ~194 feet MSL
- Normal pool is 188 feet MSL. Maximum depth 54 ft

References and Regulations

- Any dam 25 ft or greater in height and creates a maximum impounding capacity of 15 acre-feet is regulated by:
  - Dam Safety Act, Article 2, Chapter 6, Title 10.1 of the Code of Virginia
  - Title 4. Conservation and Natural Resources
  - Agency 50. Virginia Soil and Water Conservation Board
  - Chapter 20. Impounding Structure Regulations

The Chapter provides for the proper and safe design, construction, operation and maintenance of impounding structures to protect public safety

Montclair Dam is a High Hazard Potential Dam

- Definition: Failure will cause probable loss of life or serious economic damage
- How do we know its High hazard?
  - 2014 Inundation Study revealed that there are 354 occupied structures (19 are multi-family dwellings), 3 interstate bridges, and 4 secondary road bridges impacted by a breach event
- **Owners of High Hazard Potential Dams have additional safety responsibilities**
  - More frequent inspections
  - Emergency Actions Plans with Inundation Maps
  - **Maintaining a spillway that can handle 90% of the flood caused by Probable Maximum Precipitation (PMP)**

Our status - We Have a Problem

- Our dam is inspected every other year by a professional engineer and annually by trained MPOA staff. The MPOA Operations Manager inspects the dam every month
- The Emergency Action plan (EAP) is current, the last revision was provided to state and county officials in Feb 2017
- **The dam's spillways do not have the capacity to pass the Spillway Design Flood (90 % of the flood resulting from PMP)**
  - **Current Spillways can handle ~ 50%**

- We are currently operating with a Conditional Operation and Maintenance Certificate:
  - ***"Submit alteration permit application so that the dam can safely pass the requested spillway design flood with enough freeboard at the dam by June 30, 2017, and rehabilitate the dam after receiving necessary approvals"***

Goal

- Full Compliance of Dam Safety Regulations
- Obtain a Regular Operation and Maintenance Certificate in order to operate Montclair Dam

When Did We Know

- 11 Jul 2014 Inundation Study and Spillway Stability Analysis conducted by Froehling and Robertson, Inc (F&R, Inc)
  - Spillway could not meet Spillway Design Flood
  - Erosion would cause failure through the Auxiliary spillway

- 6 Nov 2015 Preliminary Engineering Report provided some options

F&R Inc

Dam Consulting Services

Froehling & Robertson, Inc. has assisted clients with consulting services related to the design of earthen, rock fill, roller compacted concrete, and concrete gravity dams. Having conducted investigations of nearly 100 dams throughout Virginia, our engineering staff has successful working relationships with all of the regional dam safety engineers at the Virginia Department of Conservation and Recreation and can help public and private dam owners understand and navigate Virginia Dam Safety Regulations.

Recognized Expertise
Specialized Services
Innovative Dam Solutions

F&R's Comprehensive Suite of Dam Services

F&R's dam consultants can provide the following specific analyses and studies:

Dam Safety Inspections - F&R performs site observations and visual assessment of embankment and spillway structures to identify deficiencies and potential problems such as erosion, animal burrows, settlement, slope instability, excess seepage, unsuitable vegetation, or structure deterioration. We then report our findings in an easy to read report and complete the DCR required submittals.

Hazard Classification Assessments - Combining topographic maps, aerial photographs, and GIS data together with visual reconnaissance of downstream areas, the F&R staff can evaluate potential damages and flooding that could result from a dam breach to determine a dam's appropriate Hazard Class.

Inundation Studies - F&R uses DCR accepted hydrologic modeling methods and software to evaluate storm water runoff and dam break scenarios utilizing GIS data, field survey data, site reconnaissance, and as-built structure data. F&R regularly produces inundation zone mapping reports for our clients that the DCR Dam Safety Regional Engineers approve with little or no questions and comments.

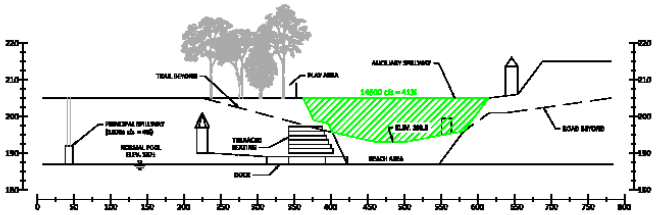
Emergency Action Plans - This service includes development of action plans for implementation by dam owners and local emergency responders in the event of a potential dam break. The EAP includes detailed maps of impacted properties to be evacuated and roadways to be closed.

Geotechnical Analysis - Using intrusive subsurface and non-intrusive geophysical techniques, F&R's professionals can obtain the subsurface data needed to perform analyses of slope stability, settlement, and seepage of earth embankment dams.

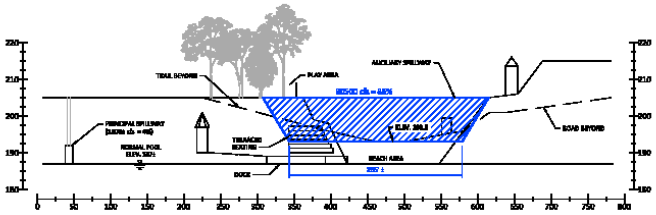
Snapshot of Services

- Dam Safety Inspections
- Hazard Classification Assessments
- Inundation Studies
- Emergency Action Plans
- Geotechnical Analysis
- Dam Removal
- Remedial Design
- Structure Design
- Plans and Specifications
- Construction Administration and Inspection
- Owner Dam Safety Training

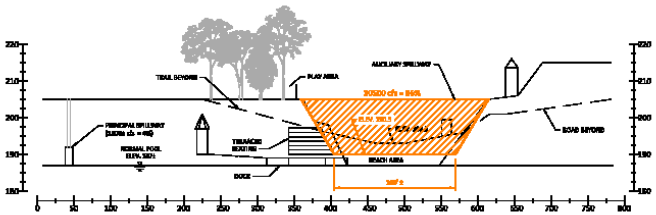
FROEHLING & ROBERTSON, INC.



EXISTING CONDITIONS

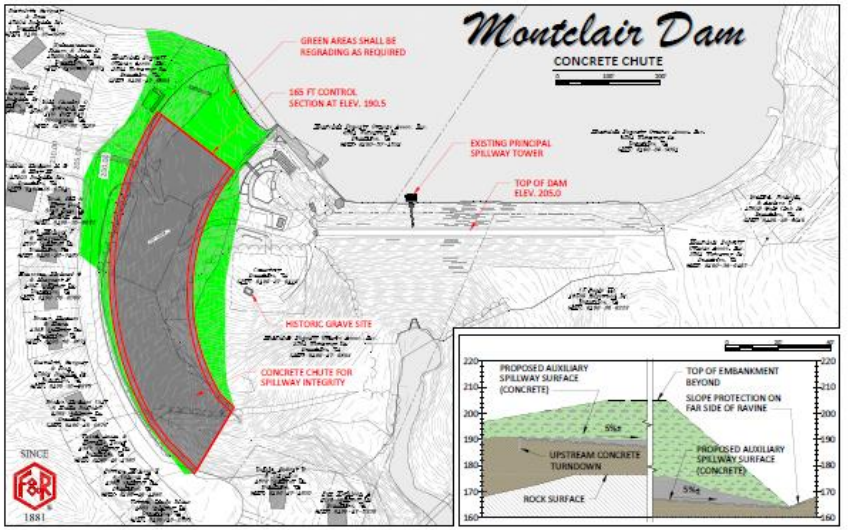


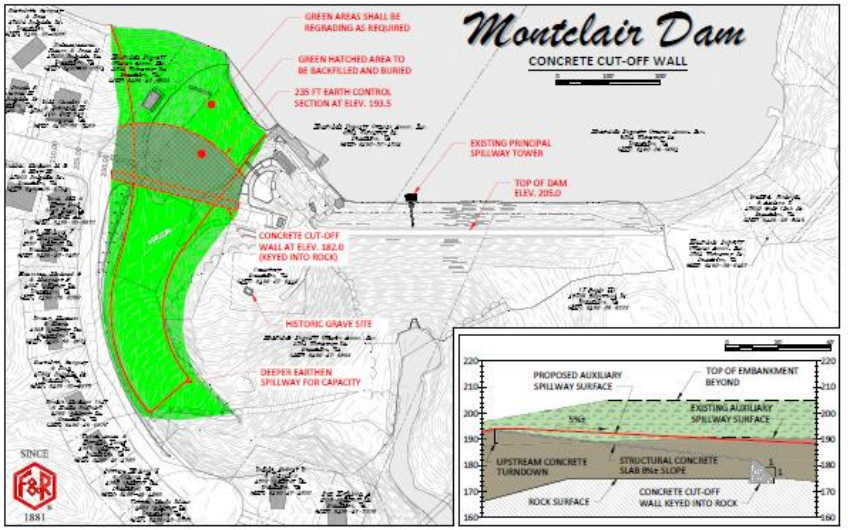
WIDEN AUXILIARY SPILLWAY WITHOUT LOWERING CONTROL SECTION



WIDEN AUXILIARY SPILLWAY AND LOWER CONTROL SECTION 3 FT

Montclair Dam

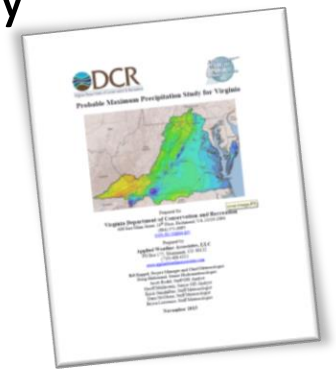




Statewide Study on Probable Maximum Precipitation

- A study was underway in 2015 to determine new Probable Maximum Precipitation values.
  - The hope was that reduced values would lessen work needed on the spillway
    - Study results became official 23 Mar 2016
    - PMP values decreased for Montclair; however, it was not enough to prevent work on the spillway

6 Hr. PMP	12 Hr. PMP	24 Hr. PMP
26.3	30.1	30.1

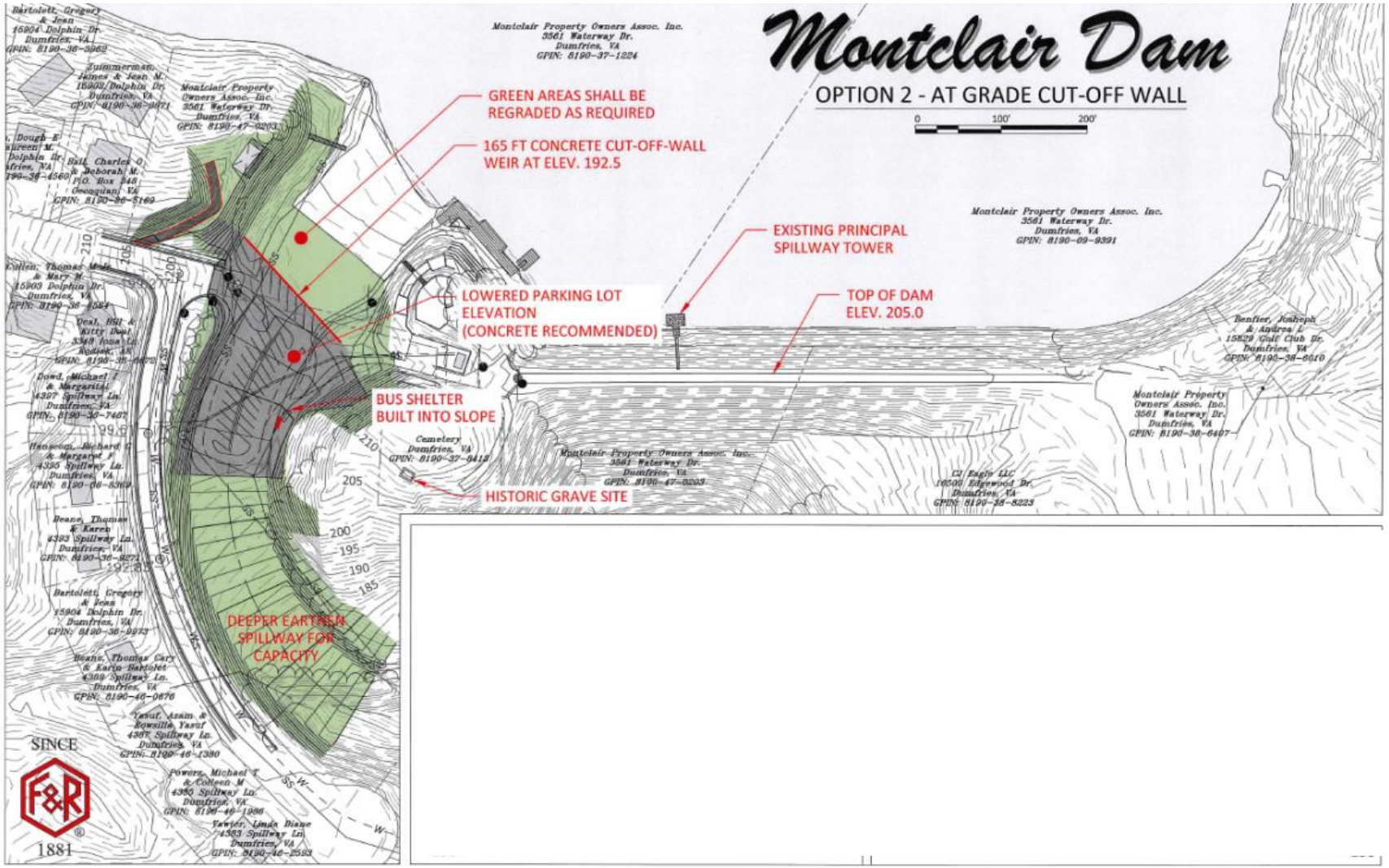


Updates and Decisions

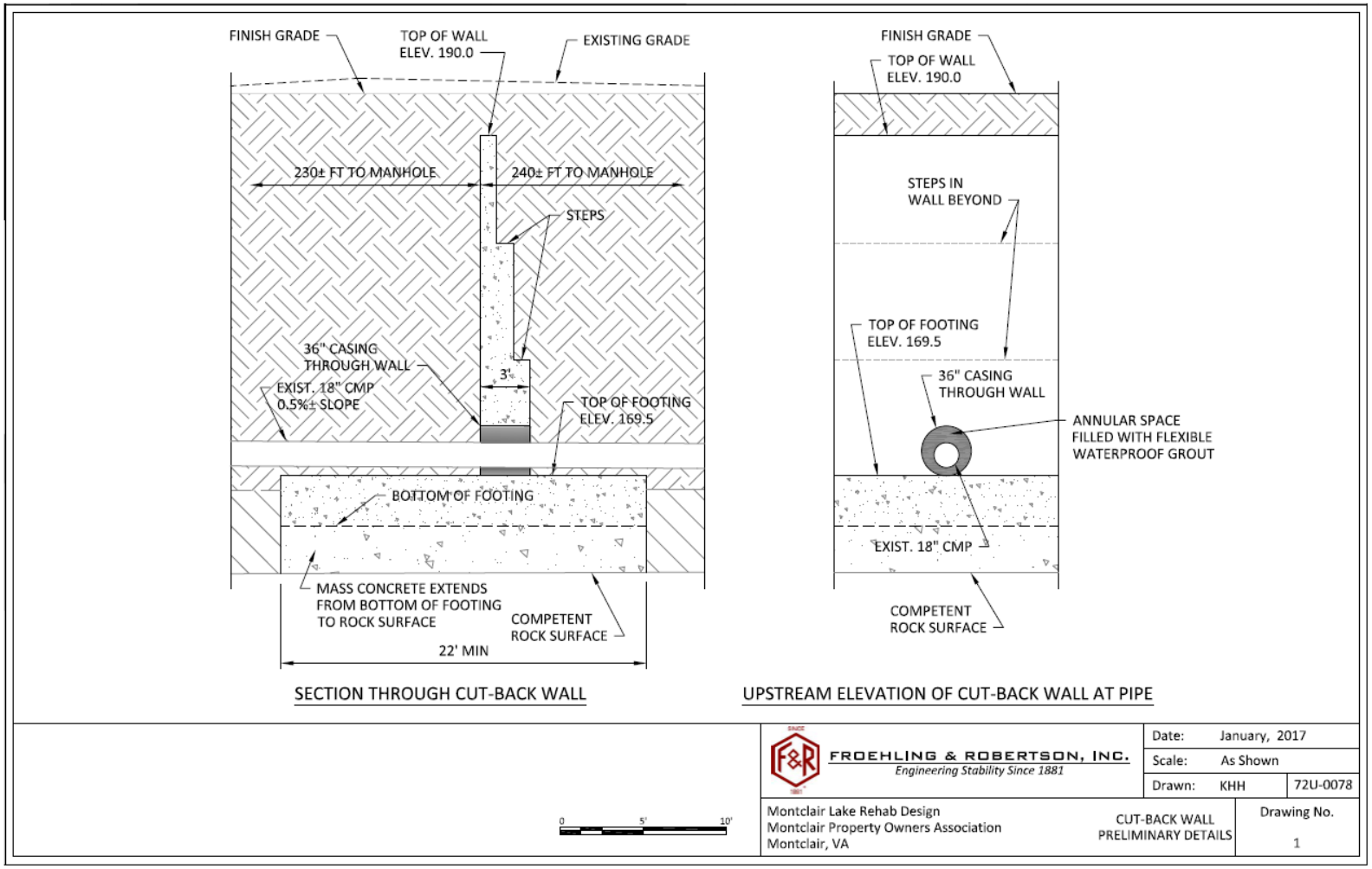
- 6 Jun 2016 – F&R, Inc completed an update to the Preliminary Engineering Report to confirm new PMP data and determine the feasibility of stabilizing the auxiliary spillway by using a concrete cutback protection wall

- **23 Jun 2016 - MPOA BoD selects option 2**

Option 2 - At grade Cut-Off Wall



Cut-Back Wall



Foundation must tie into Bedrock

- The Cut-back wall must be attached to bedrock to prevent movement

- Bedrock is 14 to 20 ft below grade

Informal Approval

- 20 Jul 2016 - F&R submits a proposal to MPOA for an engineering design that would bring the Auxiliary Spillway into compliance
  - MPOA and F&R discussed changes/concerns
- 5 Aug 2016 - F&R explained proposed option selected by MPOA to the VA Department of Conservation and Recreation (DCR) Regional Dam Safety Engineer (Dr Wang)
  - Dr Wang gives his informal support for the plan

Updates and Decisions

- 12 Aug 2016 - F&R submits an updated proposal for the Engineering Design
- 14 Sep 2016 - BoD meeting
  - Approved F&R proposal to complete an Engineering Design for the Montclair Dam Auxiliary Spillway in order to comply with VA Impounding Structure Regulations

F&R, Inc will Provide

- Set of design plans
- Refined construction cost estimate
- Obtain all required permits
- Two site visits to meet with MPOA, VDOT, PWC Service Authority and PWC Storm Water Management
- Prepare final bid documents for construction phase

Why drawdown the Lake?

- Construction will require excavation to the competent bedrock
- Drawdown ensures water does not flow through the spillway during construction
- Construction needs a dry environment
- State must approve Design to include addressing all safety concerns
  - Construction Emergency Action Plan required

Lake Drawdown -20 feet

Wildlife Concerns

- Reference
  - Prince William Co. Environmental Services (watershed)
  - VA Department of Game and Inland Fisheries

- Powell's Creek is a perennial stream
- Lower water levels will result in increased predation on forage fish
- Exposed lake bed will benefit from sediment compaction as lake bed dries
  - Winter draw downs are common on many lakes
- Mammals and birds will adapt to lower water levels or move to a new location
- Any terrestrial plant growth will provide habitat when water levels return to normal

Next Steps

- F&R completes design work and with MPOA approval submits Alteration Permit Application to the Virginia Soil and Water Conservation Board (SWCB)
- VA SWCB review and approval
  - Application approval could take 30 to 120 days

Next Steps - continued

- F&R will prepare bid documents for the construction phase
- Bid proposals will be evaluated and a construction contractor selected
- Estimated construction duration 4 - 6 months
- F&R will perform construction phase project administration, materials testing and post construction reporting

Next Steps - continued

- Once Construction is complete a Record Report submitted to VA DCR

- MPOA will submit application for a Regular Operations and Maintenance Certificate
  - Full compliance VA Dam Safety Regulations

Teton Dam, Idaho

Teton Dam Collapse

Teton Dam During Collapse

Teton Dam Post Collapse

Questions

Parts of an Embankment Dam