



Ground Penetrating Radar Survey of Former Fort Halifax, Halifax, Pennsylvania

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Abstract

The former Fort Halifax was located along the Susquehanna River from 1756 to 1757, during the French and Indian War period. The approximate shape and dimensions of the fort are known from historical documents, but not its exact location. Archaeological excavations run by one of us in 2021 and 2023 revealed what is likely to be the foundation of a structure located near one of the four bastions of the fort. Other documents suggest the presence of a well within or near the northeast bastion. A Ground Penetrating Radar (GPR) survey was conducted in November 2023 to search for the well and other architectural anomalies, using a 900 MHz antenna in a 50 m x 50 m area. Results suggest that the well is approximately 1.5 m in diameter and about 30 cm below the surface. Excavations planned for June 2024 are expected to conduct ground truthing.

Additional Work in June 2024

The summer field school in early June involved participation of students from Juniata College and other universities as well as members of the Friends of Fort Halifax under direction of Dr. Burns. 21 Test Units (1 m x 1 m excavations) were opened within the GPR grid, as well as 5 more outside of it. Several GPR anomalies were intrusively investigated as shown in the following figures. It is notable that this site was minimally plowed but that there is evidence of shallow foundations being clipped and scattered by that action.



Figure 1: Site Map on 2022 Orthophoto

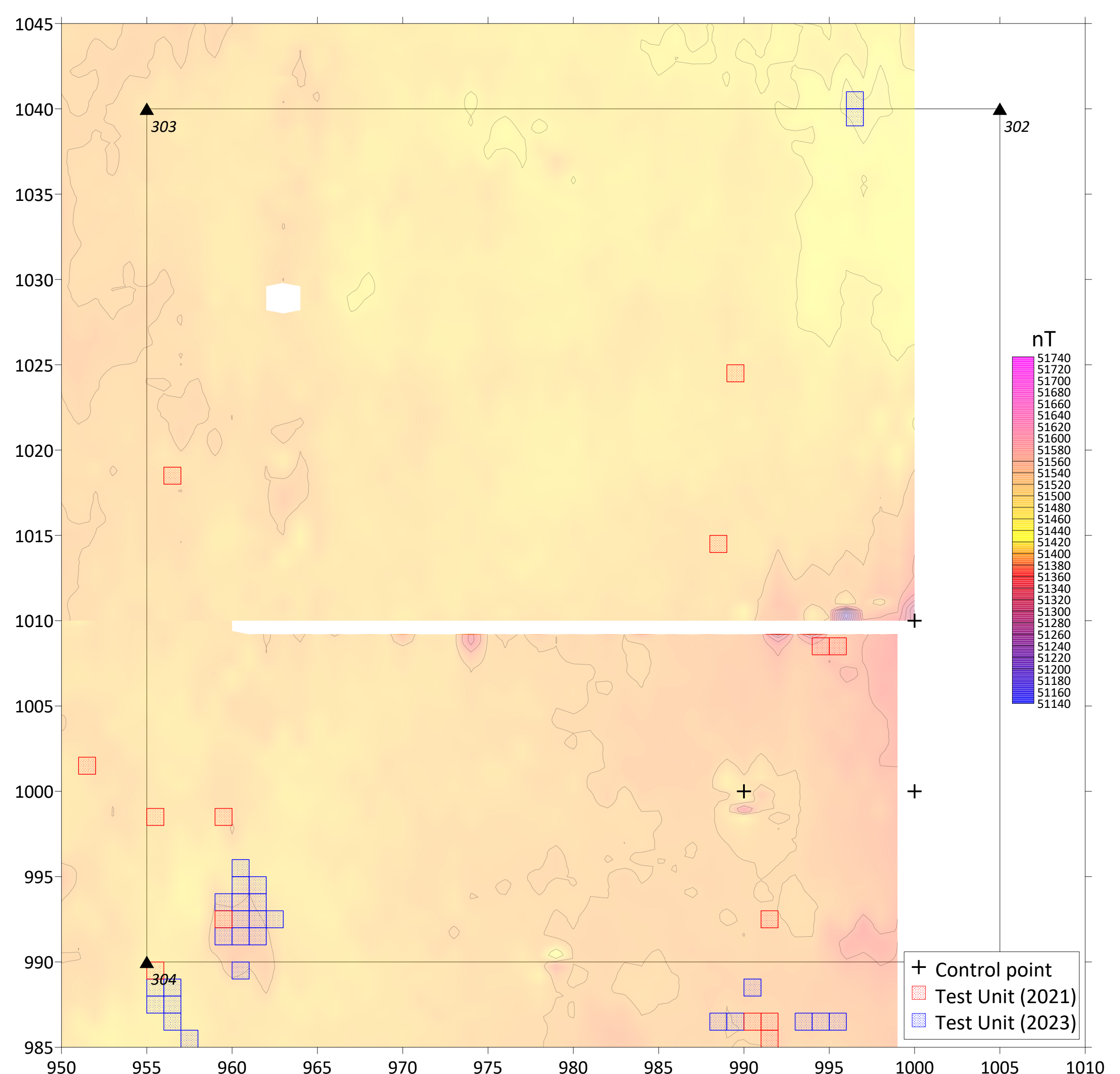


Figure 2: Map of the area of investigation prior to GPR survey and subsequent excavations, including magnetic contours. Magnetic survey was performed in April and in June of 2023 with G-858 magnetometer (single sensor). Some test units excavated in 2023 targeted magnetic anomalies.



Dr. Burns operating SIR-3000 survey cart with 900 MHz antenna

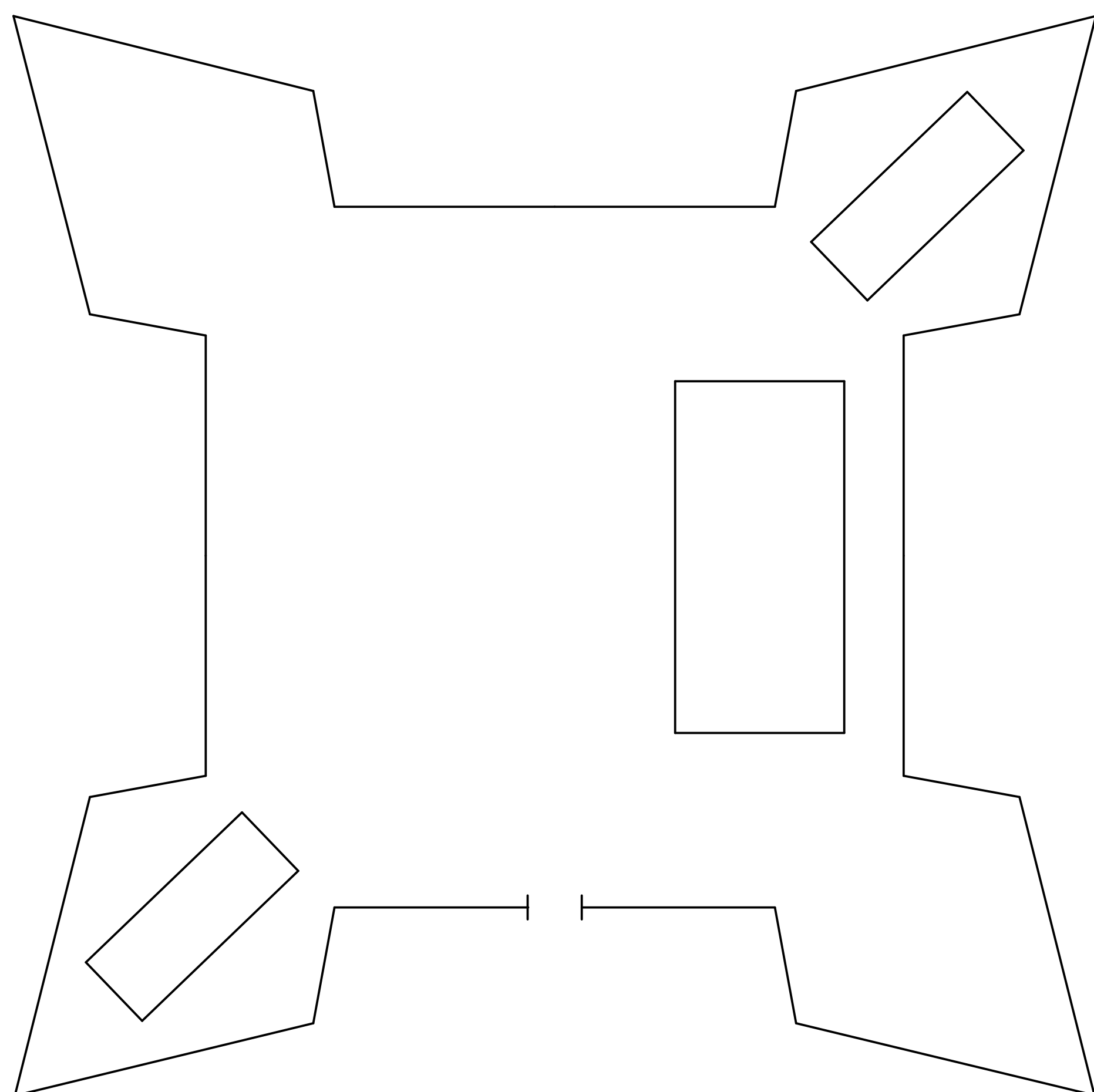


Figure 3: Approximate size and shape of former fort with four bastions, based on Joseph Shippen's map (1853). Buildings within include barracks and a storehouse. Another document by Busch (1896) shows different arrangements including a well in the northeast bastion. The fort stood for only 14 months and was then deliberately removed. The site is otherwise rich in prehistoric artifacts, being close to Clemson's Island, an Early Woodland site. Shown at same scale as survey grid in Figures 4 and 5.

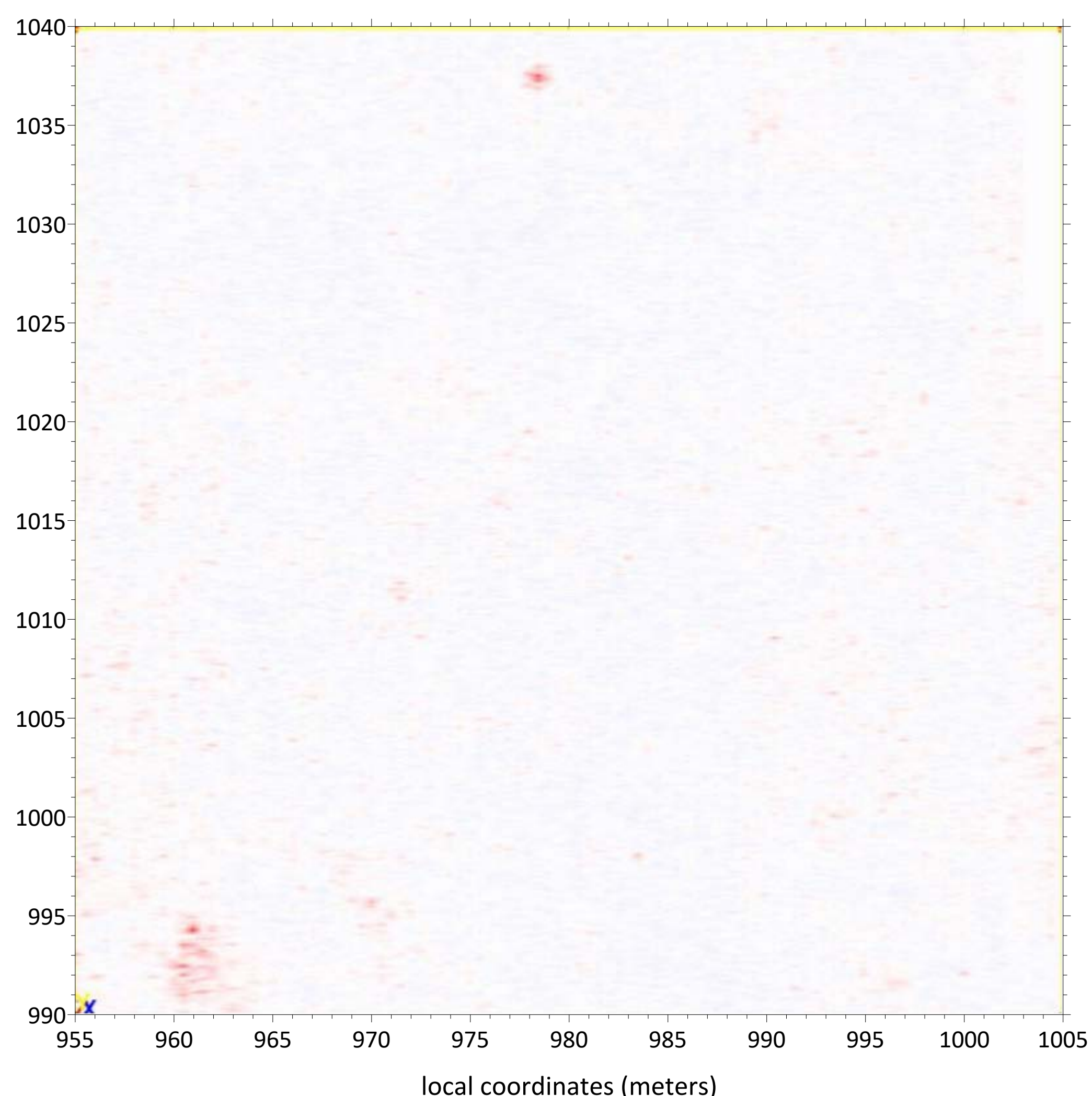


Figure 4: Survey grid showing amplitude map centered at about 0.4 meter depth. Individual files were acquired in the north-south direction at a spacing of 0.5 meters. The most significant anomaly (71) is near the top center and was believed to represent the well mentioned in Busch (1896). The other in lower left (15) correlates with a magnetic anomaly and is currently believed to represent one of the fort's four bastions.

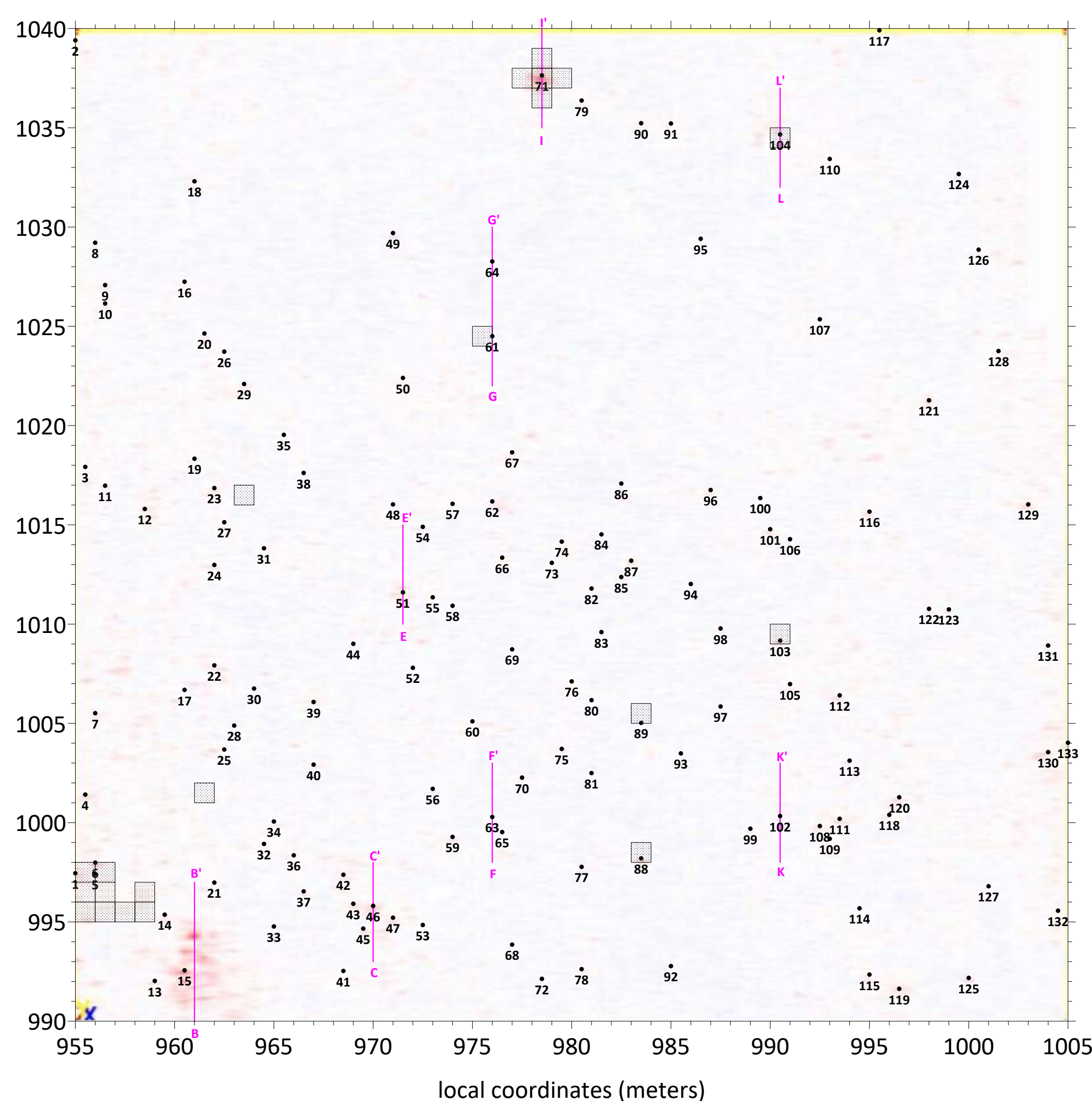


Figure 5: Survey grid showing all anomalies, test units excavated after the survey in June 2024, and the locations of several profile segments (left), with the profiles at right. Most anomalies are not obvious on the amplitude maps - most are small and were digitized by careful review of individual profiles.

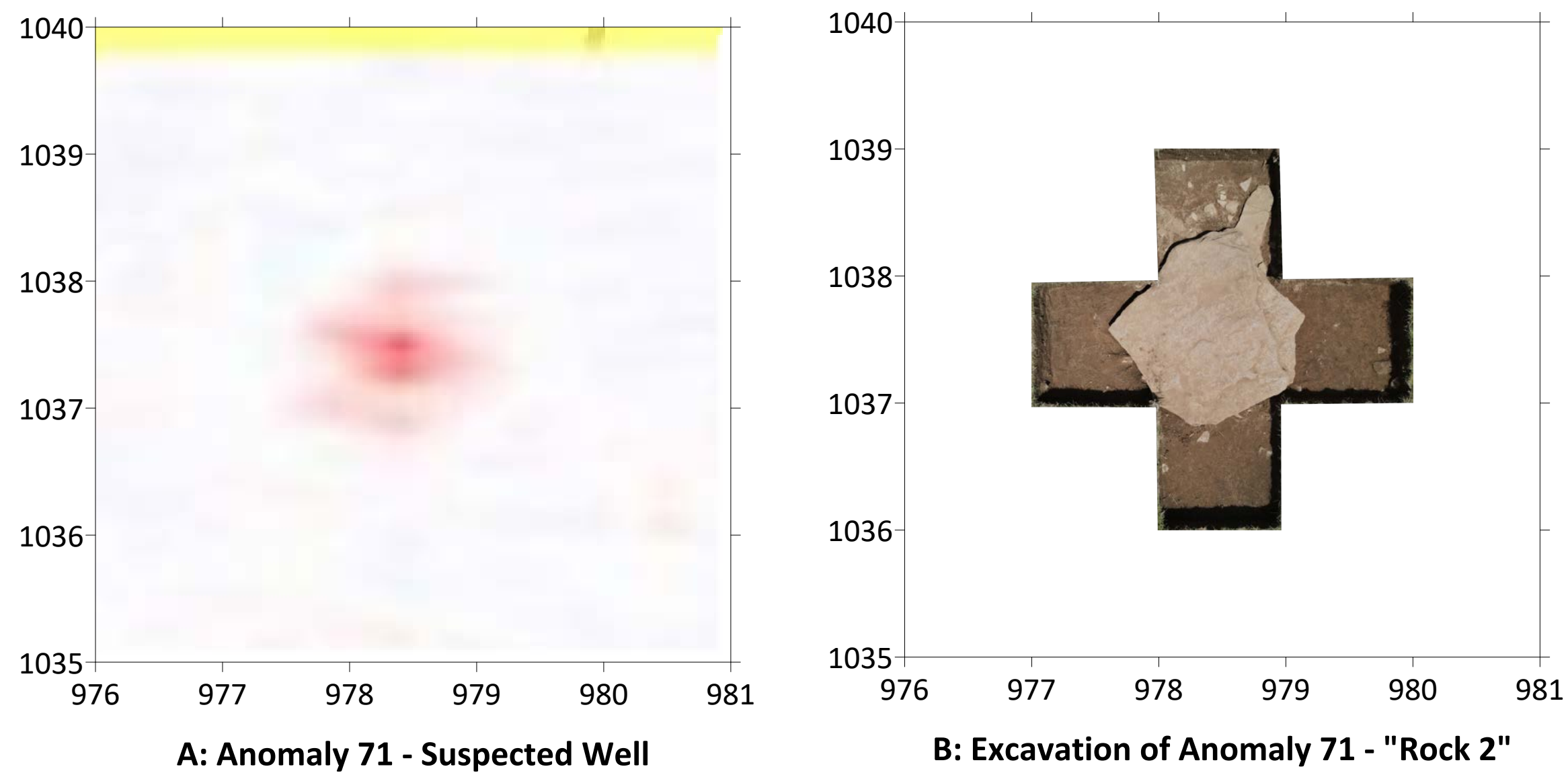


Figure 6: Investigation of suspected well. A: Anomaly 71 as shown in Figure 5. B: Modified drone photo of the excavation including test units 113, 115, 116, 118, and 119, and showing "Rock 2" at center, which caused the GPR anomaly. C: Rock 2 was removed from the excavation with a Bobcat. D: Excavation continued for ~30 cm below the base of Rock 2. No historic artifacts were found, but some prehistoric debitage was found. The rock, though unusual, is probably a naturally occurring boulder in the floodplain of the Susquehanna River (probably transported by ice damming).

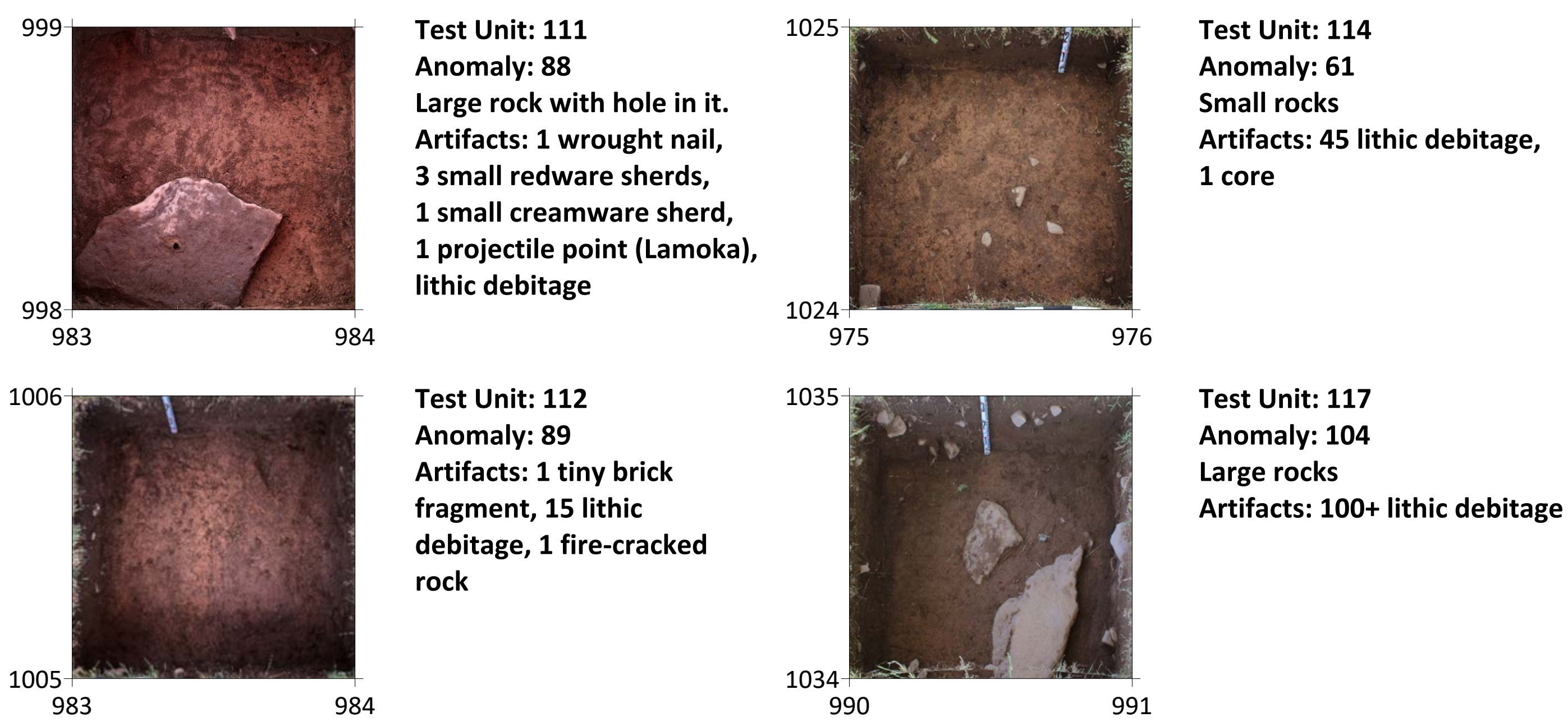


Figure 7: Other excavations testing GPR anomalies.

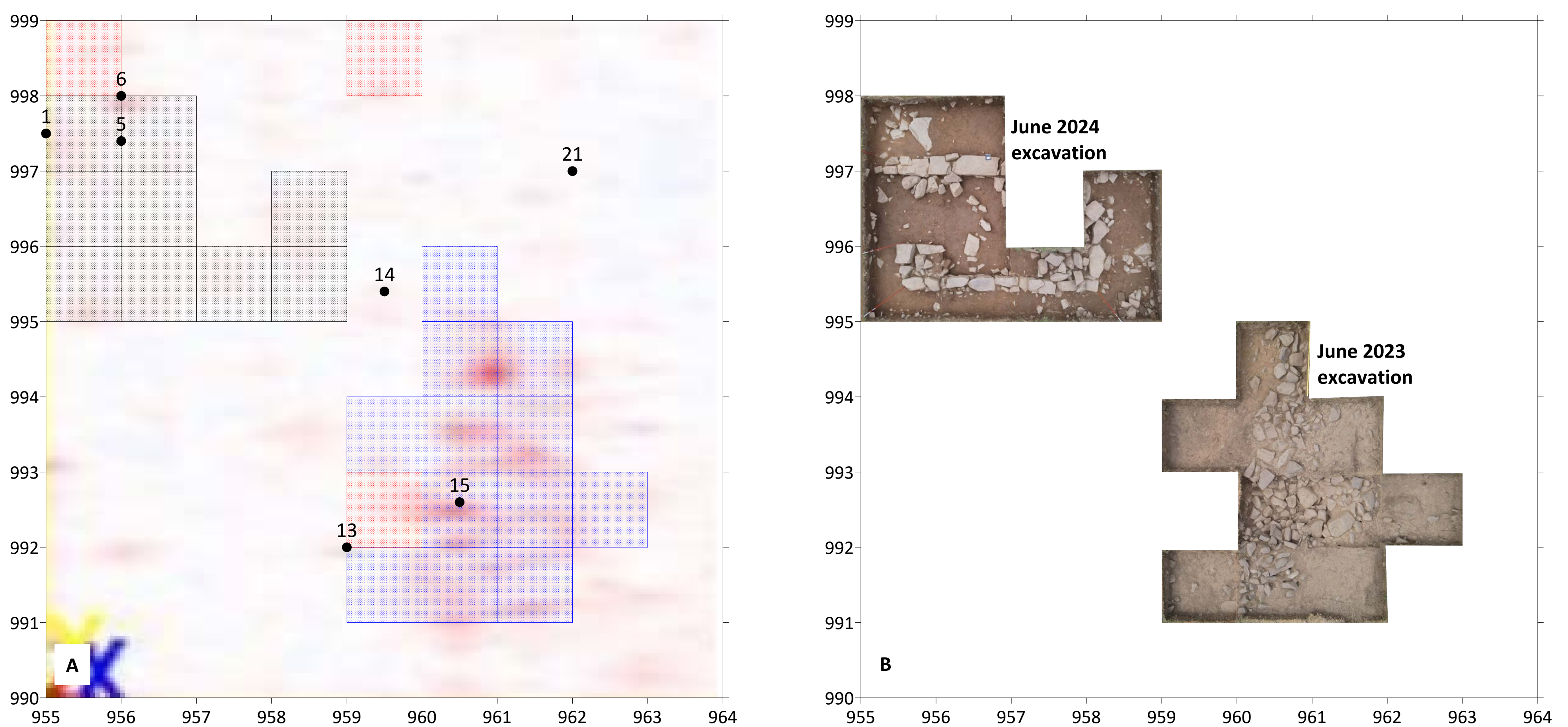


Figure 8: Excavations in southwest corner of survey grid. A: Amplitude map with GPR anomalies (as shown in Figure 5) and test units from 2021 (red), 2023 (blue), and 2024 (black). B: Photos of excavations. The June 2024 excavation covers anomalies 1, 5, and 6, and exposes a rectangular structure which may have been an officer's quarters, because of its size and association with etched glass drinking vessels. The June 2023 excavation (which had been backfilled prior to the GPR survey in November 2023) exposes a cluster of rocks that may represent a large hearth for the soldiers' barracks.

References

Busch, C. (1896) Report of the Commission to Locate the Site of the Frontier Forts of Pennsylvania, Vol.1. Harrisburg: State Printer of Pennsylvania.

Shippen, J. (1853) Map of Fort Halifax, Gratz Collection, Historical Society of Pennsylvania.