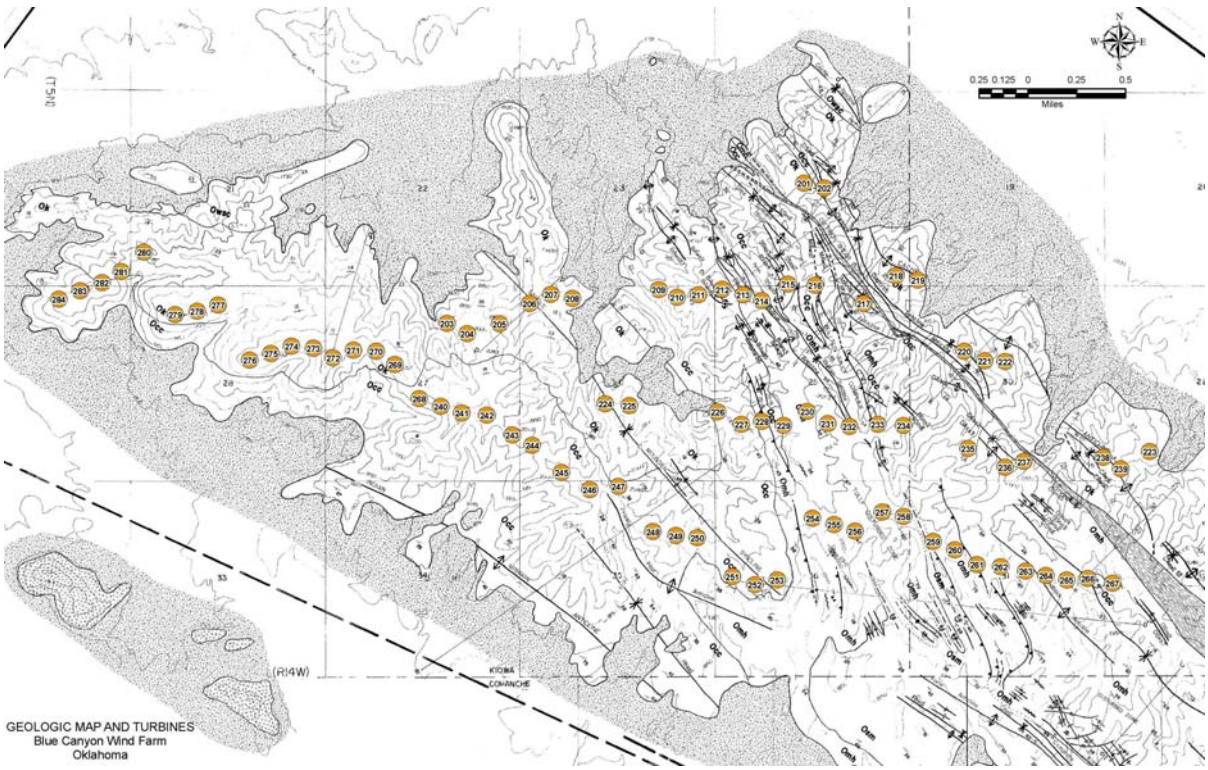
Seismic Characterization of Wind Turbine Sites Near Lawton, Oklahoma, by the MASW Method

APPENDIX II: Maps from Side Scattering Analysis (SSA)

Choon B. Park and Richard D. Miller
Kansas Geological Survey
University of Kansas
1930 Constant Avenue
Lawrence, Kansas 66047-3726

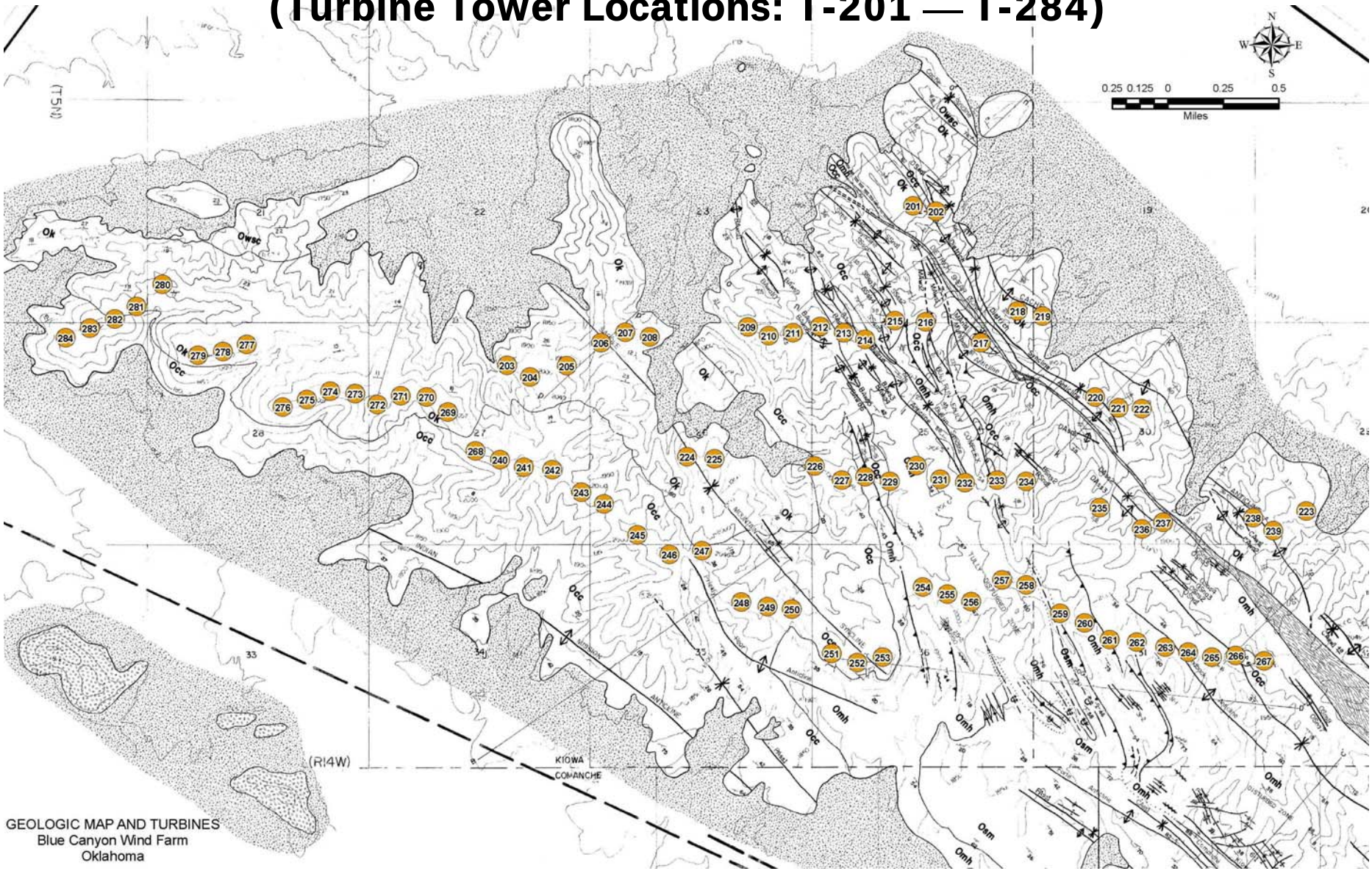


Final Report to

Rick Palm and Chris Kopchynski
Barr Engineering Company
4700 West 77th Street
Minneapolis, MN 55435-4803

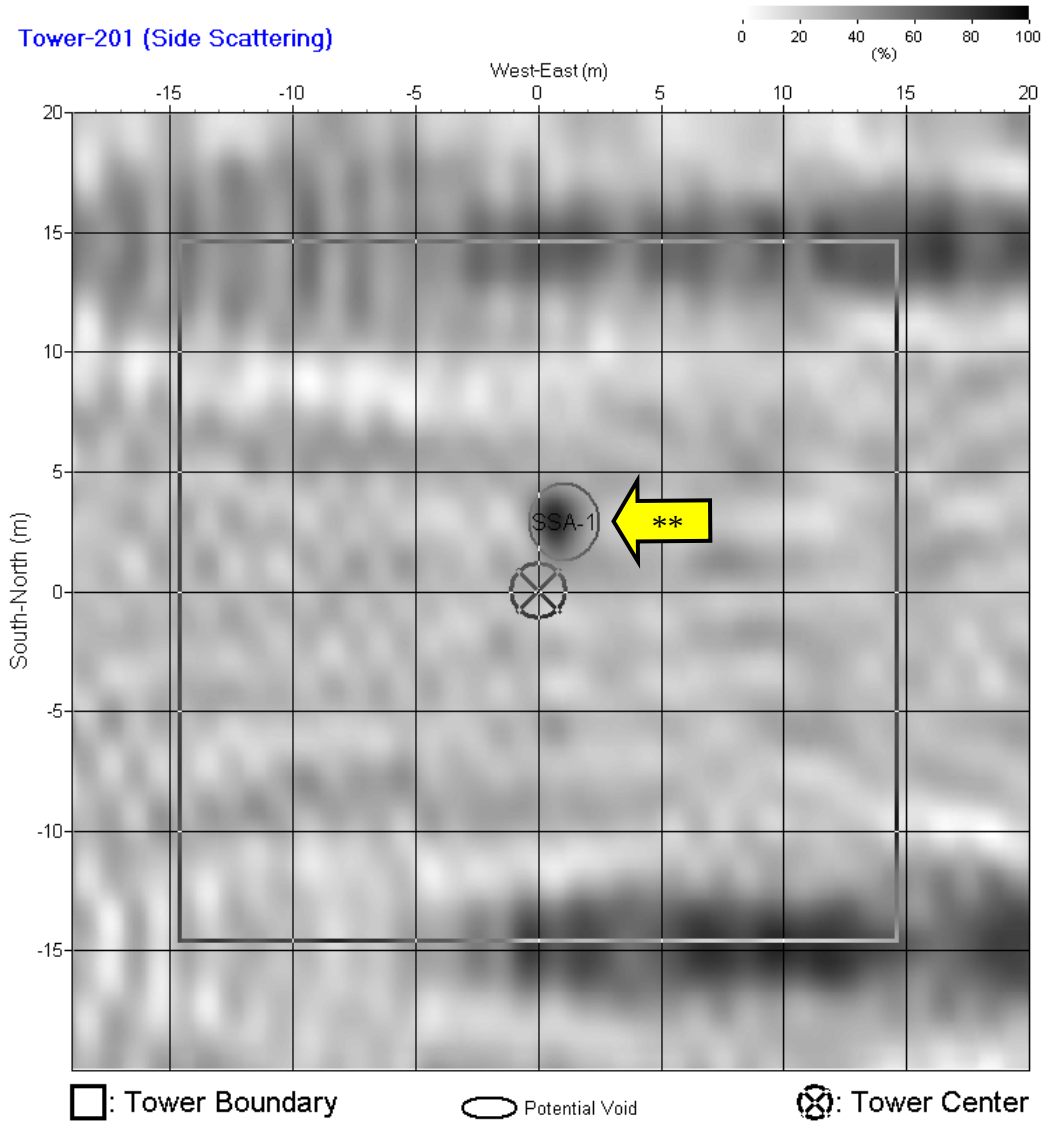
Open-file Report 2005-22 (part 3 of 4) July 5, 2005

Blue Canyon Wind Mill Farm Phase II
(Turbine Tower Locations: T-201 — T-284)



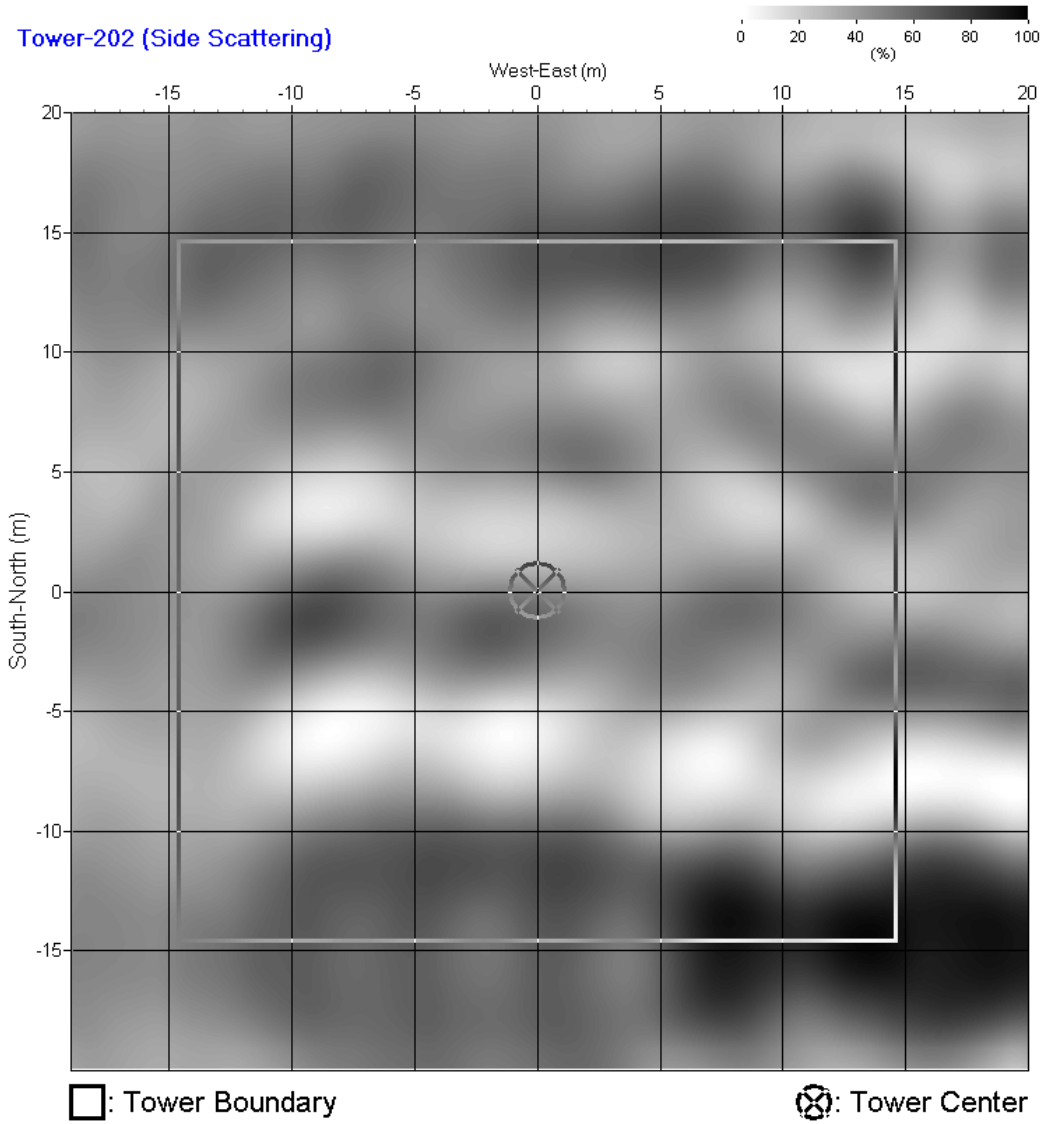
GEOLOGIC MAP AND TURBINES
Blue Canyon Wind Farm
Oklahoma

T-201

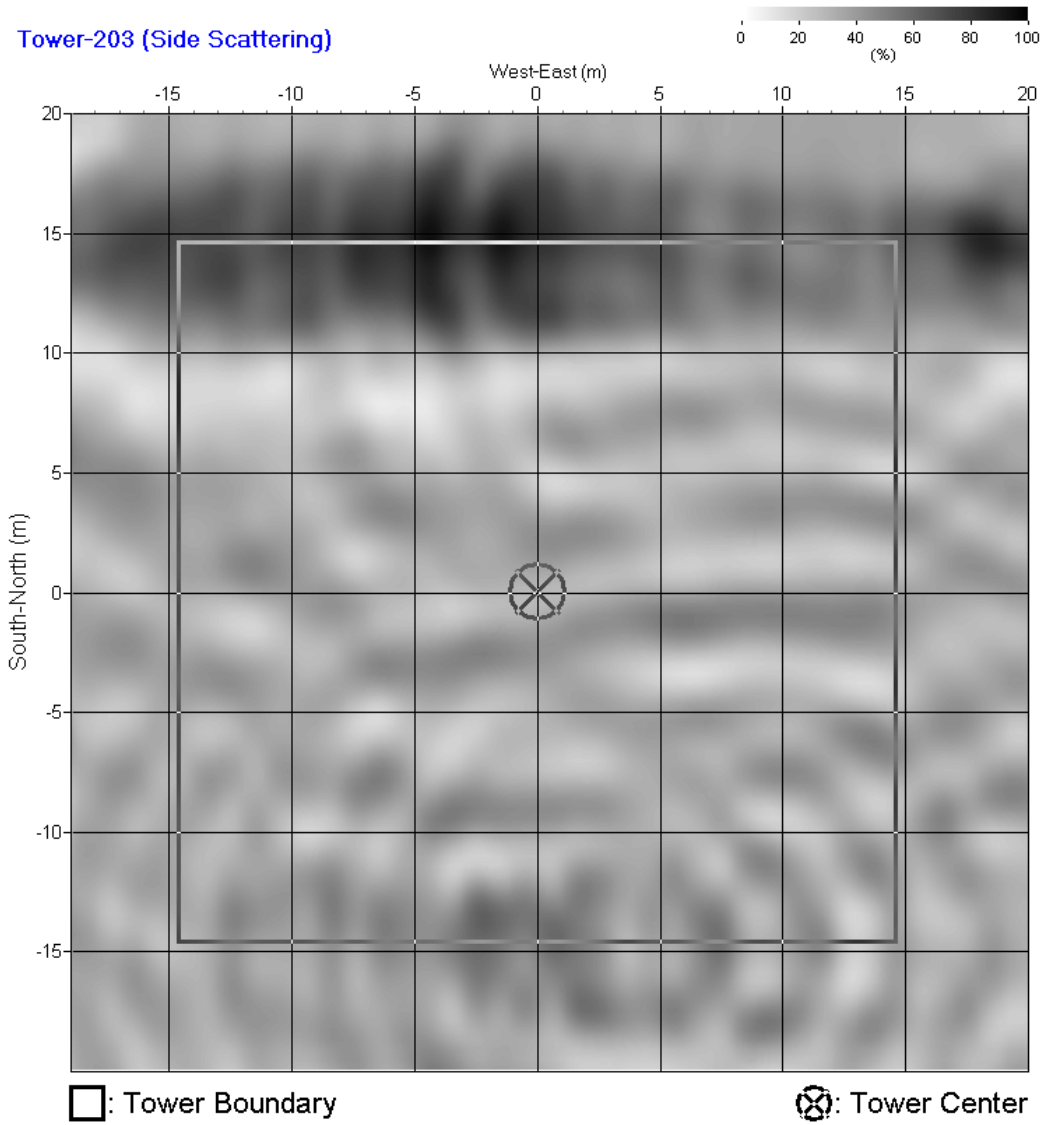


**Potential void (see separate text file for coordinates)

T-202

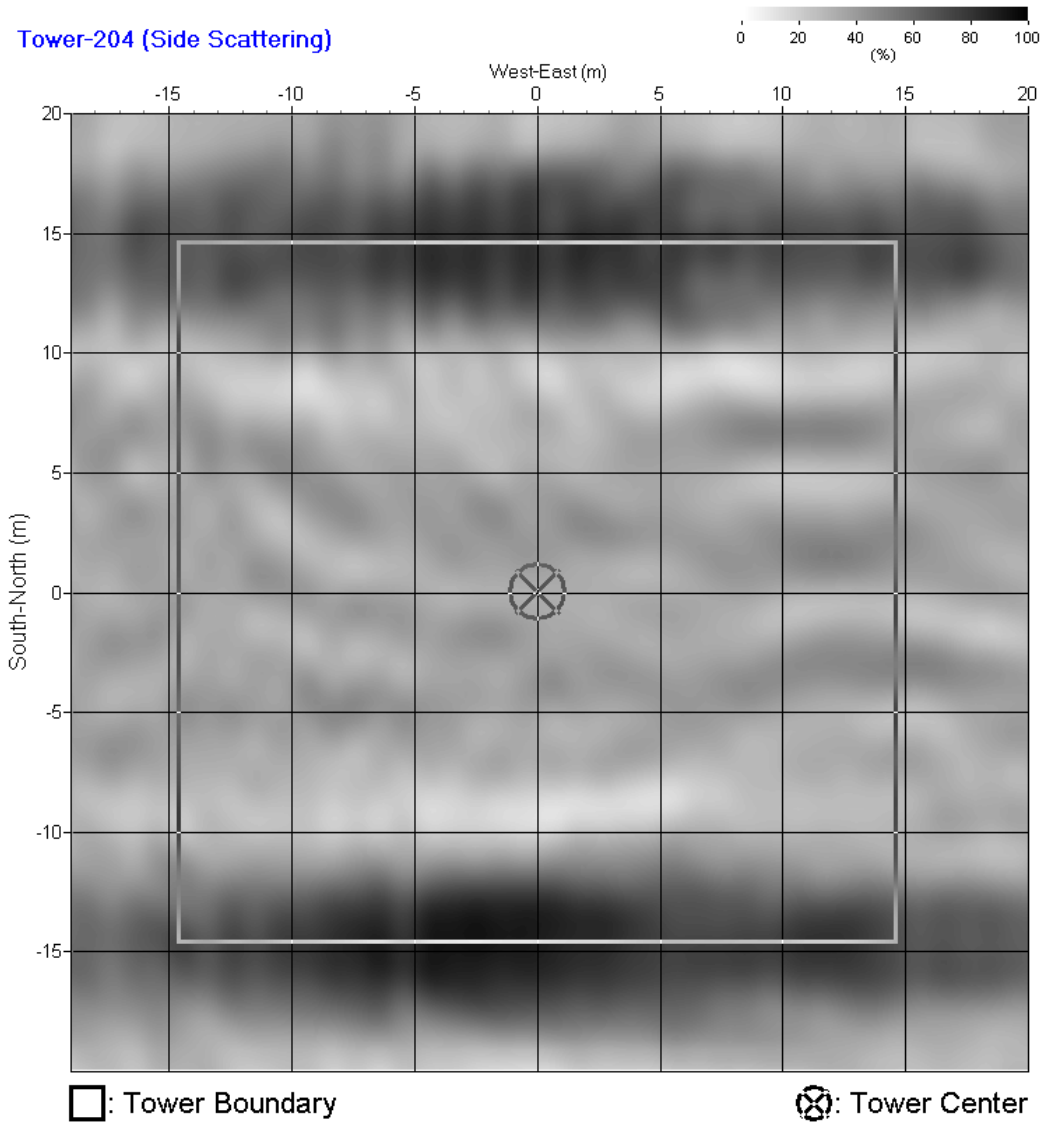

Tower-202 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-203**

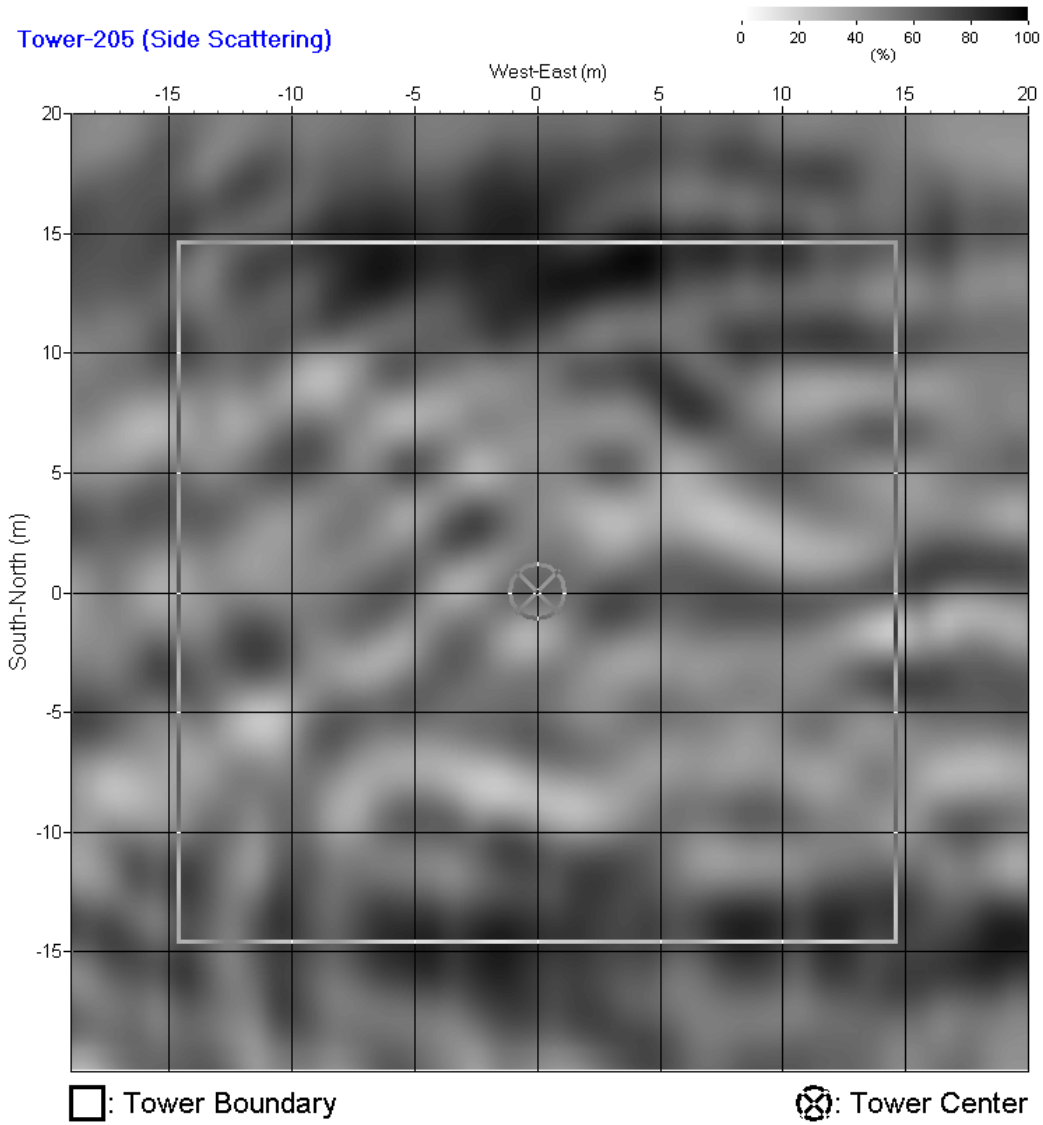


**A shorter receiver spacing of 2 ft was used for line 4 due to terrain condition (steep drop off).

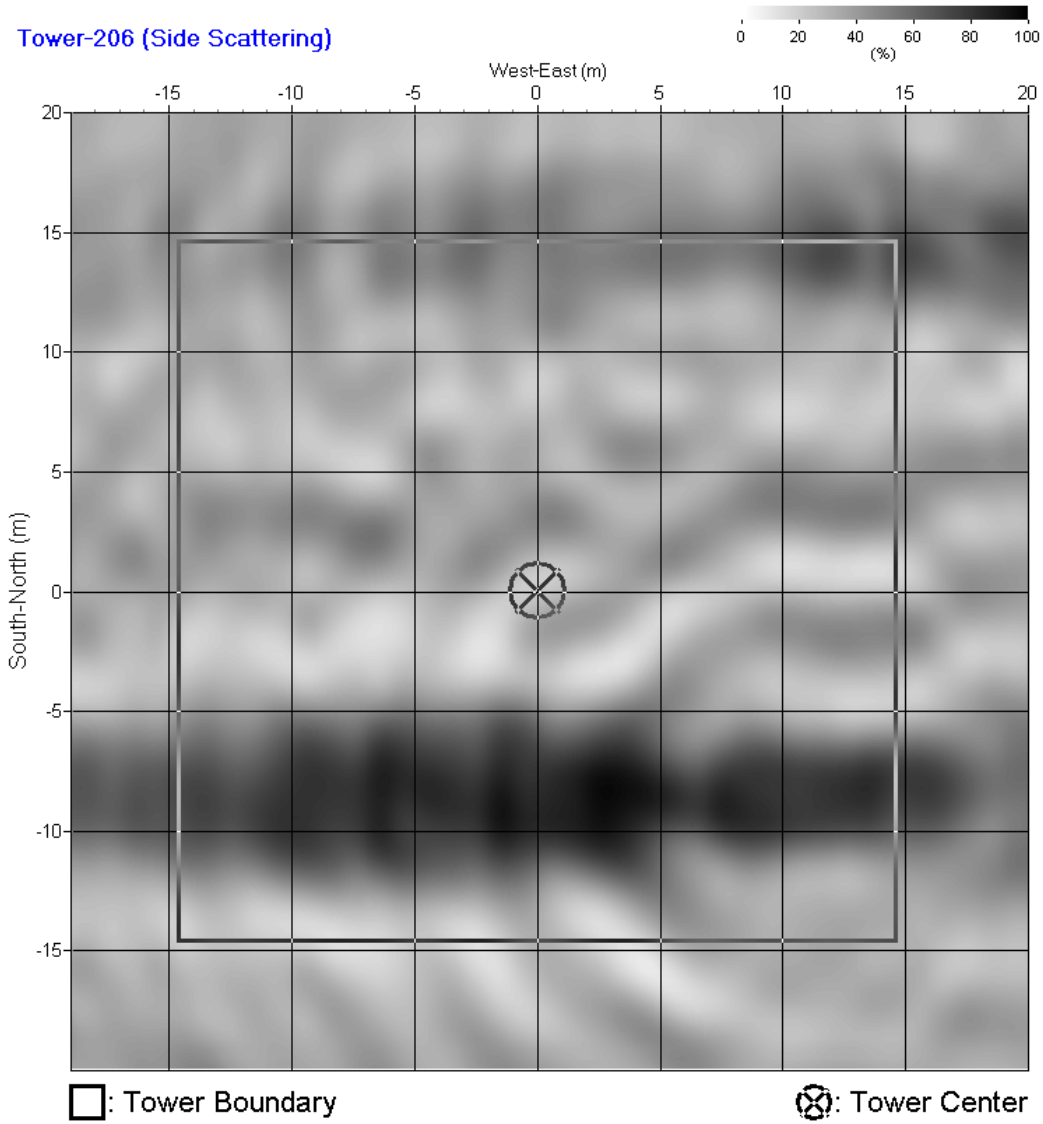
T-204


Tower-204 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-205

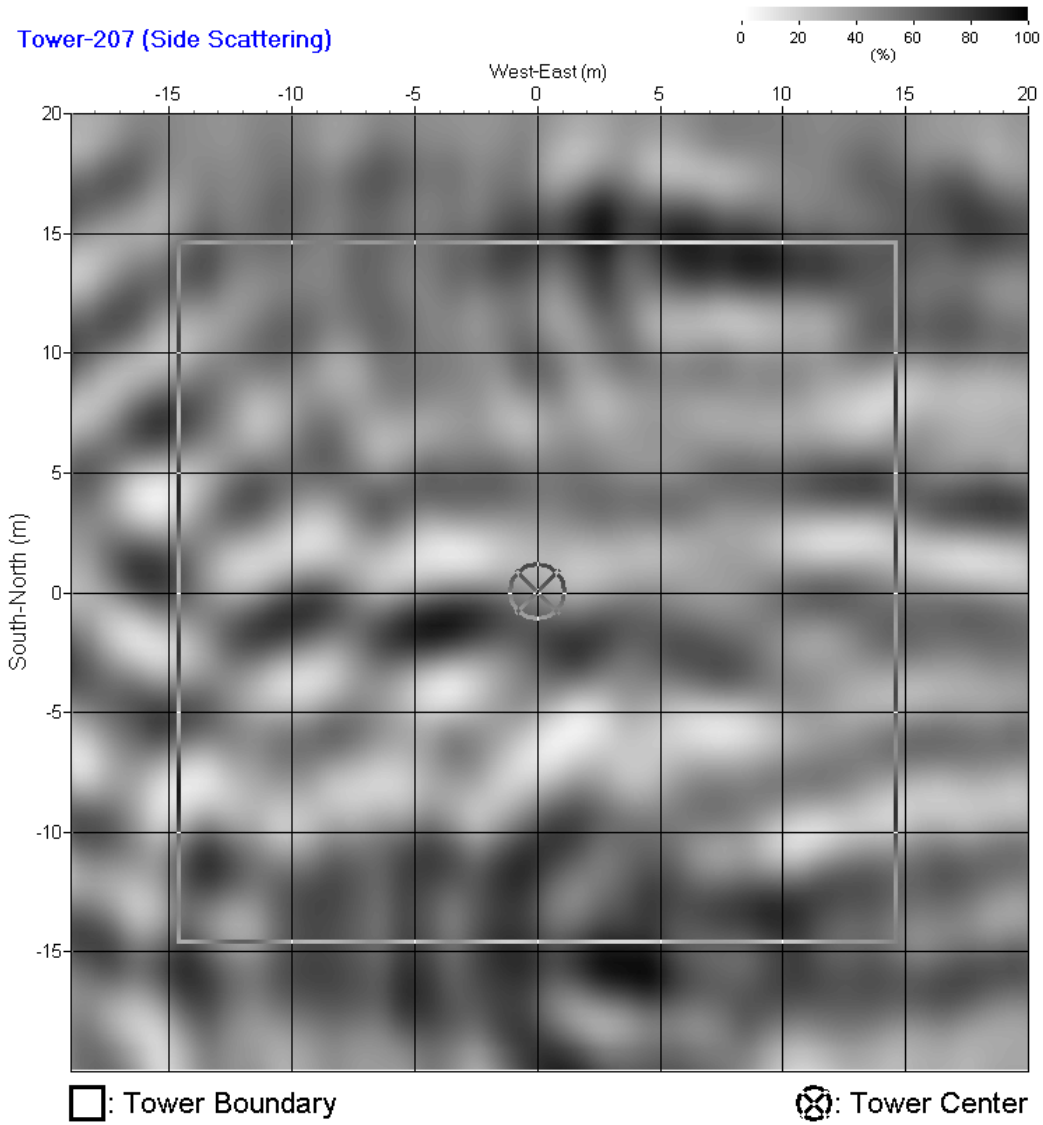

Tower-205 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-206**

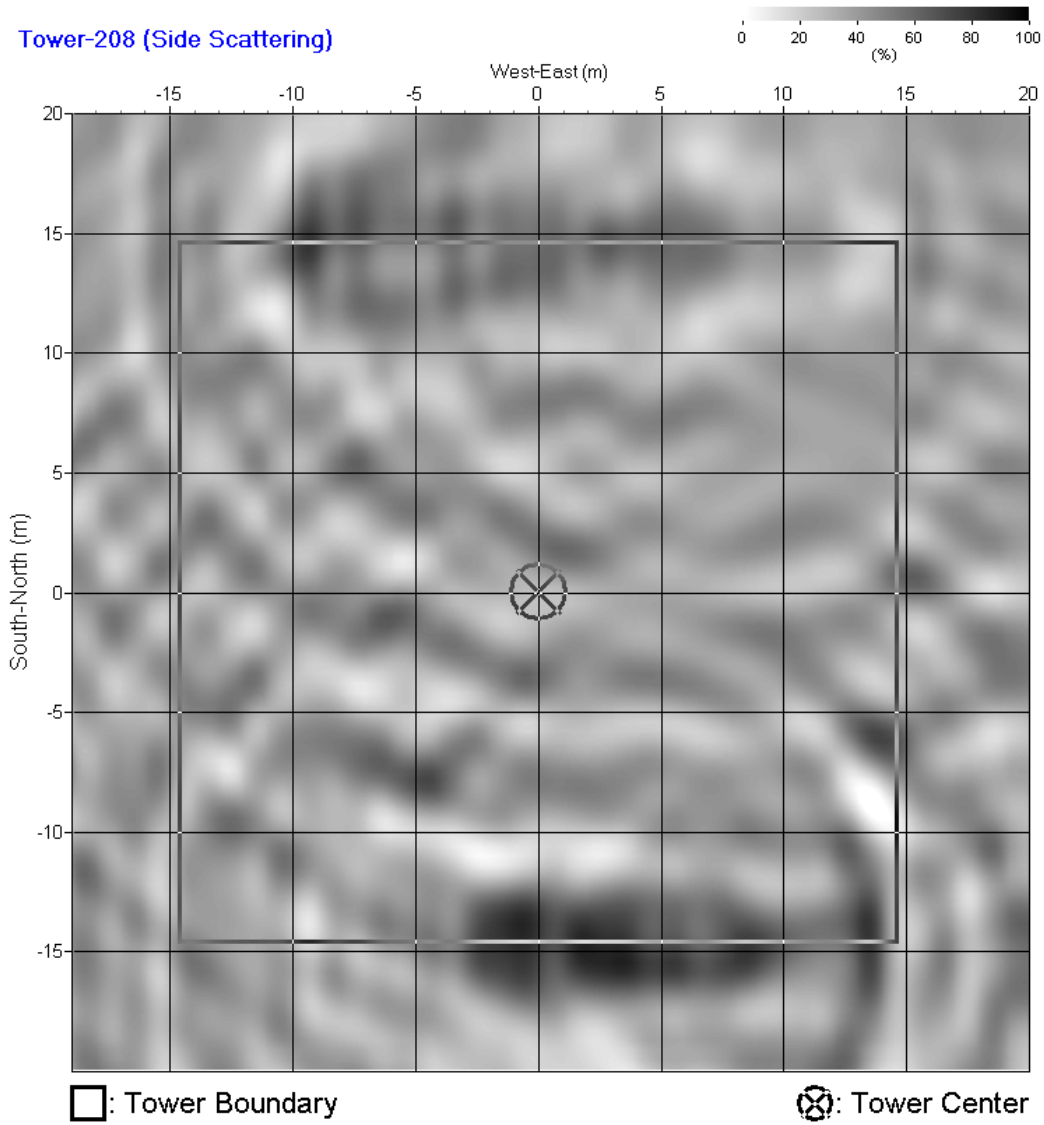


**Line 4 shifted to north by 6 stations (=24ft) from the planned position (12 stations south of tower center) due to terrain condition

T-207

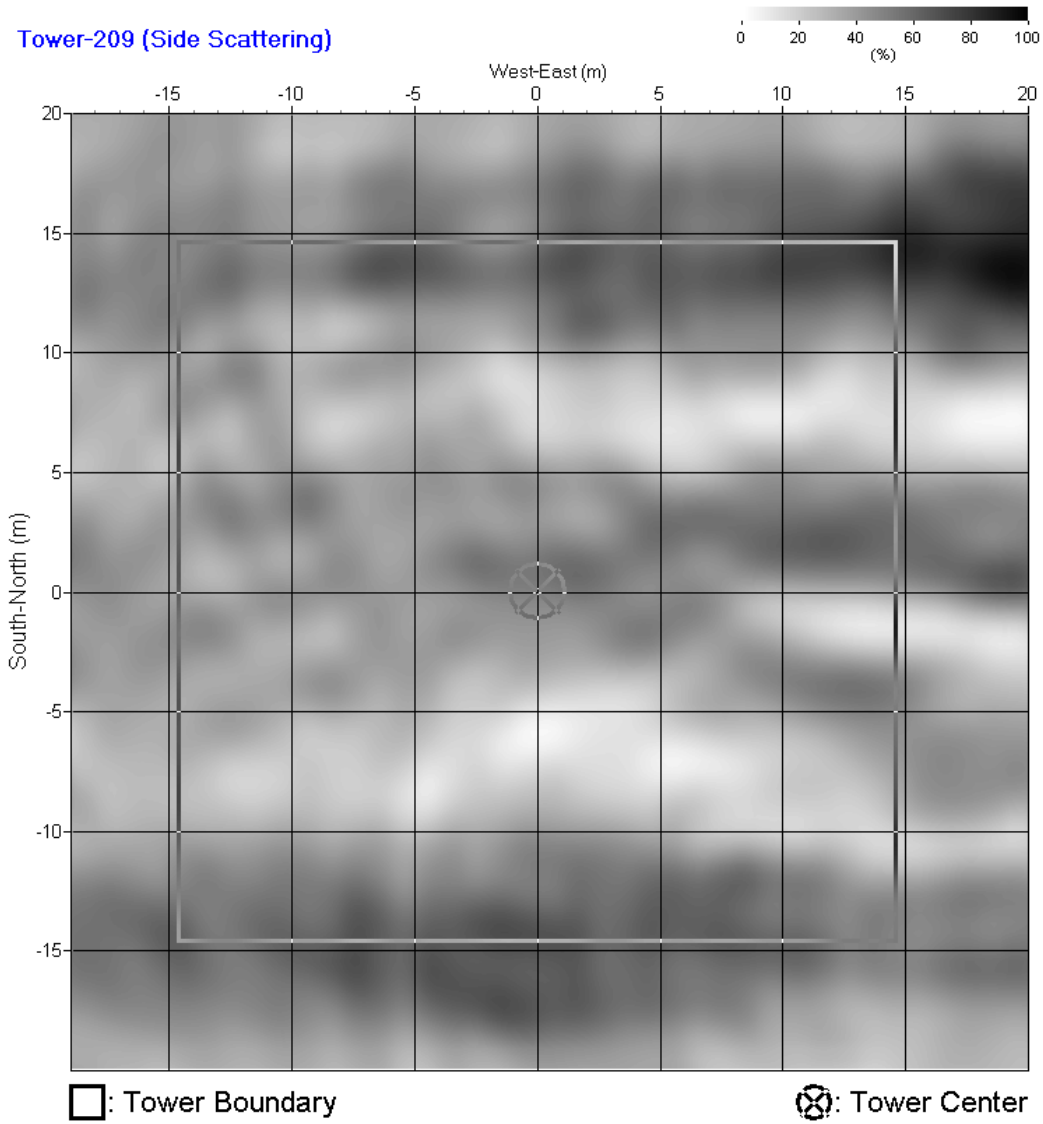

Tower-207 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-208**

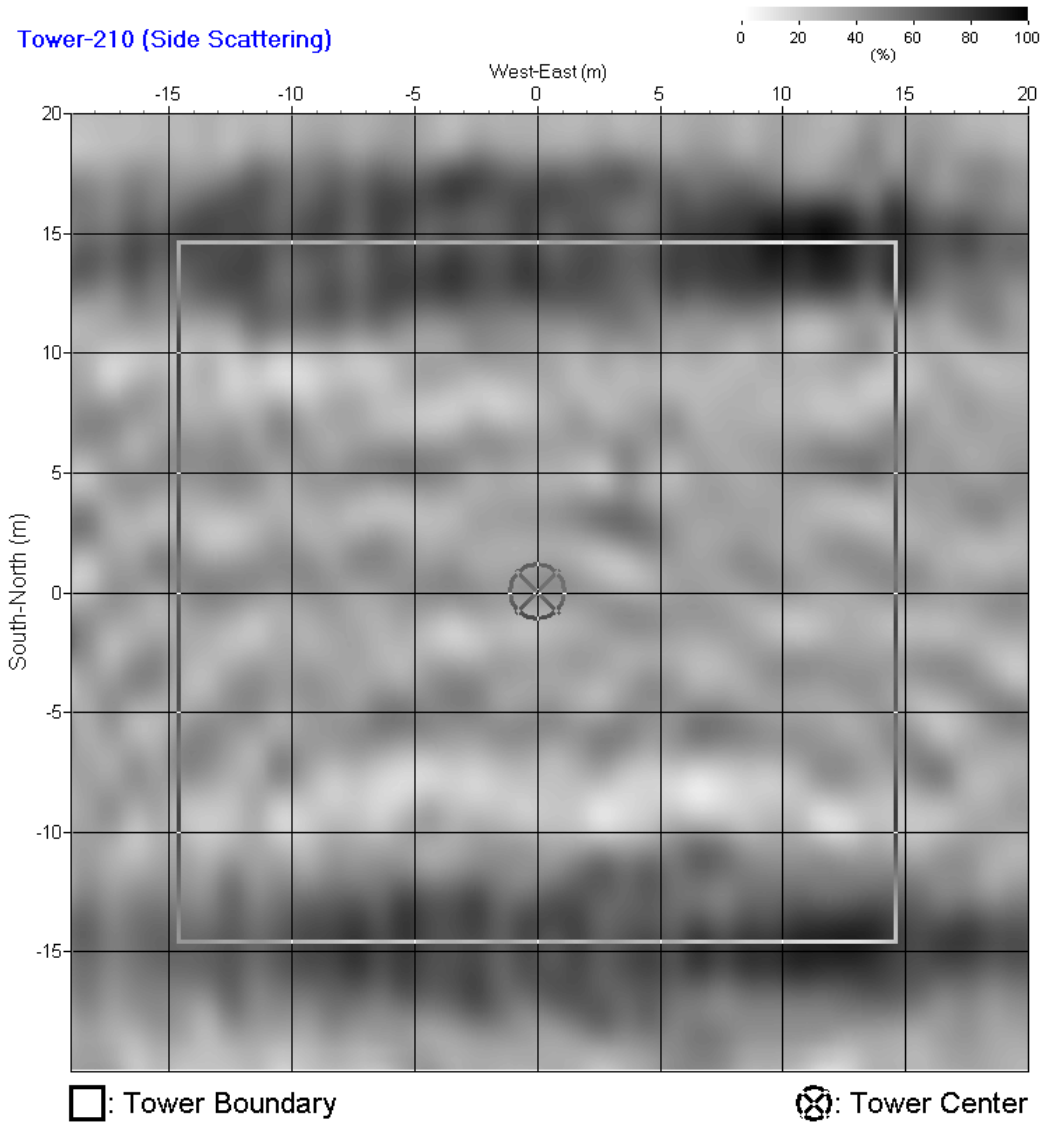


**Lines 2 and 4 used a shorter receiver spacing of 2 ft due to terrain condition (steep drop off).

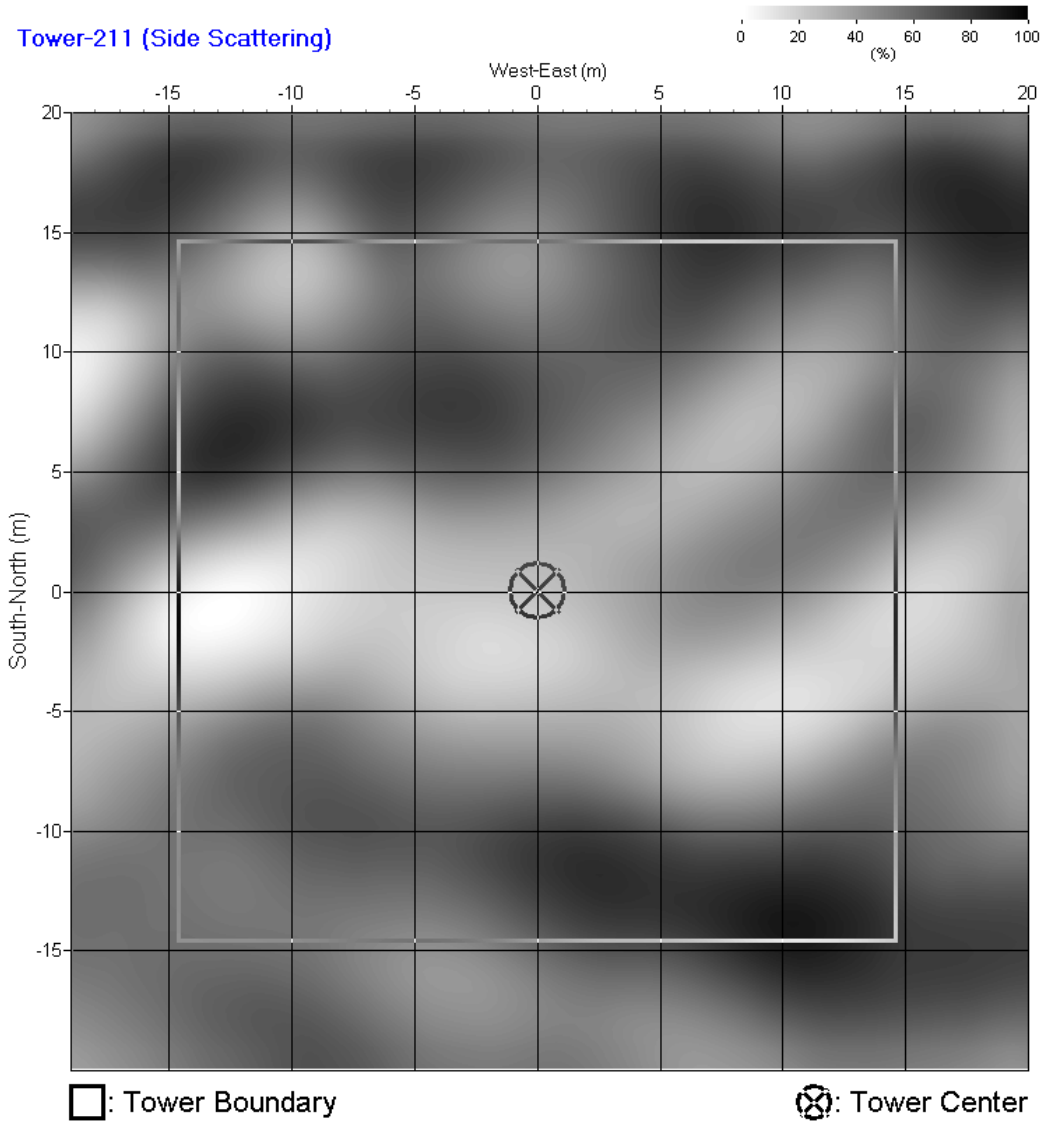
T-209


Tower-209 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

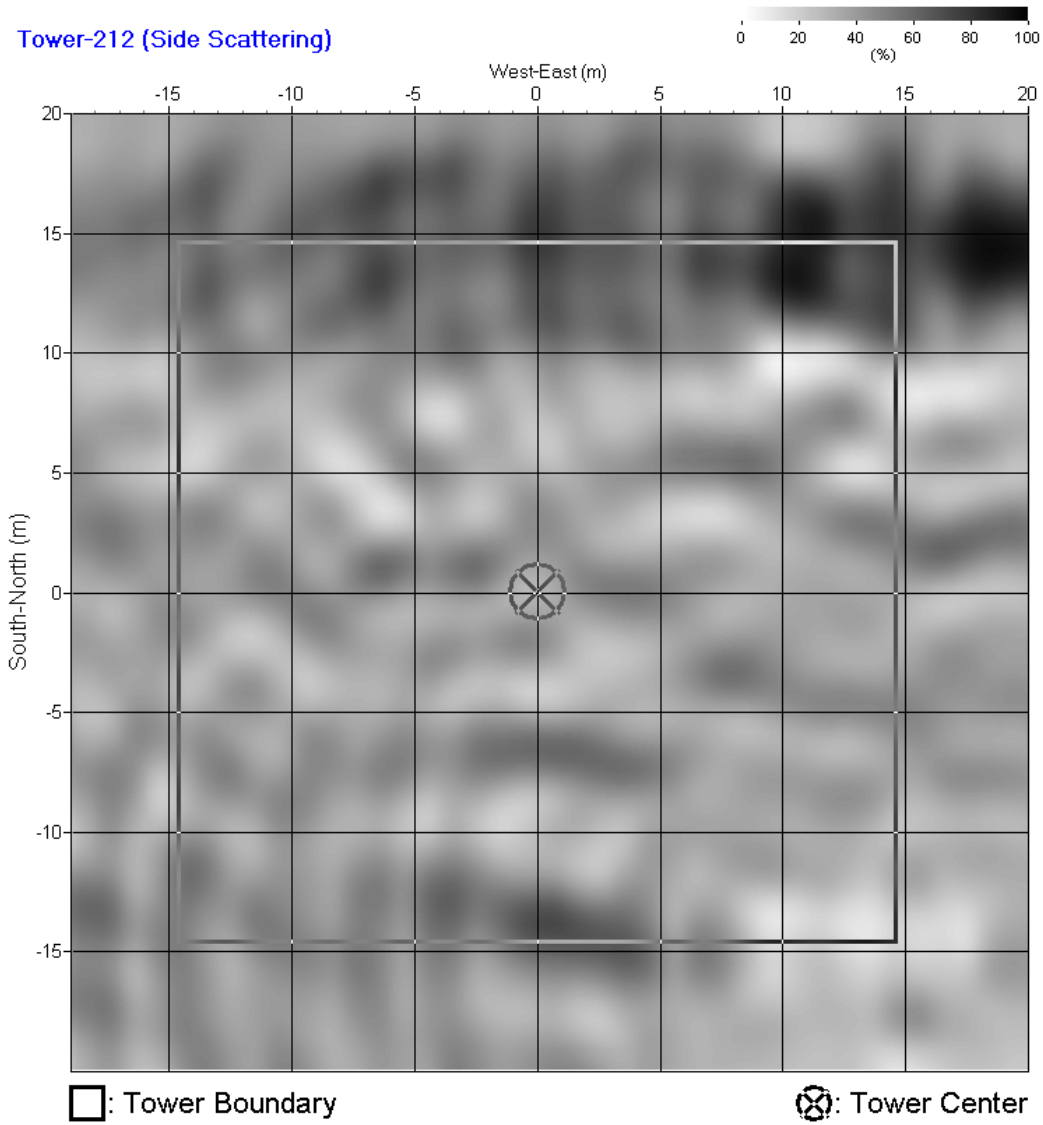
T-210


Tower-210 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

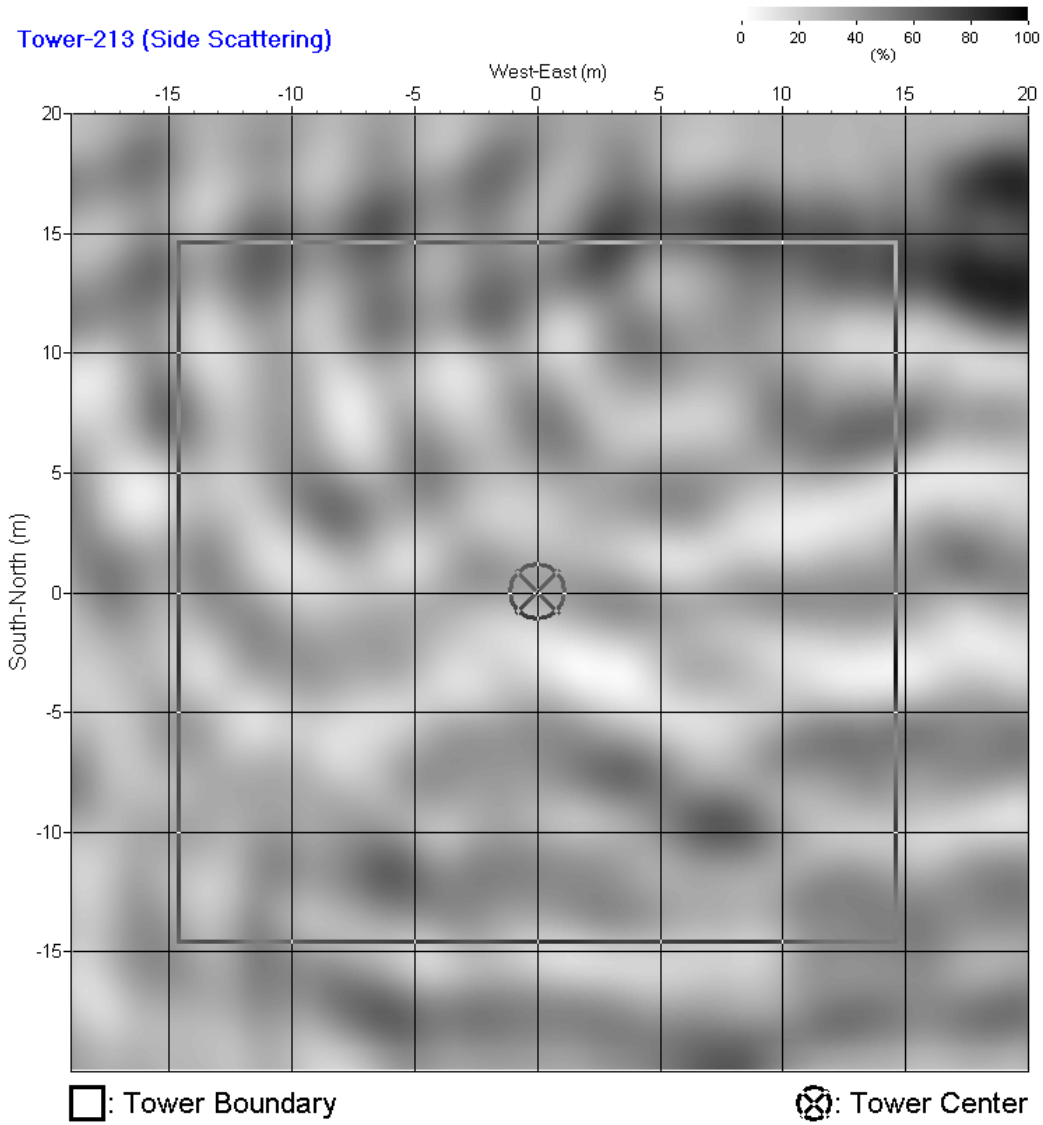
T-211


Tower-211 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

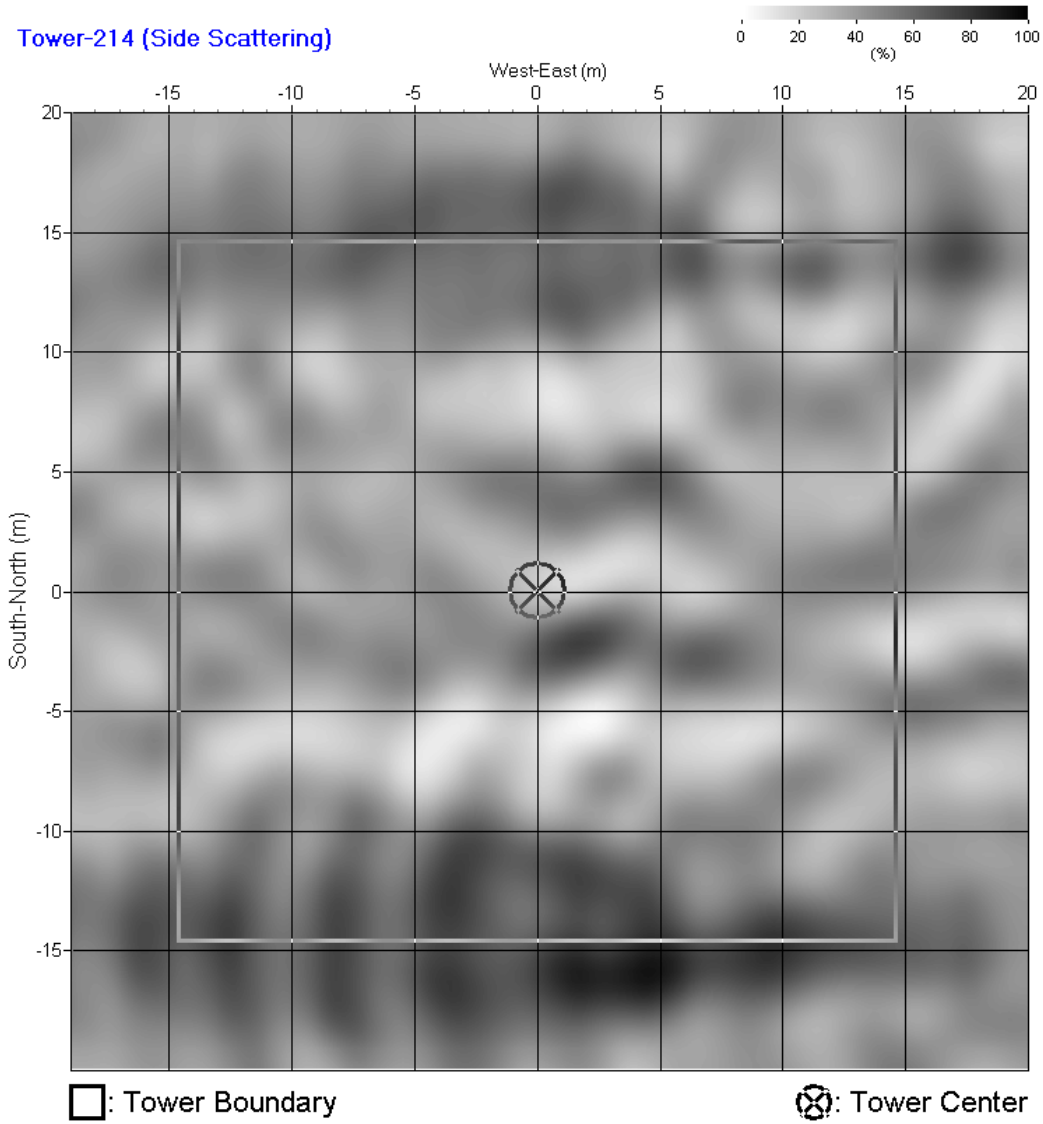
T-212


Tower-212 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

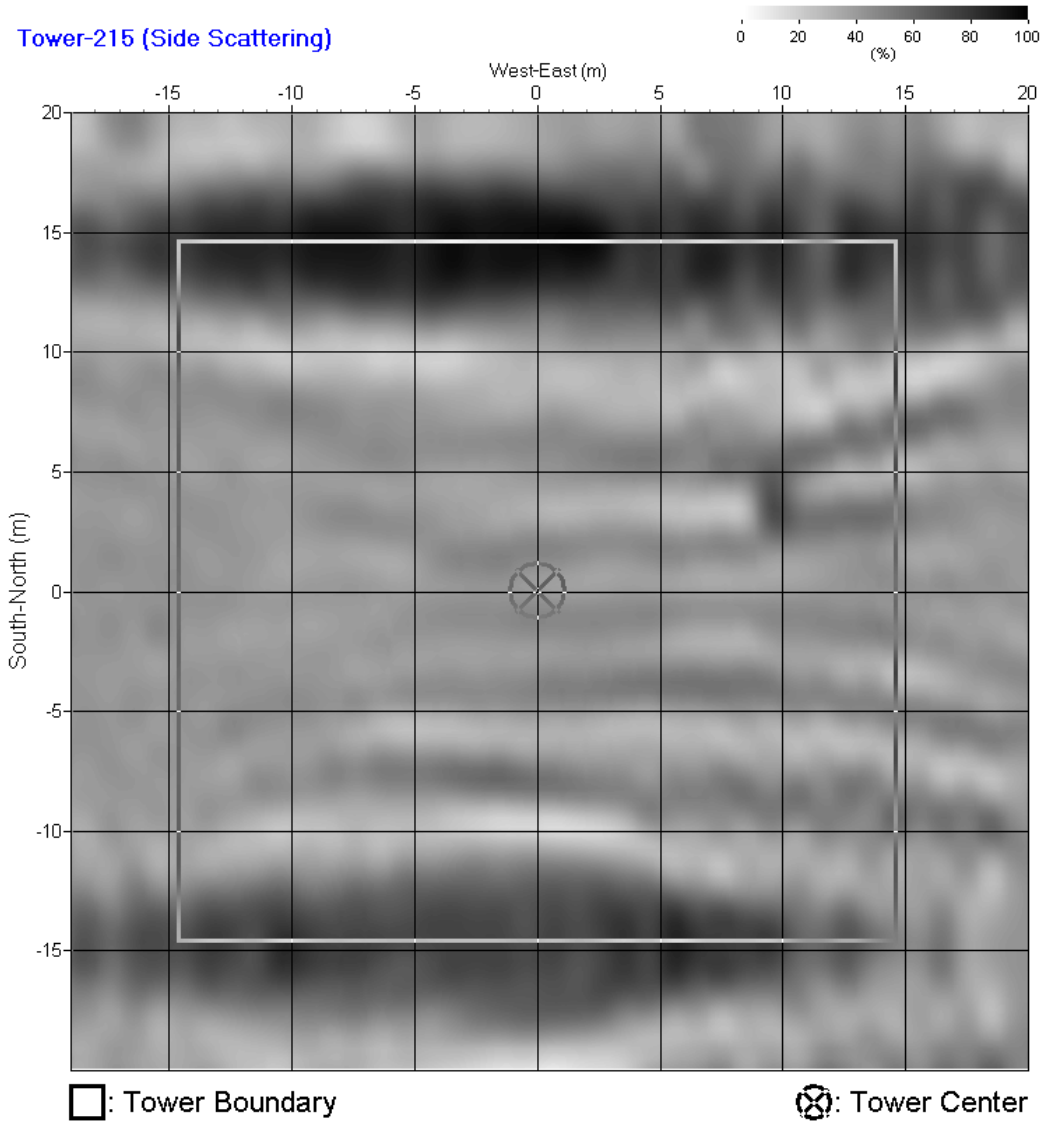
T-213


Tower-213 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

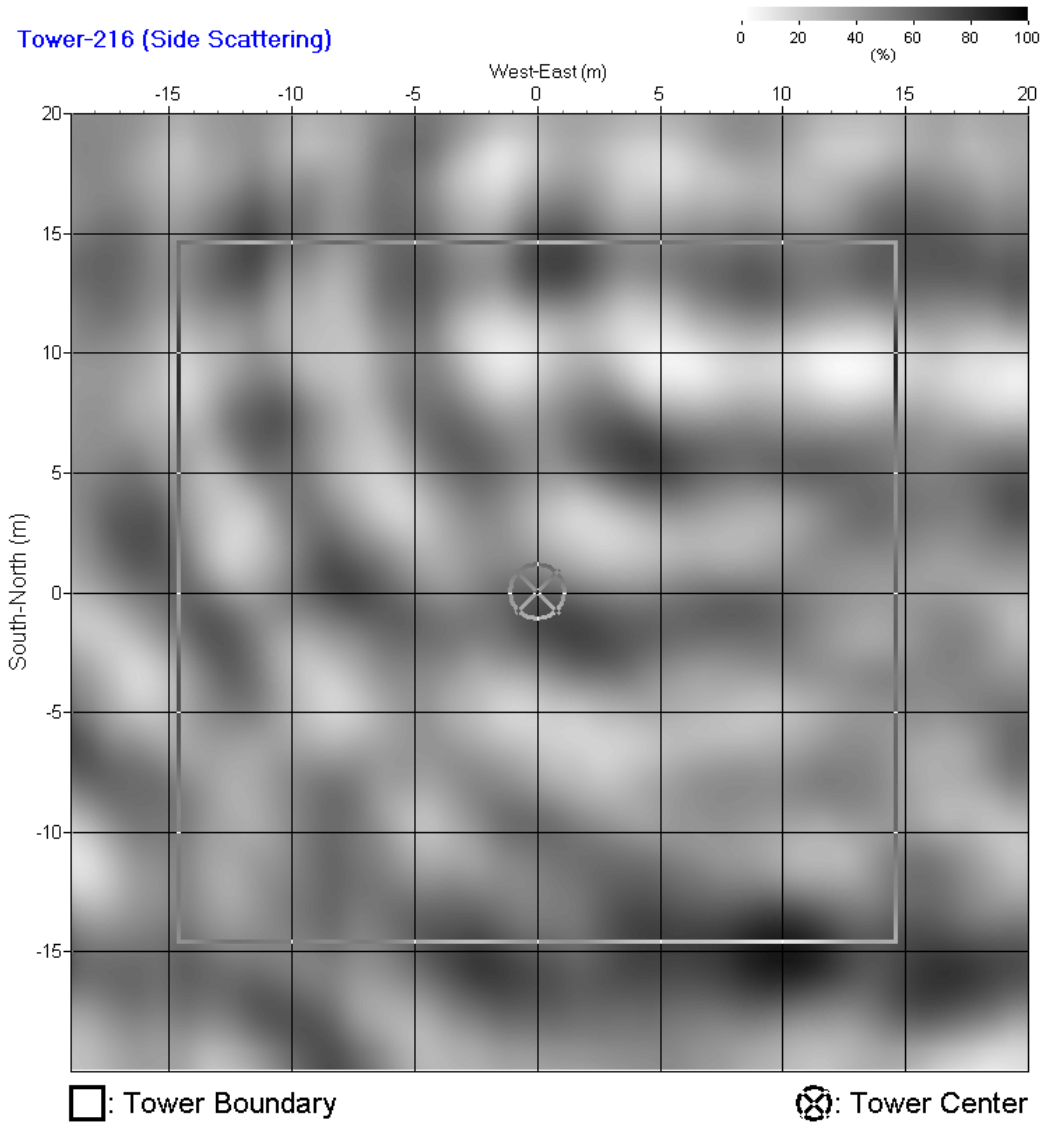
T-214


Tower-214 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

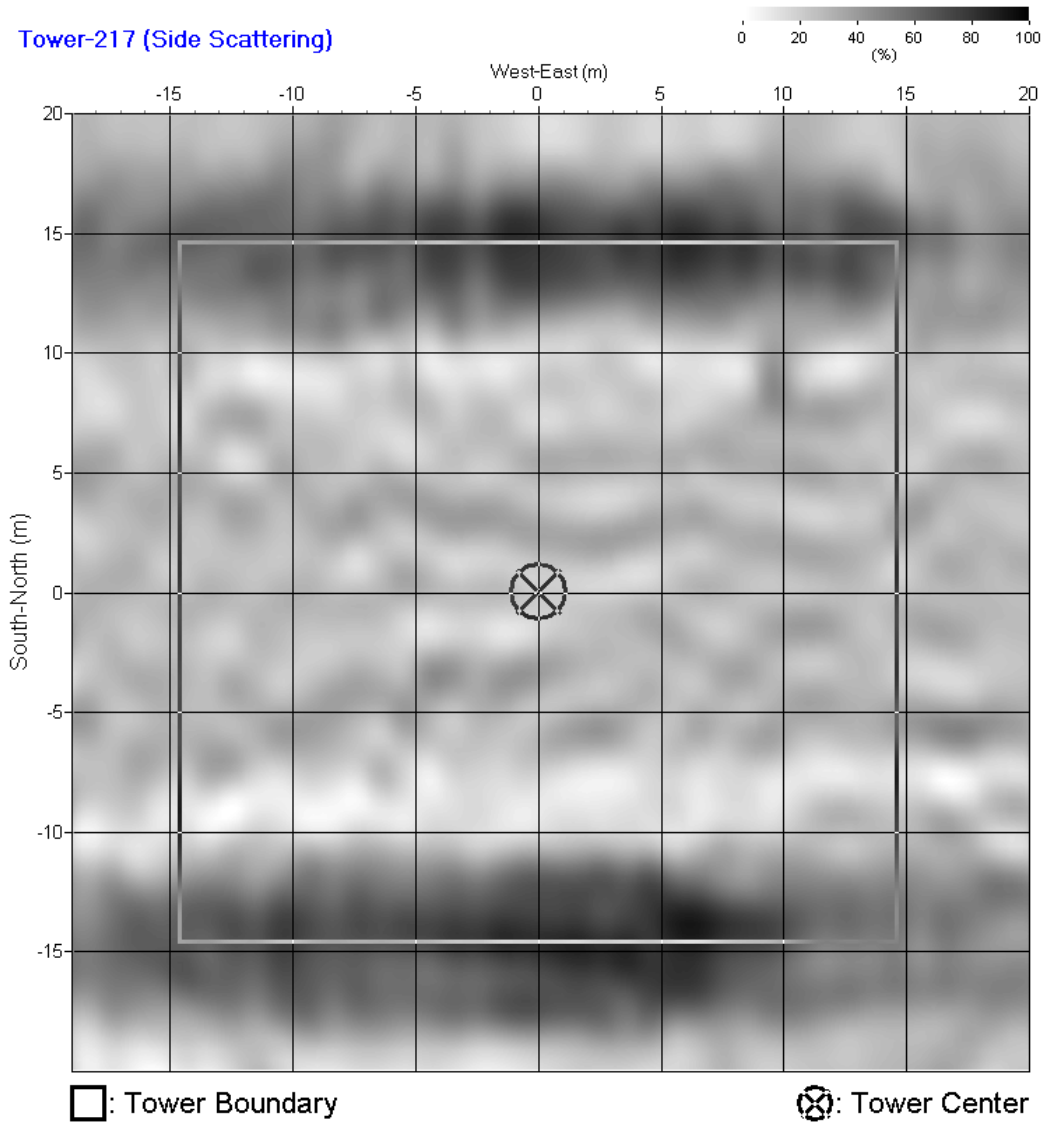
T-215


Tower-215 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

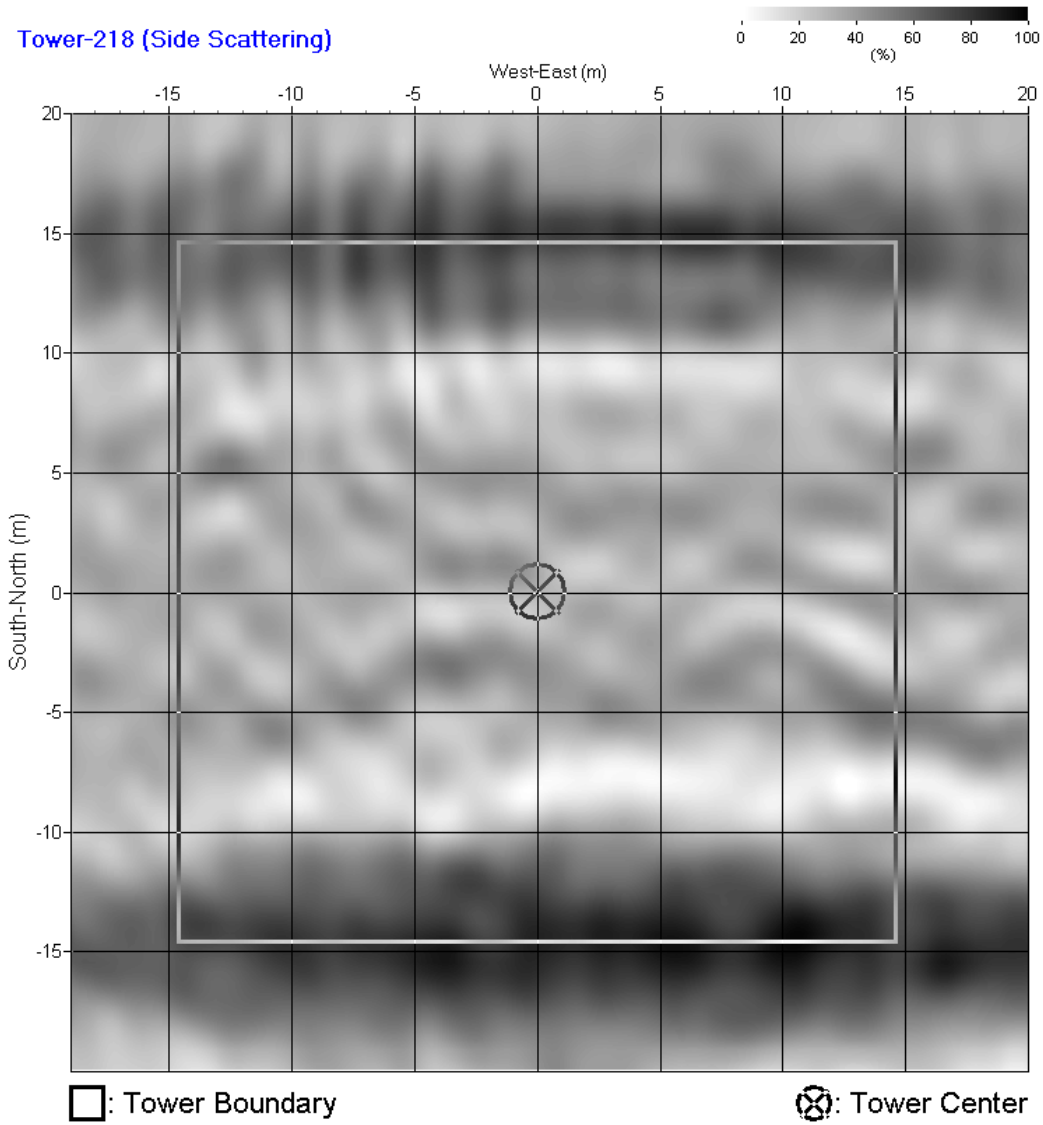
T-216


Tower-216 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

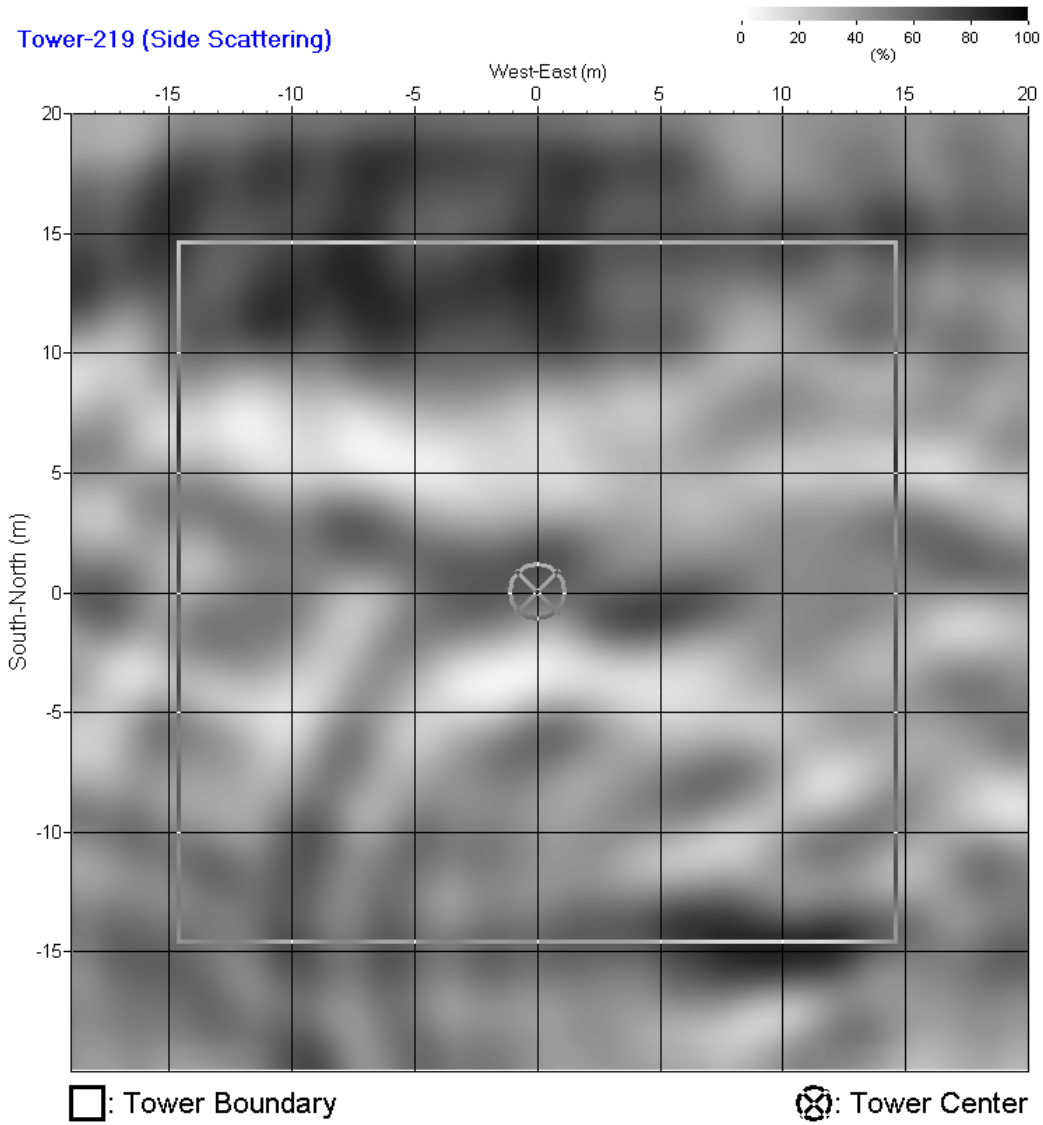
T-217


Tower-217 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

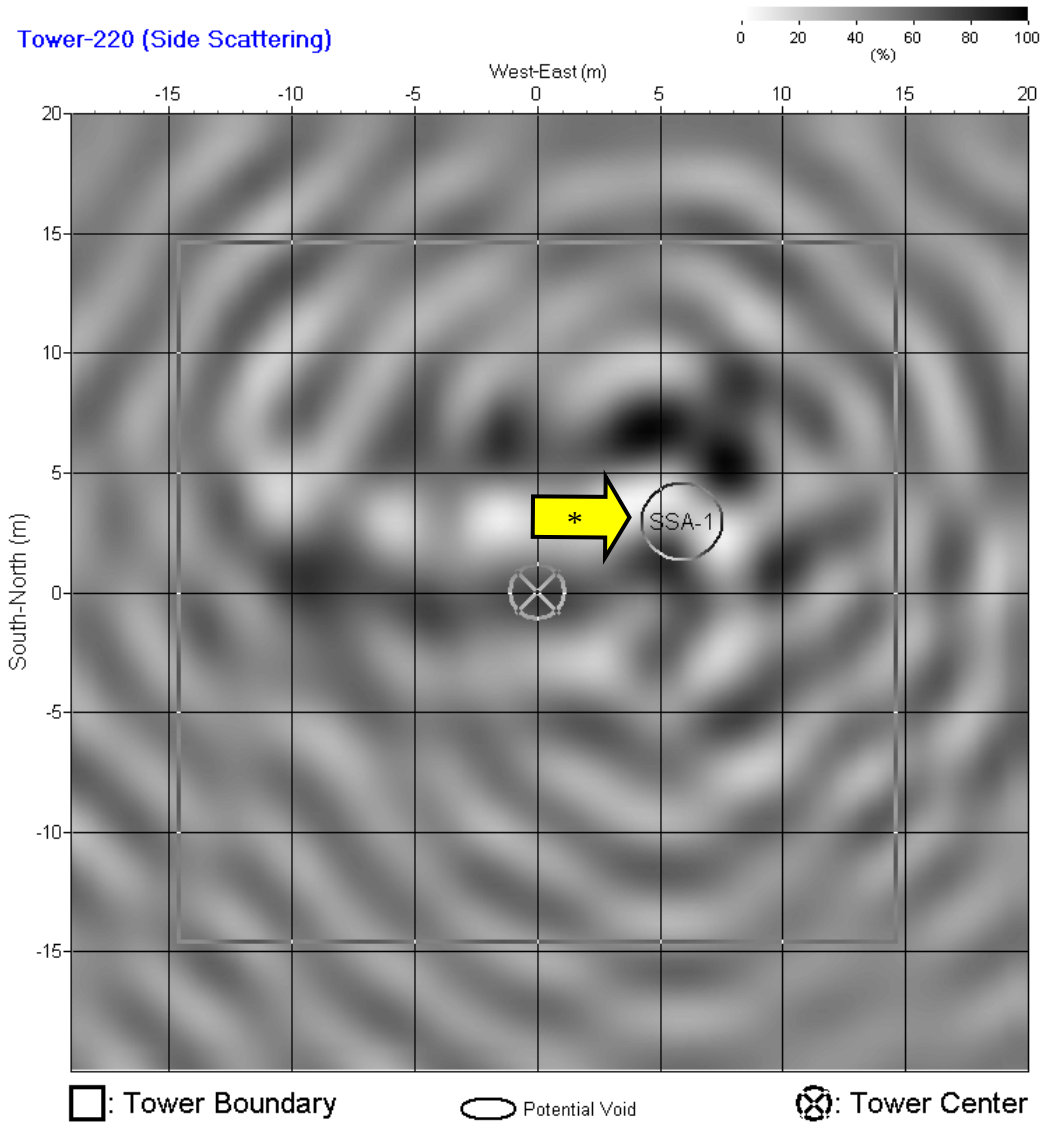
T-218


Tower-218 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-219

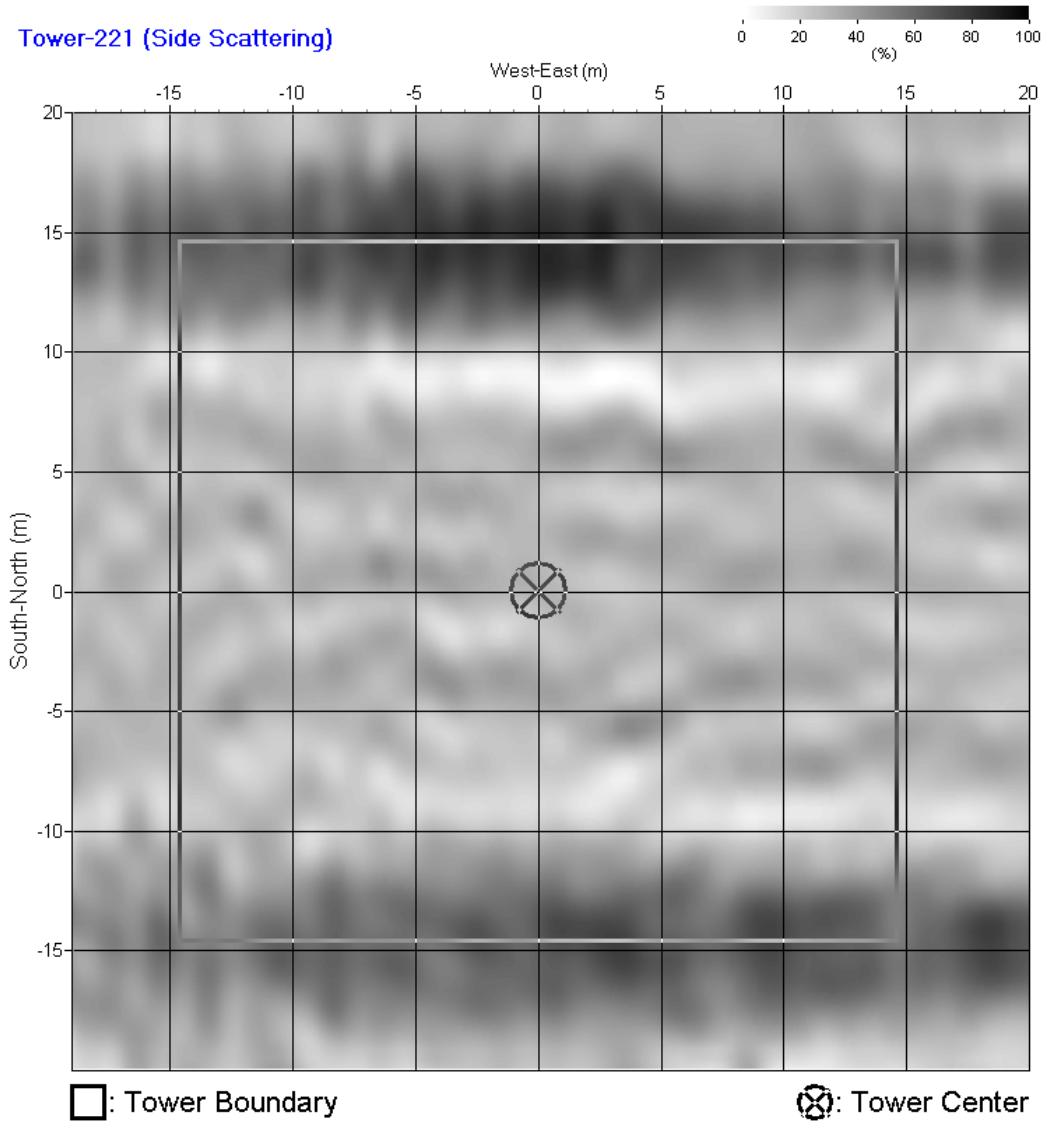

Tower-219 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-220**

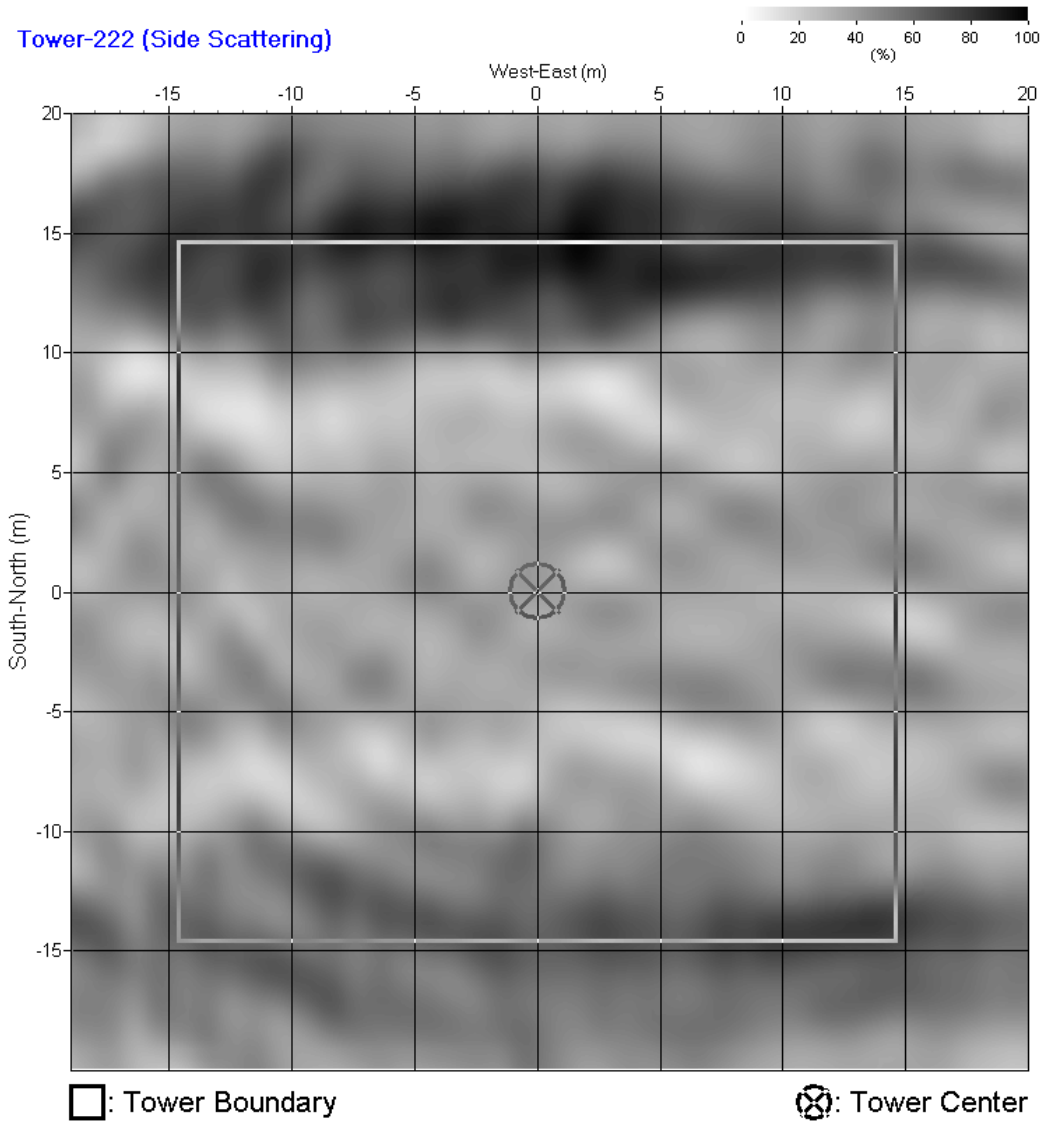


**SSA applied to lines 2 and 3. Line 4 was not acquired due to terrain condition. * Potential void (see separate text file for coordinates)

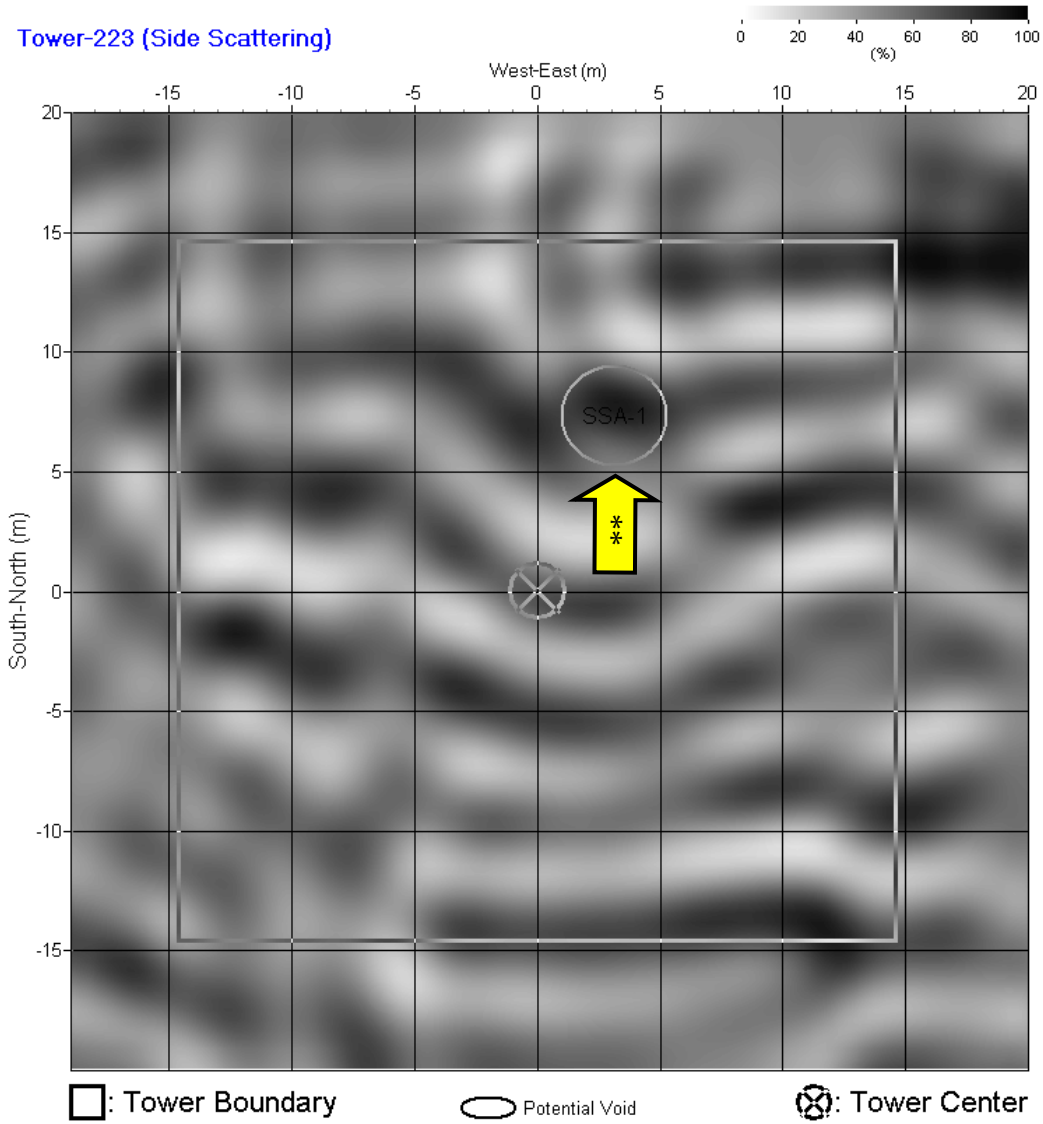
T-221


Tower-221 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-222

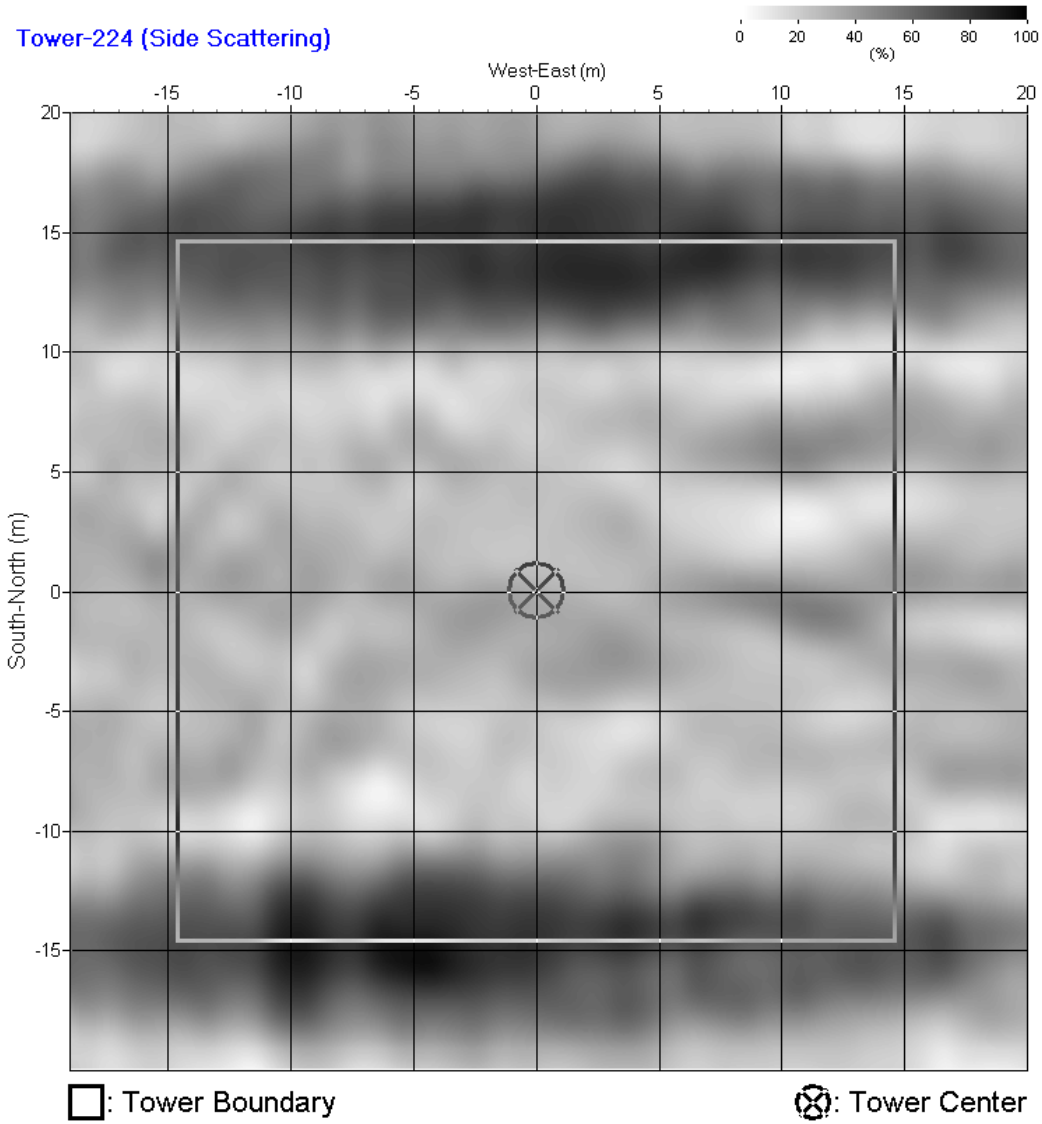

Tower-222 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-223

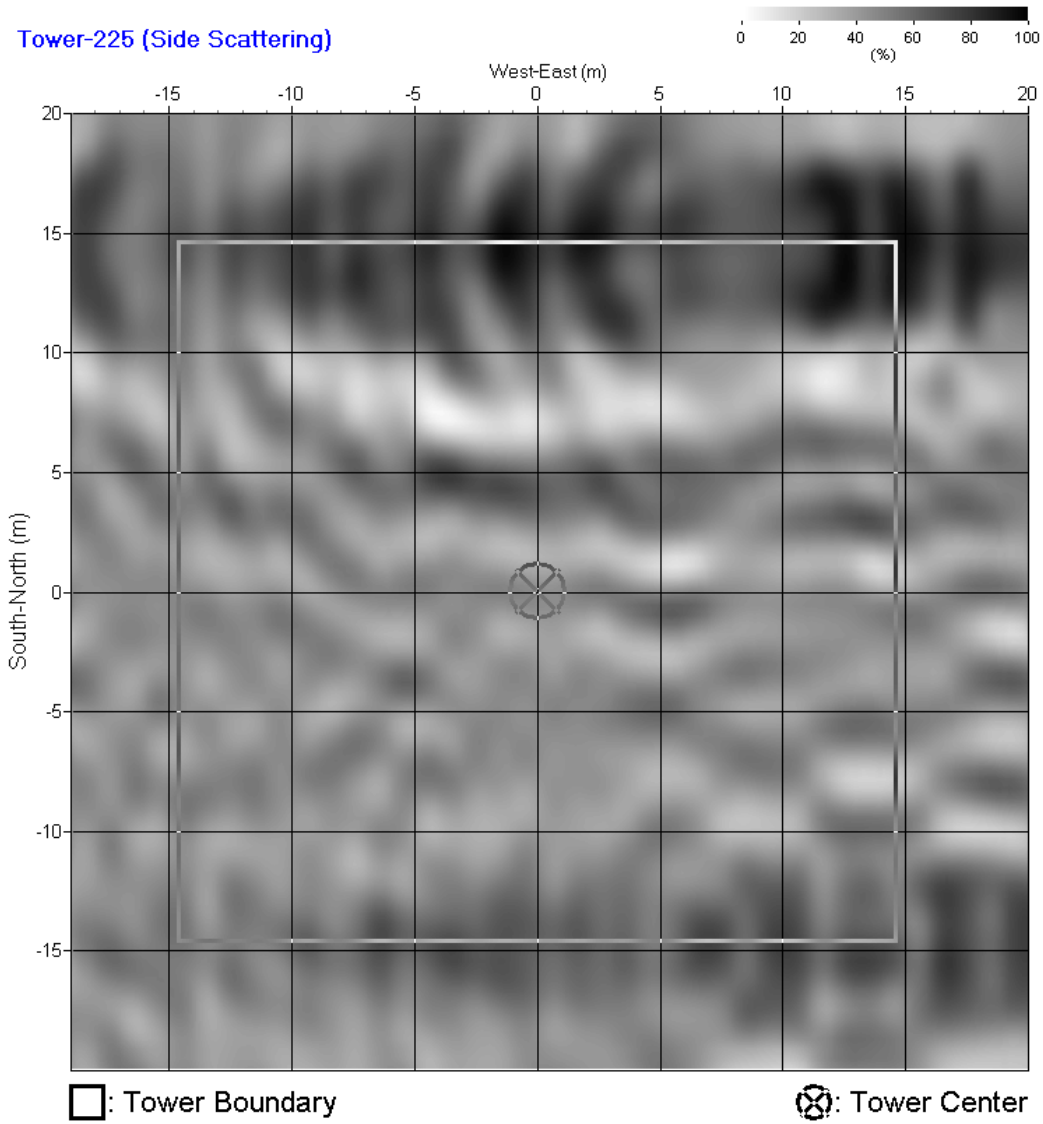


**Potential void (see separate text file for coordinates)

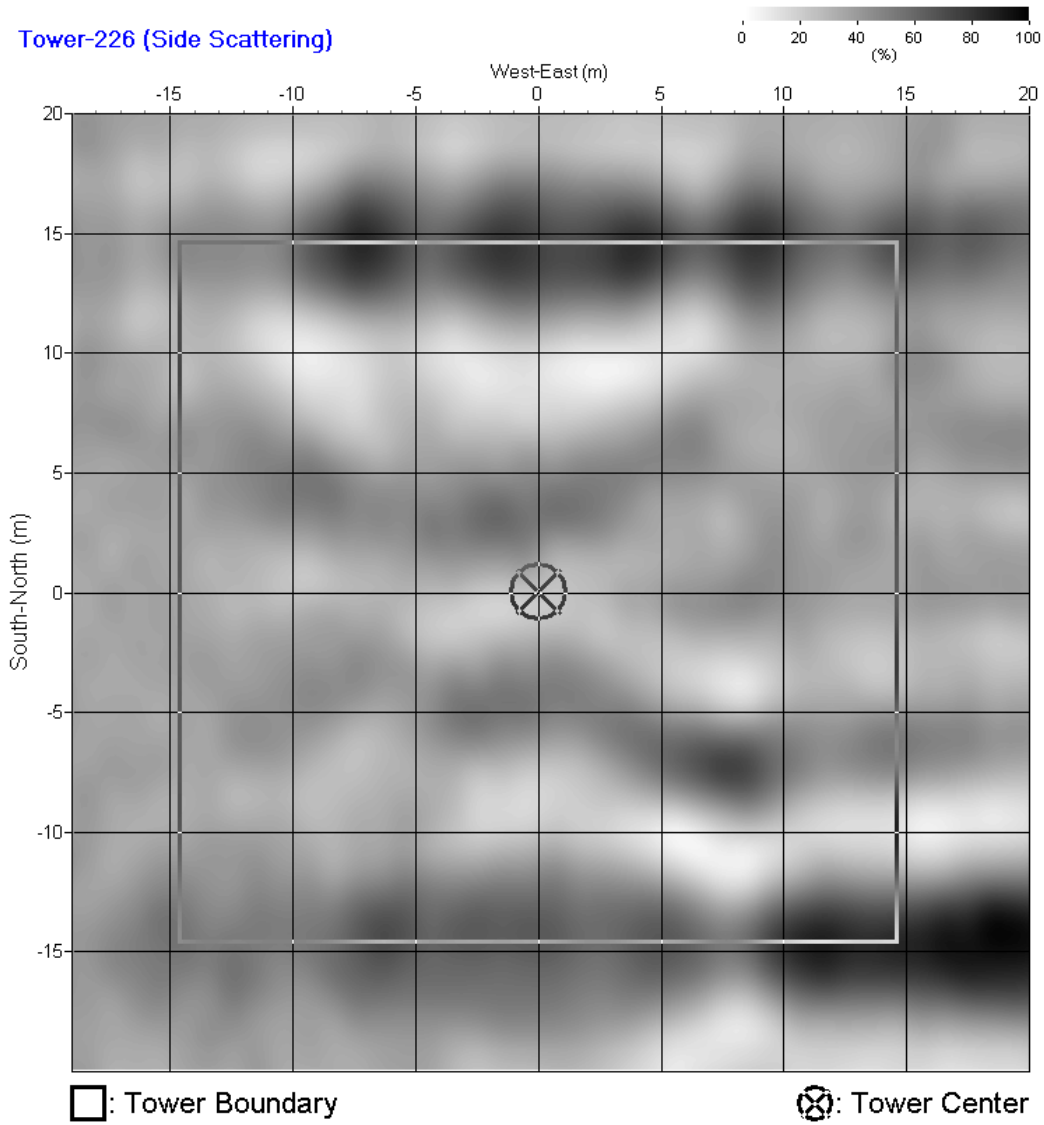
T-224


Tower-224 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

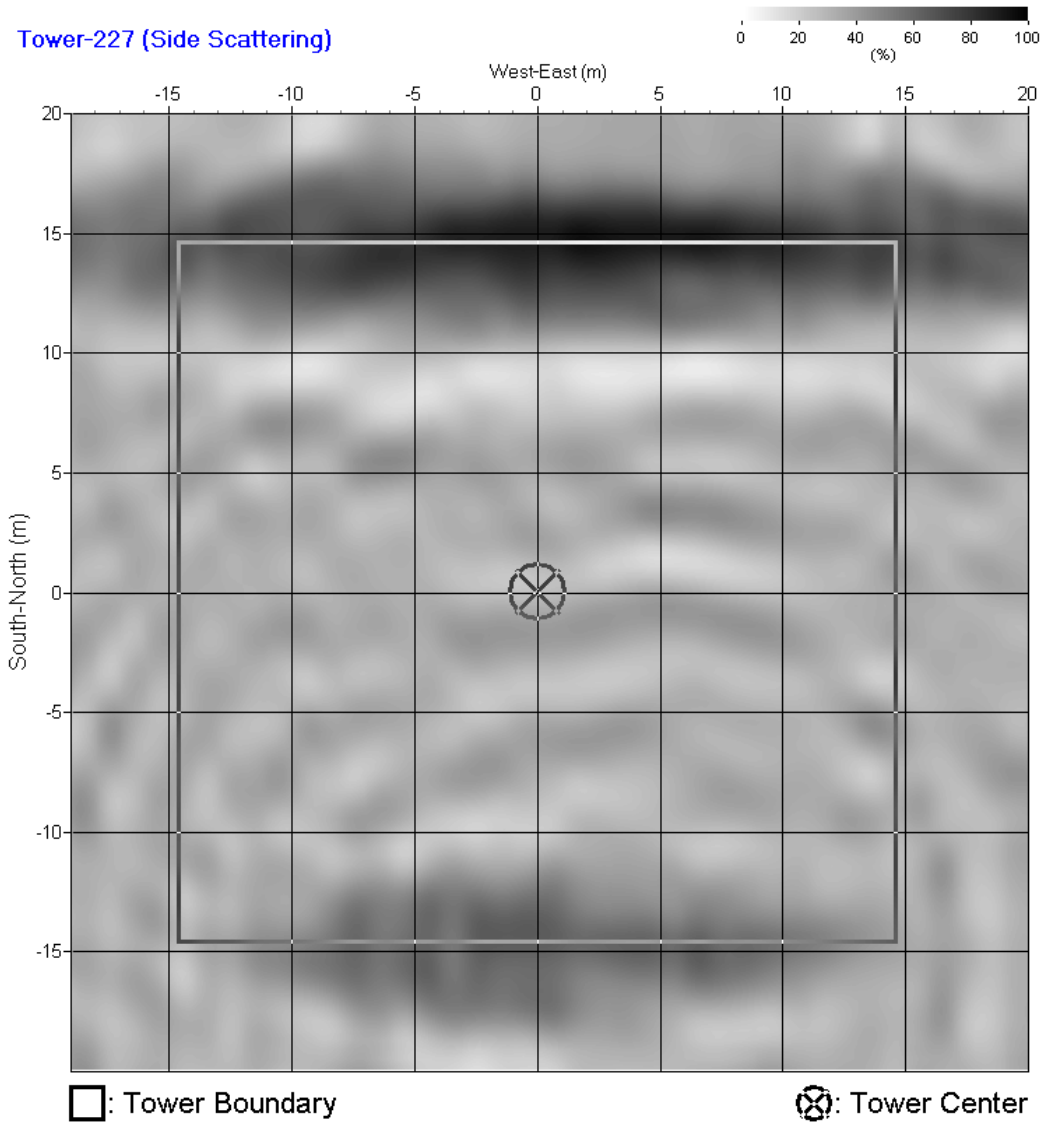
T-225


Tower-225 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-226

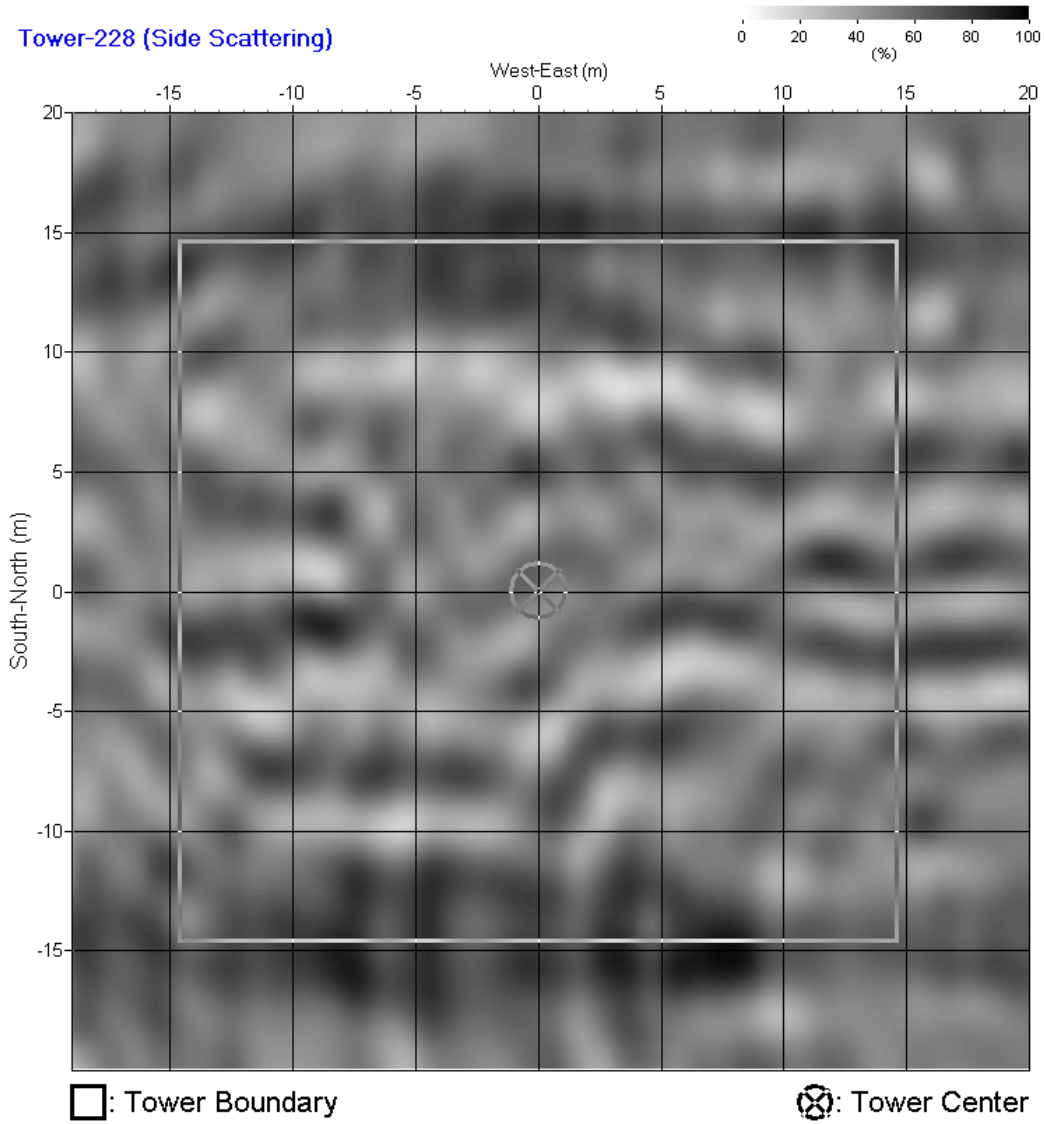

Tower-226 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-227**

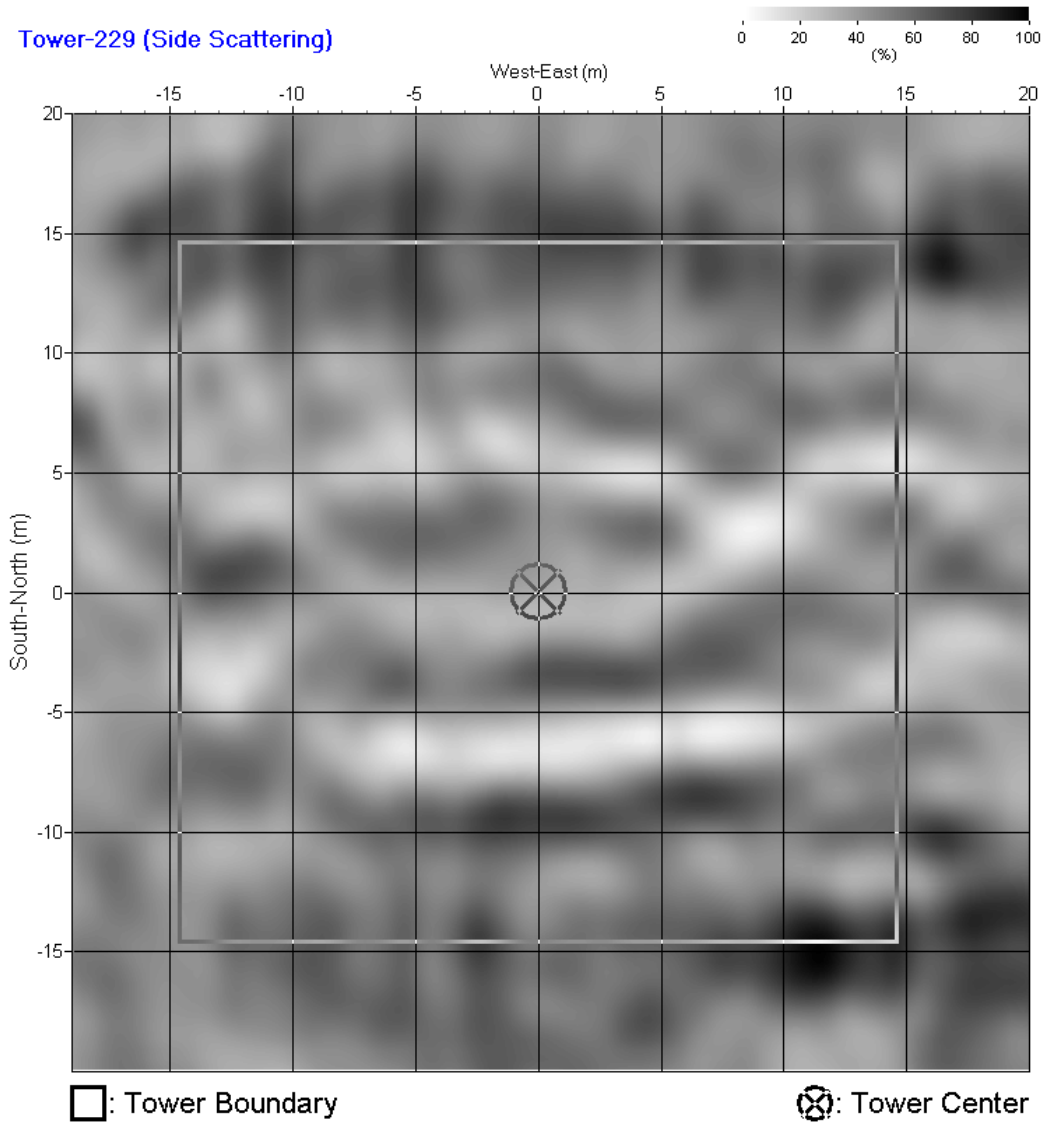


**A shorter receiver spacing of 2 ft was used for line 4 due to terrain condition (steep drop off).

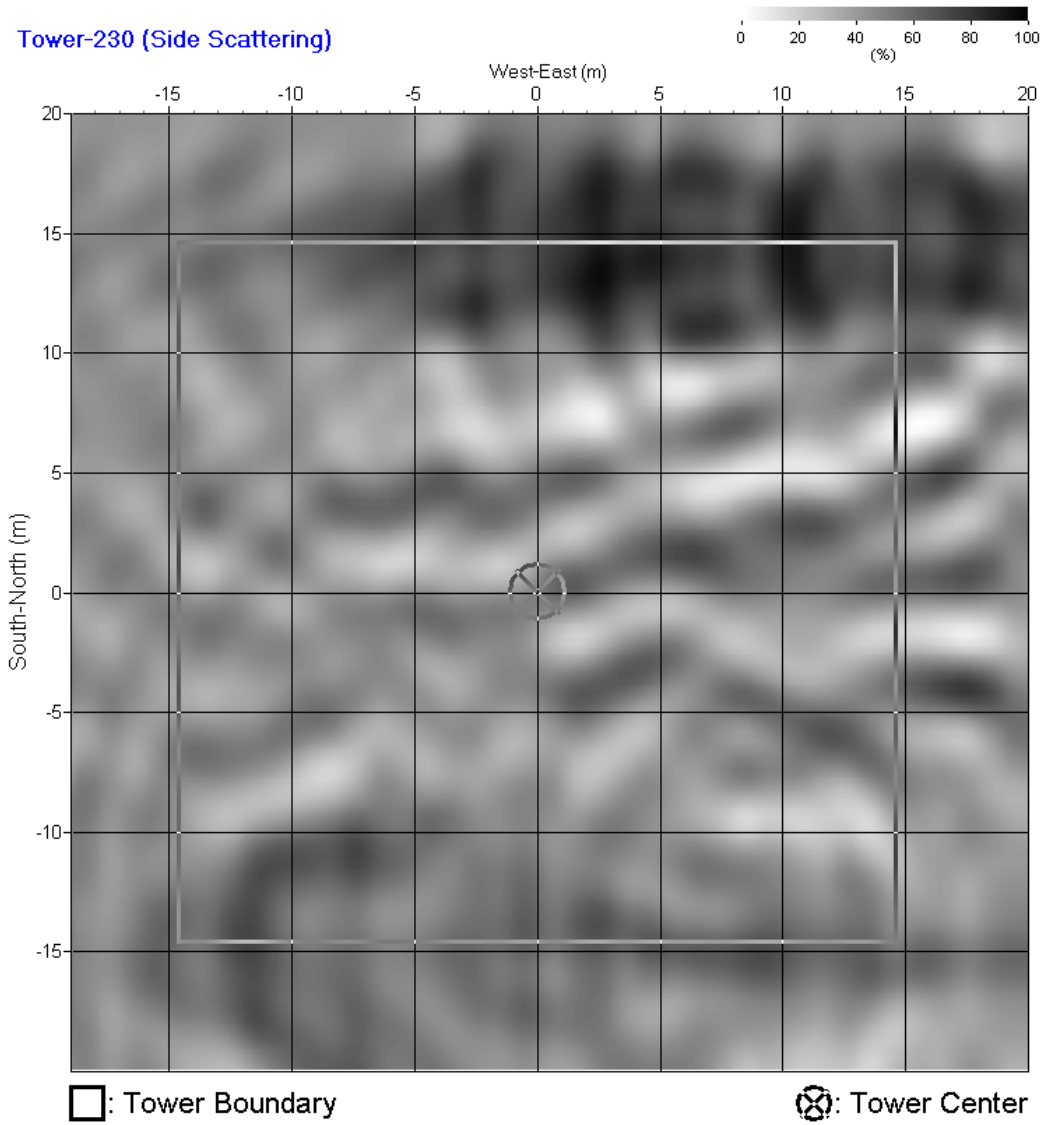
T-228


Tower-228 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

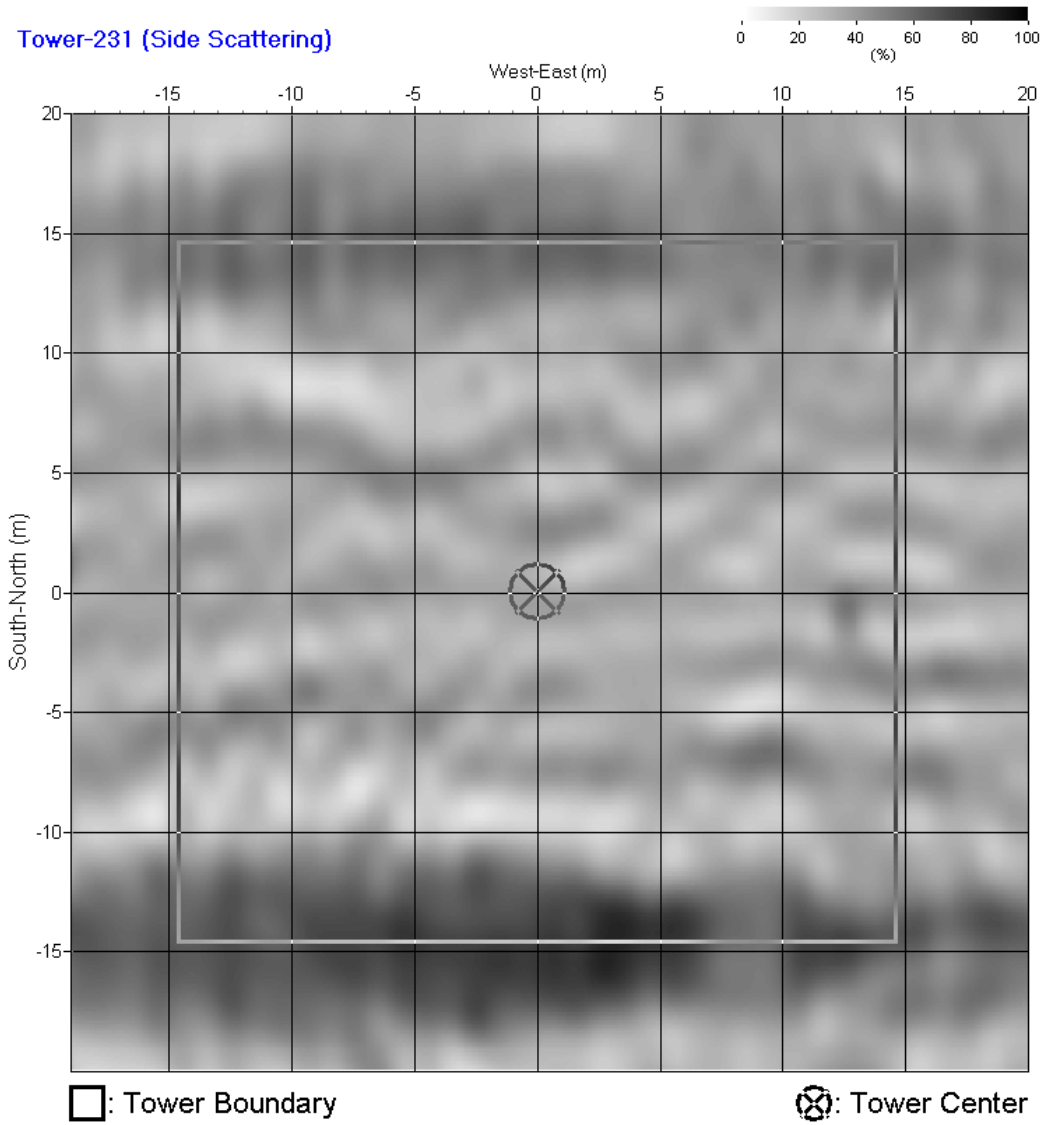
T-229


Tower-229 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

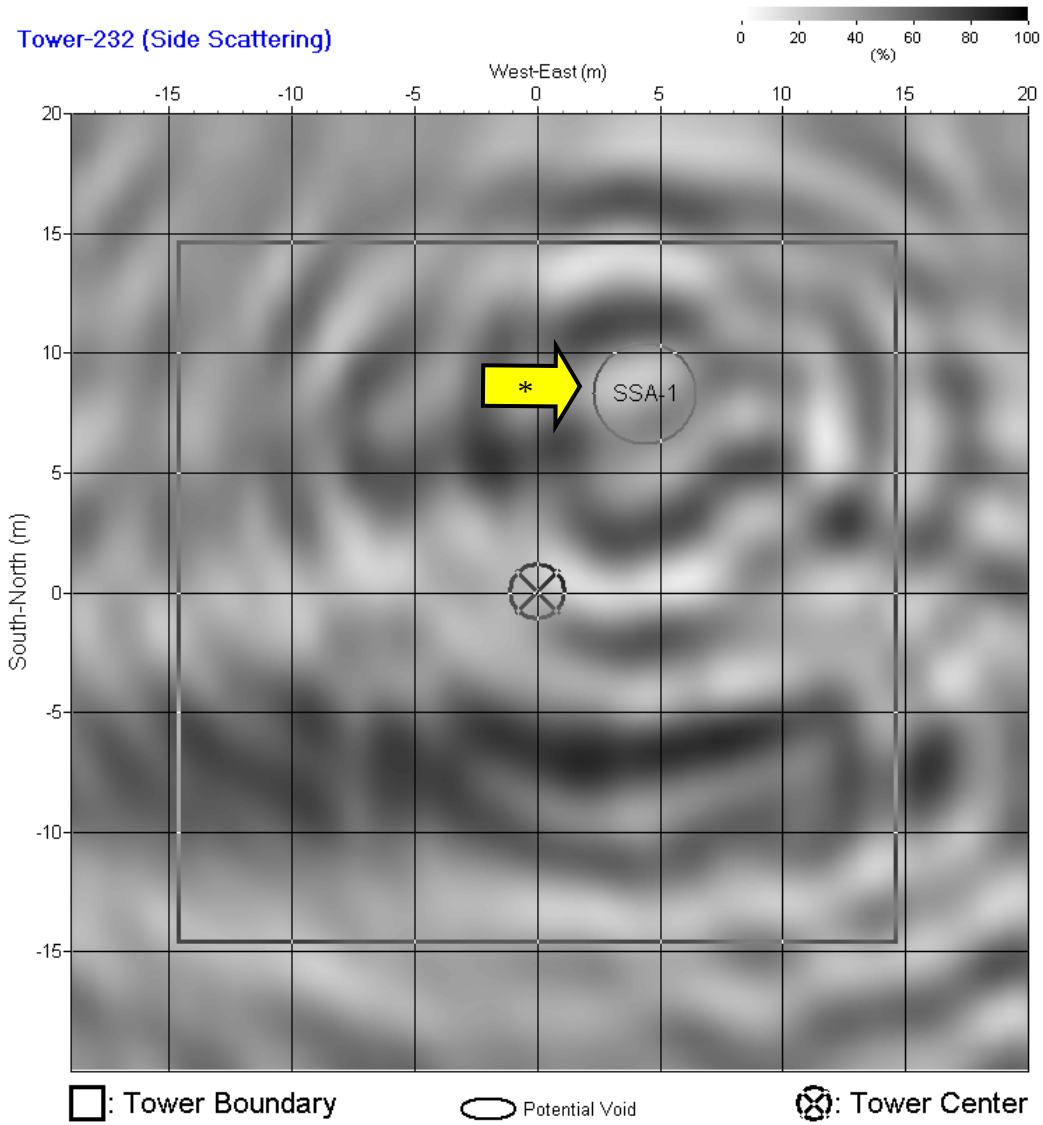
T-230


Tower-230 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-231

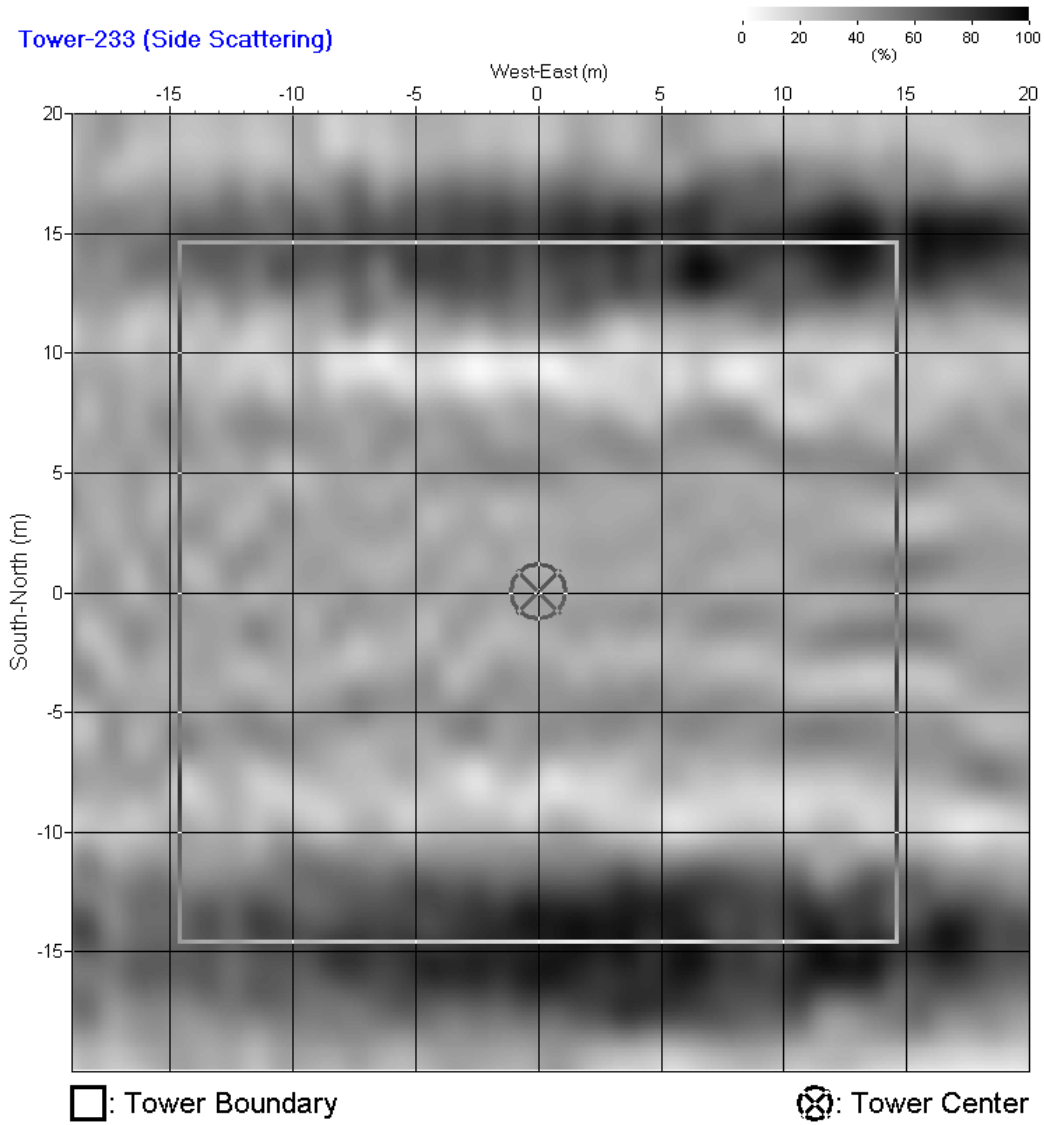

Tower-231 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-232**

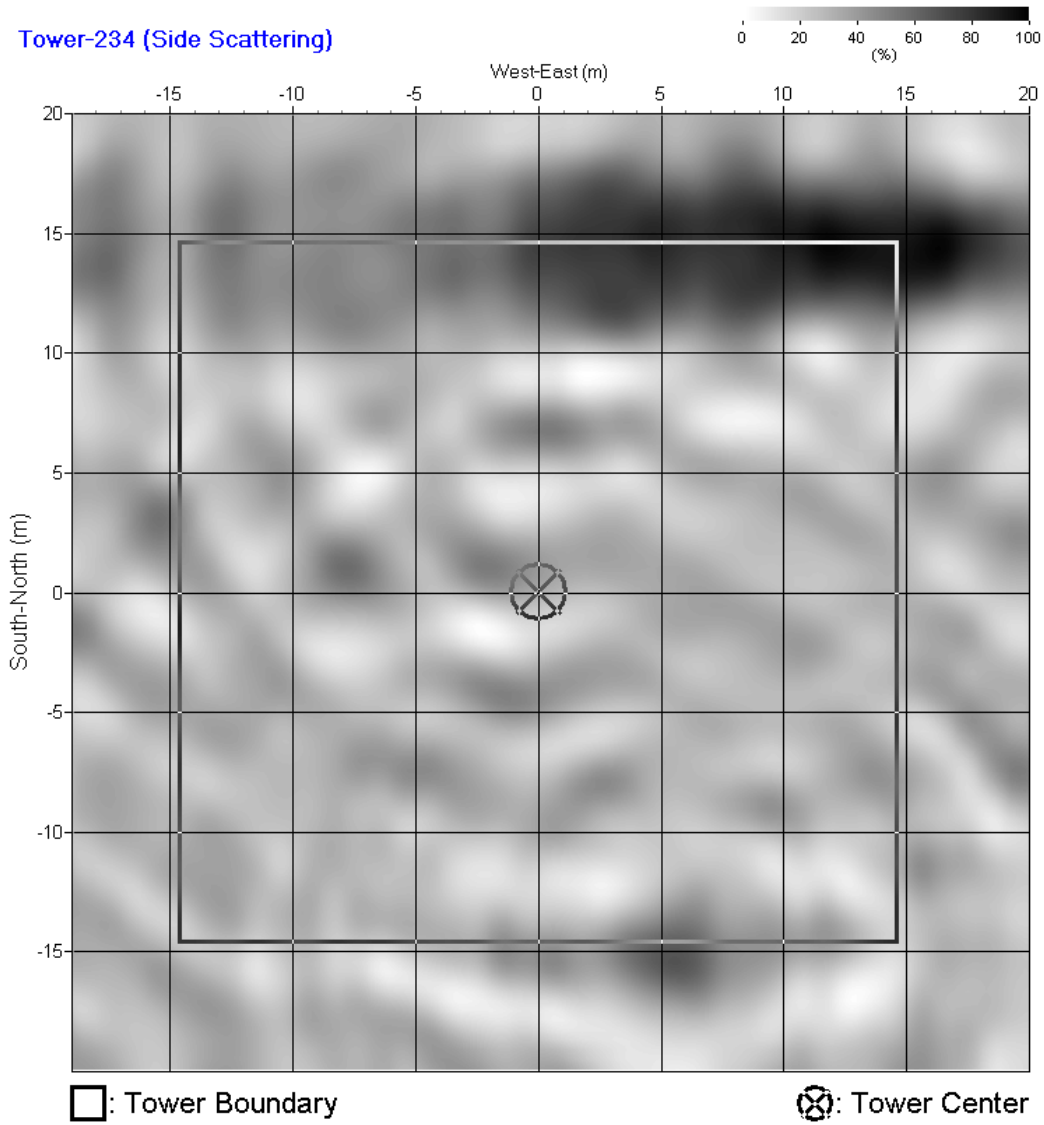


**A shorter receiver spacing of 2 ft was used for lines 1-3 due to terrain condition. * Potential void (see separate text file for coordinates)

T-233

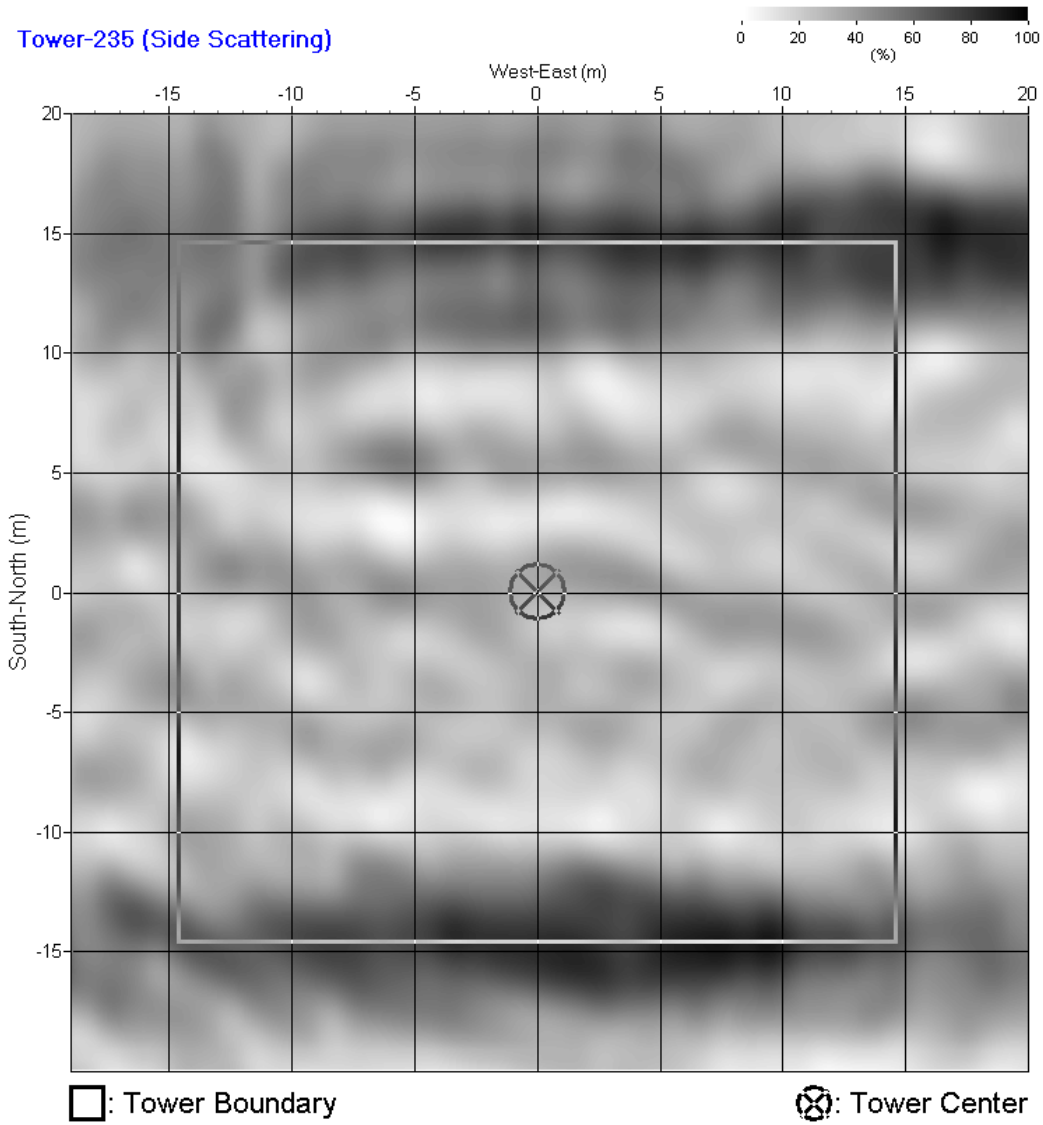

Tower-233 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-234**

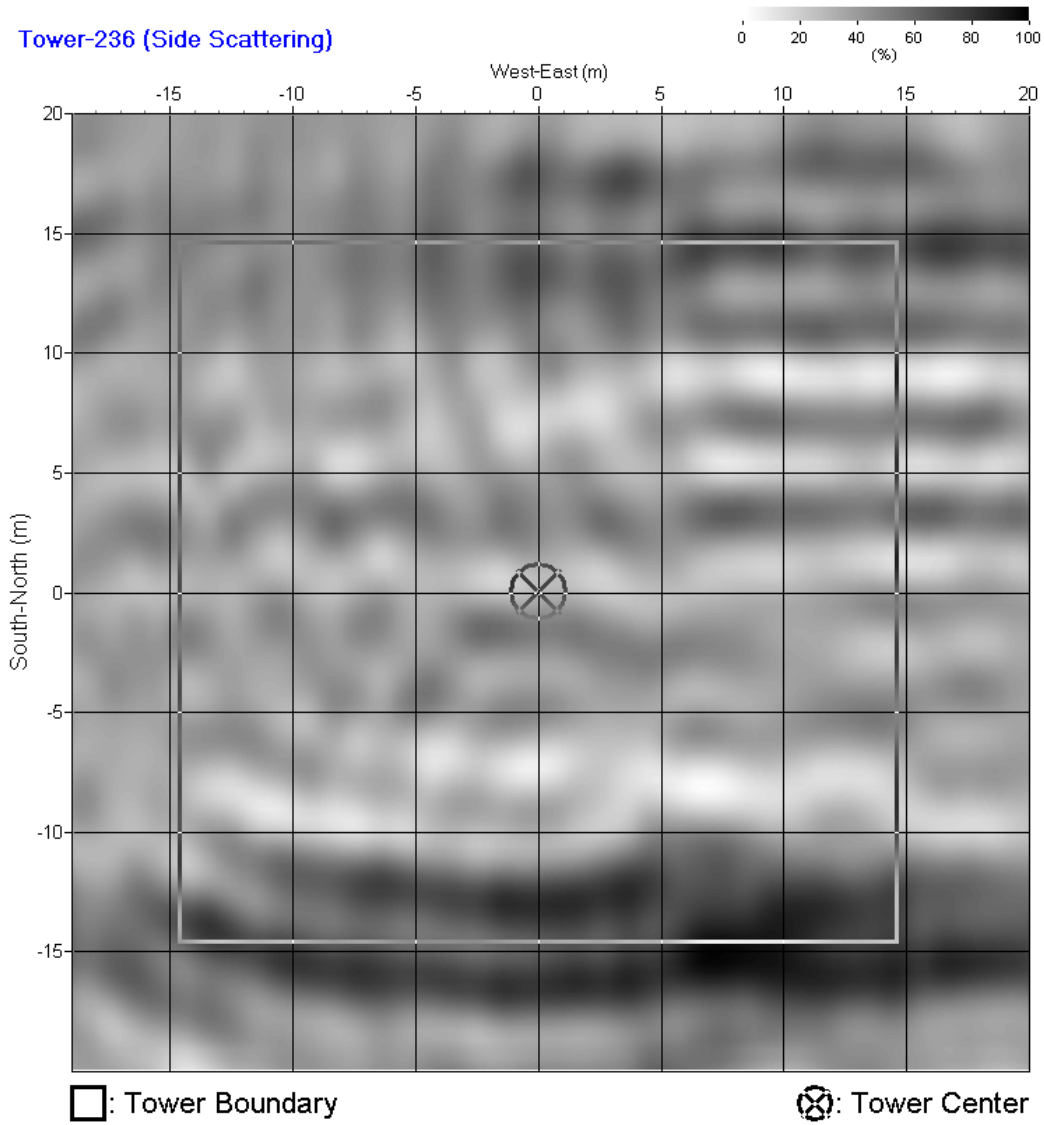


**A shorter receiver spacing of 2 ft was used for line 4 due to terrain condition (steep drop off).

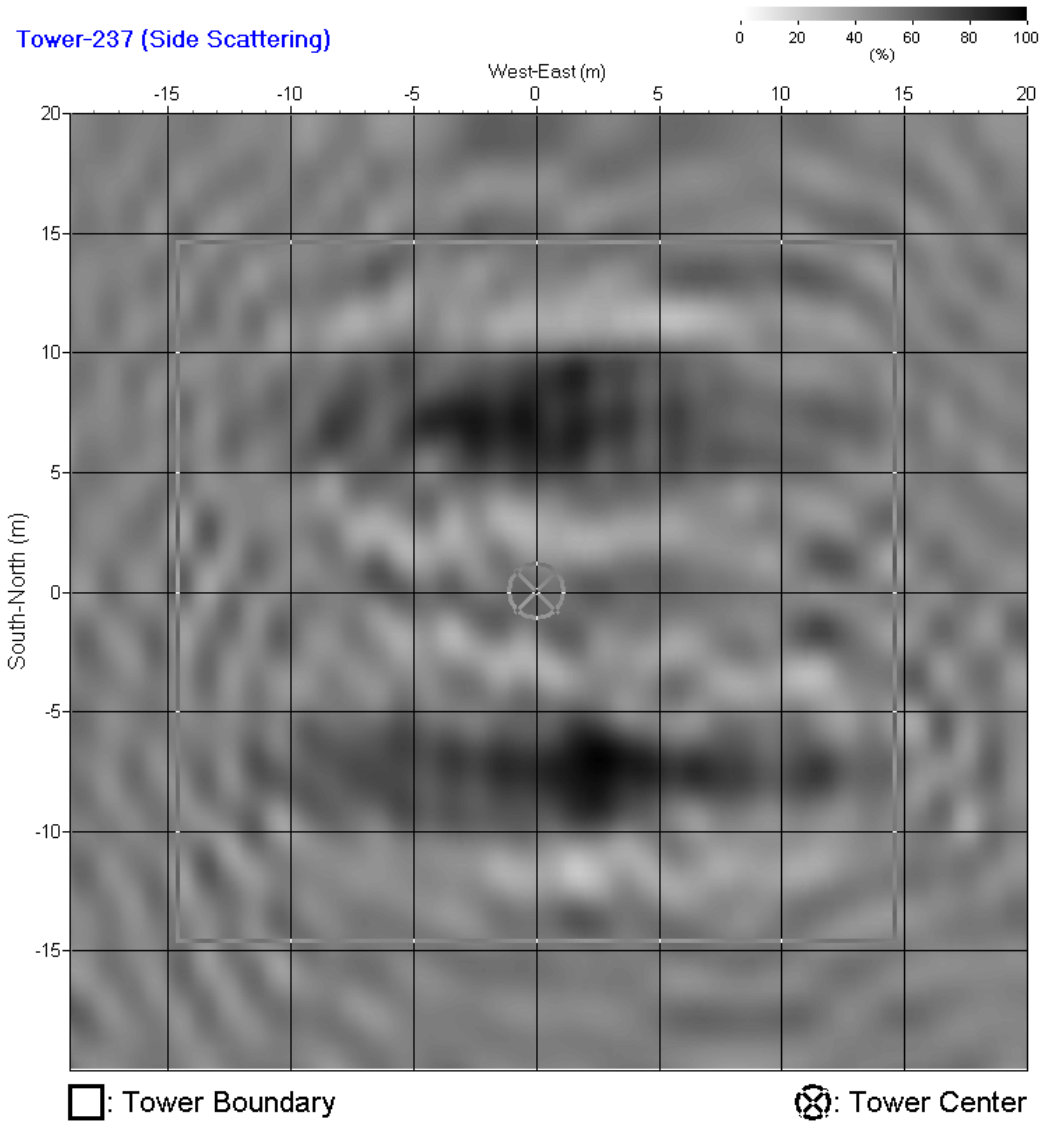
T-235


Tower-235 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

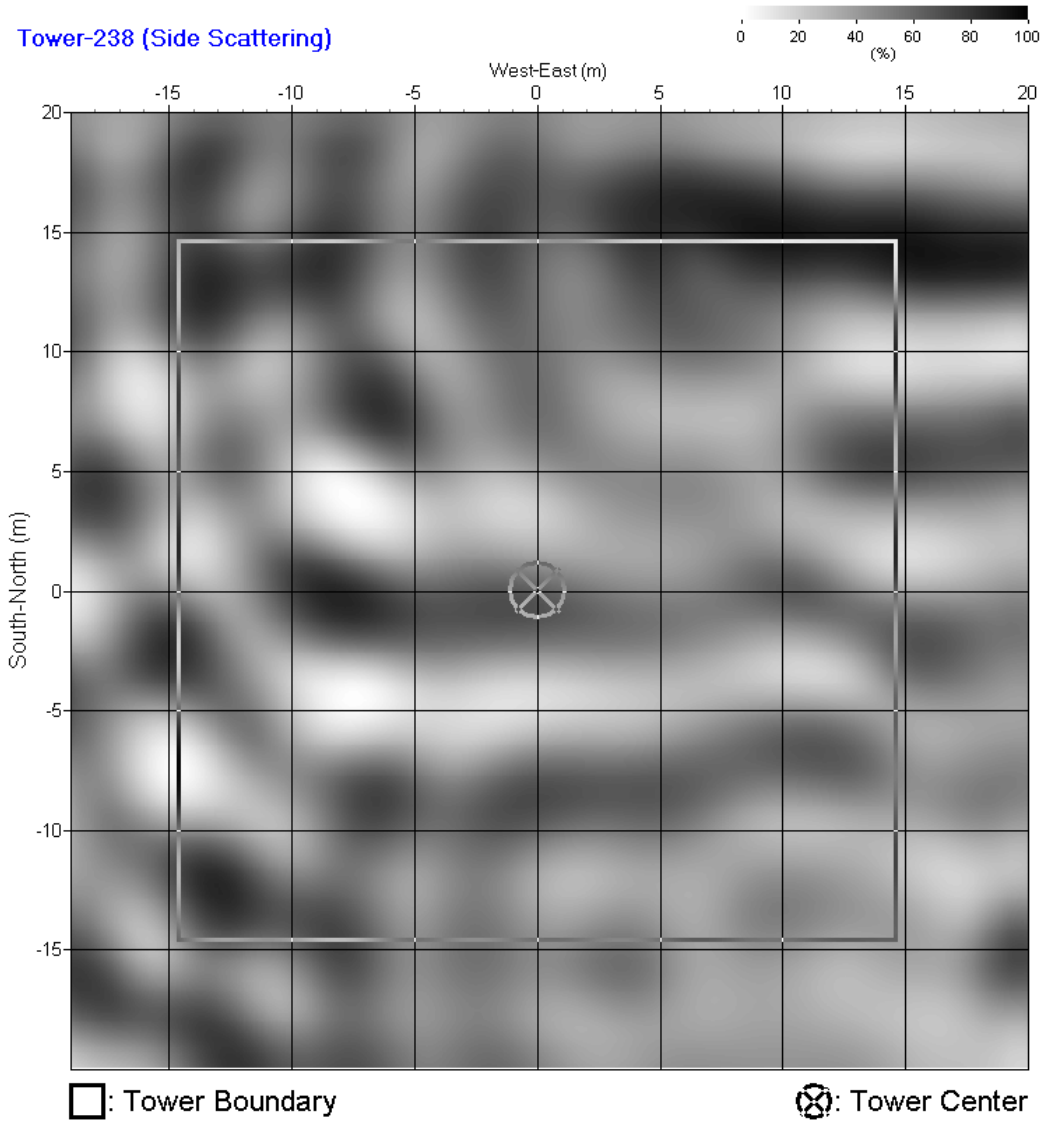
T-236


Tower-236 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

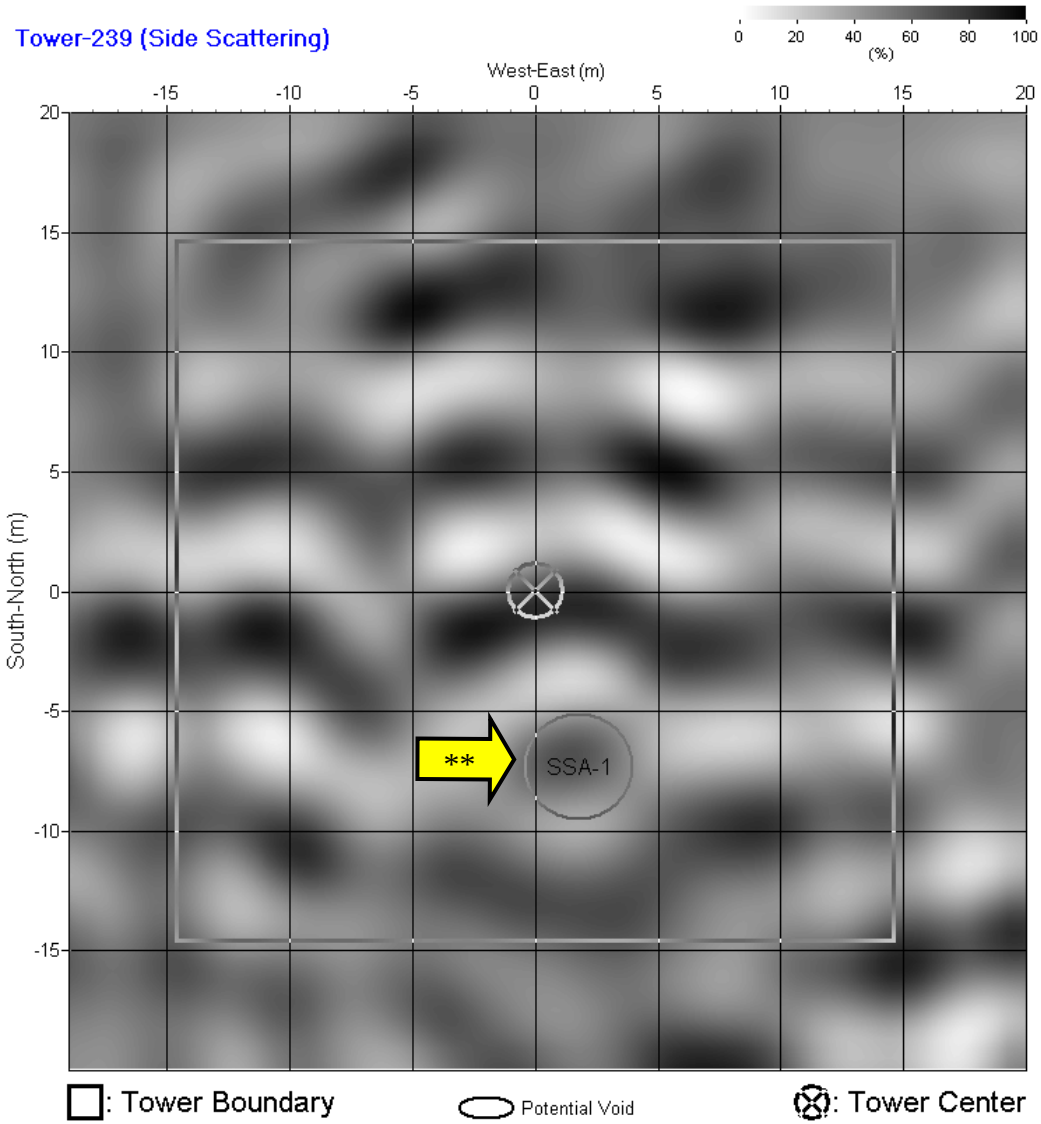
T-237


Tower-237 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-238

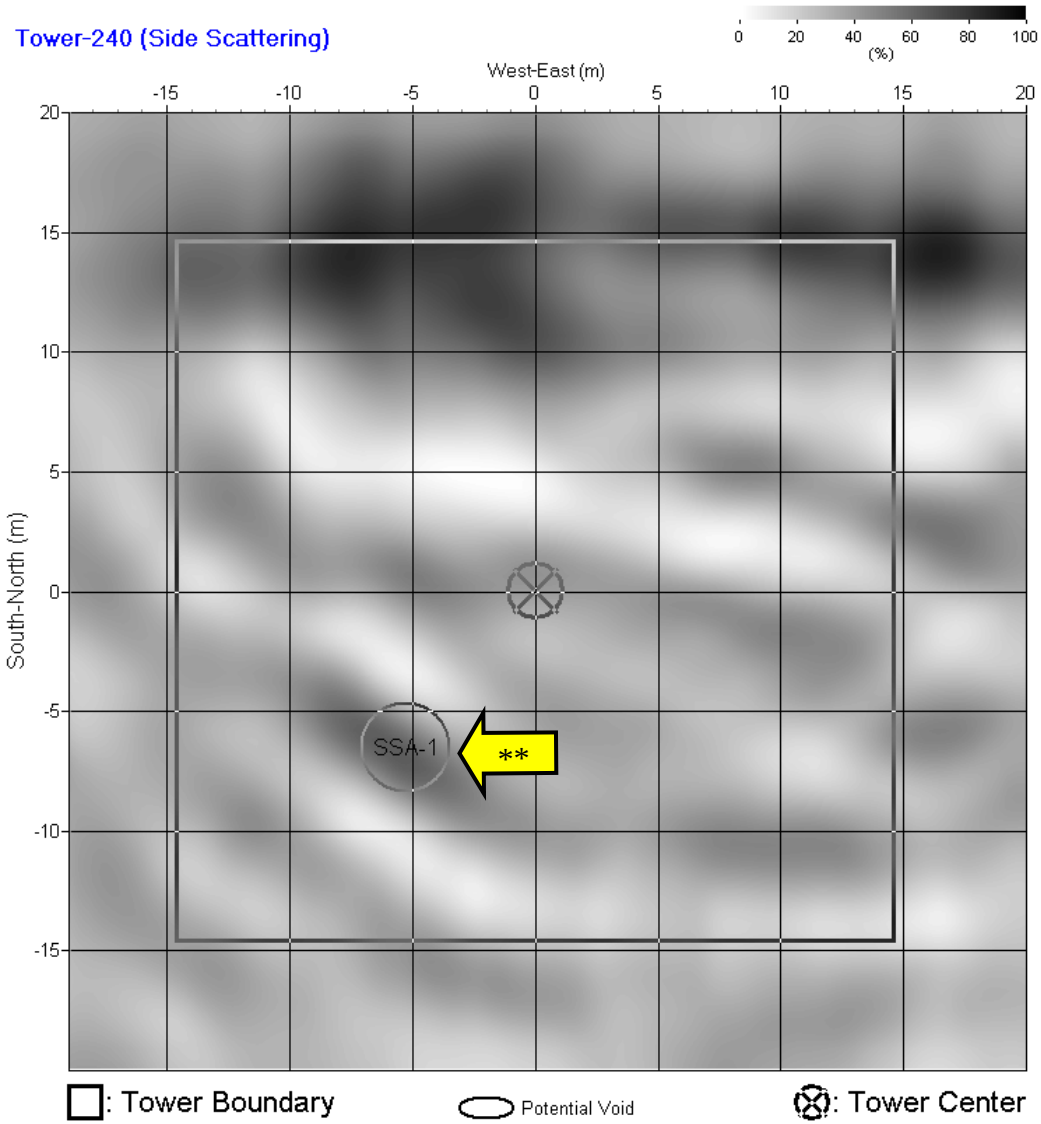

Tower-238 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-239



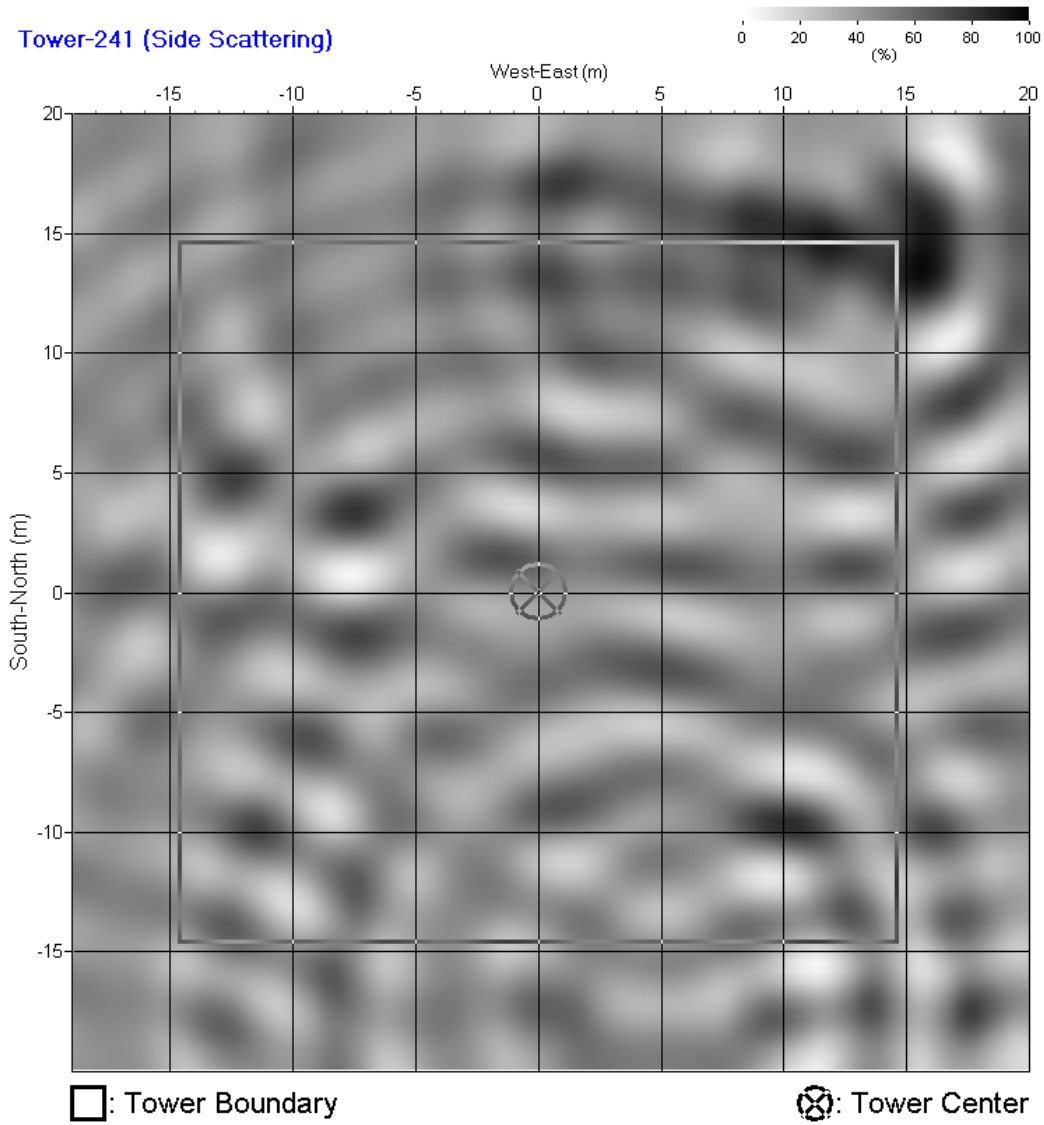
**Potential void (see separate text file for coordinates)

T-240



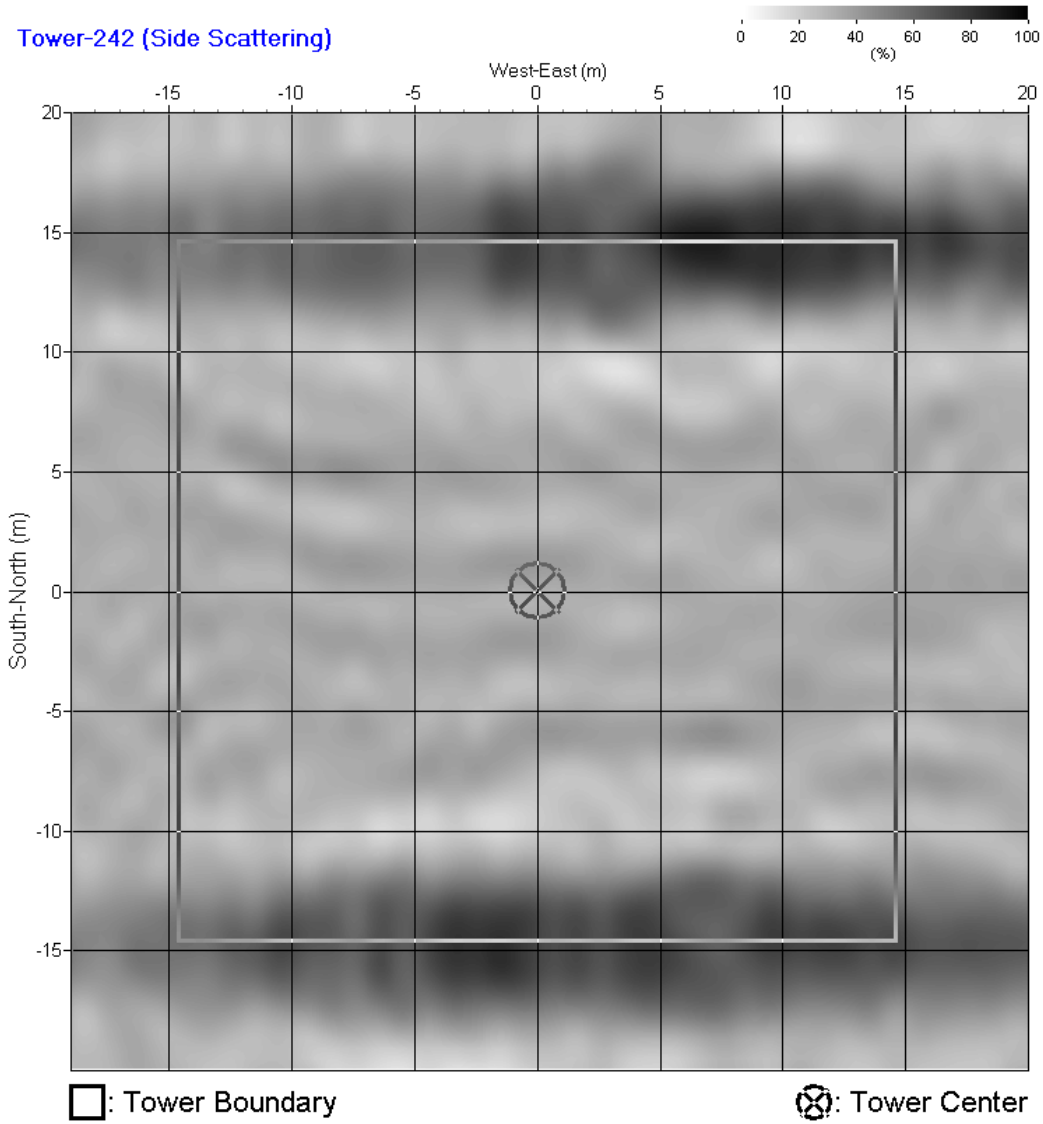
**Potential void (see separate text file for coordinates)

T-241**

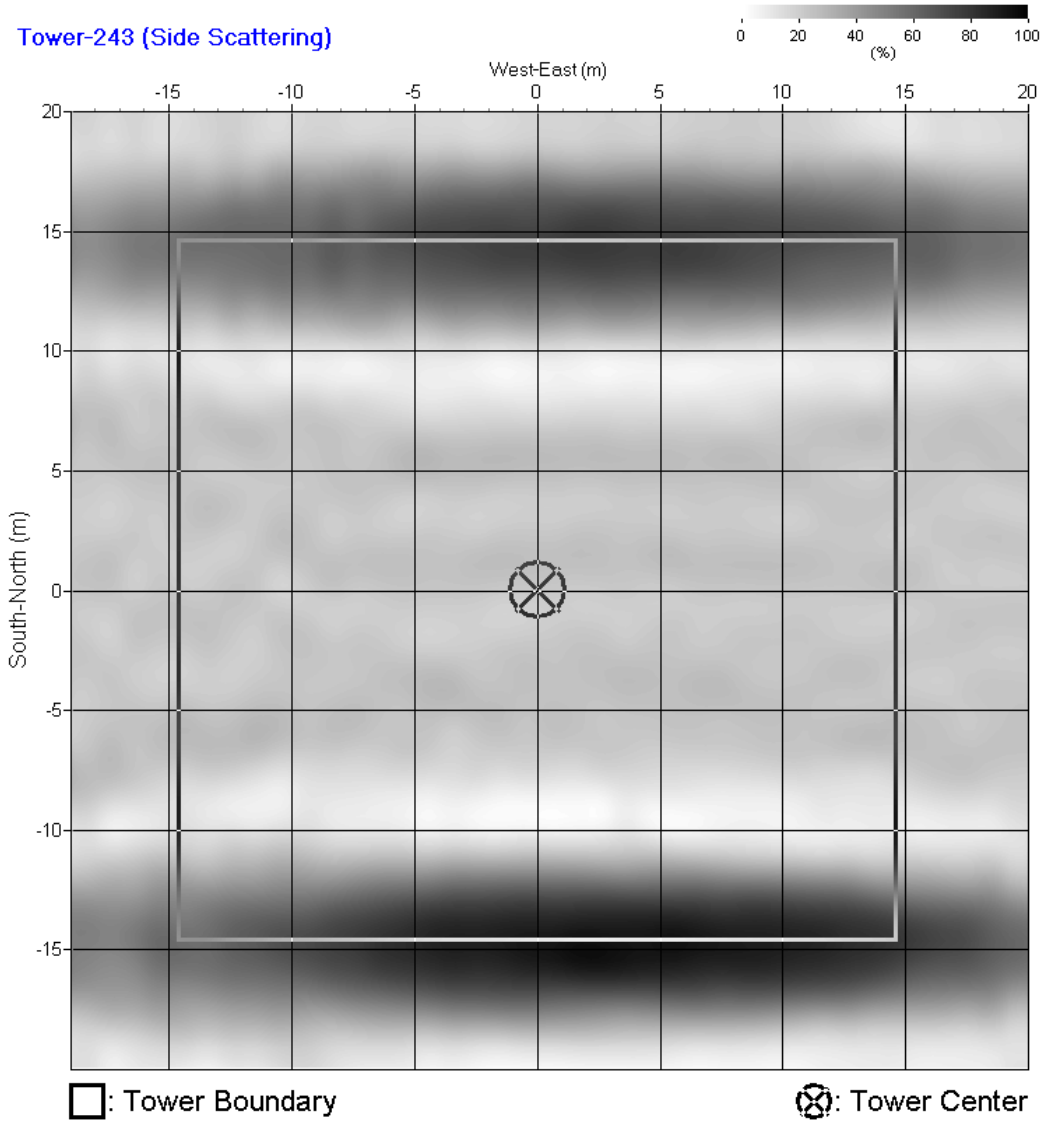


**A shorter receiver spacing of 2 ft was used for line 4 due to terrain condition (steep drop off).

T-242

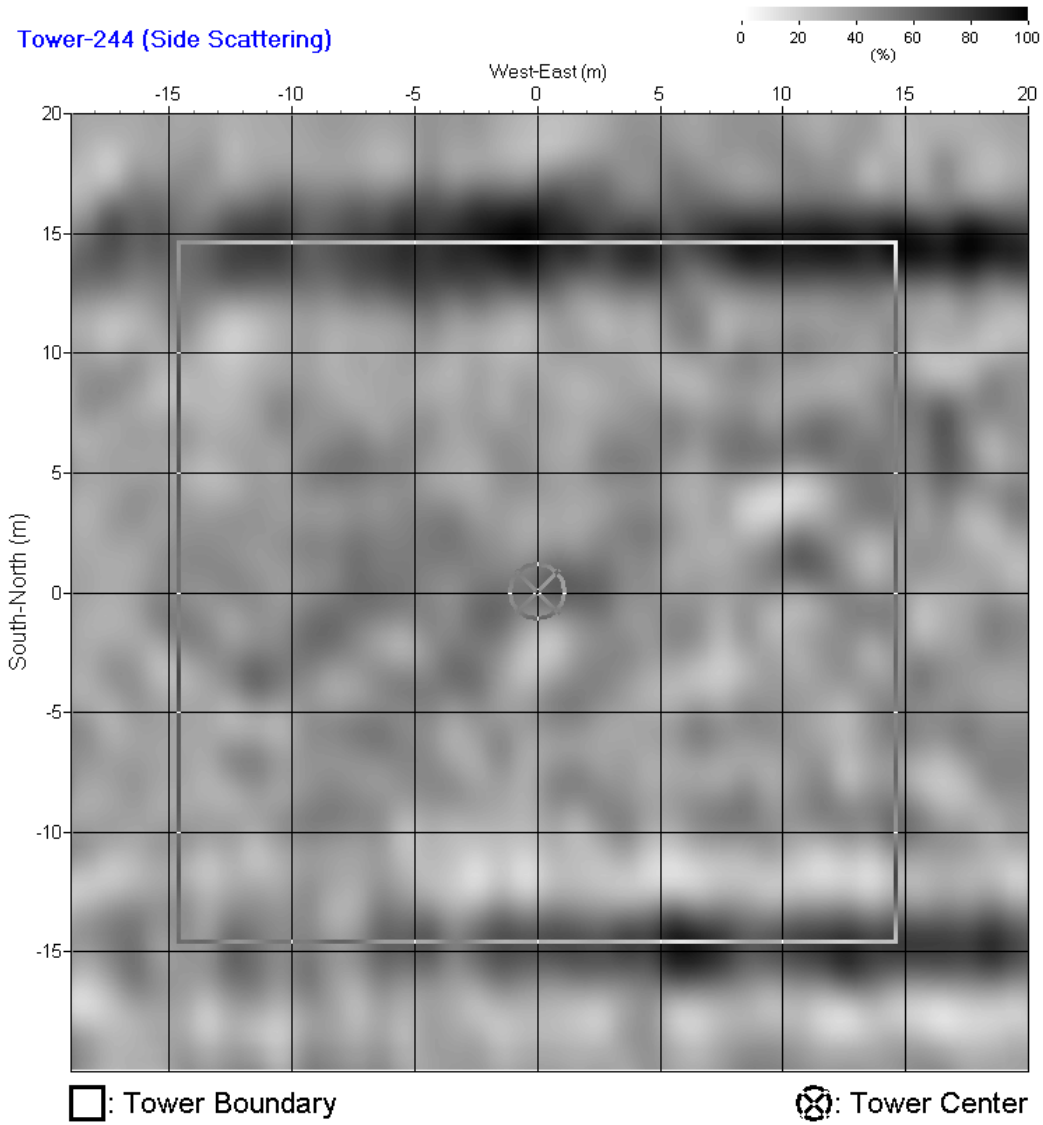

Tower-242 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-243*

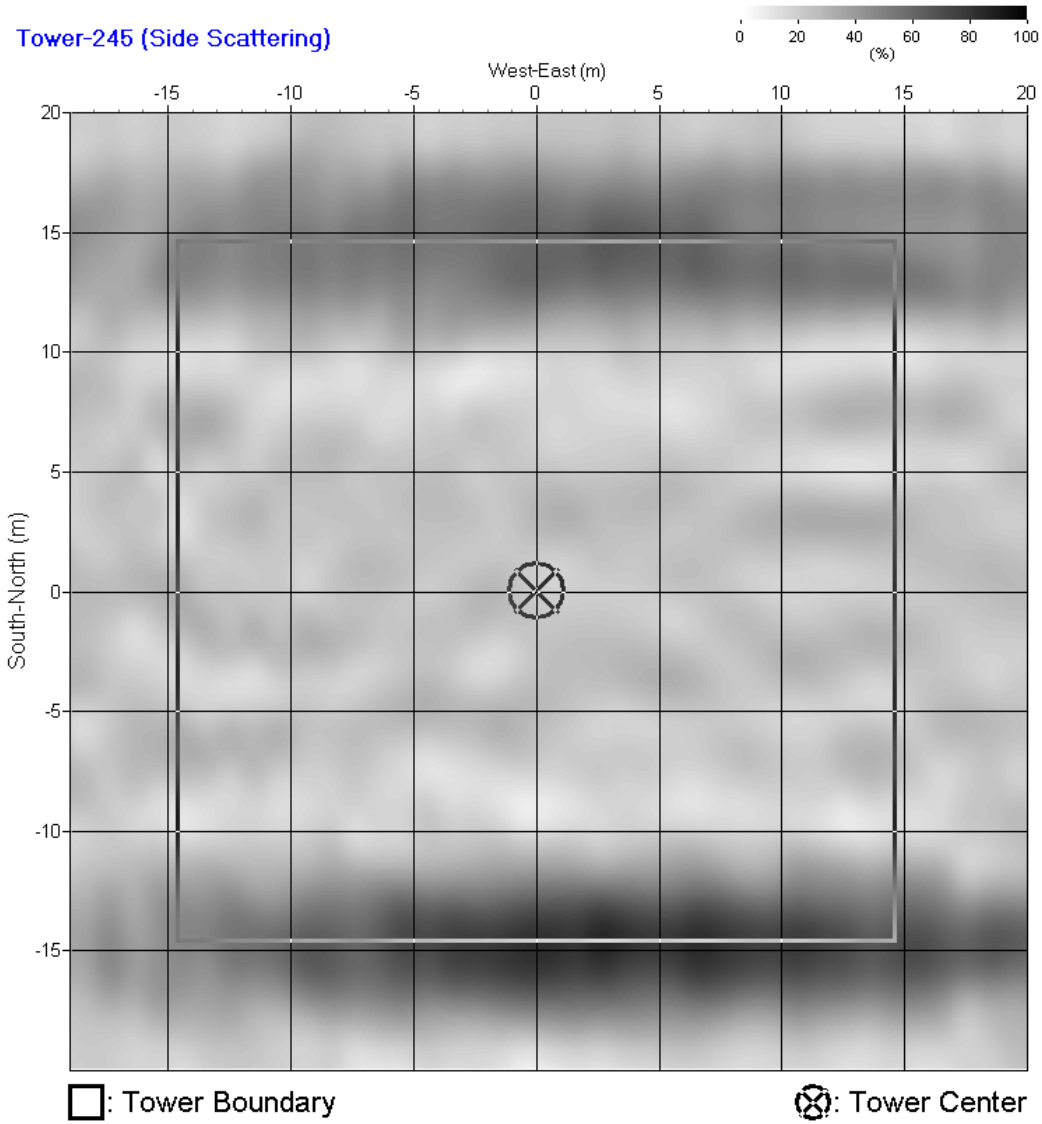


*Manual timebreak used due to broken hammer sensor. Analysis lacks reliability.

T-244

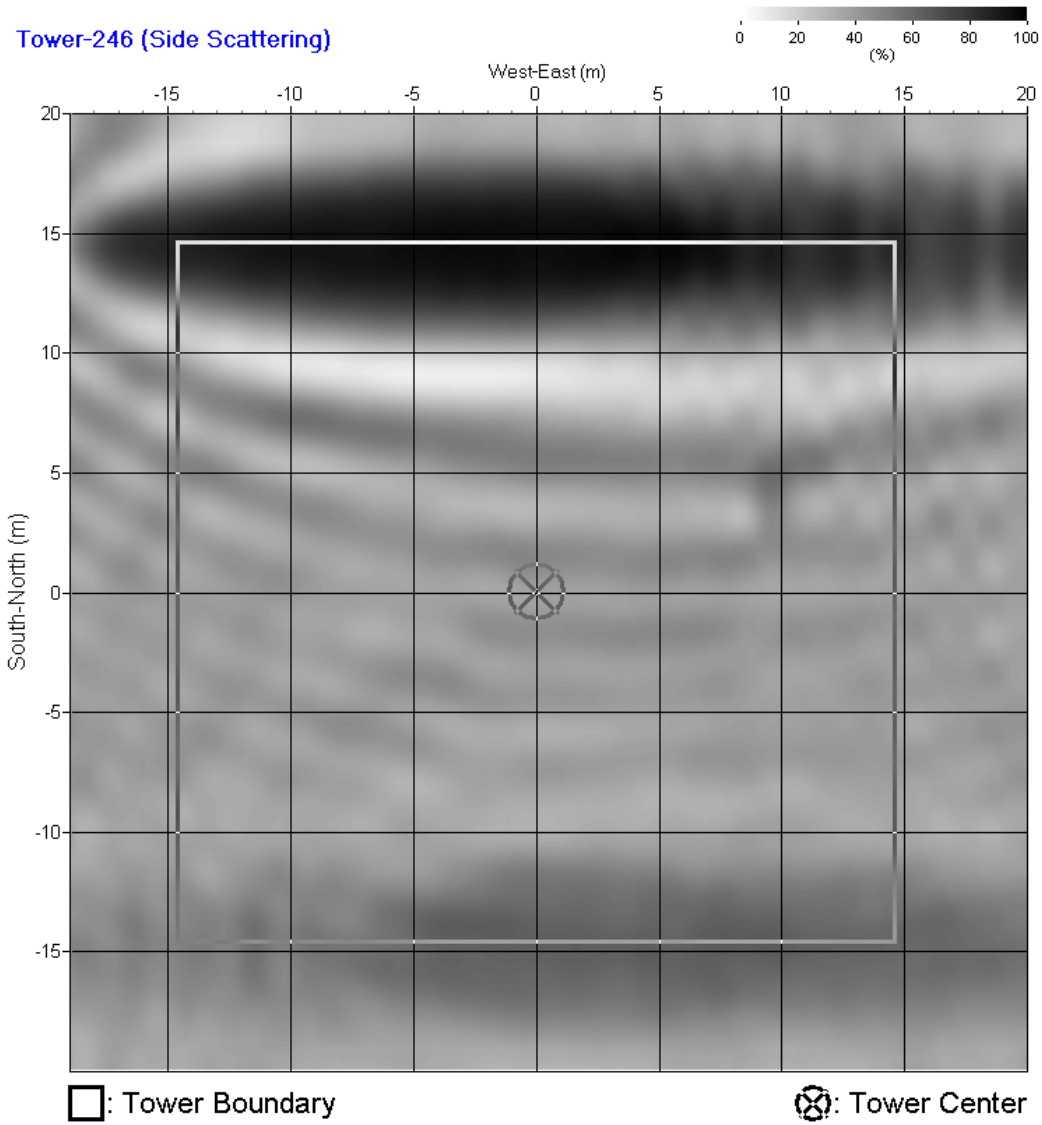

Tower-244 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-245*



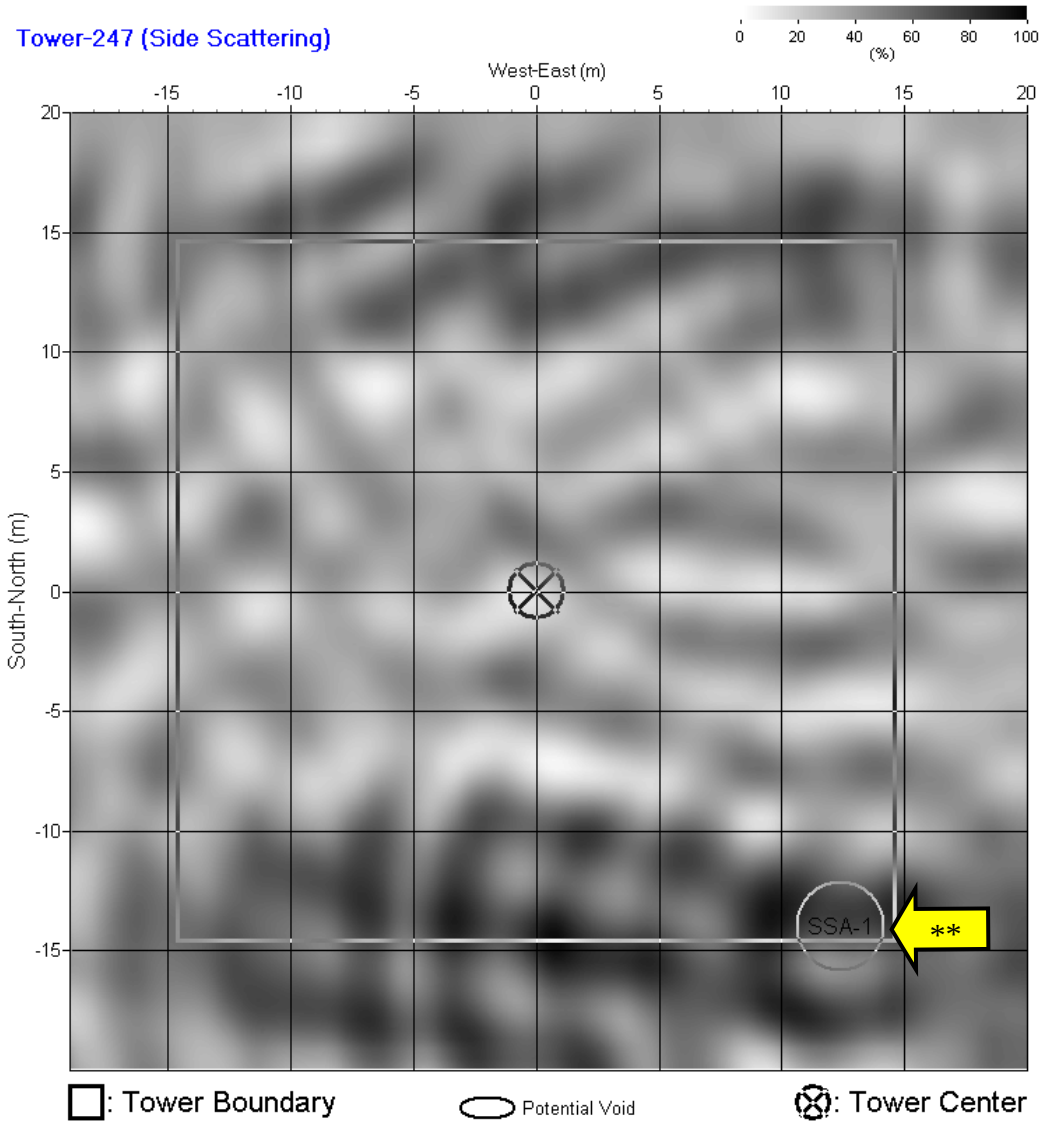
*Manual timebreak used due to broken hammer sensor. Analysis lacks reliability.

T-246*



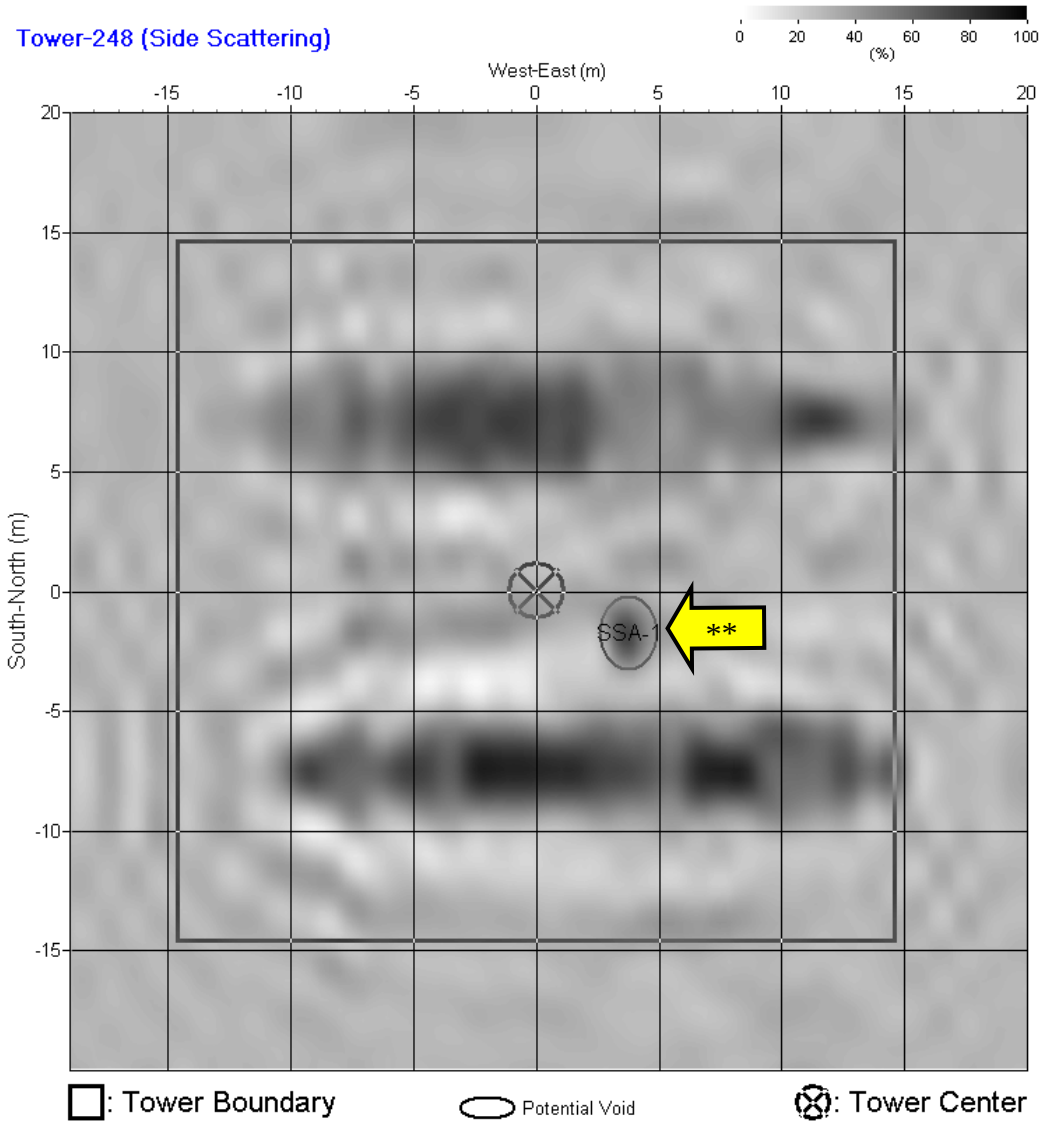
*Manual timebreak used due to broken hammer sensor. Analysis lacks reliability.

T-247



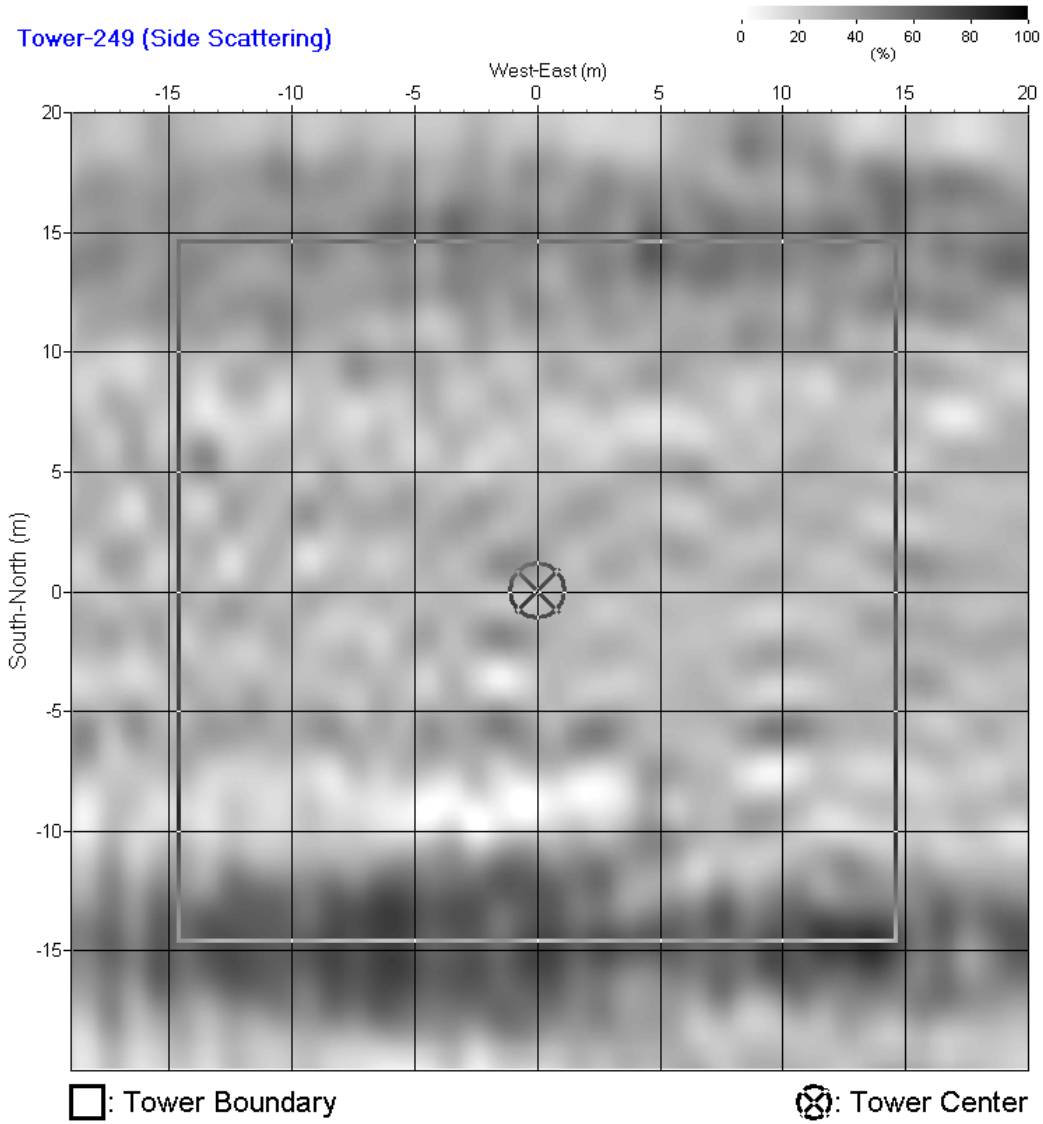
**Potential void (see separate text file for coordinates)

T-248*

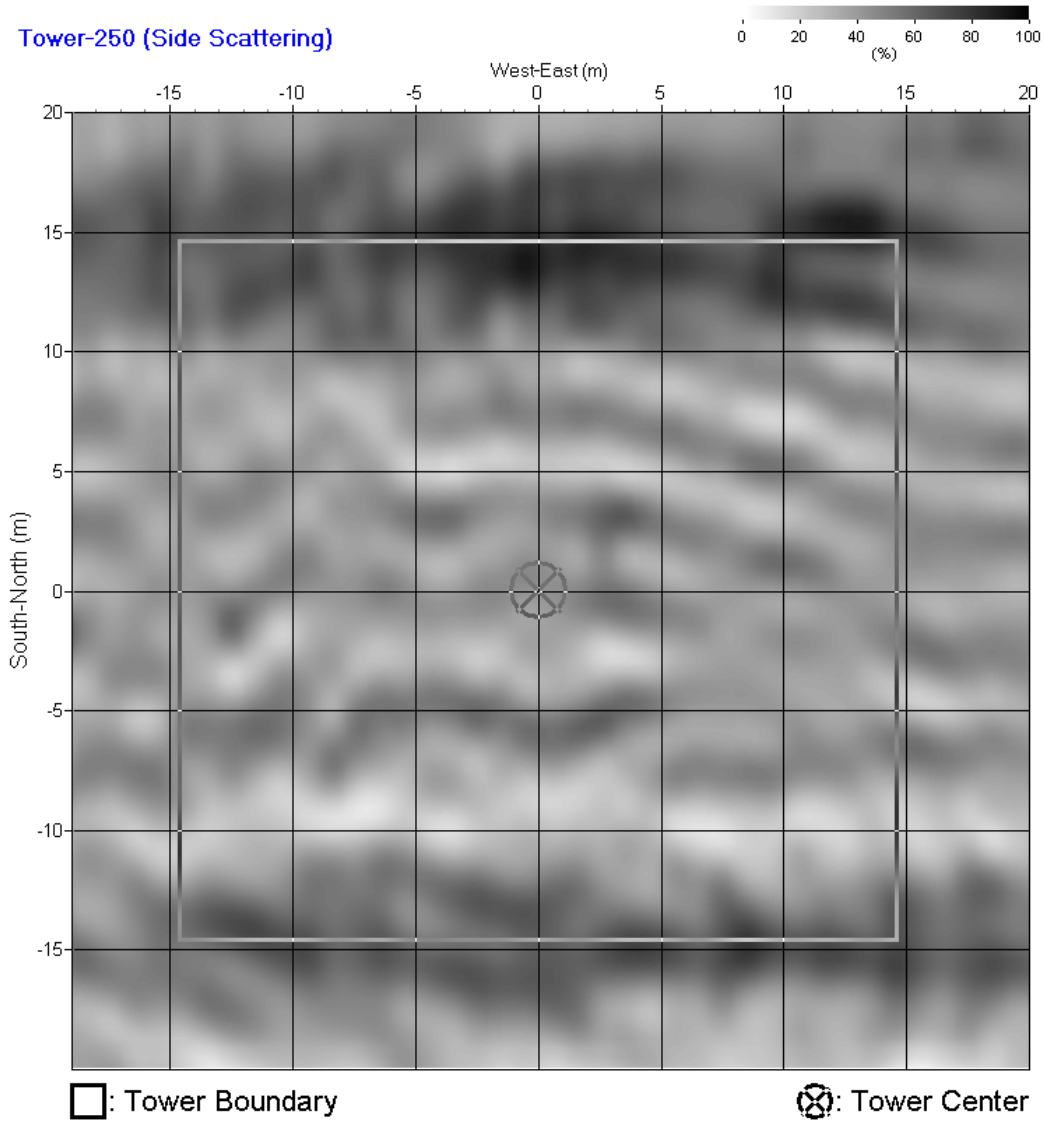


*Shorter receiver spacing of 2 ft used due to terrain condition, **Potential void (see separate text file for coordinates)

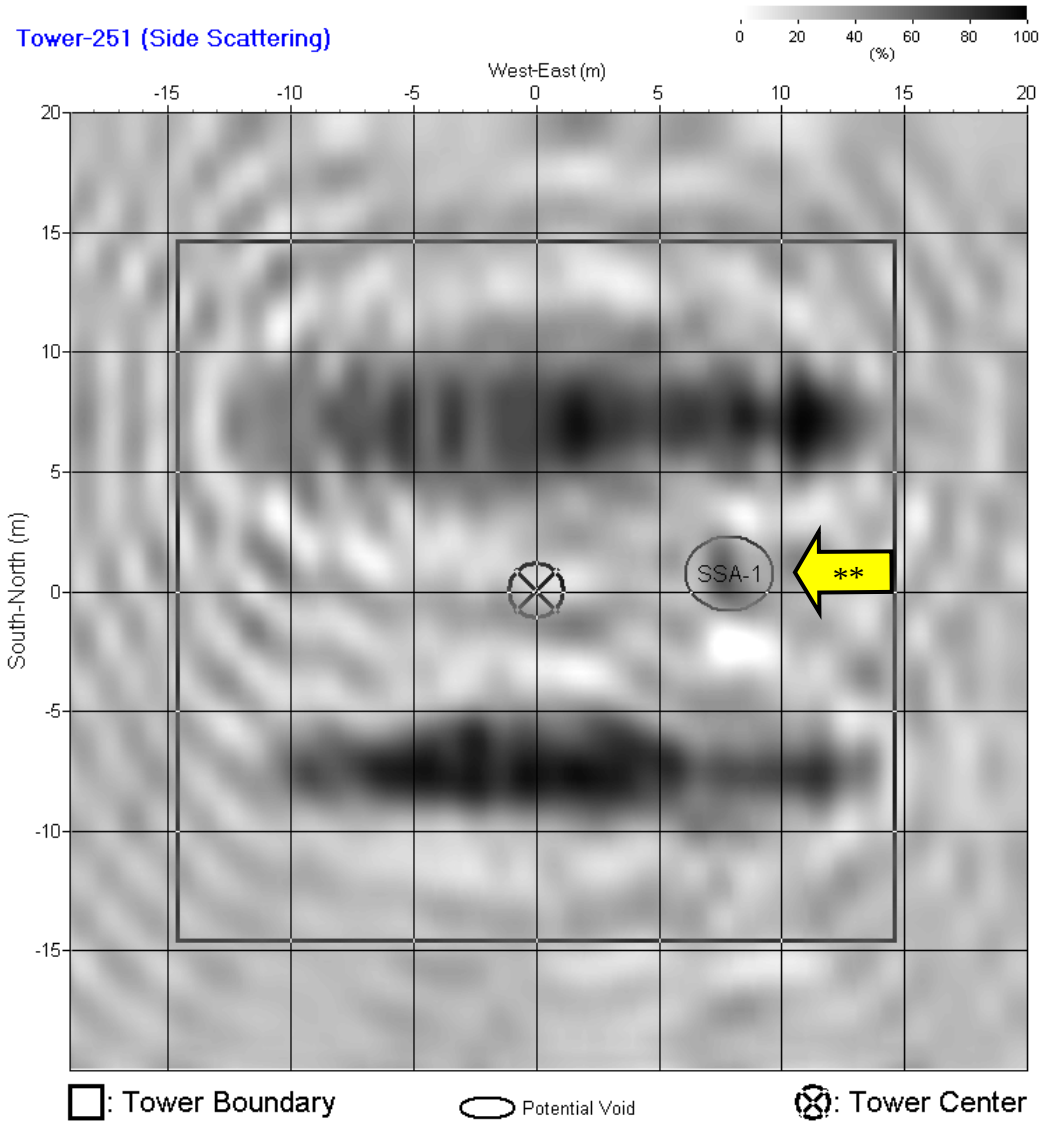
T-249


Tower-249 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-250

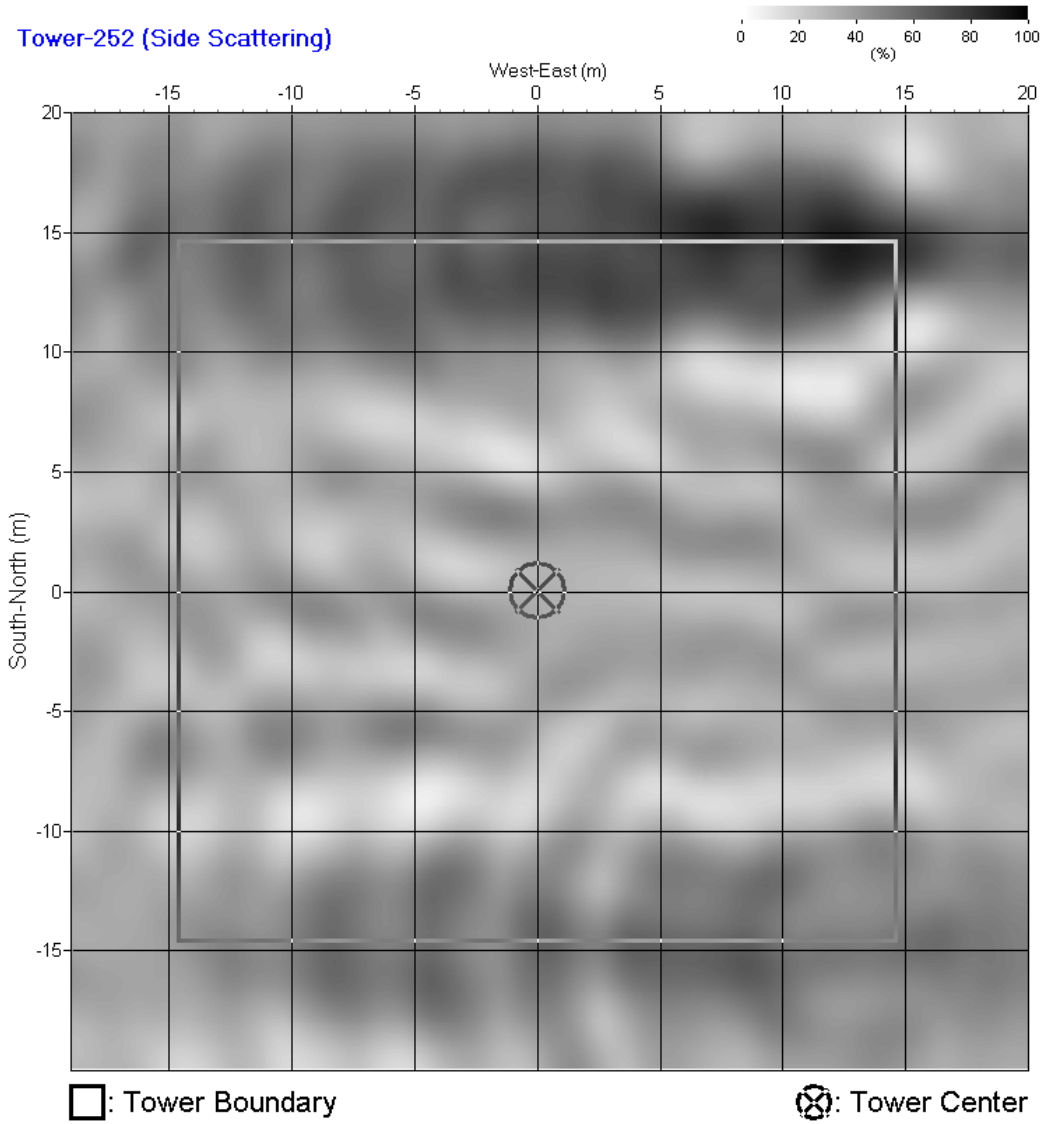

Tower-250 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-251*

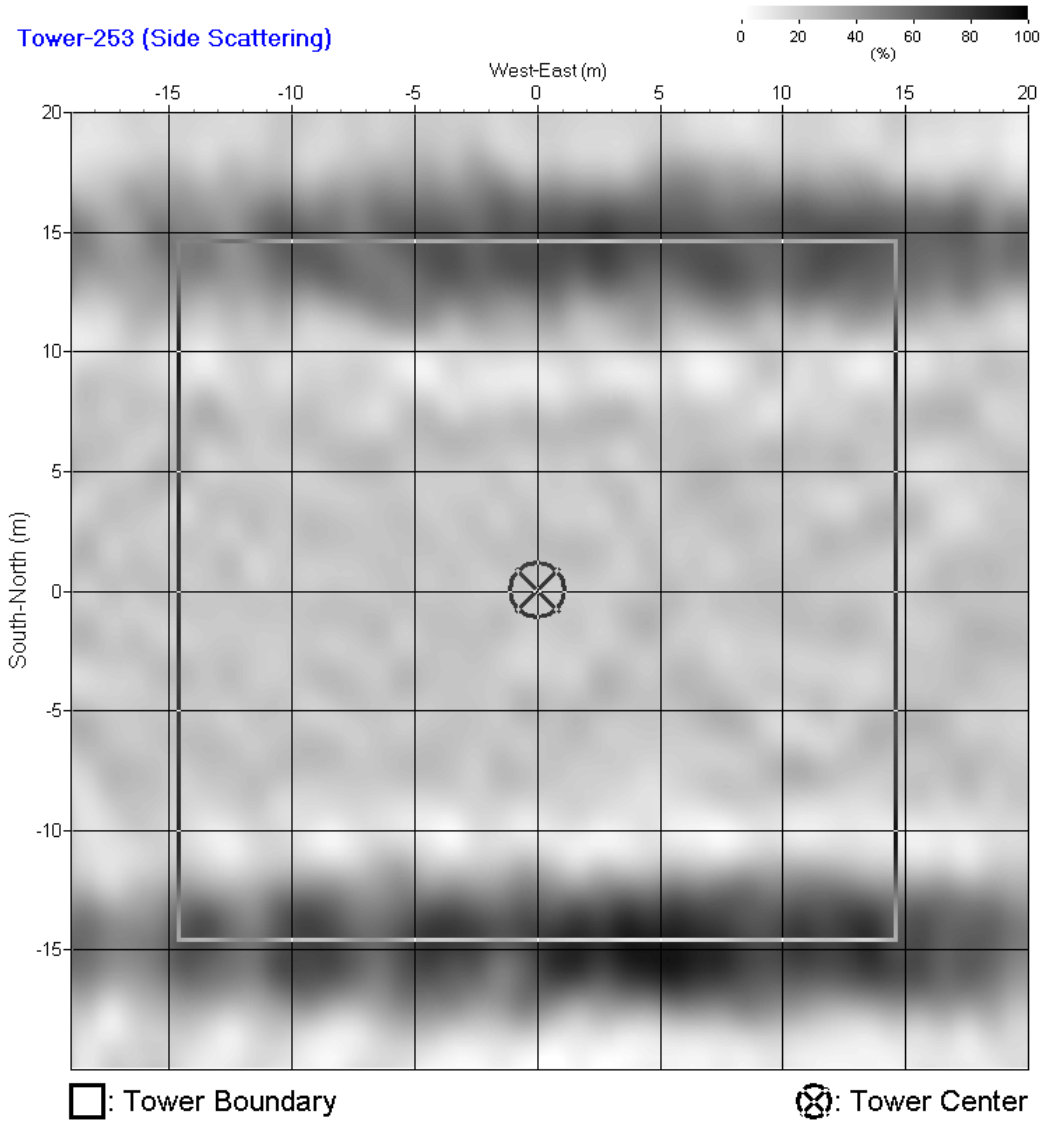


*Shorter receiver spacing of 2 ft used due to terrain condition, **Potential void (see separate text file for coordinates)

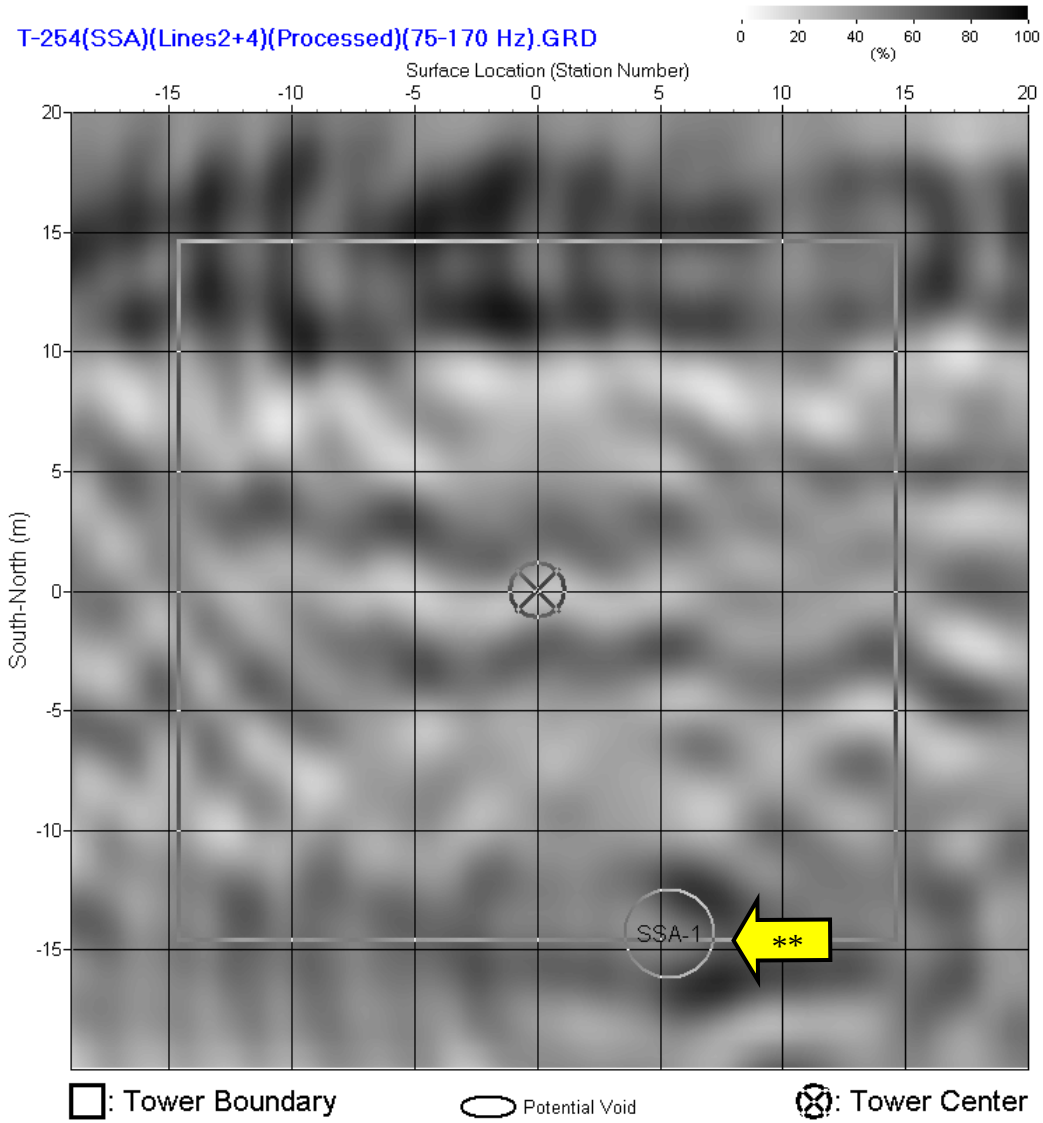
T-252


Tower-252 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-253

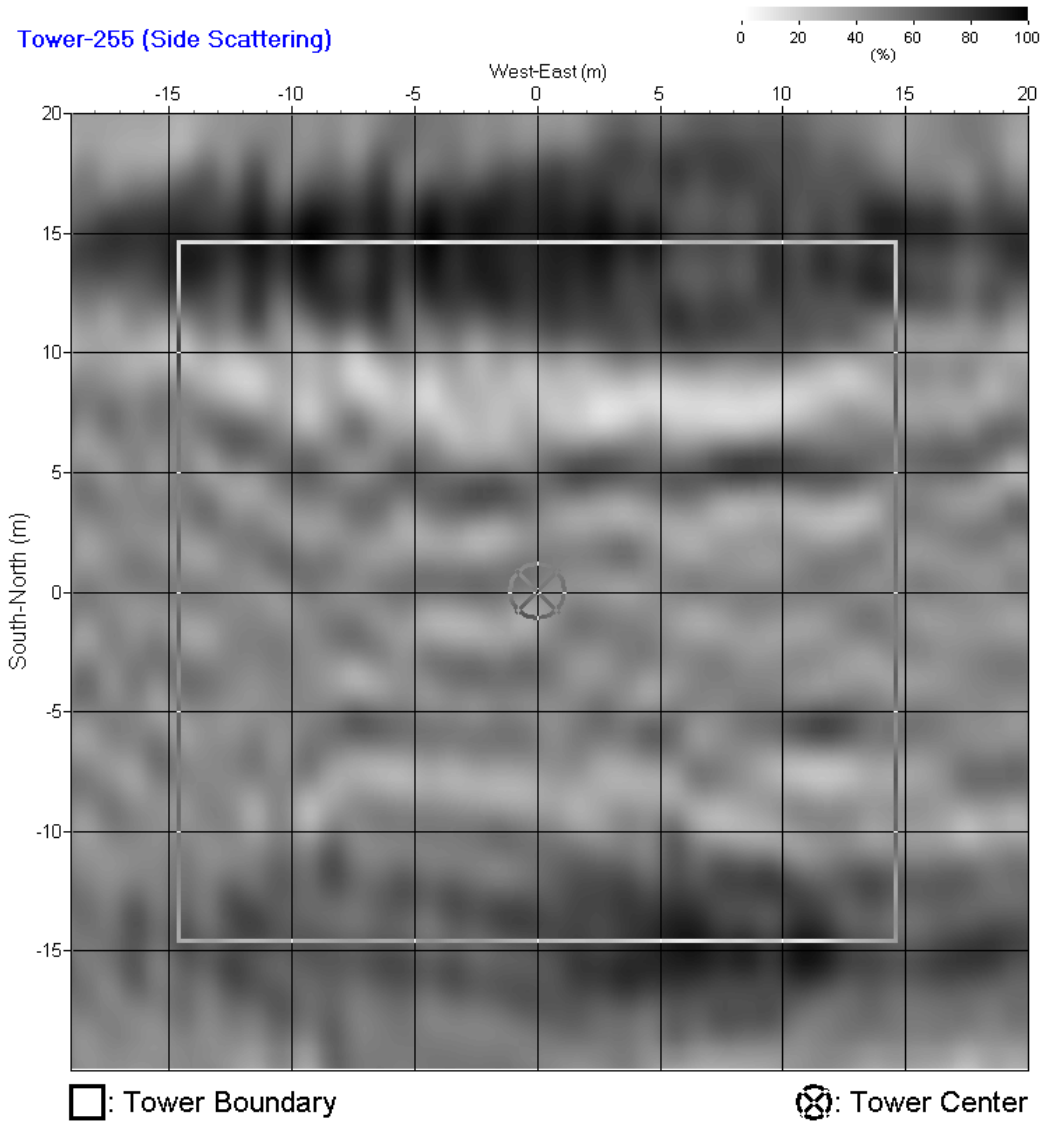

Tower-253 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-254

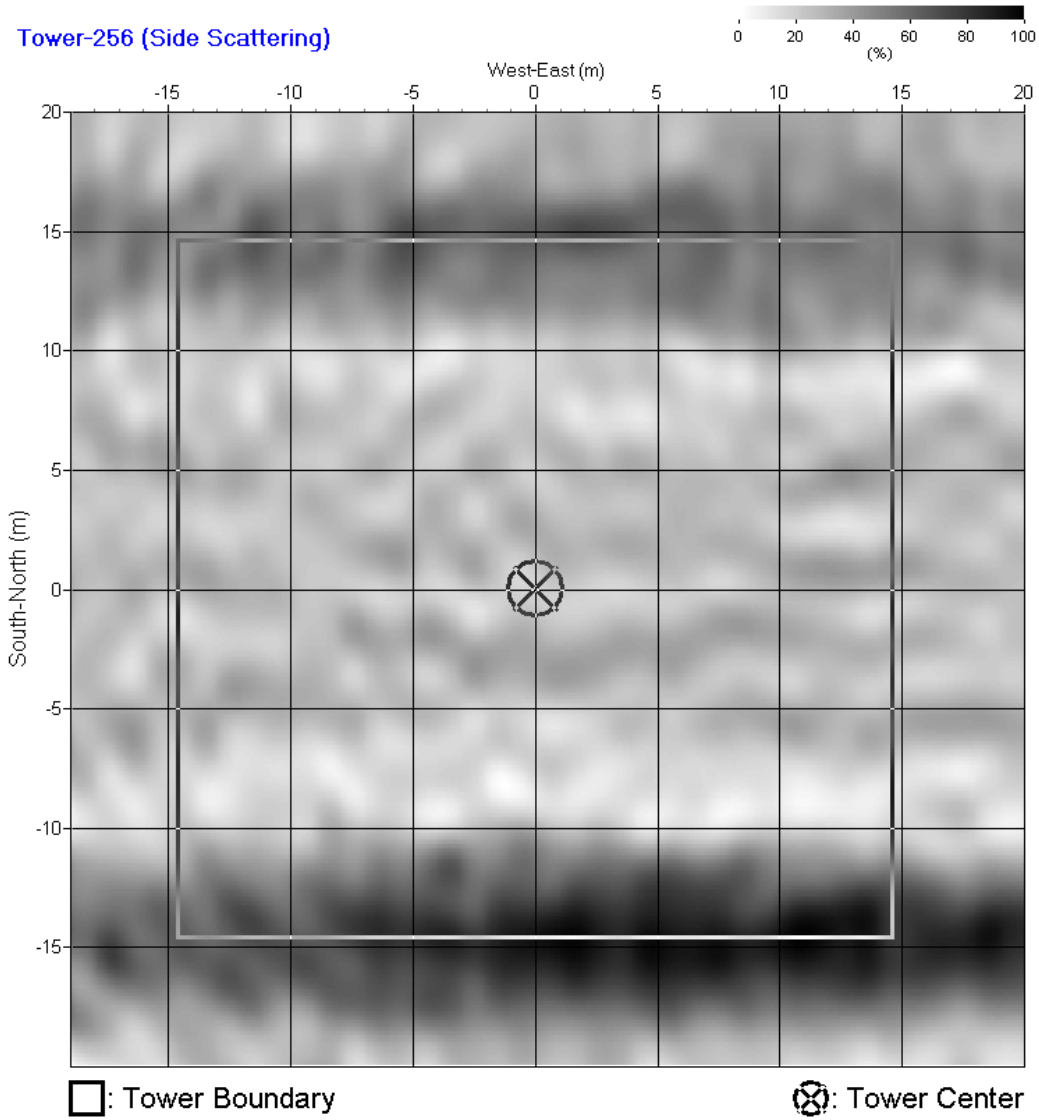


**Potential void (see separate text file for coordinates)

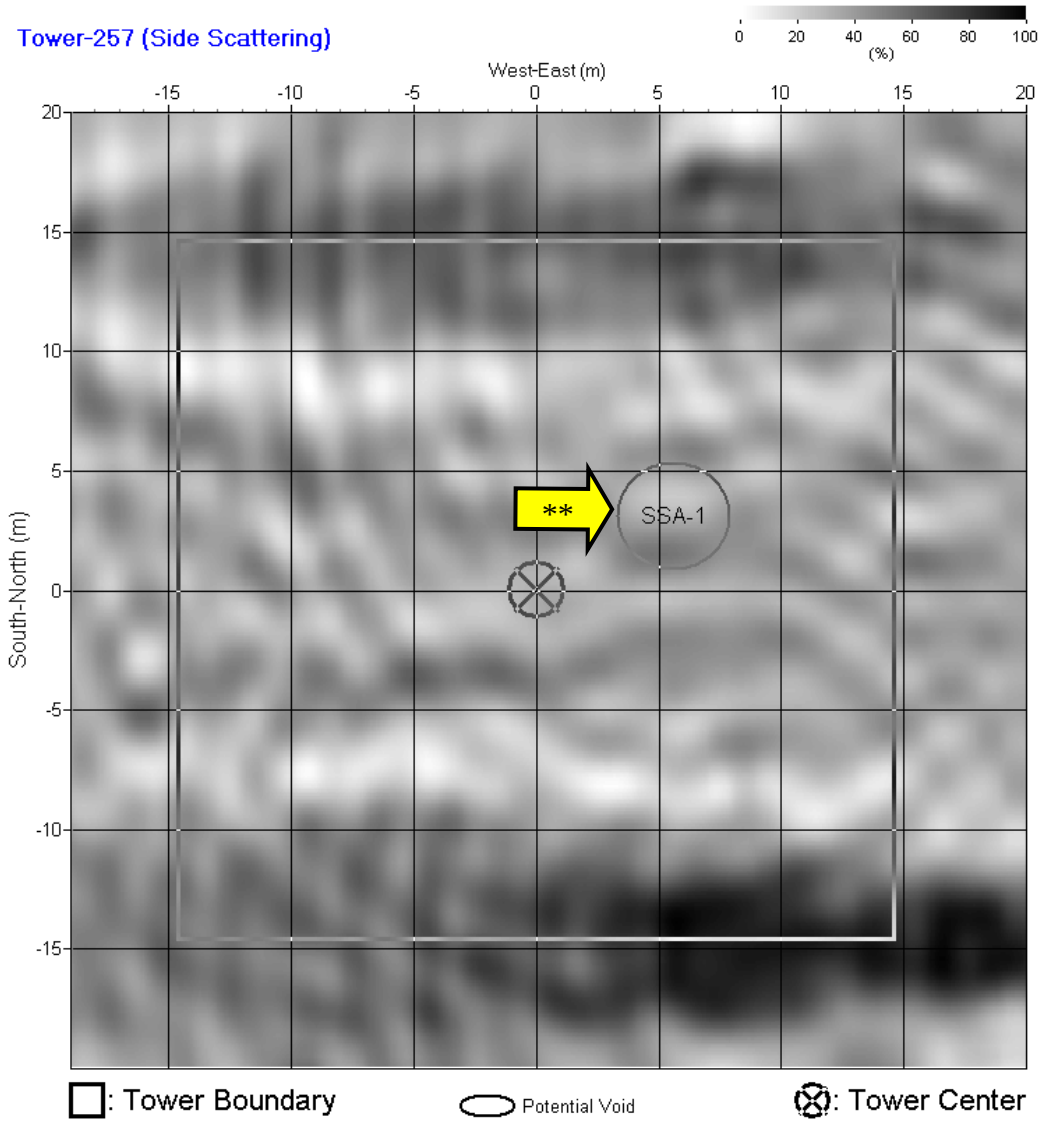
T-255


Tower-255 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-256

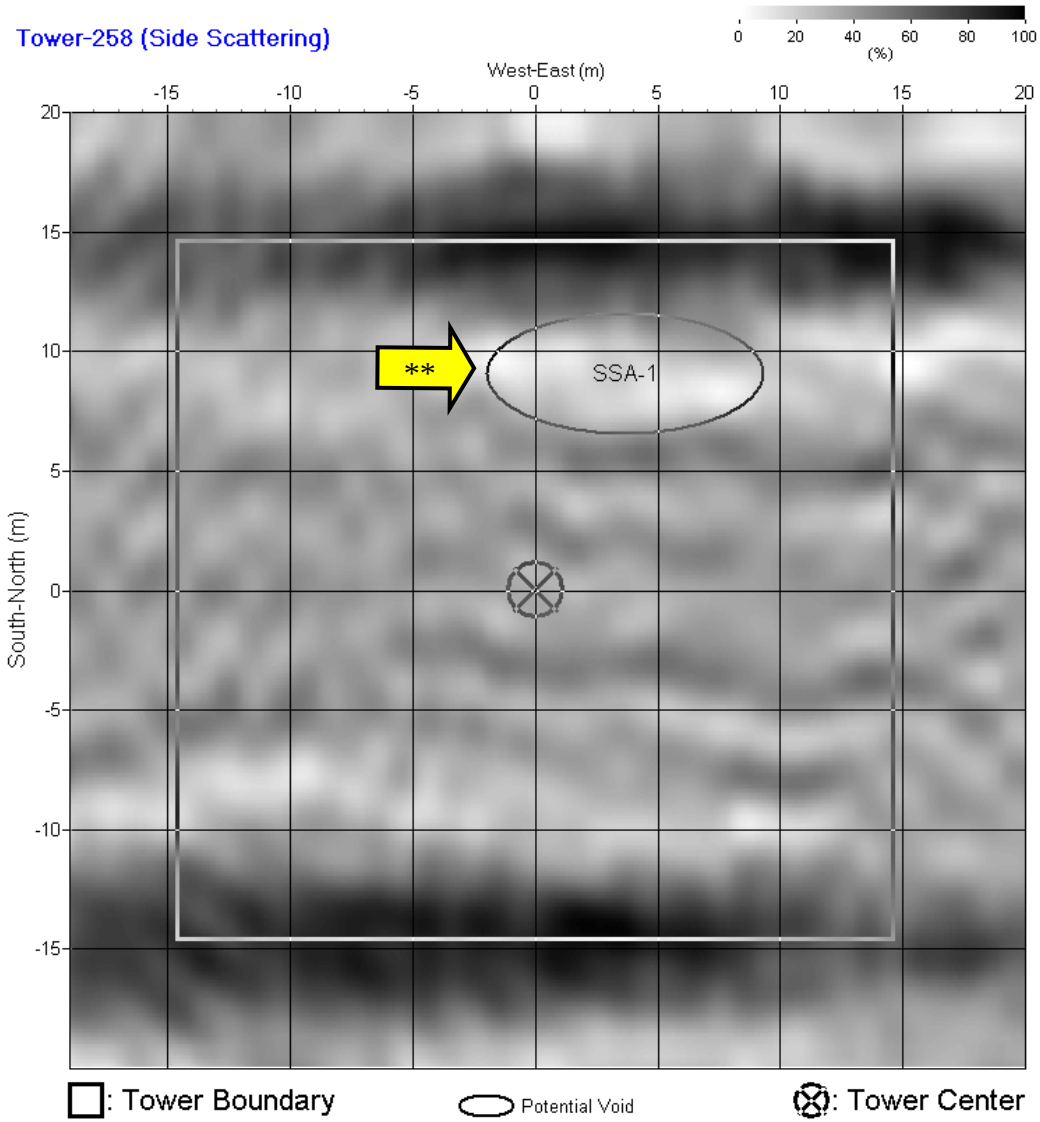

Tower-256 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-257



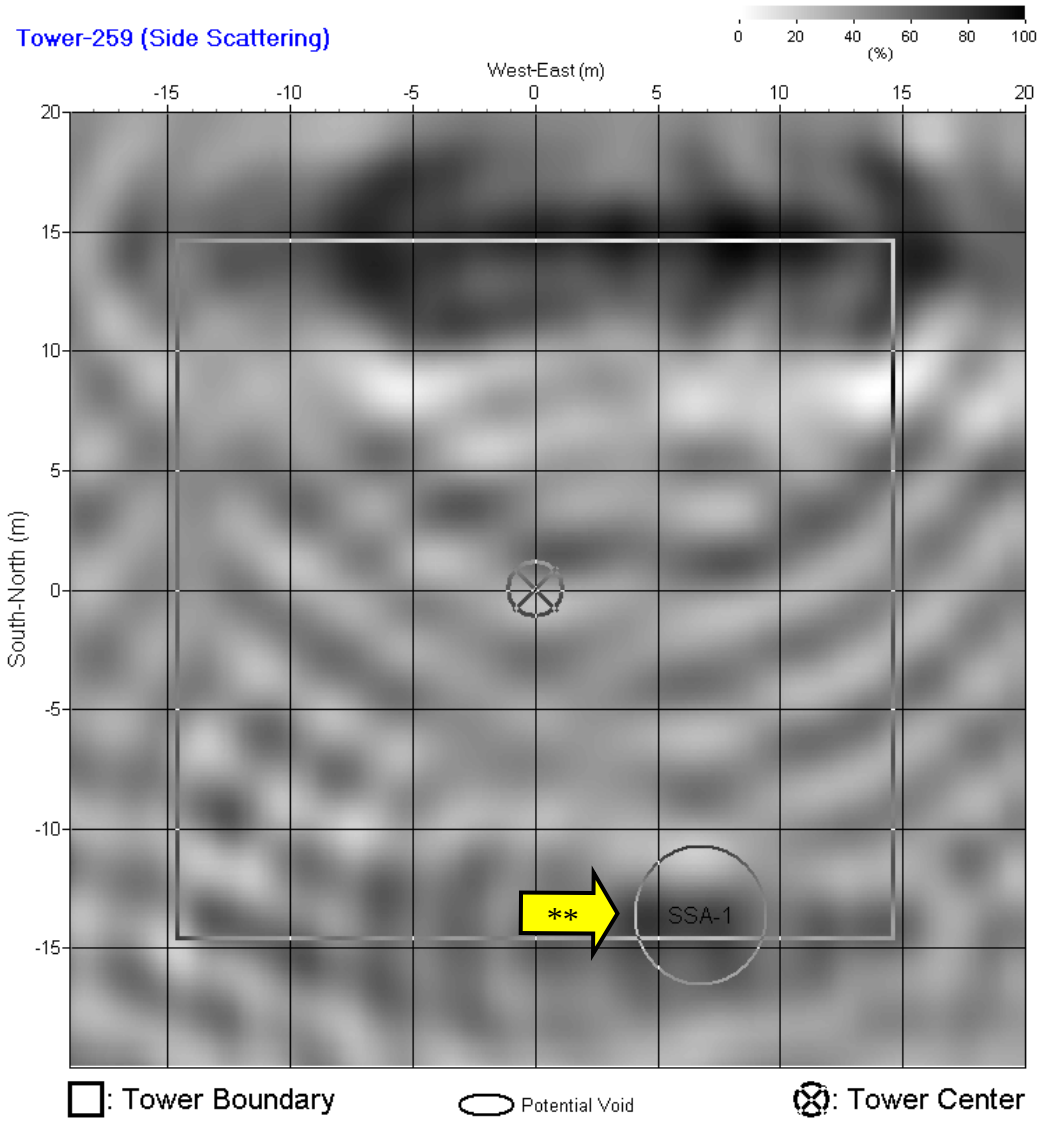
**Potential void (see separate text file for coordinates)

T-258



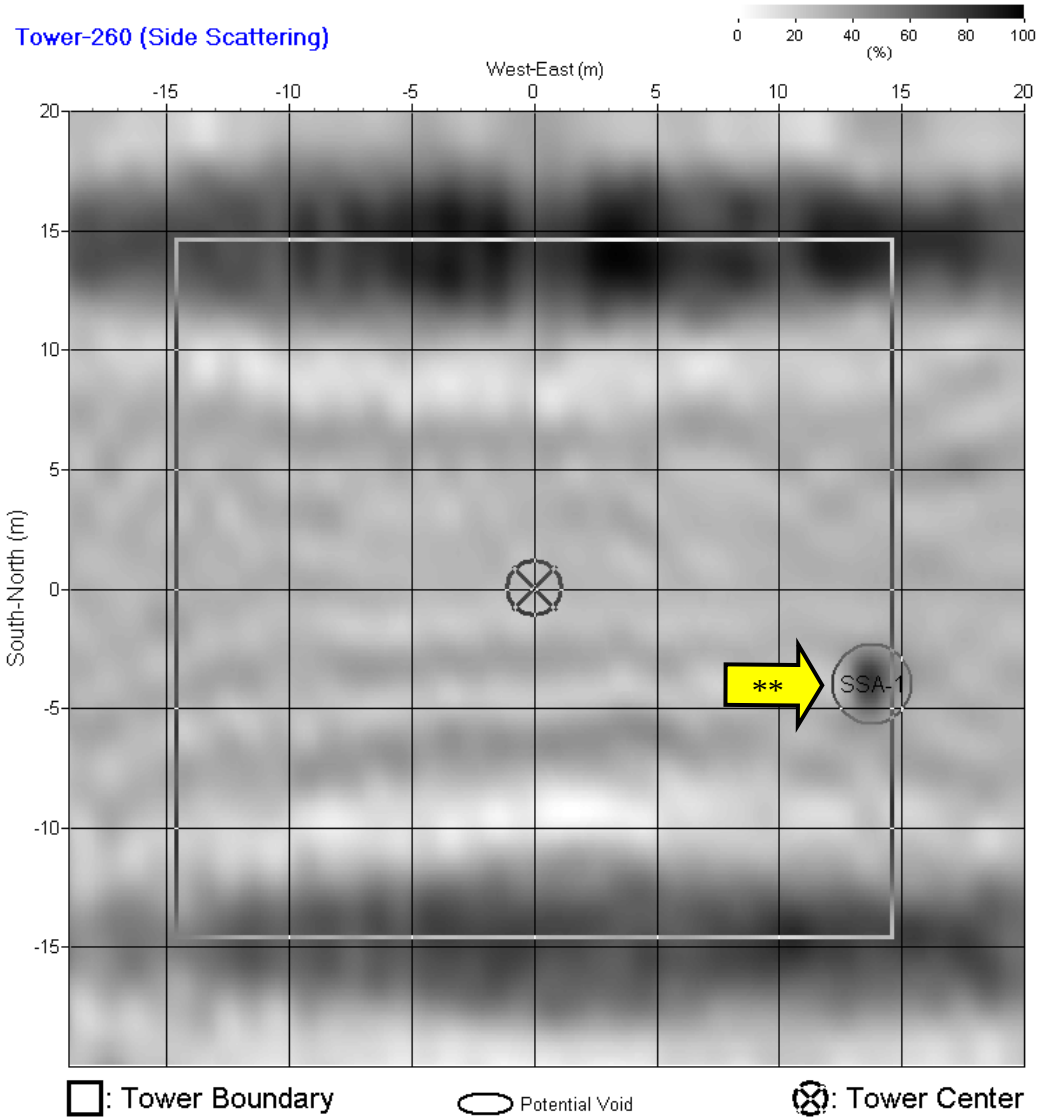
**Potential void (see separate text file for coordinates)

T-259



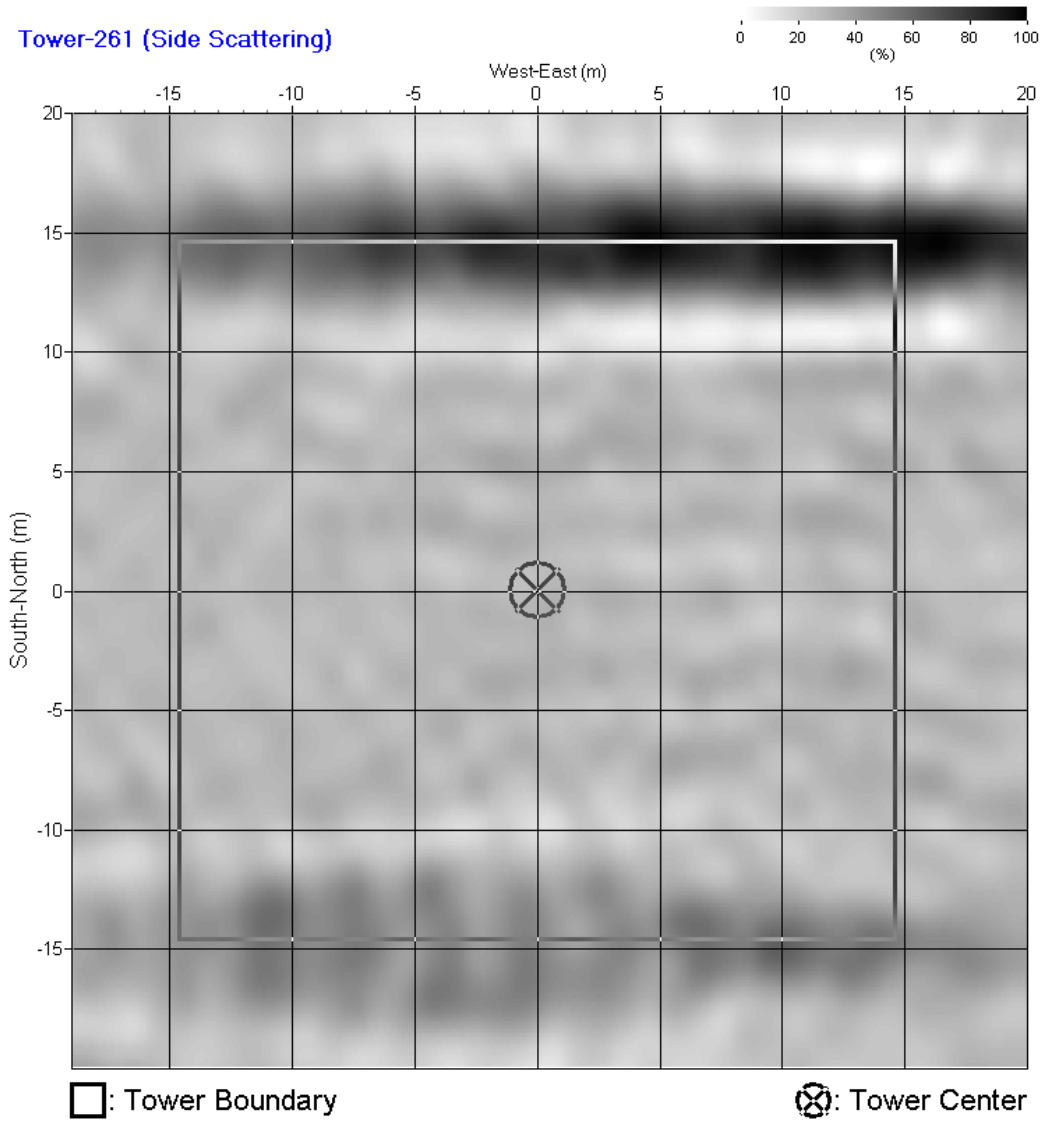
**Potential void (see separate text file for coordinates)

T-260

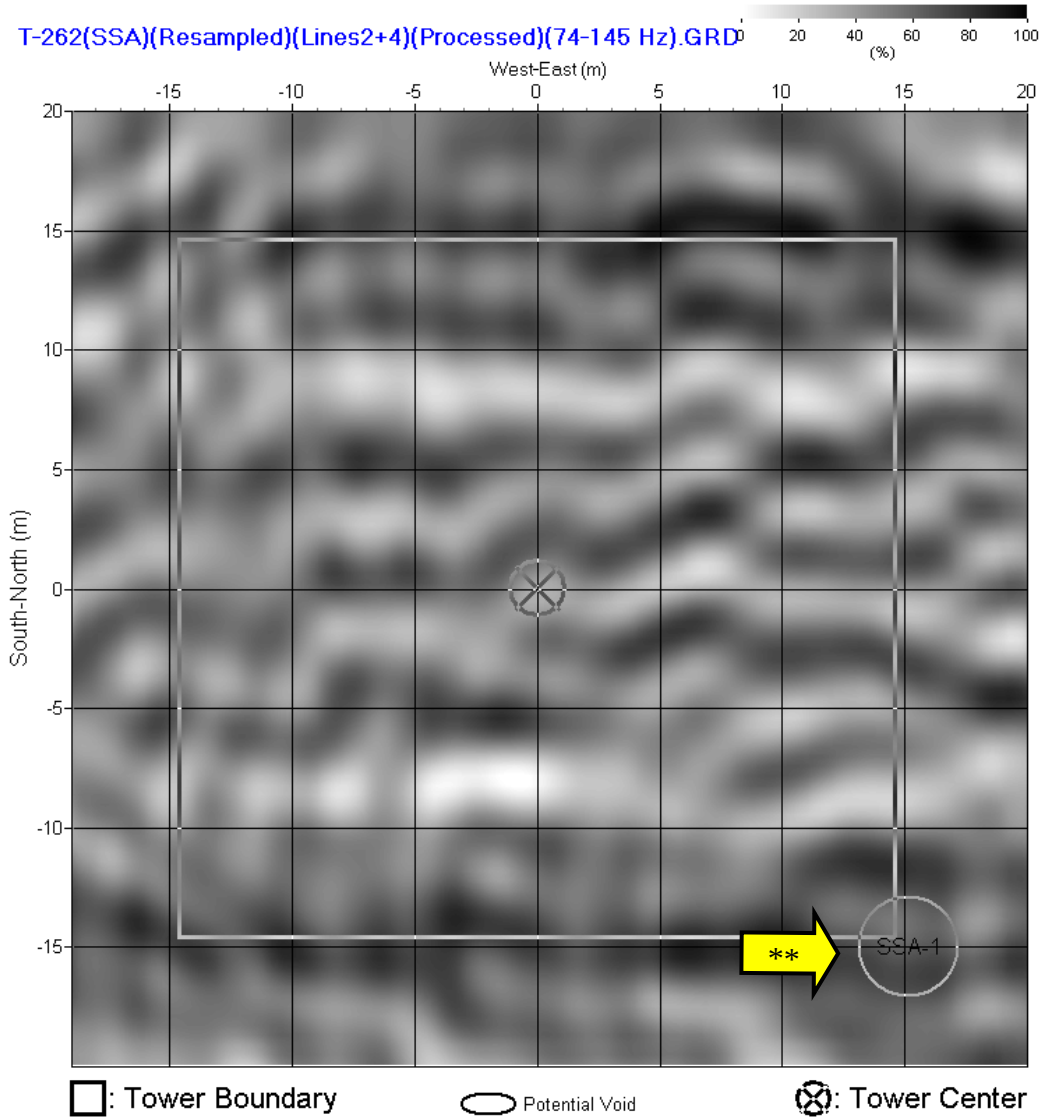


**Potential void (see separate text file for coordinates)

T-261

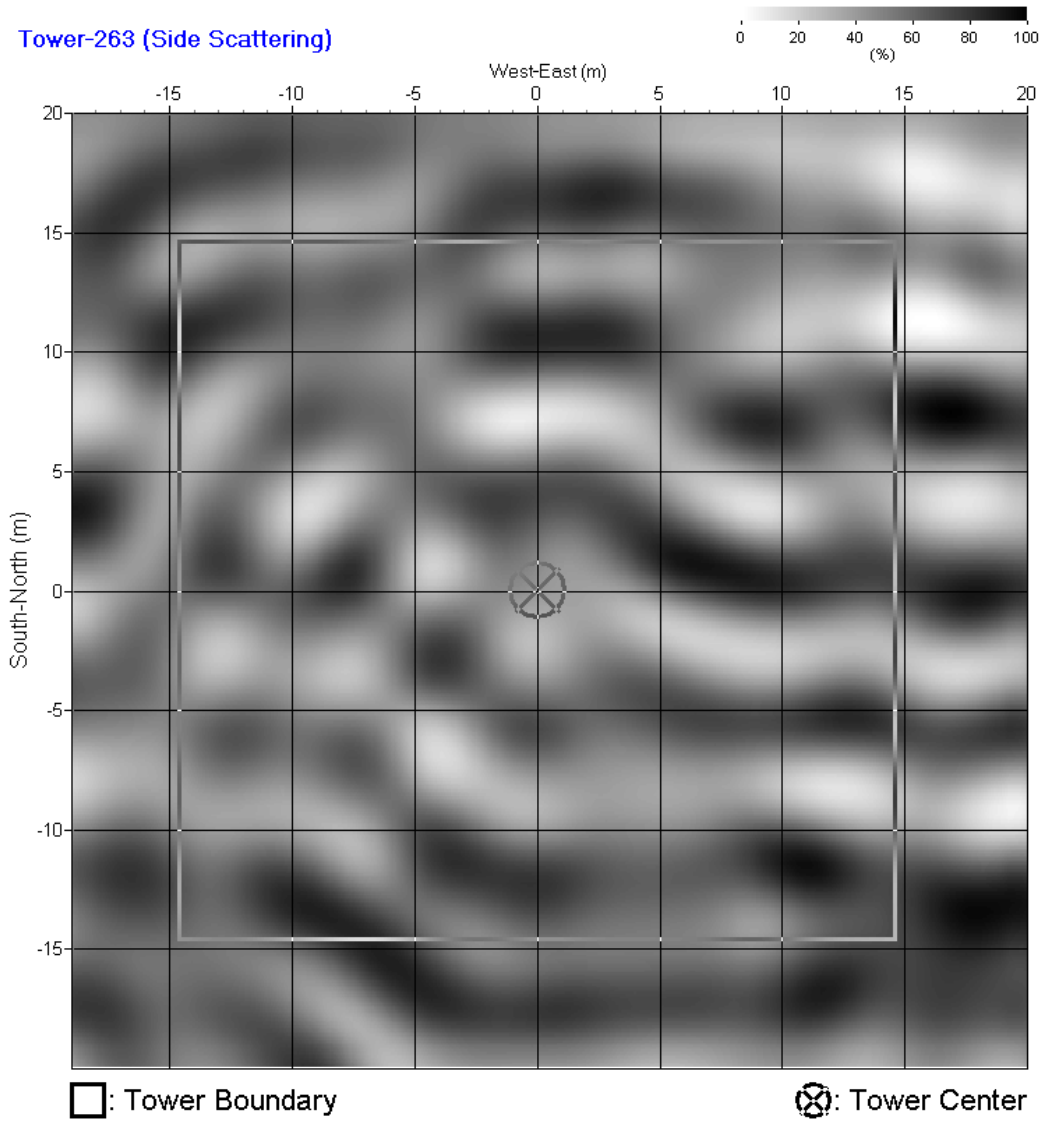

Tower-261 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-262

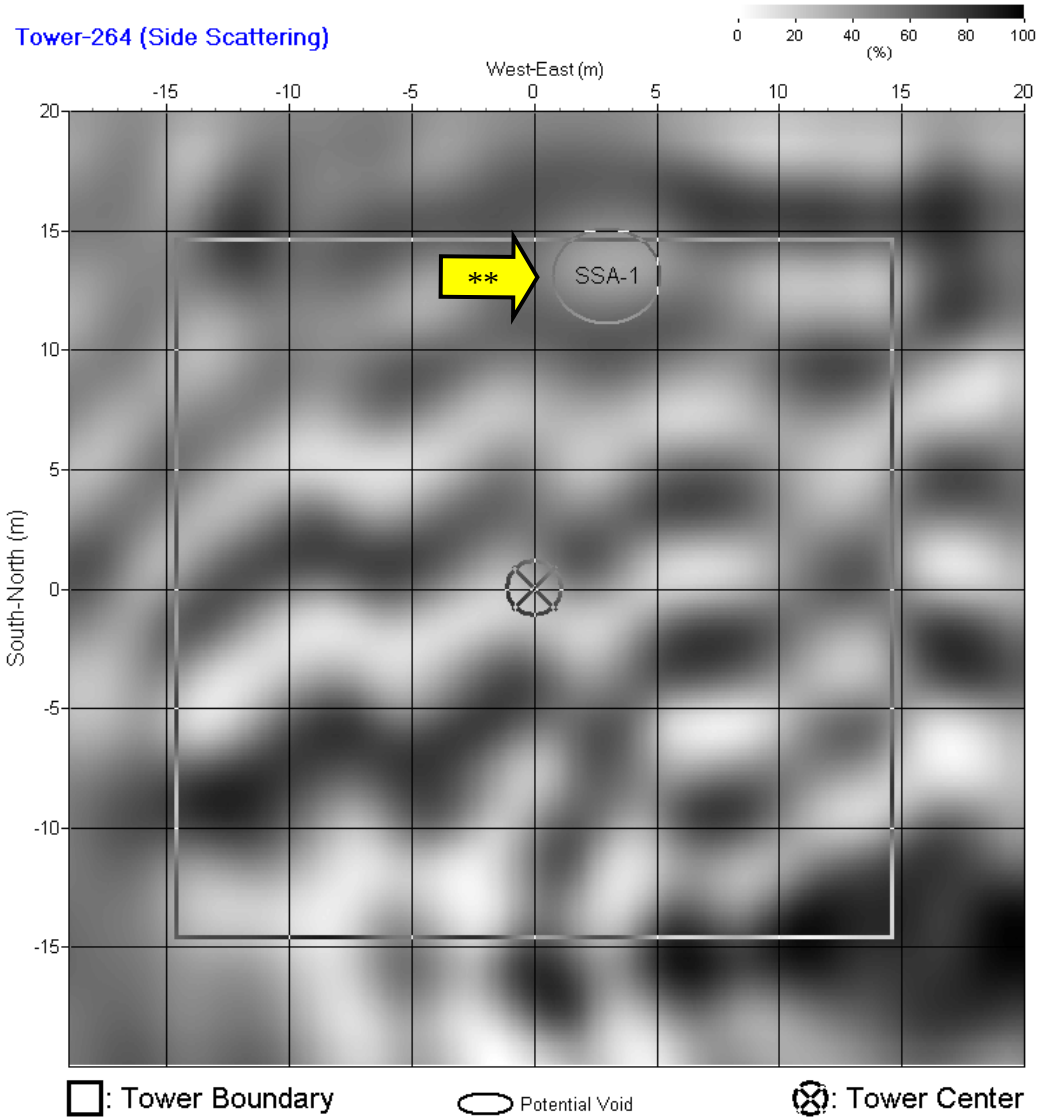


**Potential void (see separate text file for coordinates)

T-263

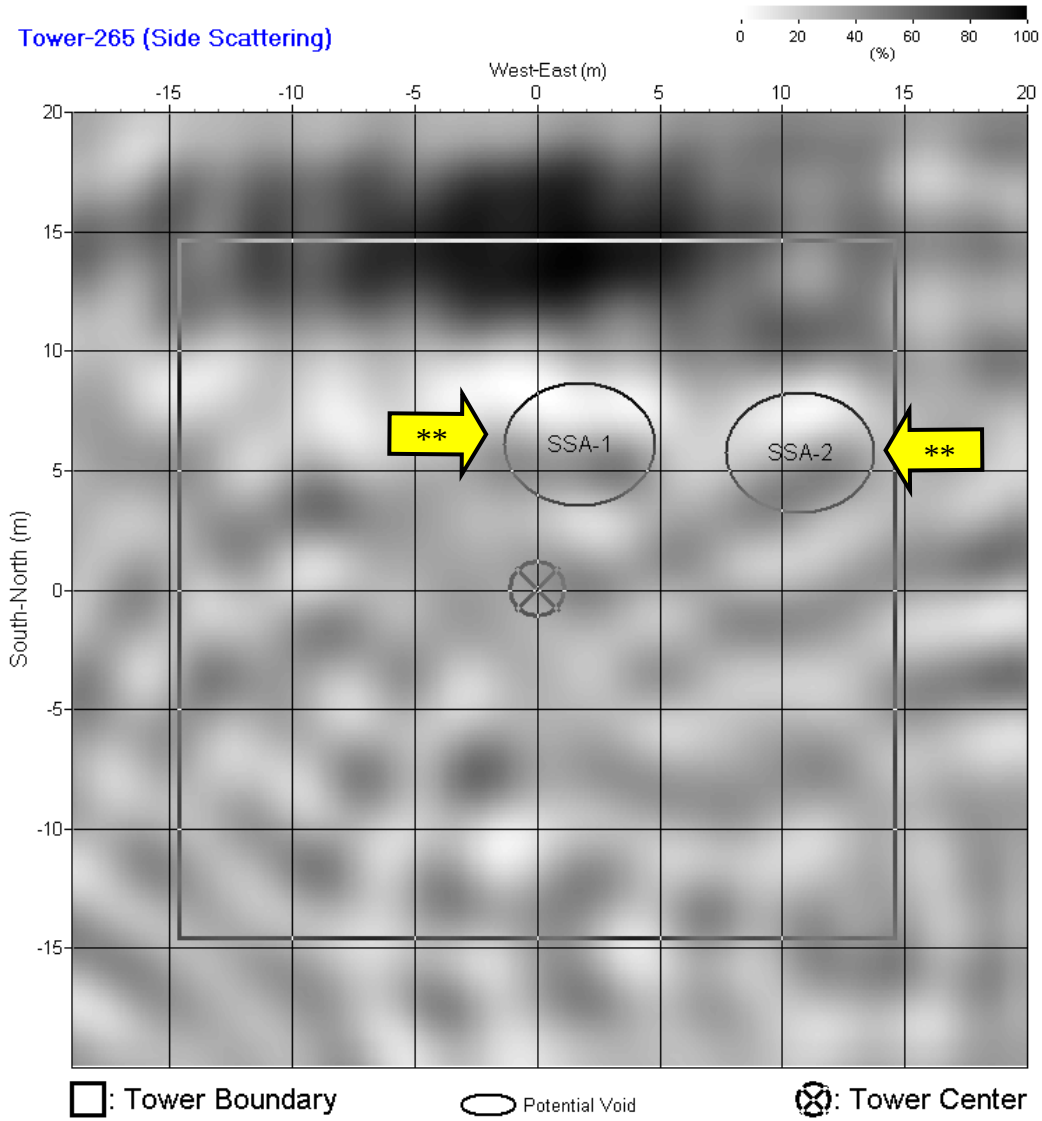

Tower-263 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-264



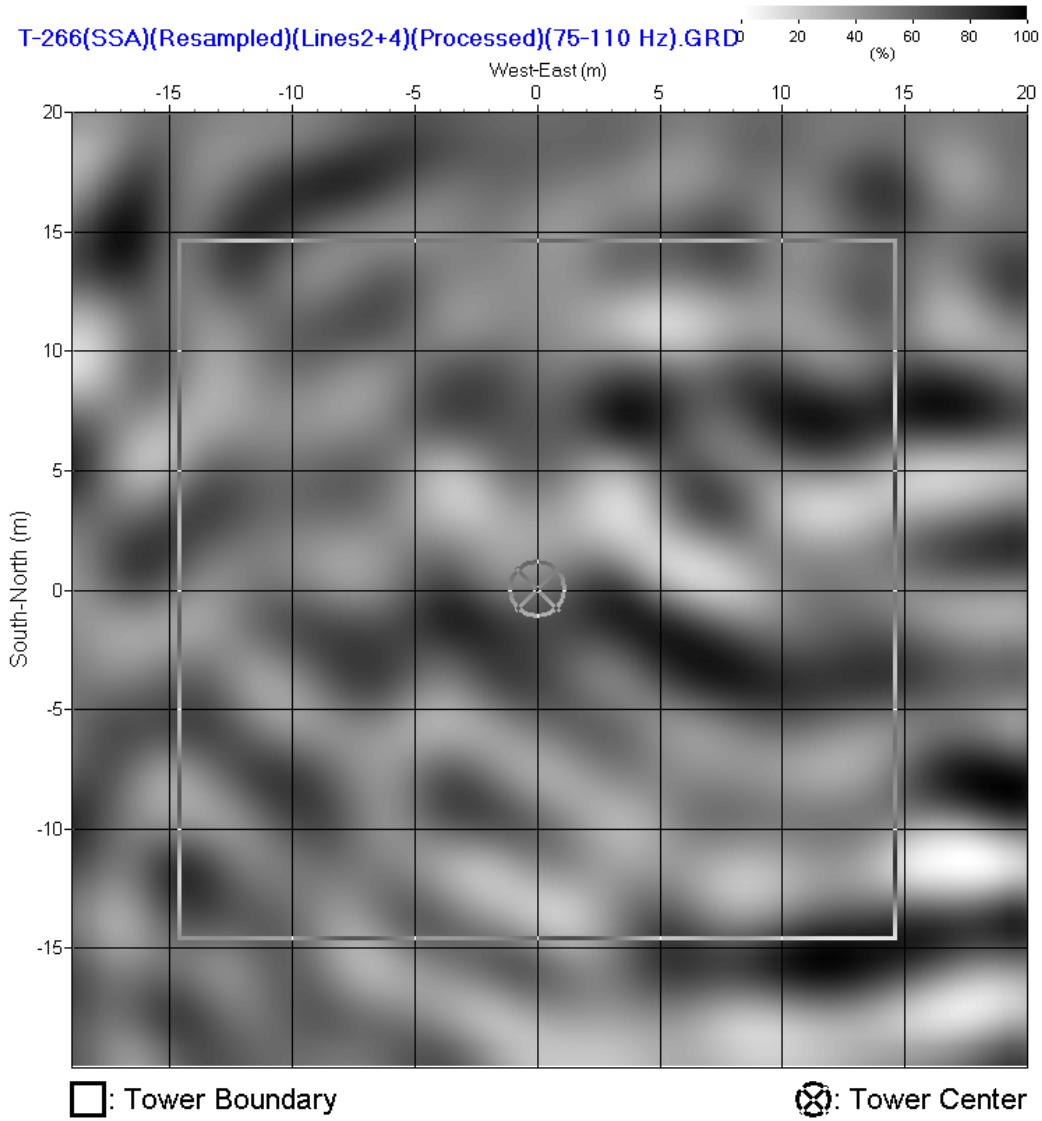
**Potential void (see separate text file for coordinates)

T-265

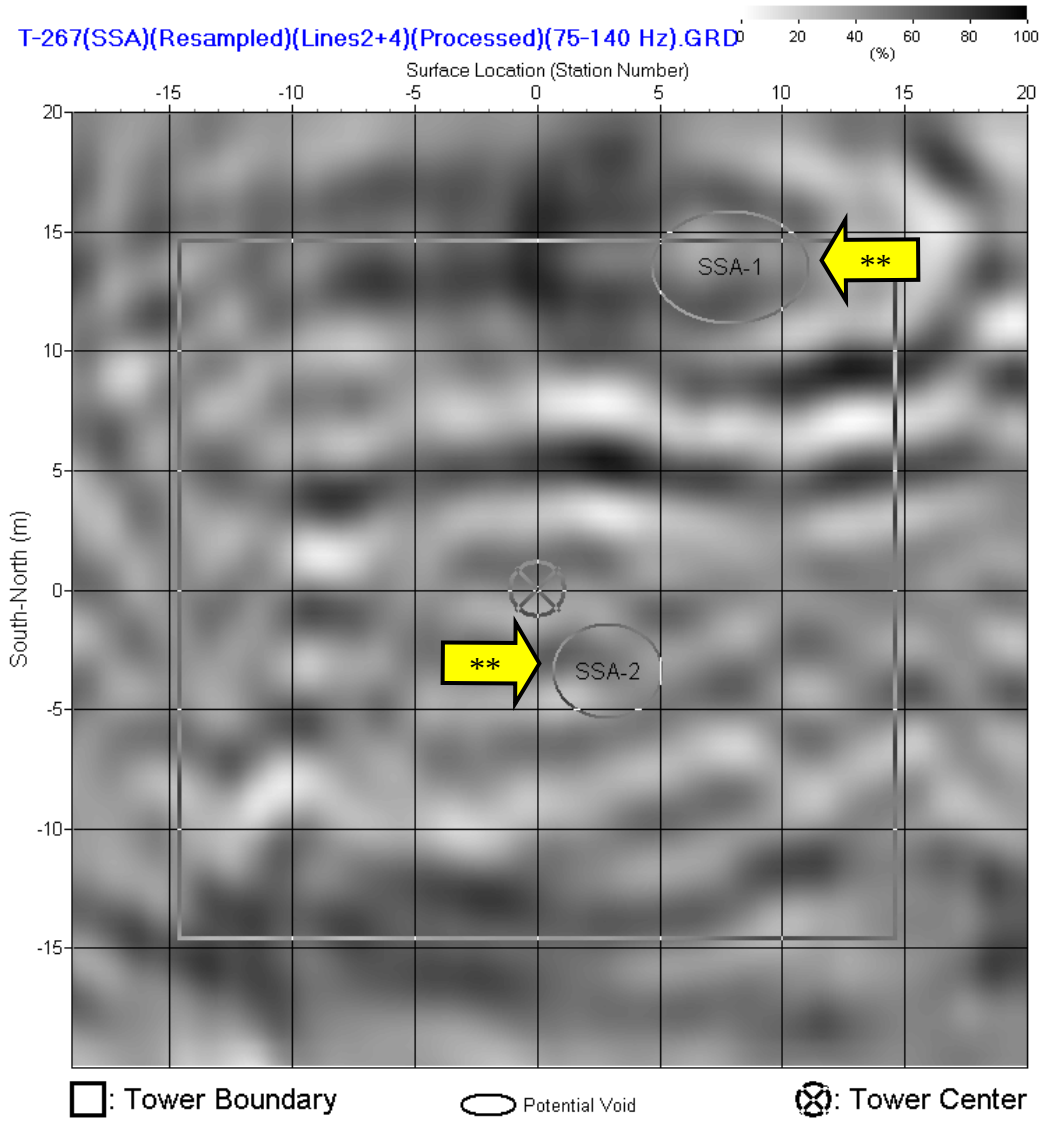


**Potential void (see separate text file for coordinates)

T-266

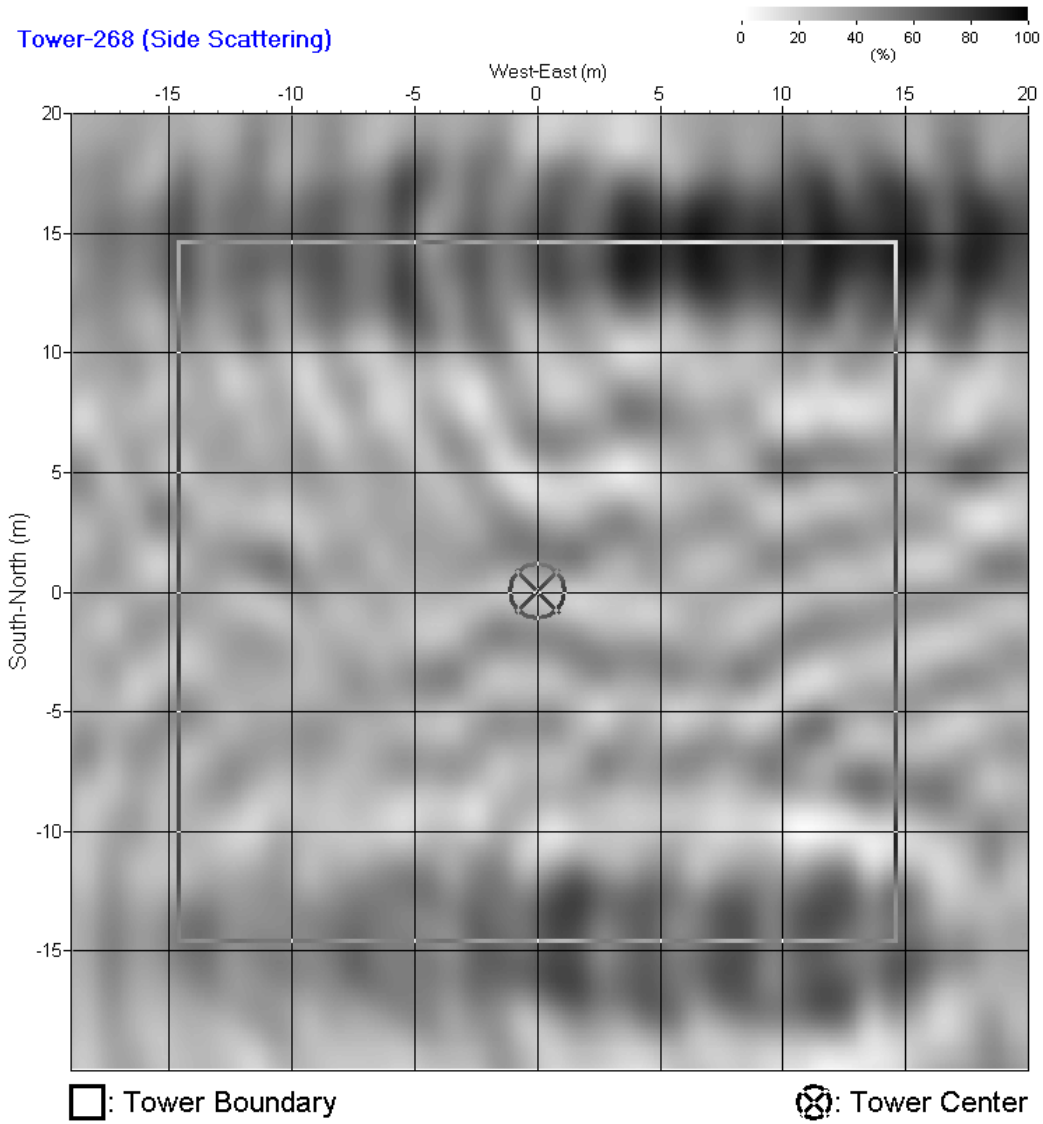

T-266(SSA)(Resampled)(Lines2+4)(Processed)(75-110 Hz).GRD
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-267

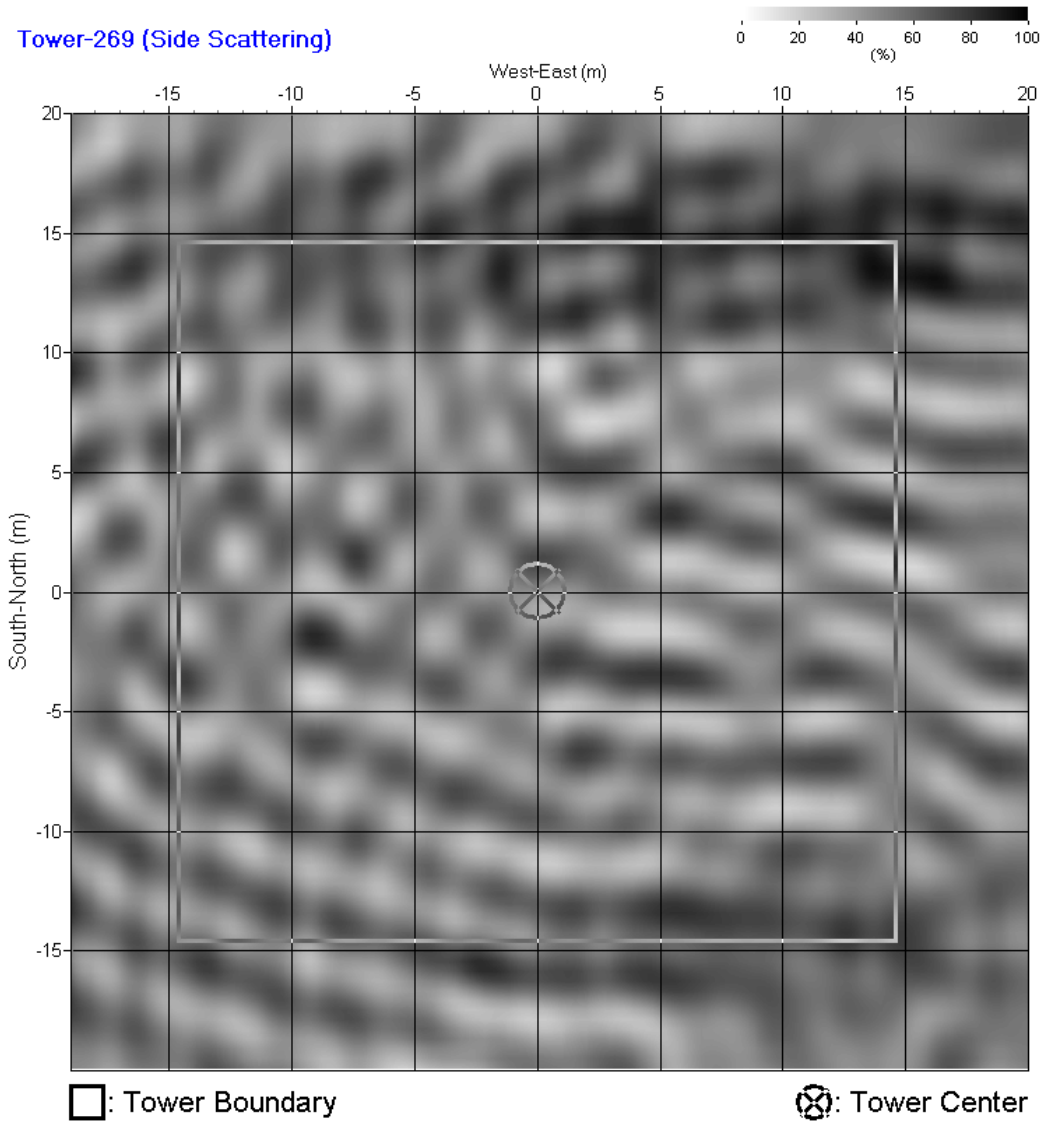


**Potential void (see separate text file for coordinates)

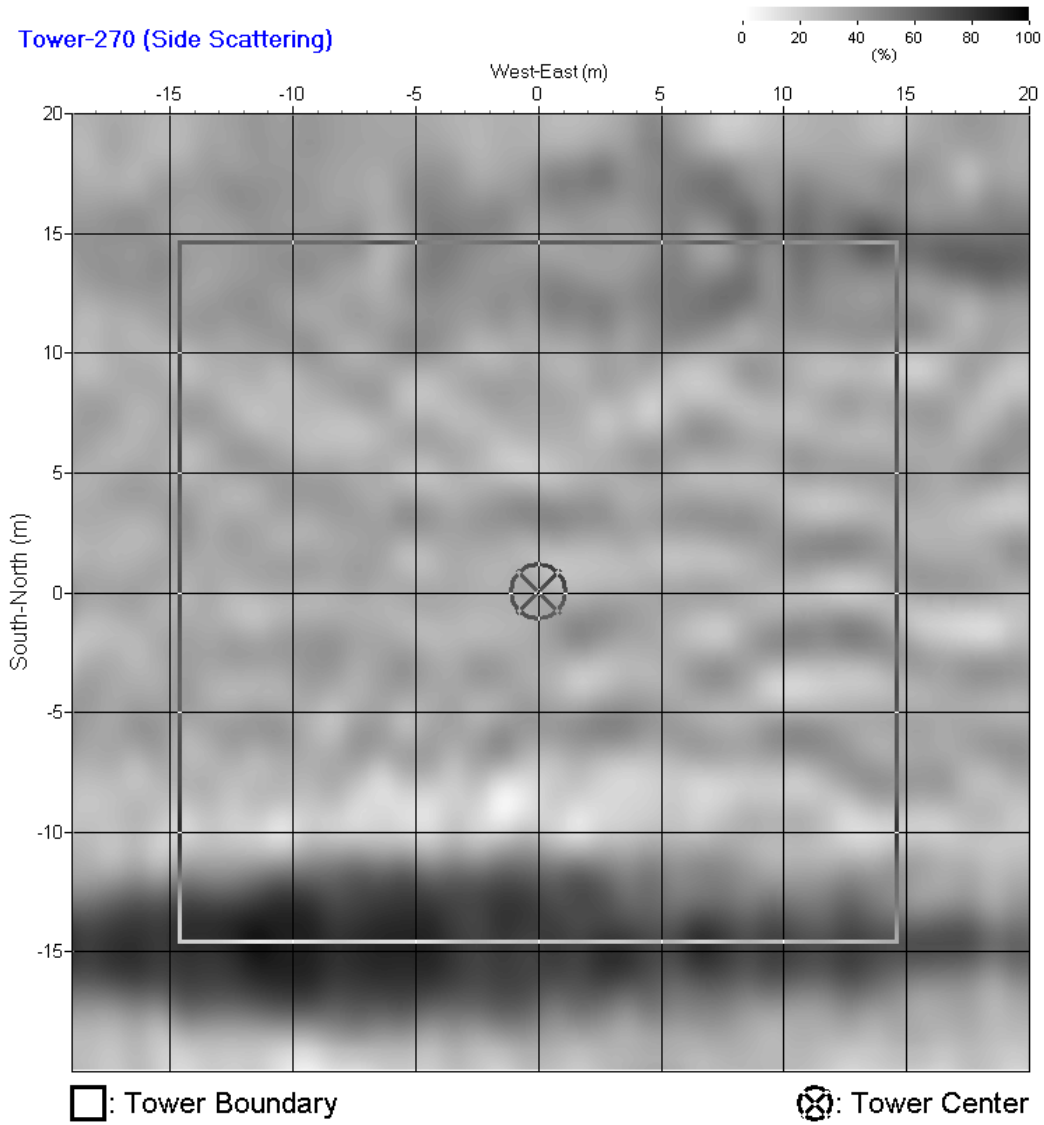
T-268


Tower-268 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

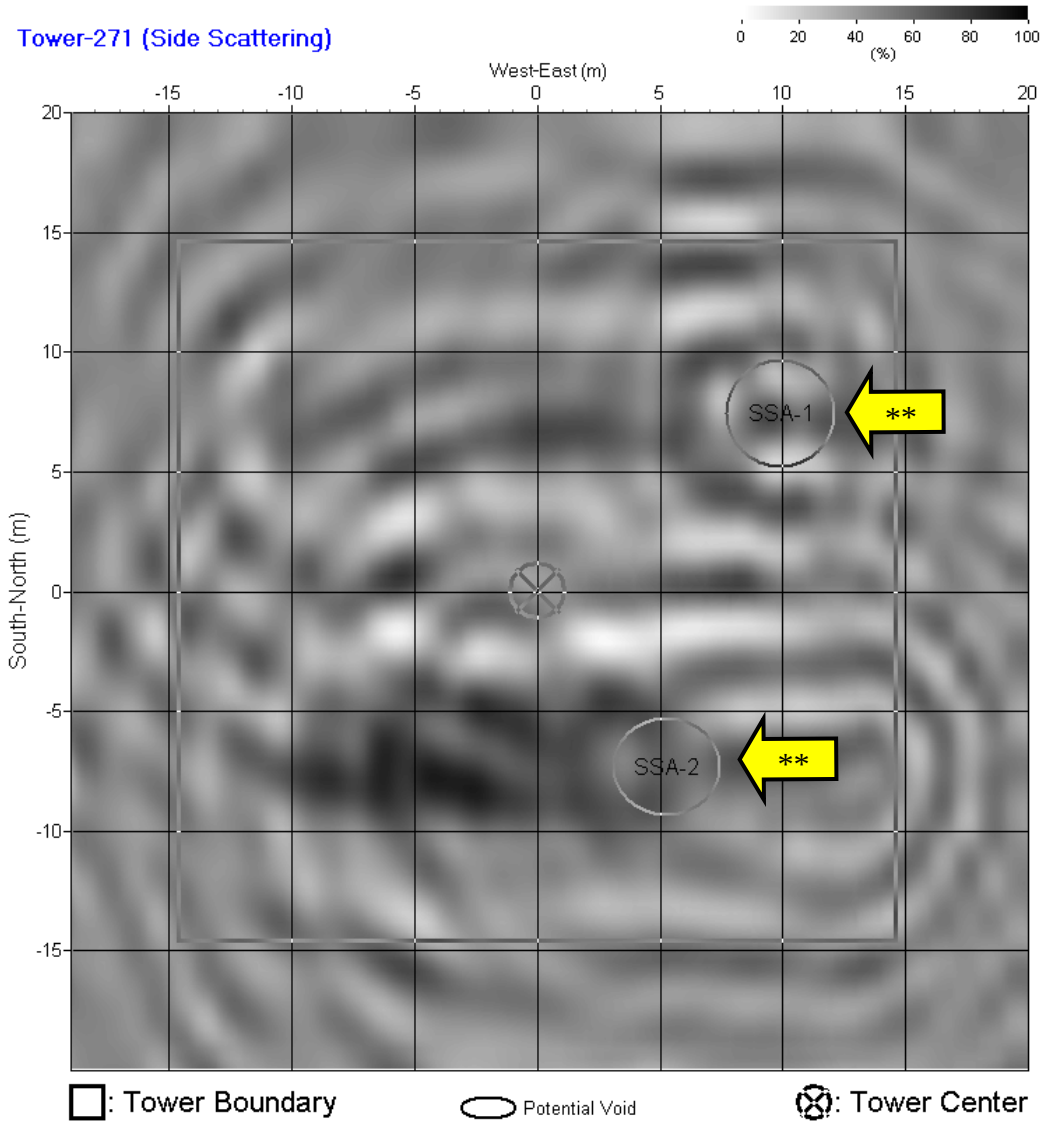
T-269


Tower-269 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-270

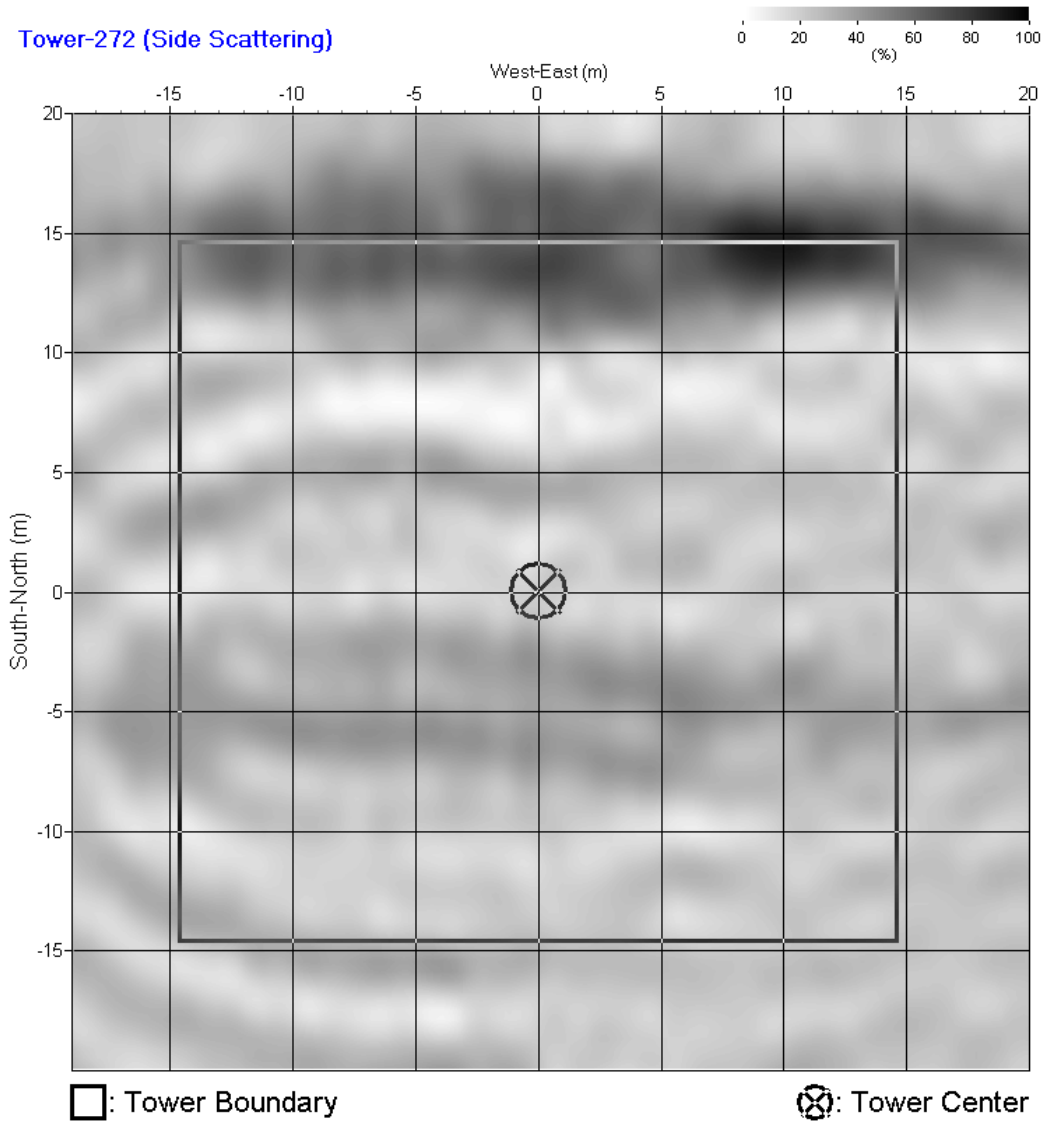

Tower-270 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-271*

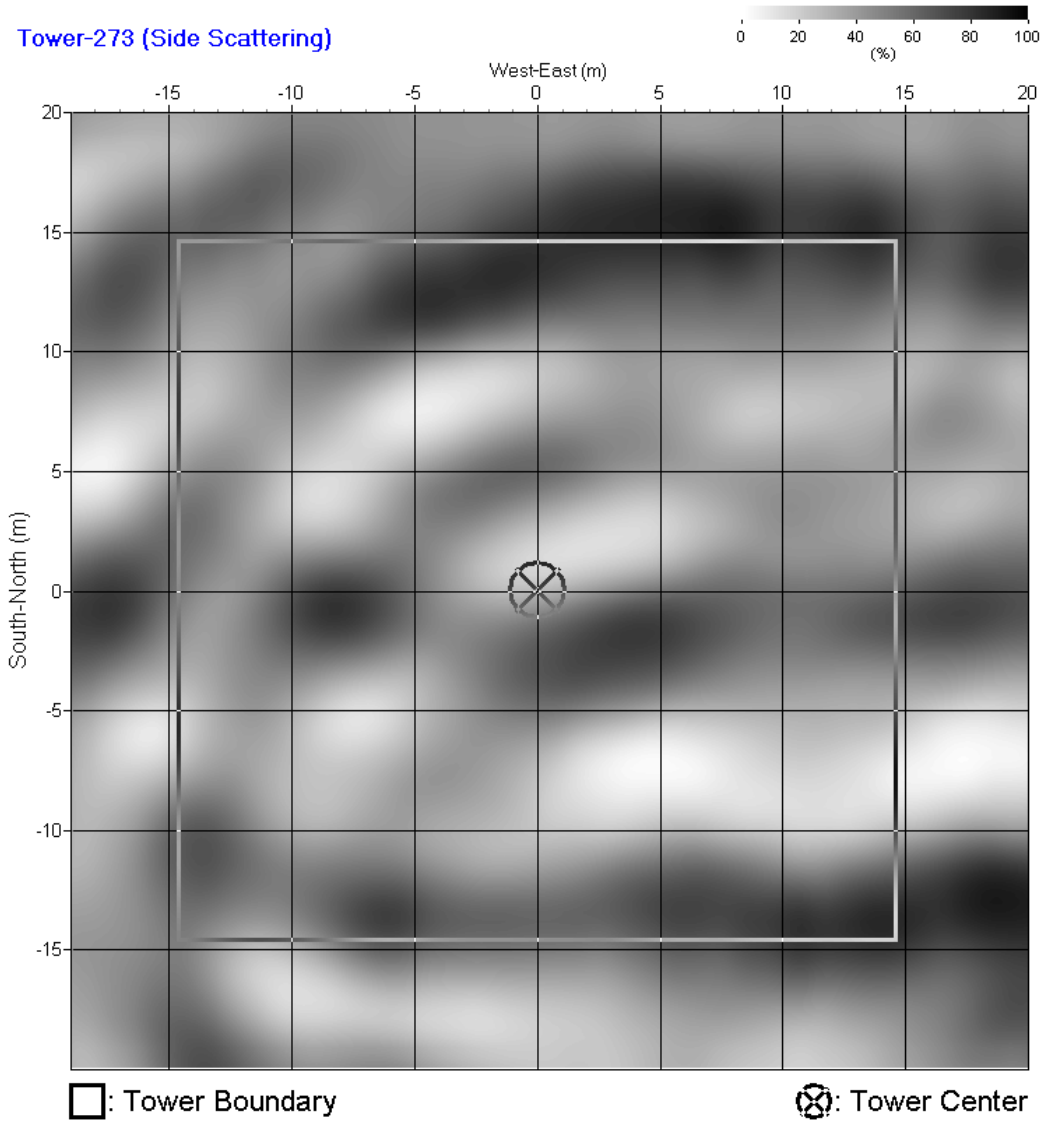


*A shorter receiver spacing of 2 ft was used due to terrain condition. **Potential void (see separate text file for coordinates)

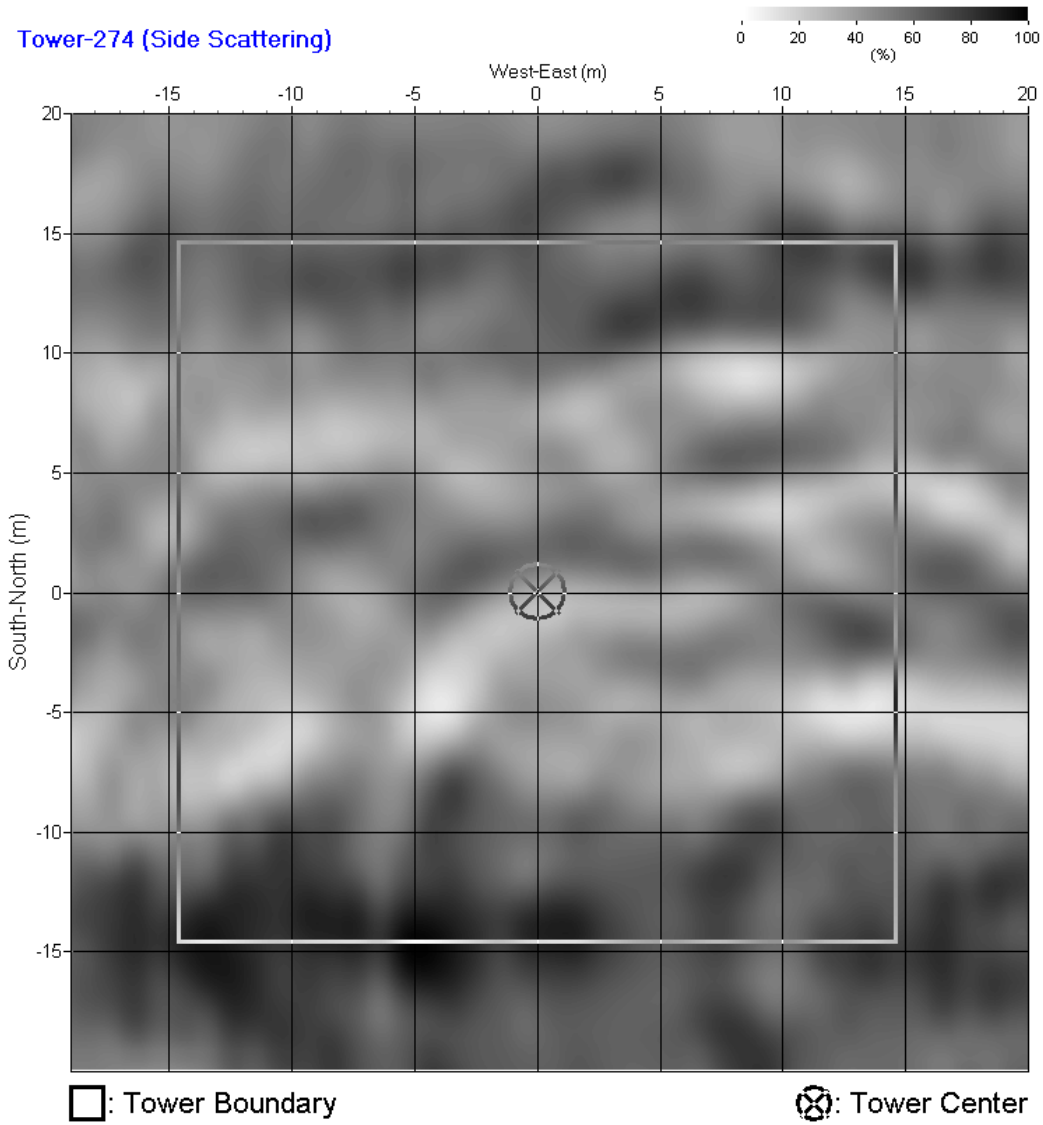
T-272


Tower-272 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

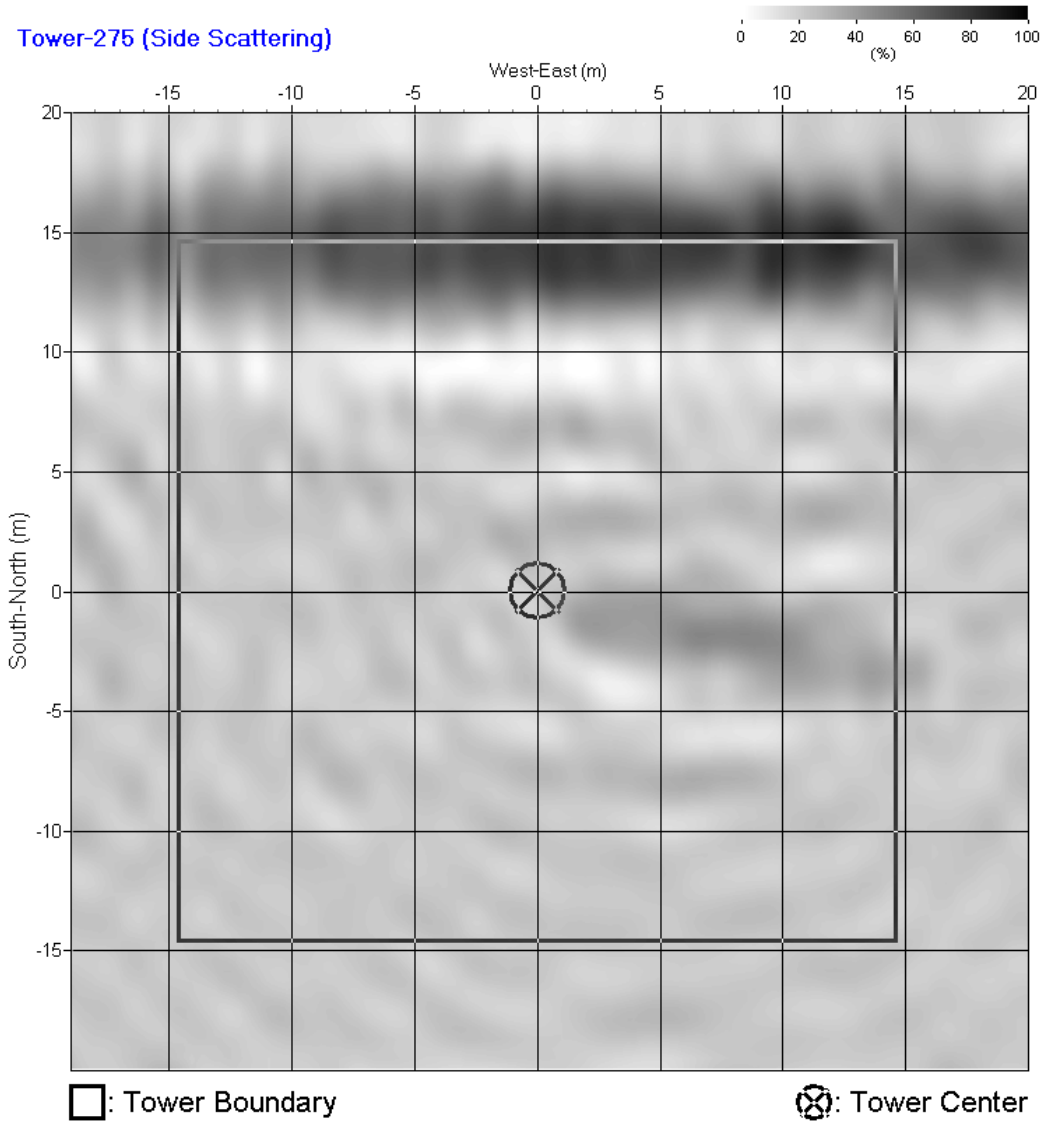
T-273


Tower-273 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-274

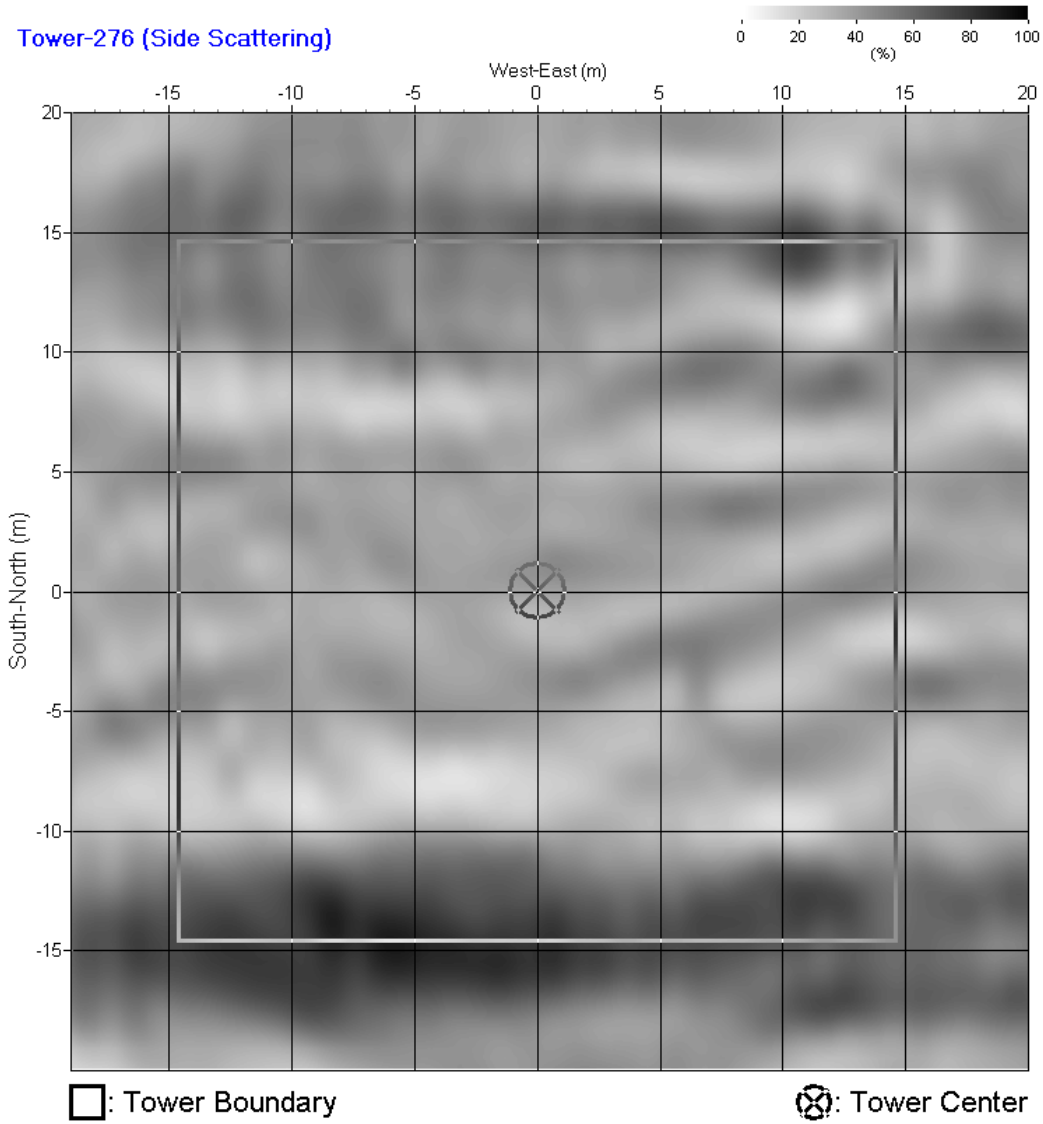

Tower-274 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-275**

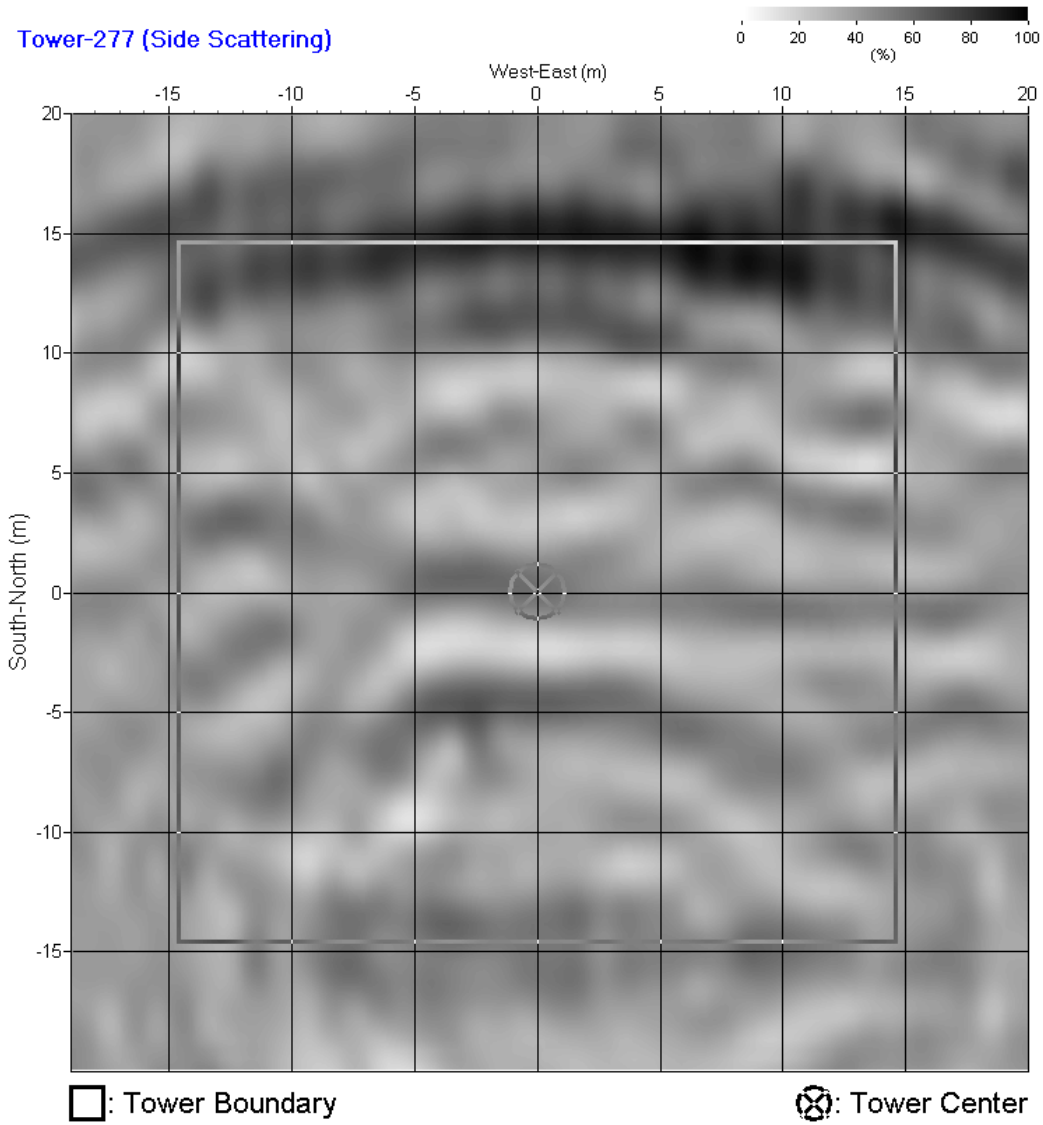


**Only 12 shots were acquired for line 4 due to terrain condition (steep drop off).

T-276

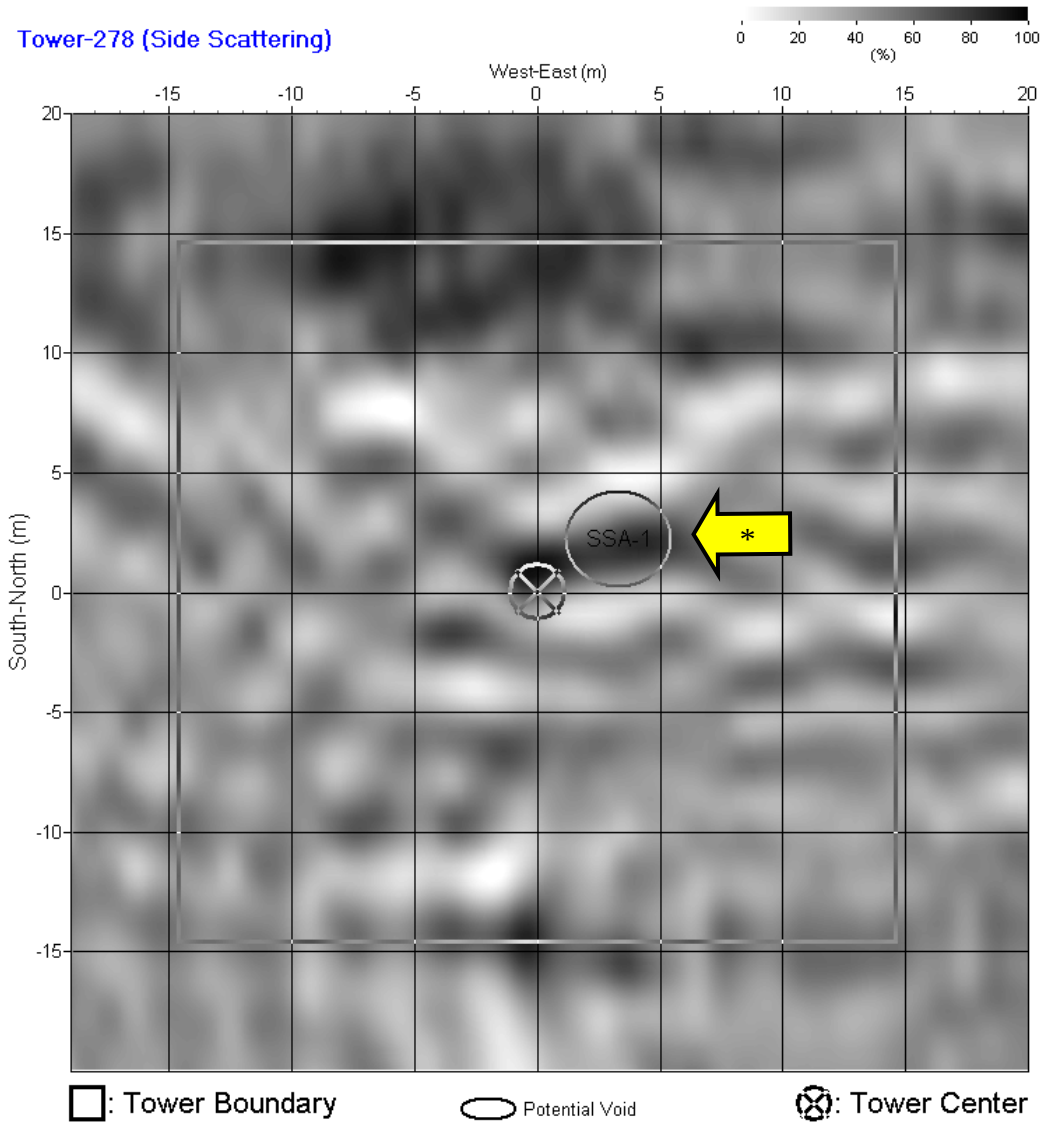

Tower-276 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-277**



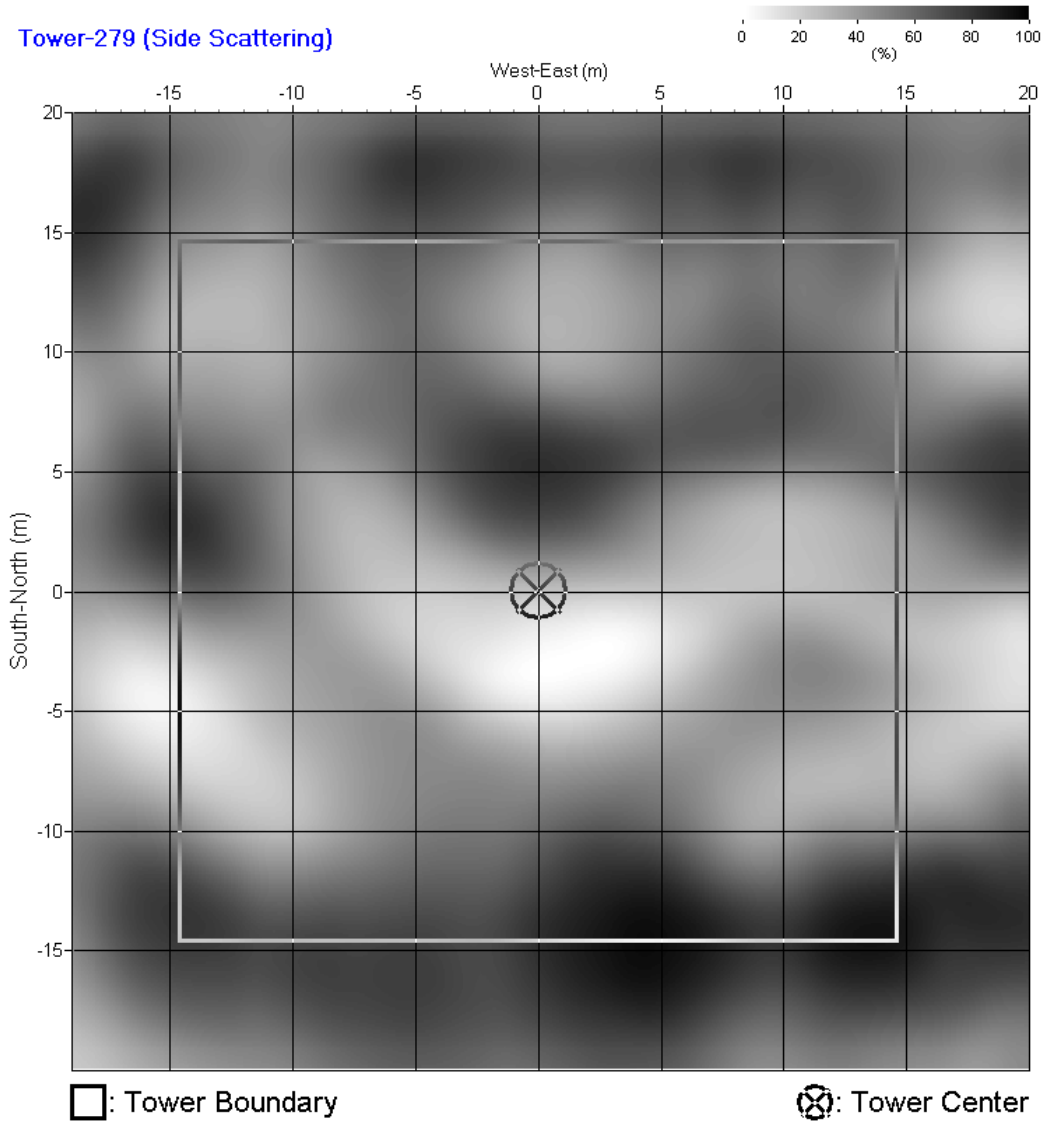
**Data acquired for a limited (half) space in Line 4 due to terrain condition (seep drop off)

T-278

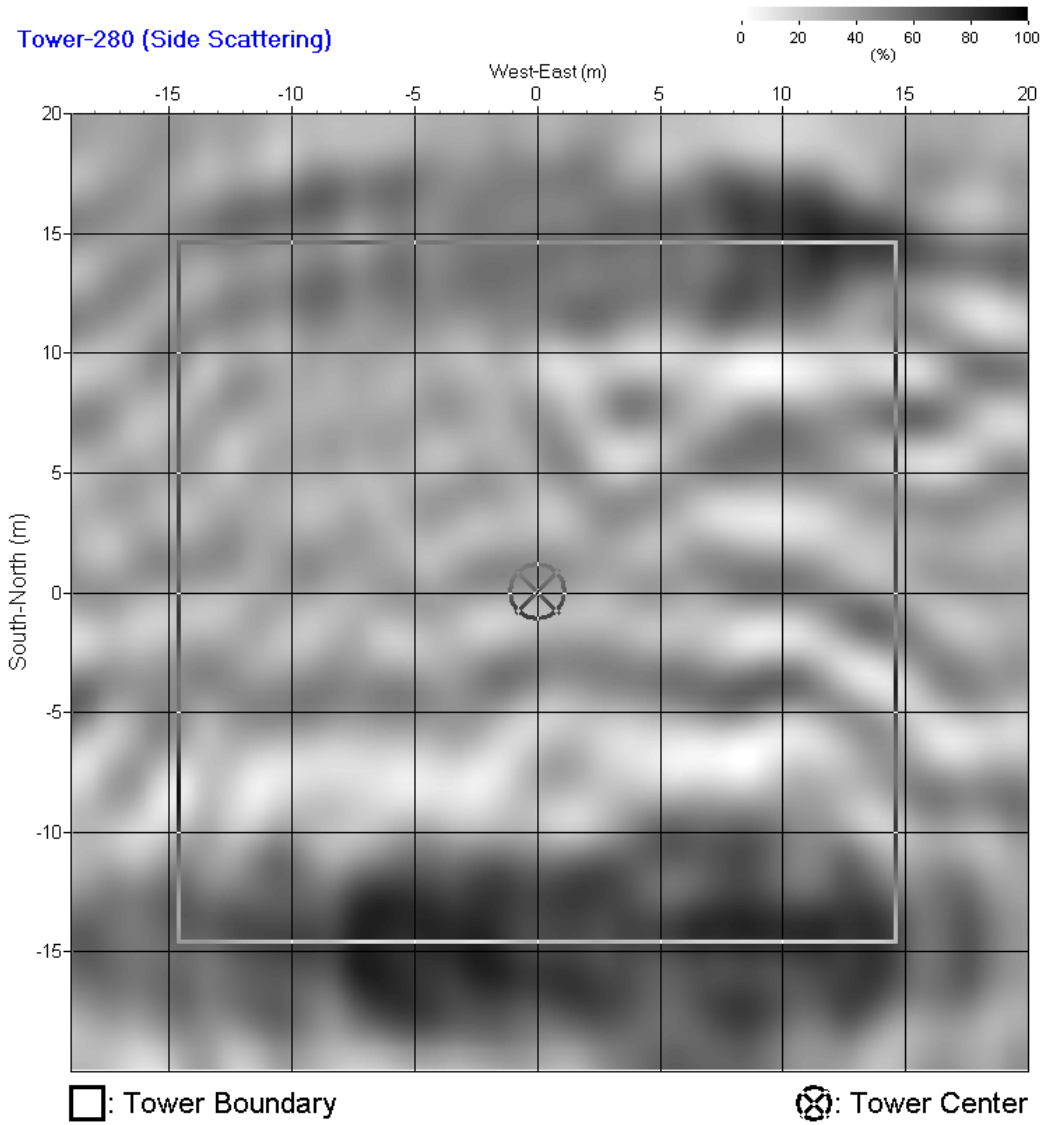


*Potential void (see separate text file for coordinates)

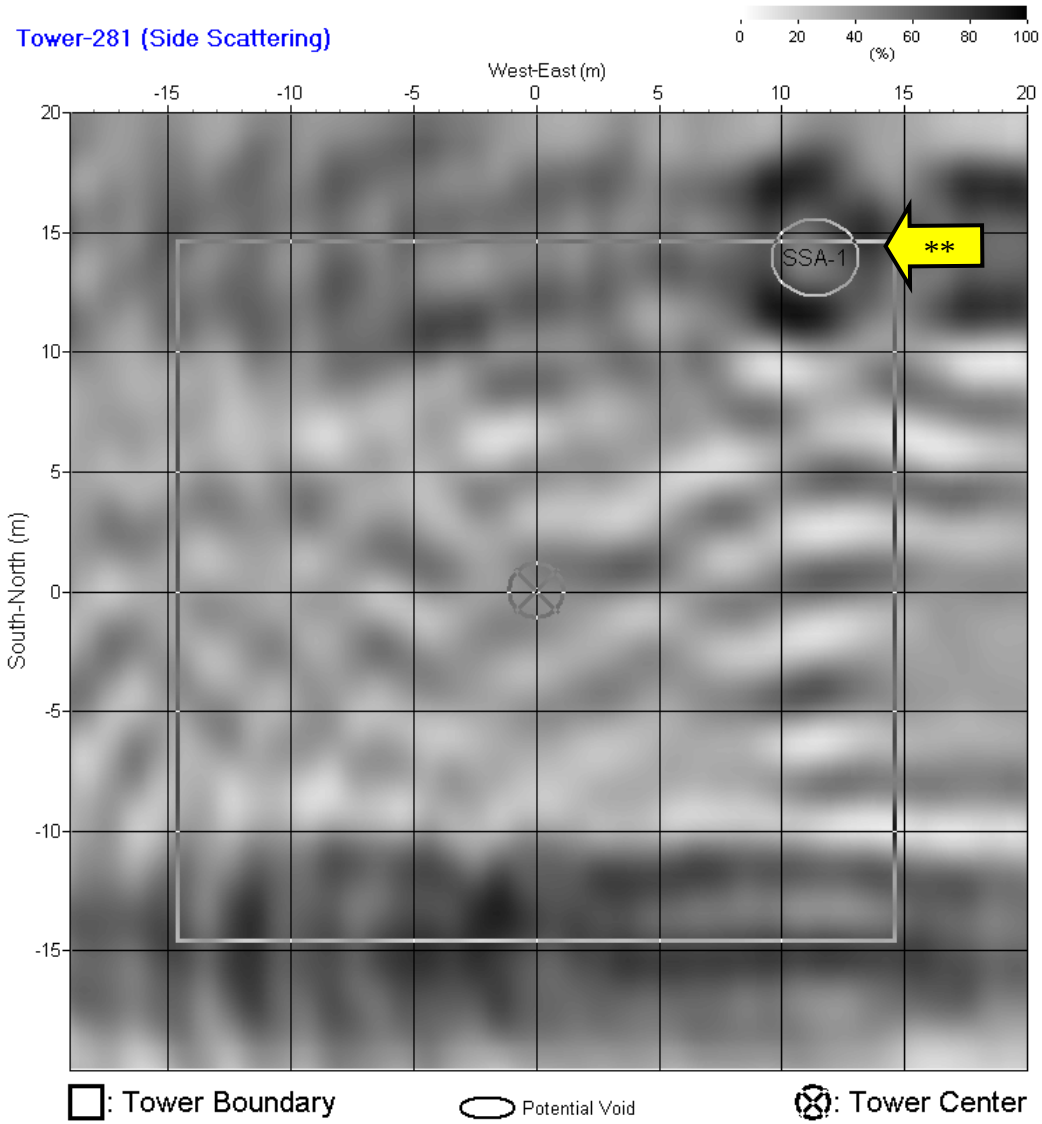
T-279


Tower-279 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-280

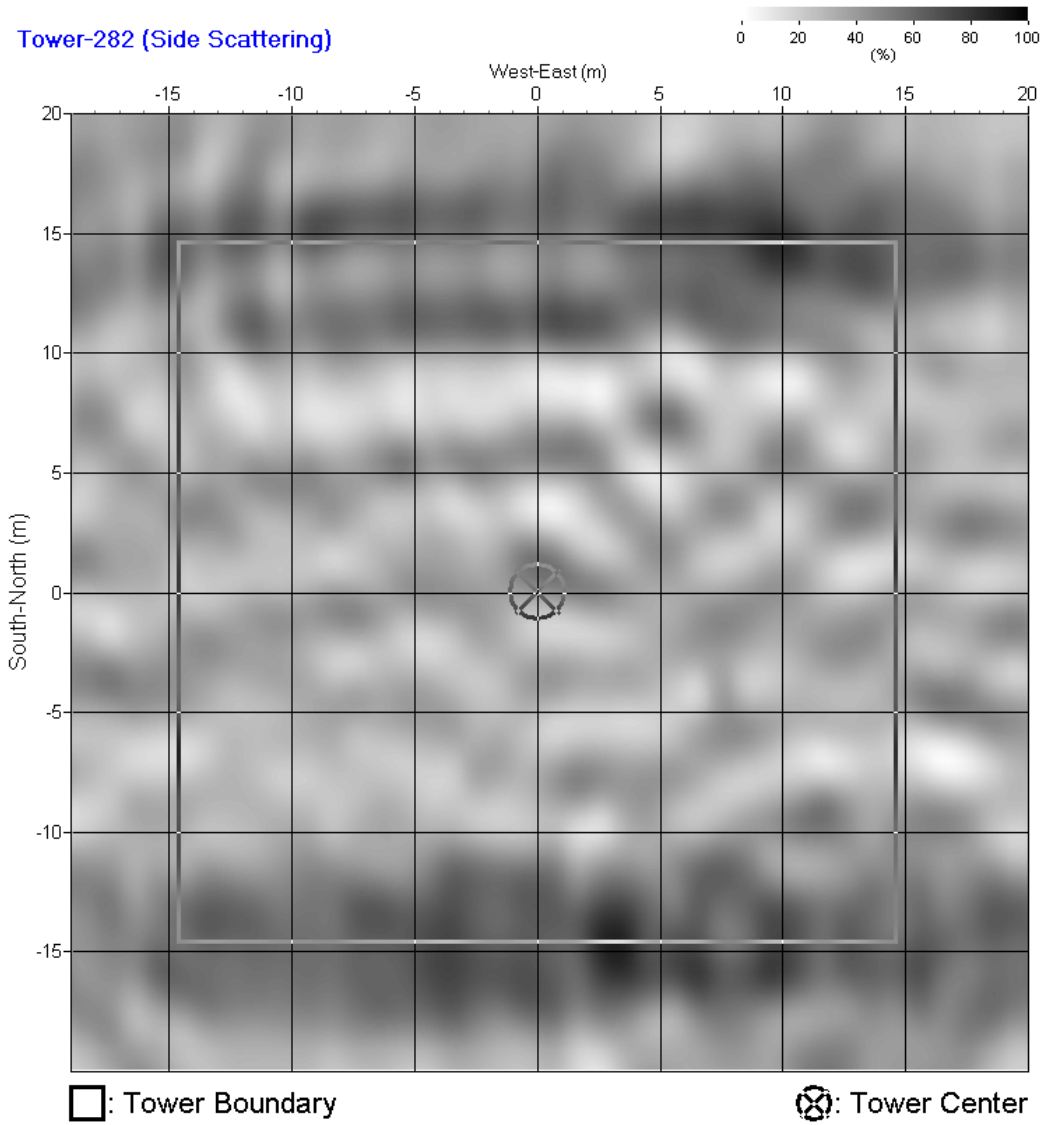

Tower-280 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-281

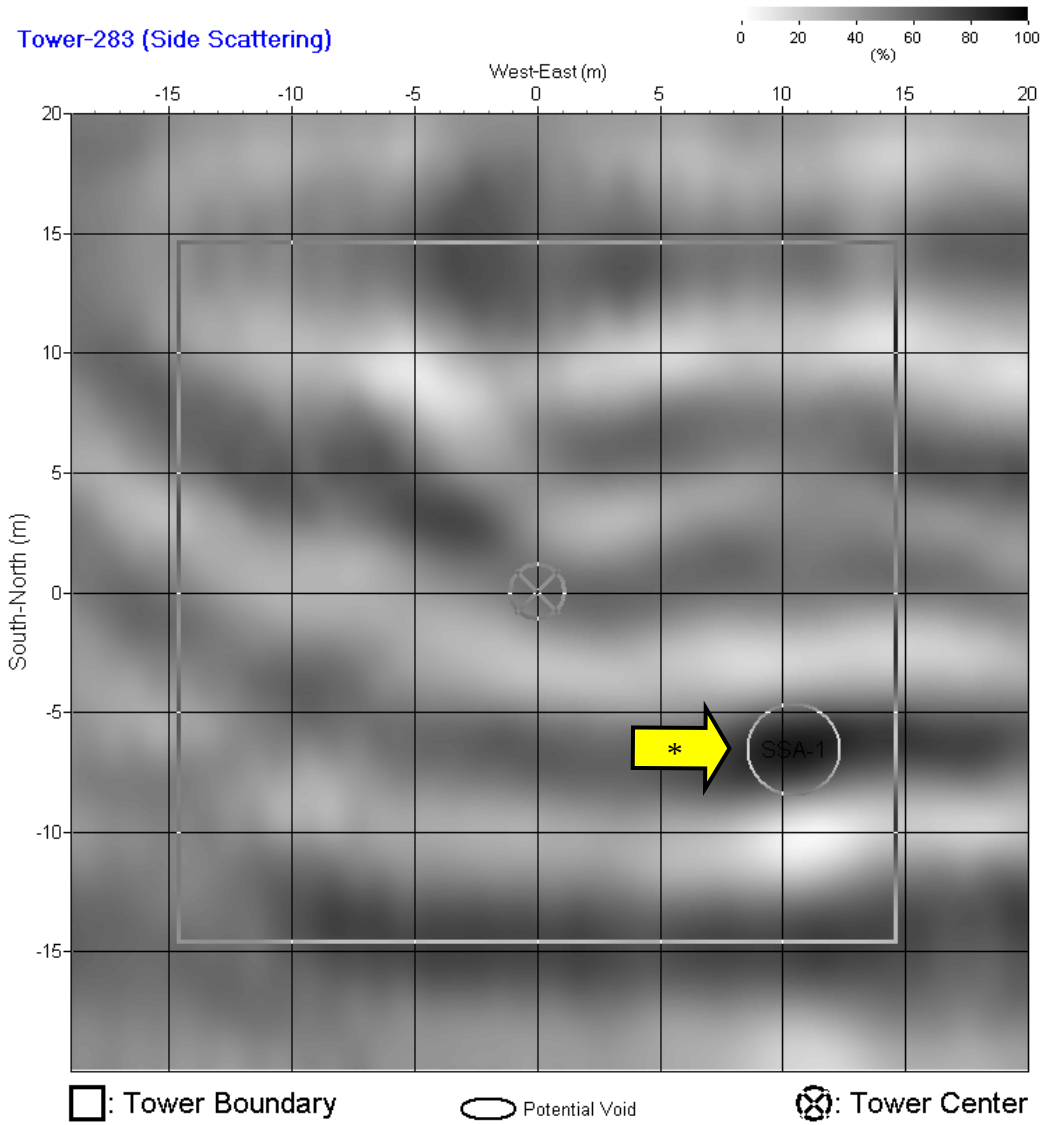


**Potential void (see separate text file for coordinates)

T-282

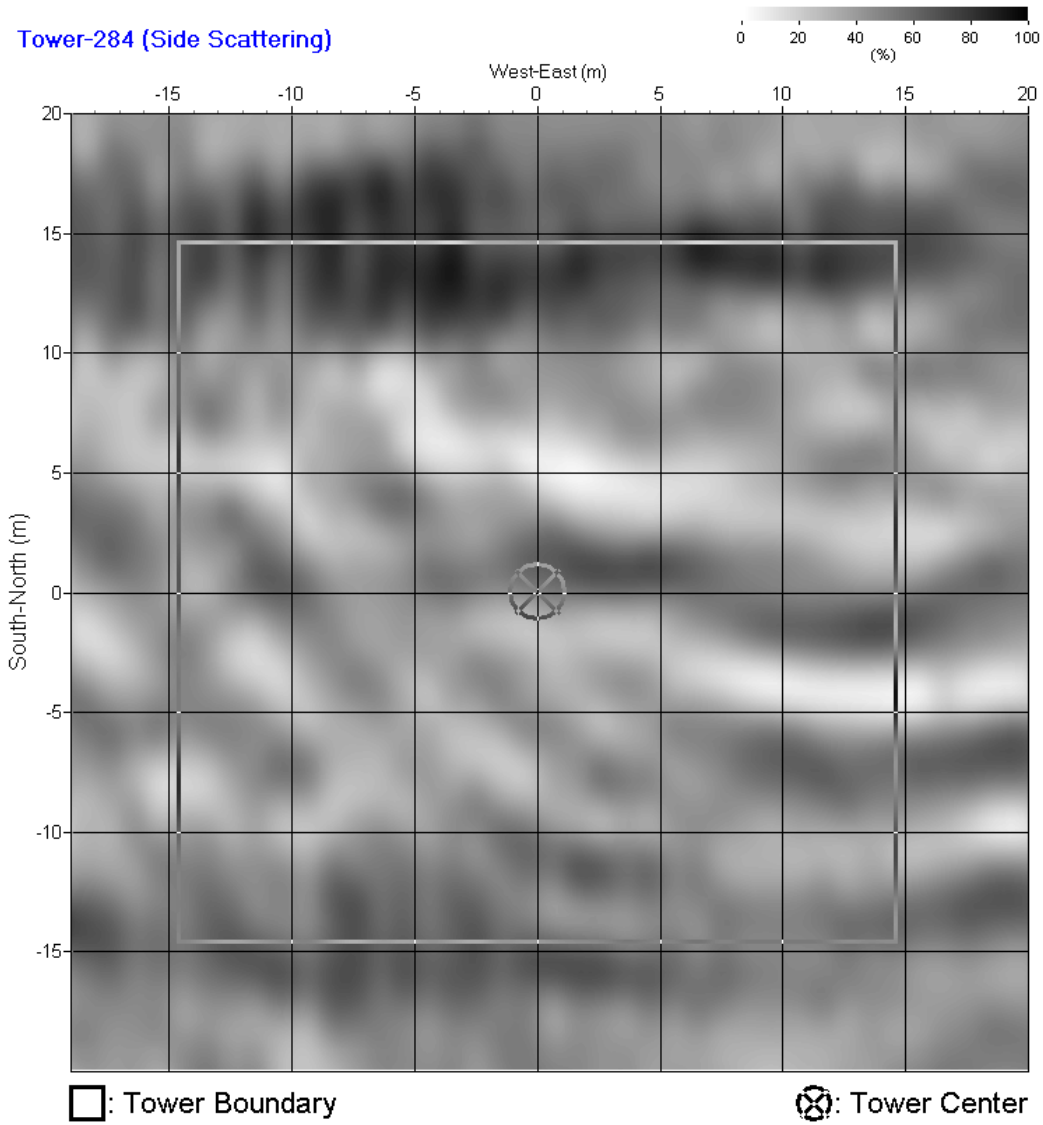

Tower-282 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center

T-283



*Potential void (see separate text file for coordinates)

T-284


Tower-284 (Side Scattering)
0
20
40
60
80
100
(%)
West-East (m)
-15
-10
-5
0
5
10
15
20
South-North (m)
: Tower Boundary
: Tower Center