

VLBA Antenna Memo 101

Azimuth Rail Grout Repair at Brewster, Washington

July 14 – July 18, 2019

J. Gallegos
July 23, 2019

1.0 EXECUTIVE SUMMARY

The grout directly below the Brewster VLBA azimuth rail was cracked and degrading in multiple places. A total of 25 damaged grout sections were completely and partially removed and replaced with a new grout. Spalling in the original cement grout used below the azimuth rail caused major cracks and voids between the rail and the grout. A new E-Chem epoxy grout was used in place of the old cement grout.

2.0 INTRODUCTION

On the 23rd of May 2019, the site technician Jesse Fulmer reported that the grout beneath the rail was deteriorating and large cracks were forming as seen in the images below.





A maintenance team consisting of Dominic Zamora, Rob Simpson, Alvin Alvarado, Anthony Peralta, and engineer Jeremy Gallegos traveled to Brewster to replace all of the cracked grout sections. VLBA Site Technicians Jesse Fulmer and Mark Hoffman also greatly supported this effort. This report will document all tools, procedures, and results that were used in conducting this repair.

3.0 PROCEDURE

3.1 Parking the antenna

The first step of the process was to analyze all grout sections around the azimuth rail and deem all critical sections that must be replaced. Once all sections were marked, the antenna was parked and locked out. It was critical to park the antenna where the wheels were not directly above or near any grout section that were being replaced.

3.2 Demolition

Demolition hammers were used to break out all grout sections needed to be replaced. In the worst places the grout was completely removed all the way to the lower foundation. The places where the grout was not cracked all the way through we only removed the top portion approximately 2 inches below the rail. All photos of the demolition can be seen below.



3.3 Cleanup

Once all the grout was busted out we discarded all the large chunks then we used compressed air to blow the rest of the debris out. We then used a garden hose nozzle and sprayed pressurized water in the section to ensure it was clear of all foreign object. Compressed air was then used again to thoroughly dry the foundation.

3.4 Setting Forms

4'x8' Sheet of Masonite house trim was ripped into 6"x8' strips. The strips were then coated with packing tape to ensure they release from the grout. The Masonite forms were then attached to the leftover grout beneath the rail plates. In the places where there was no grout to attach to, wedges were built out of a 2x6 piece of lumber and screwed to the foundation using Blue Tapcon screws. All screw holes were predrilled using a hammer drill. Once the forms were set we used generous amounts of Silicone caulk to seal the

forms and prevent the grout from leaking out of the cracks. All images of setting the forms can be seen below.



3.5 Grouting

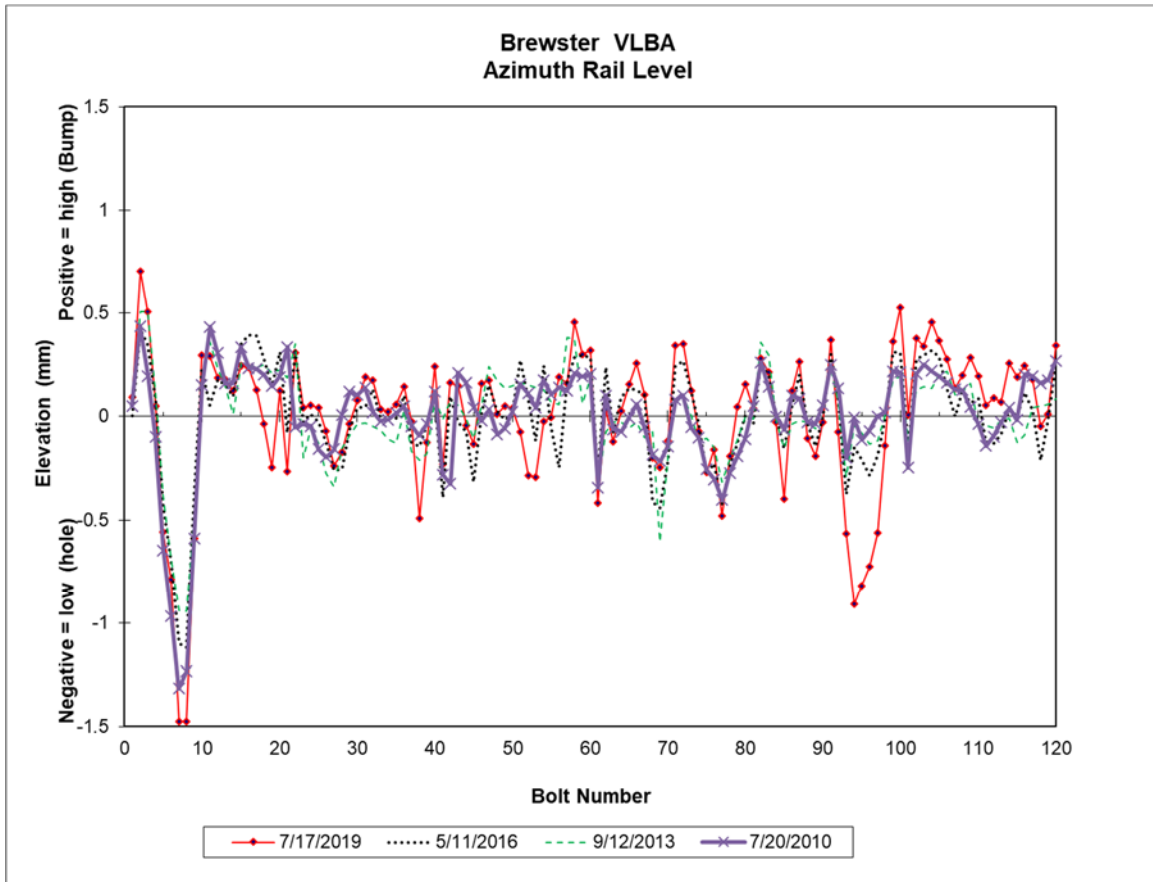
E-Chem EP15 high-performance epoxy grout was used to replace the old grout. The grout is extremely sticky and is a health hazard if in contact before cured completely. In order to prevent all contact with the grout protective clothing, eye protection, and gloves were all used. The gloves are then duct taped to the suit to prevent the gloves from falling off in the grout.

Parts A and B are first combined together and mixed well with a paint mixer. Once thoroughly mixed we poured it into the cement mixer and added part C. A full mix requires 4 bags of grout (2 cu ft.) but the mixer used for this job would not accommodate this much volume so the mix was cut in half.

Once the grout was thoroughly mixed it was then poured into 5 gallon buckets to be distributed beneath the rail. It was very important to pour the grout only from one side of the rail to ensure there is no air that gets trapped under the rail or the plates. The cement mixer was cleaned after every 2 mixes due to the working time of the grout. All grouting photos can be seen below.



4.0 Results



5.0 CONCLUSION

There are still other sections on the Brewster rail grout that can be replaced. There were a few spots that the maintenance team could not fix due to time and antenna positioning. The antenna was parked and locked out in the position we felt the most work could be done. Although this position worked to repair all severe cracks and spalled sections we were not able to do minor spots that were positioned beneath the wheel. After completing the job I feel that more work should be done on the grout in the future. Once the old grout was busted out it was clear that all the sections we were fixing were sections that had been previously done in the past. Although a better grout is being used I still feel that these grout repairs are just temporary and will eventually need to be redone. I noticed from observing other previous grout repairs that the interface between the new and old grout tends to form a crack where water can get into. I feel that all of the grout beneath the Brewster azimuth rail should be replaced in the future. Also on future grout repair jobs I would recommend using a mixer large enough to accommodate a full grout mix.

APPENDIX A. Required tools and Material

Tool List for Grout Repairs

Tools	QTY.
Epoxy grout	10 ft ³
Demolition Hammer with Bits	4
cordless impact drill	1
electric drill with paint mixer	1
Masonite forms (6"x8")	10
Form wedges (2x6)	10
Duct tape	2
Packing take to coat forms	3
Blue tapcon screws	2 boxes
Precision level	1
Level targets	3
fast dry caulking	1 case
Power strip	1
Extension cords	6
Garden hose and nozzle	3
Air compressor	1
Compressor hose with blower nozzle	1
Cement mixer	1
Shovel	2
Tyvek suits	20
Heavy duty rubber gloves	2 boxes
respirators	20
Eye/ face protection	20
Hard hats	5
comfort pads for shooting rail	23
Clean up rags	
5 gallon buckets	5
scraper	2