



**GROUND
PENETRATING
RADAR
SYSTEMS, INC.**

Monday, March 02, 2015

US Army Corps of Engineers
Attn: Patrick Hunter
Chief, Engineering and Contracts Section
John Day/Willow Creek Projects
PO Box 823
Rufus, OR 97050

Re: GPR Report of Investigation and Survey of Concrete – John Day Dam, Rufus, OR.

Date of Inspection: February 23, 2015

Mr. Hunter,

I appreciate the opportunity to work with you and the US Army Corps of Engineers at the John Day Dam fish ladder. All things considered, I am pleased with the results of our survey from Monday, February 23, 2015.

Ground penetrating radar was used to inspect an area of existing concrete wall to determine concrete integrity. The wall is leaking in numerous parts of a section that was not part of the original structure.

On the following pages you will find information regarding the equipment we used, the survey process executed on site, and information on the results of the survey. Additionally, you will find a photo and data screen shots of the areas surveyed for reference.

Equipment:

We used a GSSI (Geophysical Survey Systems, Inc) Ground Penetrating Radar Unit with one specific antenna. The GPR head unit is classified as a SIR-3000. The antenna used on this project was a 1600MHz antenna which is capable of reaching depths between 18"-36". This specific antenna was created and calibrated specifically for concrete applications. These applications include void mapping, electrical conduit locating and, of course, reinforcing steel identification (rebar, wire mesh and post/pre tension cables). This equipment represents the latest technology available from GSSI. We have found the typical accuracy when surveying with the 1600MHz antenna to be +/- ¼" to the center of the object being located.

When determining the depth of an object GPR generally has a 10% margin of error. Please keep in mind that these statistics are based on ideal concrete conditions and may not necessarily reflect the findings from your project.

Survey Process/Results:

The survey process for this project was relatively simple. We arrived on site to find the location in question had been prepared for scanning by turning off all valves flowing into the area, leaving the area free of water. Three areas were scanned with the 1600 MHz antenna, one to the left of the failing concrete, the failing concrete itself, and one to the right of the failing concrete. The data obtained showed a definite difference between the concrete that was failing vs. the other two areas scanned. The area that was failing shows definite signs of voiding behind the concrete, and also a much thinner concrete wall in general. This is all illustrated in the attached data screen shots to follow.

Conclusion:

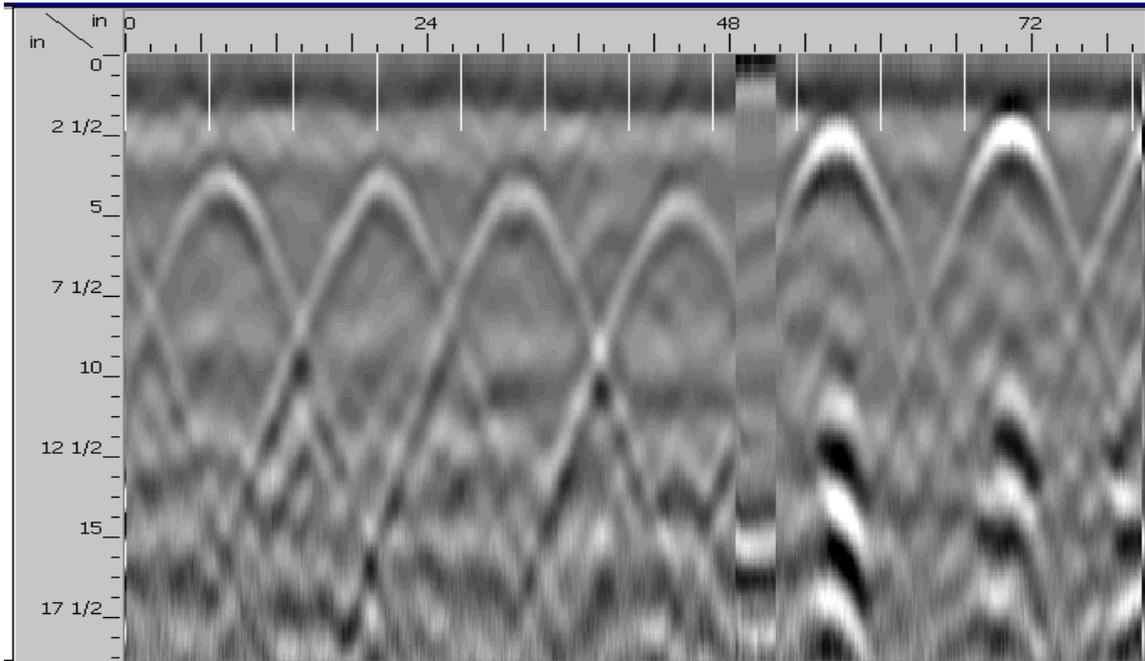
The results above are based on the field findings from the relatively simple survey conducted. Restating the findings, it is my professional opinion that the concrete in question is indeed in sub-par condition, while the other areas scanned looked to be fully functional.

On the following pages I have included screen shots of the data for your records. I have also included pictures of the areas detailed and discussed above showing the exact areas scanned and directions in which the data was collected. If you have any questions regarding this inspection please do not hesitate to contact me. Thanks again for the opportunity and let us know if we can assist you in the future.

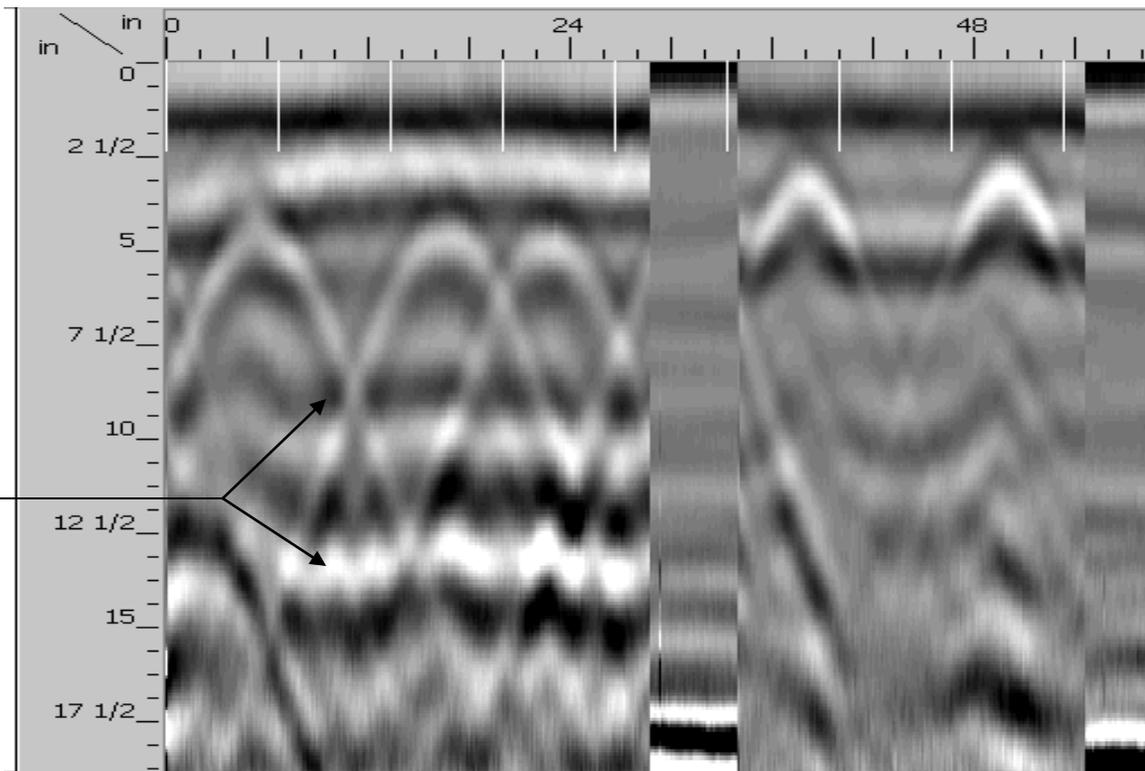
Best Regards,

Eric Steyer
Ground Penetrating Radar Systems, Inc.
503.502.4781
eric.steyer@gp-radar.com
www.gp-radar.com

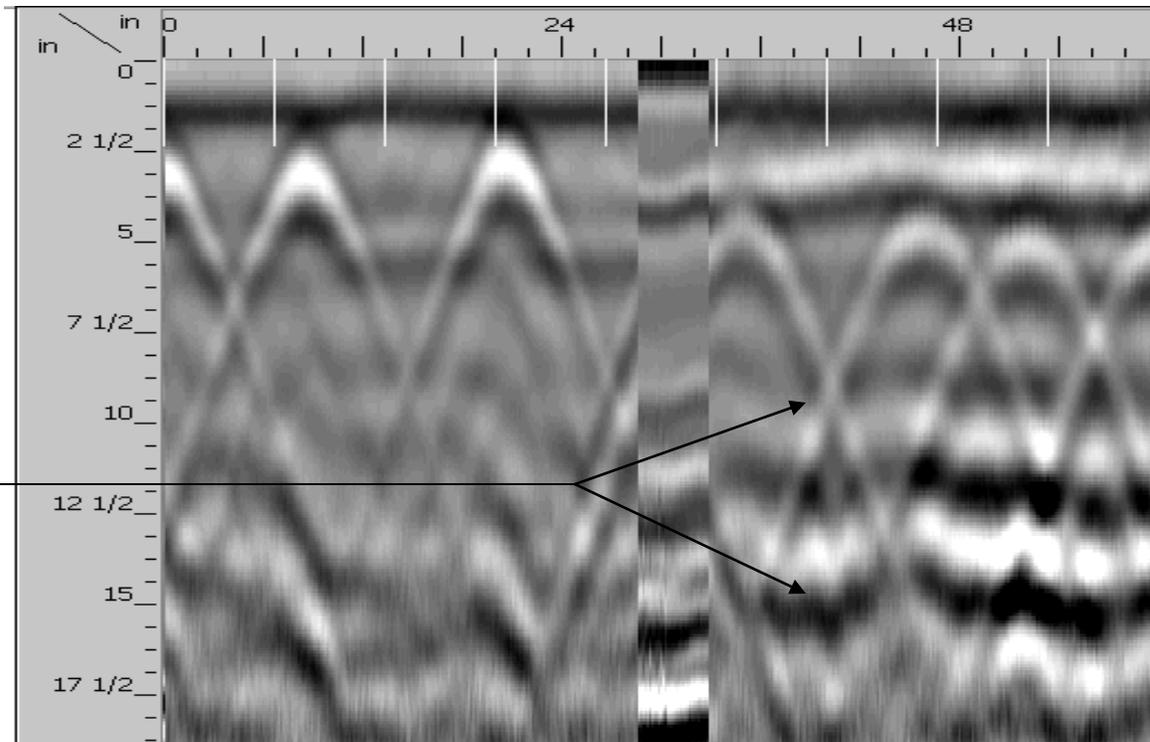
Data Screen Shots:



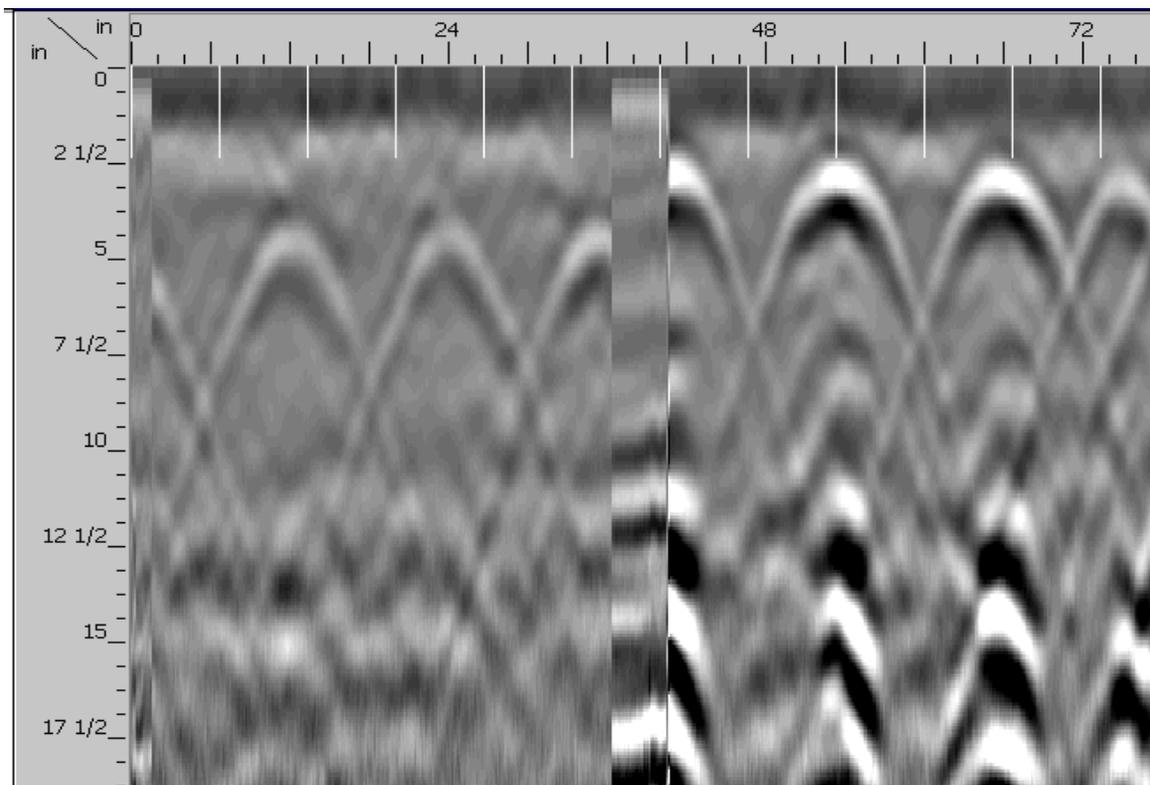
The above data was taken to the left of the failing concrete, and shows "normal" conditions
The left side of the image is a scan from left to right and the right side is a scan from bottom to top



The above data was taken from the failing concrete, in the same manner (left/right, bottom/top)
Evidence of voiding behind the wall

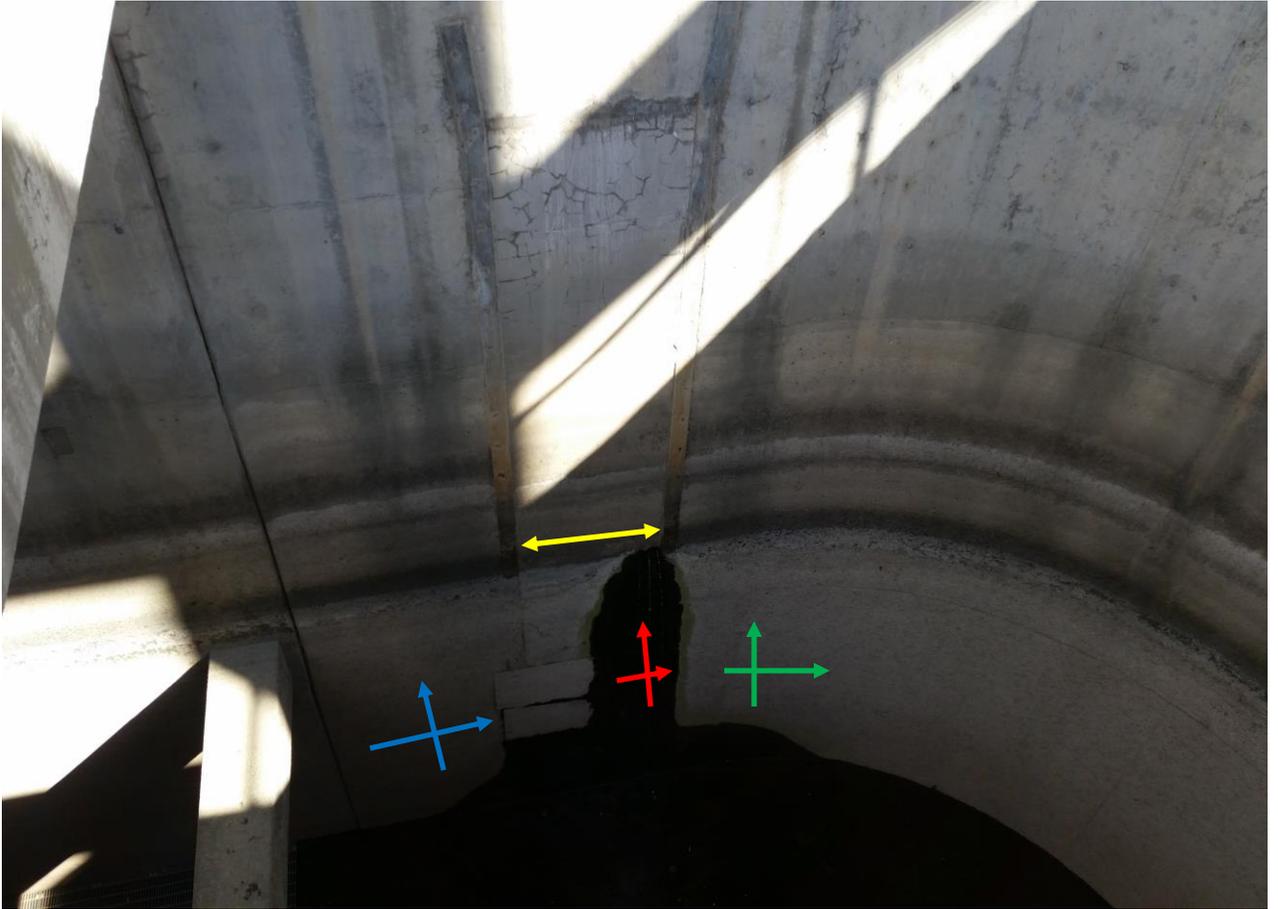


The above data is from another section of the failing concrete
Again, evidence of voiding behind the concrete



The above data was taken to the right of the failing concrete, and again shows normal conditions.

Photo of Areas Scanned:



Blue arrows are areas scanned to left of failing concrete
Red arrows are areas scanned of failing concrete (yellow arrows)
Green arrows are areas scanned to right of failing concrete