

## Weston & Sampson Phone Conversation August 7, 2025 In Thomas's voice.

**Raising the Dam Crest:** I want to summarize my conversation w/Ben Green I had to get his feedback and any potential challenges he could see about raising the dam crest a foot and a half so we could get the free board. What Ben mentioned to me, that I saw after rereading the D&K documents, the dam now, as far as hazard classification, is border line Significant, to Hazard Classification, and on the higher end of Significant. It is very close to a High Hazard Class dam. How we would evaluate that? If we raise it a foot and a half then we would have to do a "Hazard Class Evaluation." We would have to evaluate if raising the dam crest, would the dam stay in Significant Hazard Classification or would it become High Hazard Classification.

It is quite an effort to look at this, and something that is not part of our services now. But that would be one of the first steps. Can we even raise the crest a foot and a half, going up to a High Hazard dam? That is one thing you would have to look at, raising the dam crest. That was my big take away with the conversation with Ben Green. Stepping back a bit, and we have not looked at this in too much detail, but if you raise the dam crest it could potentially increase the flooding upstream during Spring runoff. That is something we have not evaluated so I can't tell you either way. Something that has to be looked at. We have all the models, and we can look at that. Another thing that we are looking at is what are the effects on the upstream side of Shadow Lake during spring runoff. They want to maintain the historical lake level, if you do that, reading the D&K report, which is used by the Lake Association, the only real way to produce that is to lower the lake, which no one wants to do. I understand that. What we are focused on, W&S - and what you hired us for, is to bring the dam into compliance. That is what we are focused on, not the upstream impact. The main take away from Ben is raising the dam crest might put us in the high hazard. We'd just be chasing our tail at that point. If we do that evaluation as High Hazard, that means the design storm elevation of the lake goes up and now the foot and a half of raising the dam crest isn't enough and so you're looking at maybe raising it two feet, two feet and a half. Chasing our tail at that point. There is a chance it will not produce the results that people want. The way to evaluate that is to run the Hazard Class Evaluation. We are not putting you on the hook to release us to do anything, I just want to go through the scenarios with you. (He predicted that cost would be approximately \$25,000.

A couple of other things to consider raising the dam crest, the survey information we have, which doesn't extend past the dam, the survey information we have is at just the dam. It doesn't extend onto private property. What you will have to do at the dam if we raise it by a foot and a half, you are raising everything a foot and a half. The gatehouse slab is at elevation 1400, If we are raising the dam crest to get a foot and a half freeboard you would have to raise everything to 1401.5. So that means the gatehouse is demolished, and we are raising everything up by the spillway by a foot and a half.

Your auxiliary spillway the walls are going downstream of the dam, the top of those walls meets the ground surface grade, those walls would have to extend up a foot and a half also. It is not just

simply raising the crest a foot and a half, there are other impacts that need to be fitted, it's money. I am not saying it can't be done, anything can be done, but it's a cost. On top of that we have to excavate the material on the downstream side of the dam anyway, and place filter material and pipes to capture that seepage because seepage is an issue at the dam that needs to be addressed regardless of what rehabilitation is put into place. Raising the slab for the gatehouse, raising the walls of the auxiliary spillway, that's on top of all the other work that needs to be done to address the deficiency of the dam. That would be another cost involved in raising the dam crest.

**Purchasing Land:** As far as your question goes, how much property do we need to purchase on the right and left. We don't have survey data that extends beyond the dam, and we don't have a property line survey. We can't say how much would need to be purchased by the town. Looking at what we have on the right-hand side of the dam, right hand side being the side with the gatehouse, we would have to raise the dam and purchase the property until we meet the grade of 1401.5. If you look at the survey that would be about where the shed is on that property. That should give you some idea. Then we must look at, if we extend that way, if the shed is at a lower elevation, then that may need to be demolished. I am not saying we would have to, I am saying that is something we would have to look at; there is a potential for that shed to be demolished because it will be at a lower elevation than the dam crest. There is a large tree at that point and a telephone pole. We would have to look at the potential for the tree to be cut down and the utility pole to be re-located. So those are the considerations on the right-hand side of the dam. I can't tell you if any of those things need to happen but those are things we need to look at and there is potential for that. It would all depend upon additional surveys. We will need surveys to extend beyond the elevation of 1401.5 and we will need a property line survey also to really determine where that property line is.

On the side with the auxiliary spillway the ground surface grades actually go down as you go away from the dam. It would be challenging to meet those grades. We would have to extend to a much greater extent on the left-hand side of the dam to meet the grade 1401.5. The grades eventually do go up. We just don't have enough survey data to be able to say how much land will need to be purchased on that side.

Towns have limited funds, we understand that. Raising the dam crest will come with a lot more required engineering. Cost you weren't expecting. Costs are real. I asked Ben if the State would be willing to run the Hazard Class Evaluation, they said no, it would be an engineering consultant, like us, or someone else that completes that. A rough cost could be up to \$25,000.00 for the Hazard Class Evaluation and the cost of additional surveys of the two intended properties. In house surveys on the two properties is useful information. If this goes to permanent construction. It needs to be one topographic survey which will include private properties. That will be an additional \$5000 or more because of property lines.

**Survey:** The survey we have now is an initial survey of the dam. When you go to construction, we will need to establish those abutting property lines. The survey we have now, keeping cost in mind, is more than adequate for what we needed. When you go to construction. We would need to

establish those property lines, so we do not intrude on those properties. The survey we have now is more than adequate, it gives us all the information we need to help evaluate the alternatives and special permits that are needed. It gives us all the information we need to evaluate for a modified spillway, flatten slopes, engineering to dam safety standard, 25 feet outside the dam on all sides.

**Structural Engineers** are on staff. At this point it was not needed. This is an earthen embankment, structural engineers get involved when there is something structural involved. If we would have them look at the auxiliary spillway if we are going to keep that in place, look at what needs to be completed to fix the deficiencies, such as the condition of the concrete is in poor condition. However, we have significant seepage through that auxiliary spillway, the bottom of the spillway, needs to be fixed. Unfortunately, we would have to demolish the auxiliary spillway and build new. At that point, the design of a new auxiliary spillway, that is when the Structural Engineers would get involved. There is no design at this point, it is all conceptual. With the gate house, the gate house is in good condition. We don't need improvements to the gatehouse structure itself. We are giving conceptual alternatives of installing a 4x8 box culvert. We would talk to Structural Engineers about potential cost.

If we go with the alternative, the gear mechanism comes out and the shed will come down. The town could put up a new barn for aesthetics. We will keep the cement walls if the box culvert fits inside. If there is not a need to demolish that, we would keep it.

**Compression test.** I don't know what they mean by compression test. If they want to explain what that would be. What we did was in accordance with engineering standards, the drilling on the dam. If they are saying blowing air down, that is 1000% something you want to stay away from. You don't want to disturb the soil when you are drilling in a dam. It could create paths for more seepage. You need to limit the disturbance as much as you possibly can. There is never anything like that completed on a dam.

**Boring Test:** One thing we are looking at when we do the boring is we want to get an understanding of soil conditions in the dam embankment. What kind of soil is there. Is it loose, is it dense, are there any voids. What we find from soils we collect in those samples informs us of engineering design premises that we use in our stability analysis. We completed our stability analysis with the information collected from those samples. That's through the dam embankment, that's foundation soils, we look at stability. We look at seismic analysis too, which is earthquakes. Are foundation soils that the dam is built on, are the soils susceptible to liquefaction to an earthquake event. When you get sandy soil that is not dense, they will be susceptible. We would have to come up with a rehabilitation fix that would mitigate any kind of damage that was due to an earthquake event. Fortunately, at this dam we have very dense soils that are not susceptible to liquefaction. This is what we look at when we do our drilling. The information from the drilling is critical and the only way to evaluate the soils and evaluate the slope stability and complete the seepage analysis and look for the potential of liquefaction under an earthquake event is to complete that drilling. It can't be done otherwise.

**Overtopping:** We plan to have a Teams Meeting sometime in September with Ben Green to review a different scenario and what they might be acceptable to. With my phone conversation with Ben, he had his hydraulic engineer with him, he asked him, what would he be comfortable with for overtopping. That is another option out there. Dam Safety Program is not keen on the idea of having the dam overtopping and having overtopping protection on the downstream side. We looked at that as an alternative we wouldn't increase impact on the downstream if that were the case. Now what that is we don't have any freeboard at the dam which means during the design storm the water surface is basically at the dam crest within .1 feet. We could provide overtop protection on the downstream slope so when the water comes up and overtops the dam there isn't any damage to the downstream slope. (Overtopping protection is concrete, noneroding surface on the downstream slope so it cannot fail) That is a very big concern when you look at dam safety if water was to come over the dam crest, what happens it erodes that downstream slope and the dam fails. You can provide overtopping protection to protect that slope so it withstands the forces of the overtopping water. Most times Dam Safety Program does not allow that. It is done in various circumstances when there are not any other alternatives. There are alternatives in this case, not great because of lowering the lake, but there are alternatives. I got from them they might be willing to look at overtopping protection and to be open to that idea if we provide a certain amount of freeboard. Instead of providing a foot and a half of freeboard, maybe it is 12". That would be providing overtopping protection and maybe they would be a little more comfortable with providing some freeboard. I want to talk through that with the Hydraulic Engineers and what they might be open to. We wouldn't have to modify the spillway. We'd still have to do all our excavations on the downstream control to get the filters in, but we would provide overtopping protection, and the lake level may not be historical level but would be 8 -10 -12 inches instead of 2 feet. There is still that potential, and it is worth having a conversation with Ben and go through that before we have our next meeting and before we attend the next selectboard meeting. I want to involve Vermont Flood Plains, to get their opinion on the increasing flows downstream. As I mentioned there could be give and take with Dam Safety and Flood Plain, have Dam Safety with the freeboard. All this will come into play with where we end up with a final lake level; assuming we do not raise the dam crest. This will be the final step before we finalize our reports, to get their feedback, so we can provide the alternatives that are permissible. We would have a recommended alternative. You would select the alternative after you receive the report and before you put the next project out for bid for consultants, and you would have an alternative in mind at that point. We will propose up to three alternatives, with those alternatives there are pros and cons, you look at everything, and the town decides the alternative.