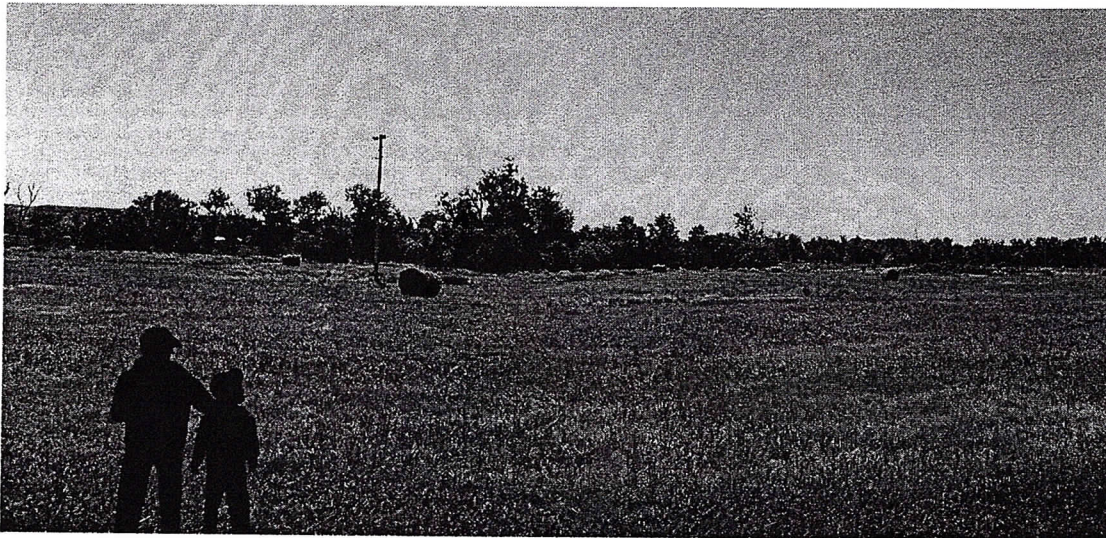


“DADDY, I DON’T SEE A FORT”

*A popular presentation of geophysical findings at Fort Pierre Chouteau National
Historic Landmark*

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“It’s just a field!”



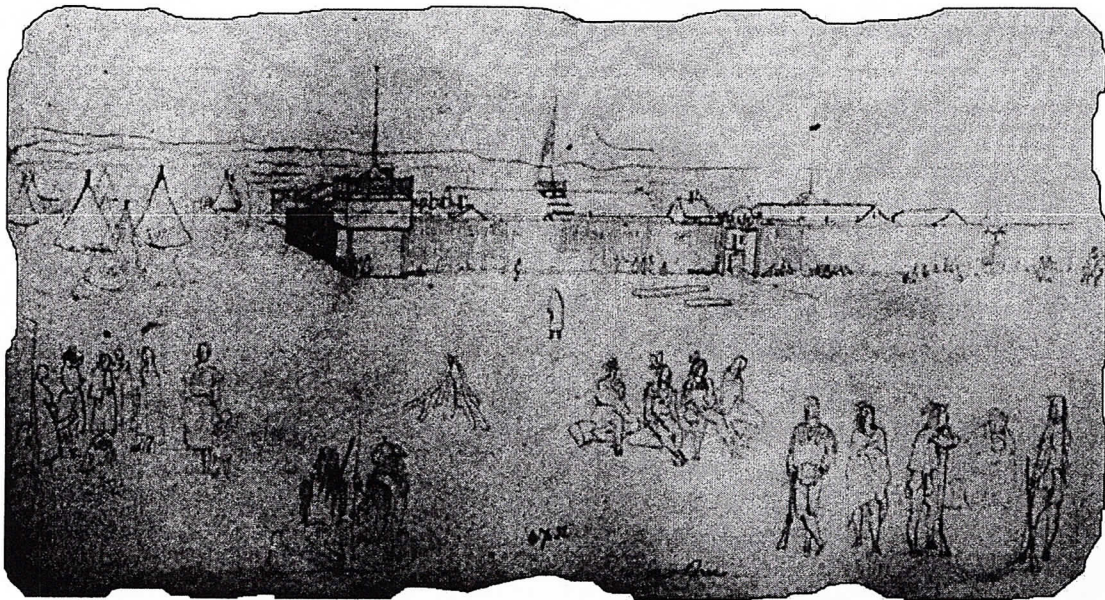
1. The site of Fort Pierre Chouteau today

Look again!

A first glance onto the site of Fort Pierre Chouteau reveals a prairie with a walkway, a small monument, a lone tree, a utility line, and little else. This could seem quite anticlimactic to a child or adult who has come to view this important site in South Dakota’s, and our nation’s, history.

Named for Pierre Chouteau, Jr., an enterprising trader, the “fort” was really a fortified trading post that played an important role in the American fur trade for almost 25 years in the mid-nineteenth century. In 1832, when it was founded, the Missouri River flowed right next to this field, just below the tree line to the east. Steamships could navigate up

and down the river in those days, bringing manufactured goods to this outpost of civilization, and returning with mounds of furs traded for those goods by Native Americans. Furs would be shipped down river to St. Louis, more than a thousand river miles away, and then on to points on the East Coast and eventually overseas. In return, goods distributed at the trading post included staples like guns, beads, tobacco, blankets, flour, and coffee. In 1855 the trading post was sold to the U.S. Army, and it became a military fort with new buildings outside of the compound. Its life as a military post only lasted a few years, when it was ultimately abandoned in favor of other outposts, such as Fort Randall a couple of hundred miles downstream.



2. Fort Pierre Chouteau as Rudolf Friederich Kurz saw it in 1851

As the years passed and the fort was left to decay all traces of it eventually disappeared. Most people will simply think that is the end of the story, that nothing more remains, and therefore nothing new can be learned about this once dynamic place.

That is not exactly true.

Although nothing on the surface attests to the trading post and the many past activities that occurred there, this field holds many secrets. To see what truly remains we must return back to a time when the Missouri River lapped at the nearby shore and boats ferried supplies and trade on the river. There were no cars or even trains at this time. There were no cell phones or telephones. Communication came by word of mouth or by letters as boats arrived, often months after they were sent. This was the life of the fur trade in the 1830s.

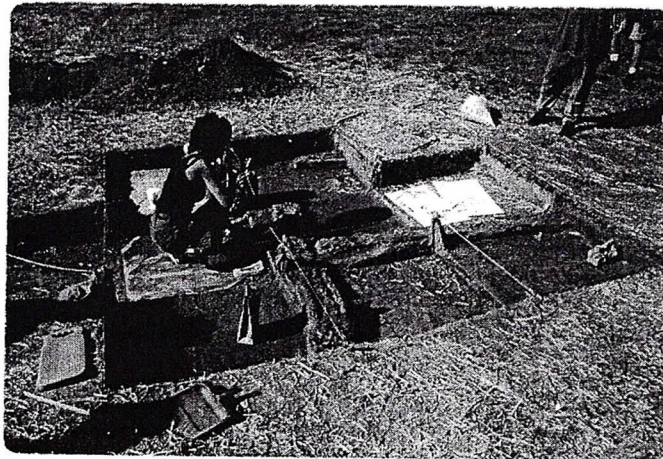
How Can We Learn About the Past?

History can tell us about the past through documents, but most people did not leave their story behind in written records so we do not know about them, what they did, or even how they lived. After all, few people could even read or write in the mid-nineteenth century when Fort Pierre Chouteau was occupied!



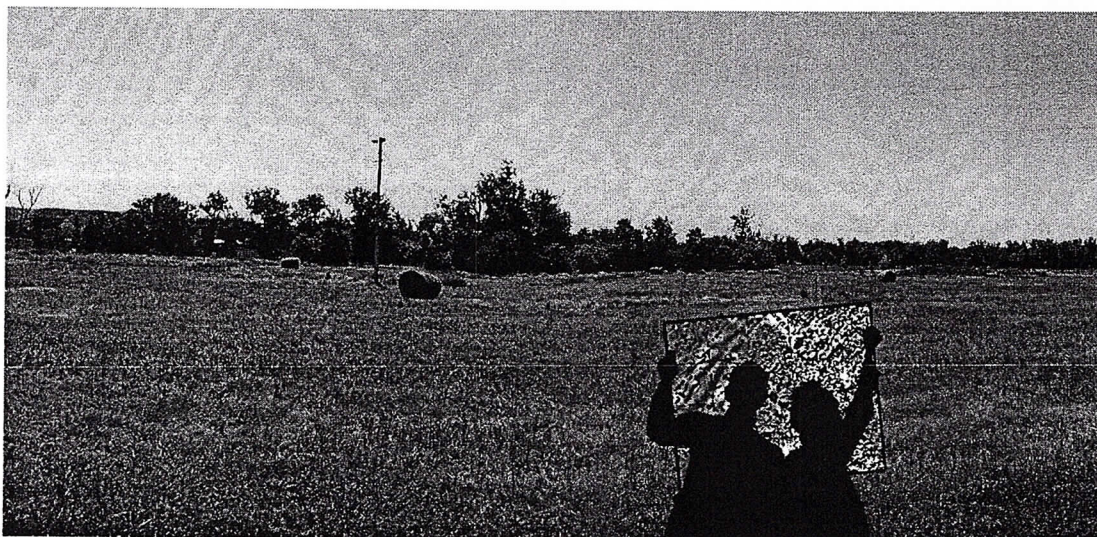
3. A typical diary page of the nineteenth century

Another way to learn the secrets of the past is through Archaeology. Archaeology is the science that learns about the past through study of material remains—what people left behind. One of the chief tools of archaeology is *excavation*, where archaeologists dig into the ground to find artifacts, architectural remains, and the like. The big problem with excavation is that it is destructive. Digging a hole removes much of the evidence forever, except what might be recorded by the archaeologists. Excavation is also expensive, and it takes a great amount of time to analyze and report the findings. In fact, archaeologists are still analyzing excavations made a decade ago at Fort Pierre Chouteau.



4. Excavations at Fort Pierre Chouteau in 1998

In recent years archaeologists have turned to advanced technologies that literally “see beneath the soil.” They use the tools of *geophysics*, such as radar beams, to see what is in the ground without digging, almost like x-ray vision. This makes doing archaeology much quicker, and less expensive, because through geophysics archaeologists can learn exactly where buried things are located.



5. Archaeologists study a geophysical map that shows the subsurface

“Geophysics” refers to the application of the principles of physics to *geology*, which is the science that studies the earth. Geologists use geophysics to find things in the Earth like oil or precious metals, which often are deeply buried. Archaeologists study the earth too, but only the very shallow part near the surface in which archaeological remains may be found. They have therefore borrowed the techniques of geophysics to “see” into archaeological sites, even renaming it “*archaeo-geophysics*”!

Geophysical Instruments

Several geophysical instruments were used at Fort Pierre Chouteau.

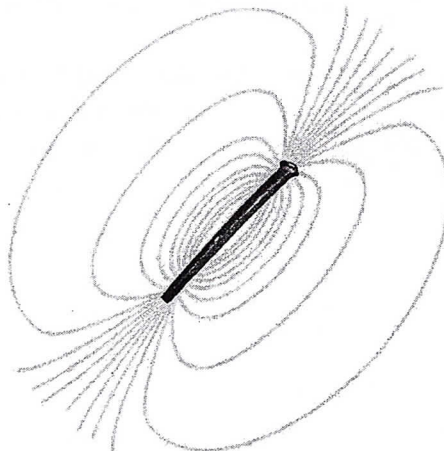
Magnetometry

The main instrument used at Fort Pierre Chouteau is a *magnetometer*. It is extremely sensitive and measures magnetism in the ground.



6. A magnetometer in use at Fort Pierre Chouteau

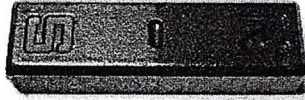
The magnetometer found evidence of thousands of iron artifacts left behind after the trading post and later fort were abandoned. We all know that the Earth's magnetic field moves a compass needle. The magnetometer can "see" these artifacts because iron "magnifies" the Earth's magnetic field.



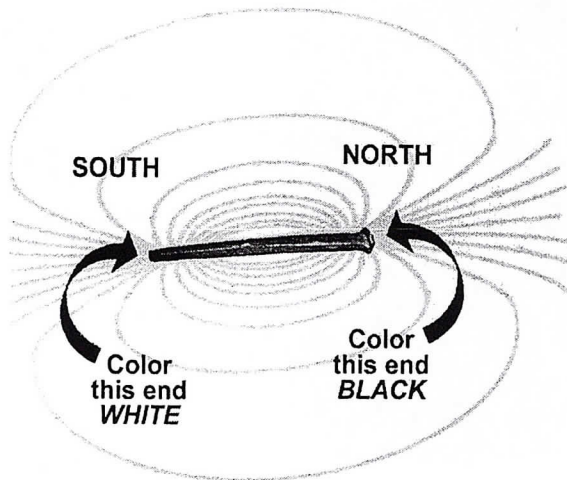
7. An historic iron nail from the 1800s and its magnetic field

Each piece of iron acts like a tiny bar magnet buried in the ground, with a north and south pole just like a magnet, making iron very easy to find. The computer "colors" the north

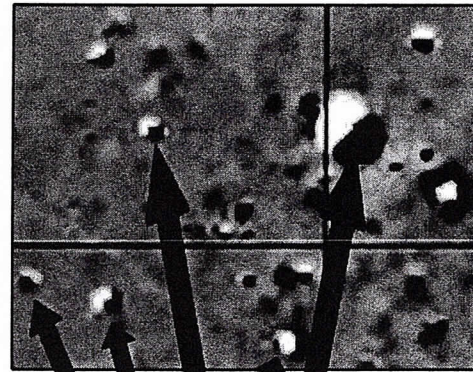
poles black and the south poles white, so wherever black and white occur next to each other means that a piece of iron occurs right below the surface.



Bar magnet with north and south poles



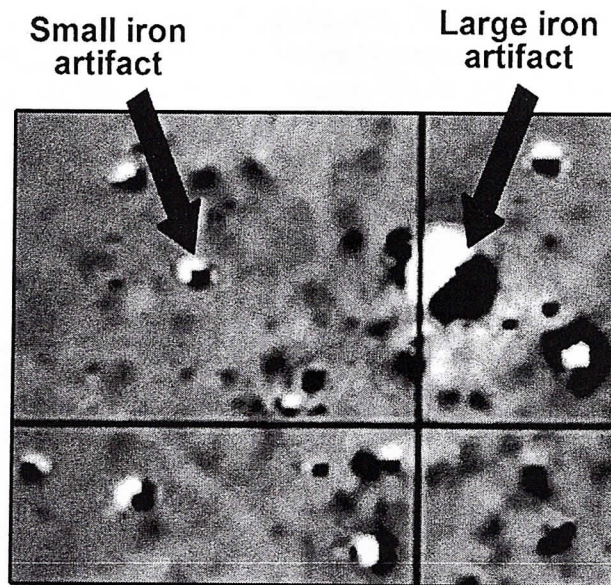
Iron nail with north and south poles



Iron artifacts and their north and south poles at Fort Pierre Chouteau

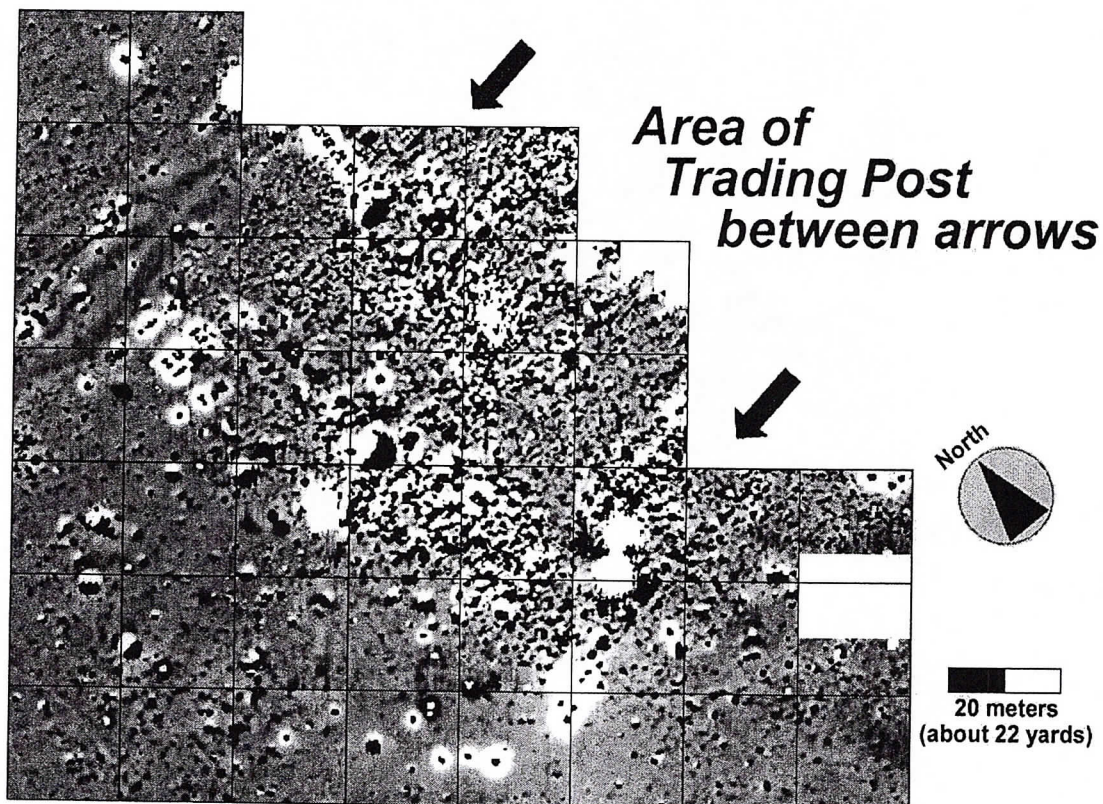
8. How a *magnetometer* “sees” iron artifacts

Most of the iron is only junk and rubbish, such as the nails once used to hold the trading post’s building together, or a horse’s iron shoes to its hooves! Some iron artifacts appear to be very large, however, and probably represent things like iron stove parts or even a blacksmith’s anvil!



9. Small and large iron artifacts

An overall map of the area of the trading post shows where the trading post once stood because there are so many iron artifacts within it that they define its shape!

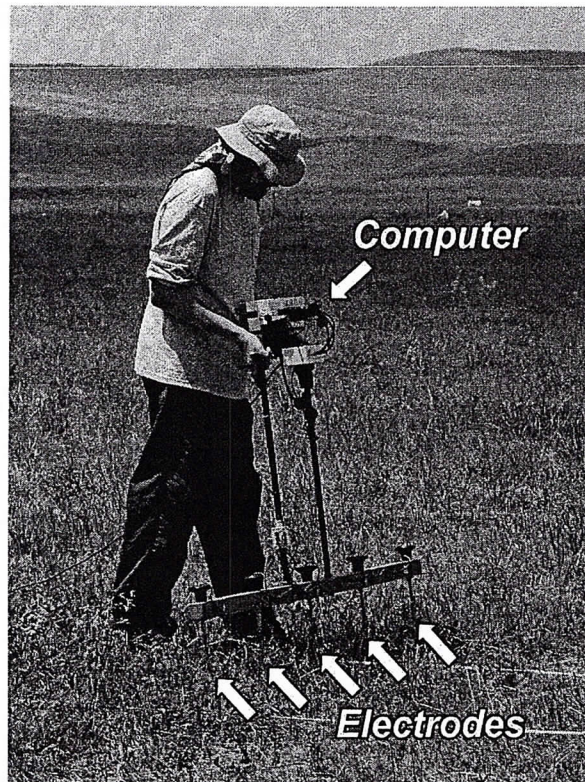


10. Area of Fort Pierre Chouteau revealed by density of iron artifacts

The magnetometer also shows that many iron artifacts occur *outside* the trading post. This indicates that many activities occurred beyond the compound, including military activities and buildings. Native Americans also camped outside the trading post. All apparently lost or discarded iron artifacts.

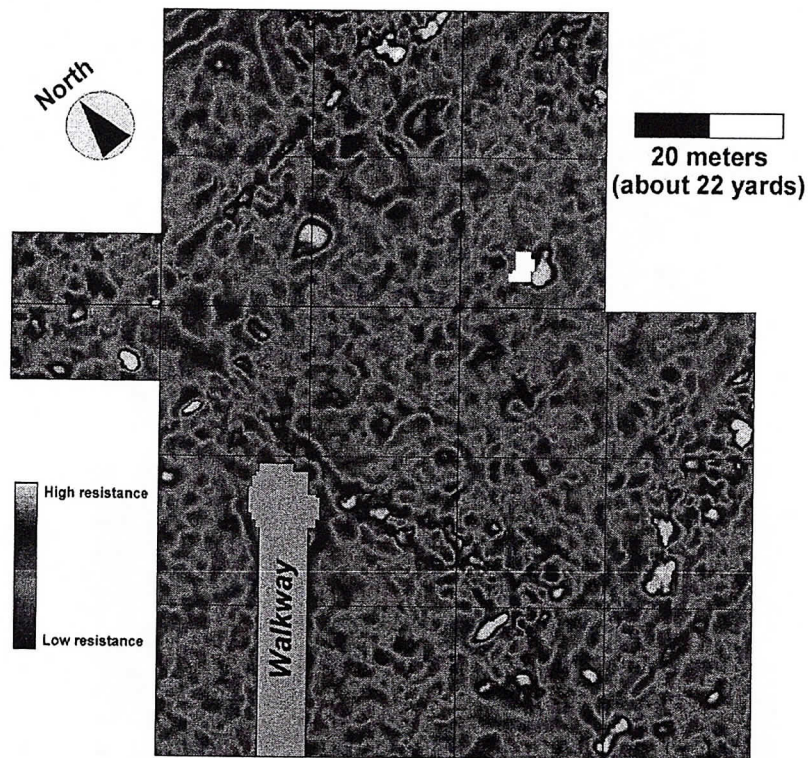
Electrical Resistance

Everyone knows that some materials, like metal wire, conduct electricity better than others, like glass, which we call an insulator. The same is true in the soil. Wet soil conducts electricity better than dry soil, and materials like brick and stone act much like insulators. We actually inject electricity into the ground to see how conductive or resistant the soil below might be. The electricity is injected with *electrodes*, which are long steel spikes connected to batteries.



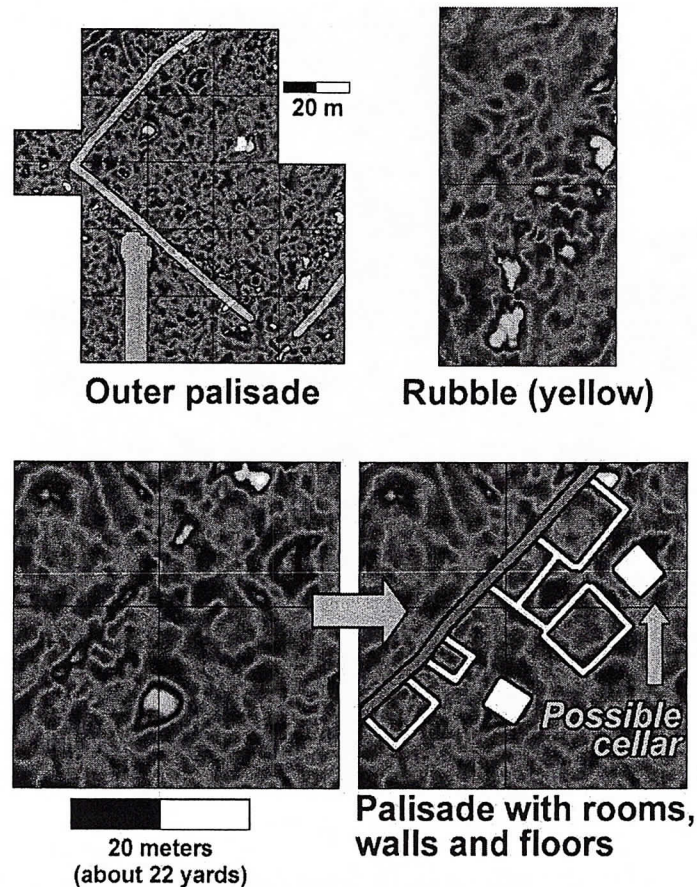
11. Electrical resistance meter in use at Fort Pierre Chouteau

Each time the electrodes are inserted into the soil a small computer records the electrical resistance of the soil. If this is done every few feet the measurements can be color coded and a map can be made of electrical resistance.



12. Electrical resistance results at Fort Pierre Chouteau

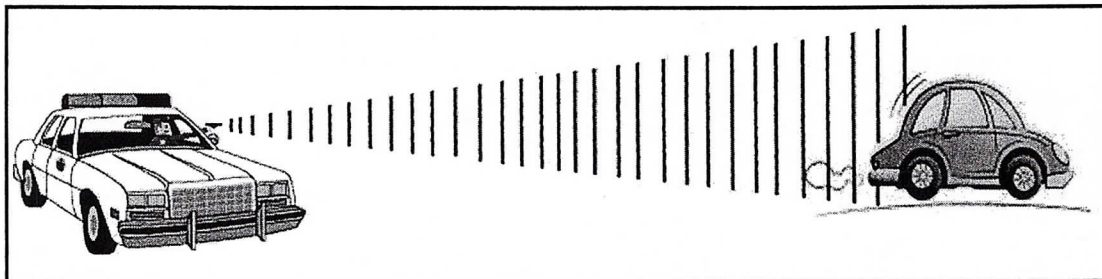
This map of electrical resistance tells us much about the historic trading post and fort. It shows us the wall of the exterior palisade that protected it from outside attack. It also shows us some of the walls and rooms of interior buildings, their floors, building rubble, and even a likely stone-lined cellar.



13. The electrical resistance data indicate the palisade, mounds of rubble, walls, rooms, and floors within Fort Pierre Chouteau

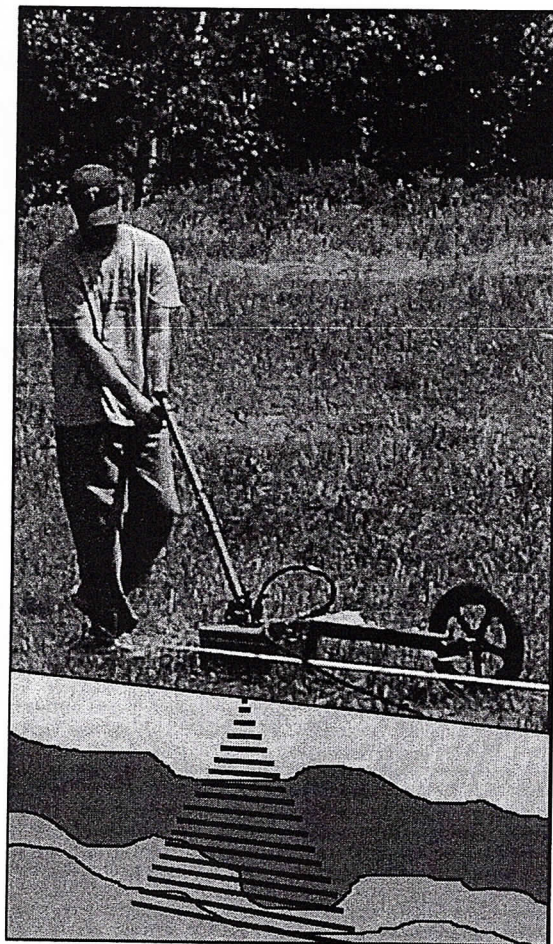
Ground-penetrating Radar

Ground-penetrating radar, or GPR, was utilized in only a small area, because time did not allow a larger survey. GPR uses microwaves, just like in a microwave oven, but at a much lower level of energy. The police use radar too, but to see how fast cars are going. In this case a radar “gun” is used to shoot a radar beam at a moving car. A very accurate clock times how long it takes for the radar beam to travel to the moving car and return to a sensor in the gun. Since we know how fast a radar wave moves in air, a computer can figure out how fast the car is moving.



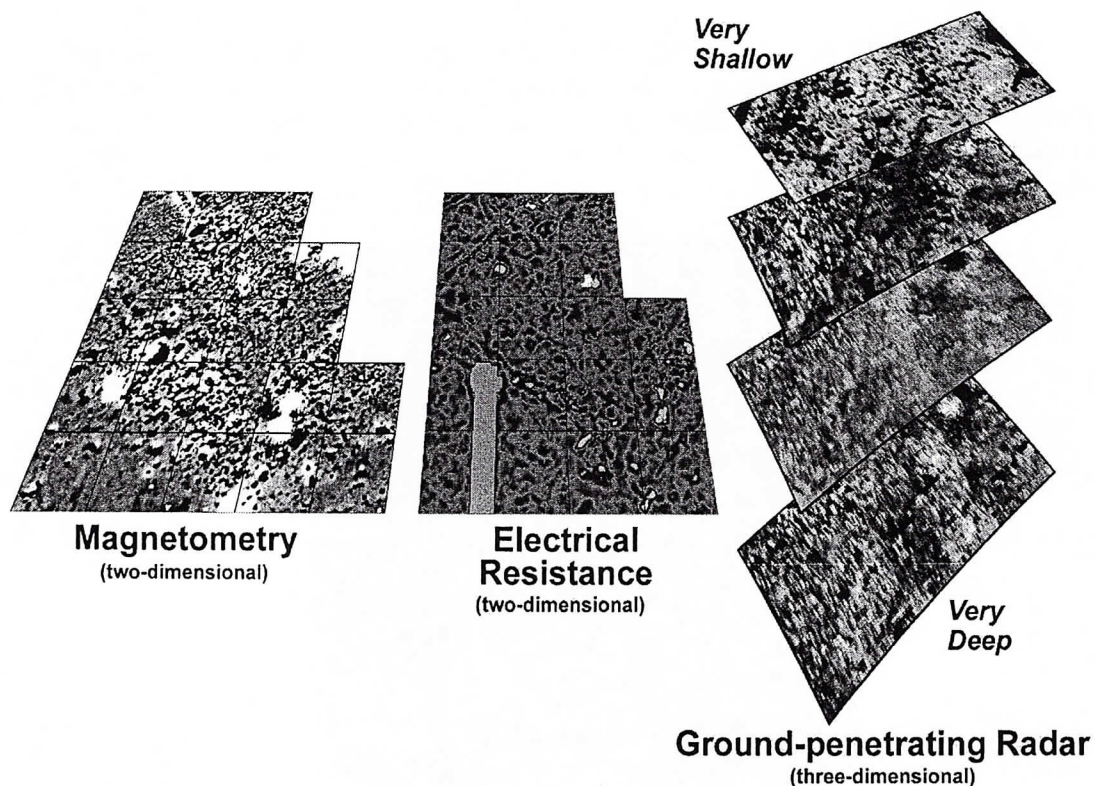
14. The time it takes for a radar wave to hit a moving car is related to the car's speed

The same thing happens in archaeology when a radar beam is sent downward into the earth. In soil, however, buried objects do not move, so instead the radar waves reflect off artifacts and architecture that archaeologists would like to find. A computer assembles this information into a “picture” of the subsurface where reflection times are related to depth.



15. The ground-penetrating radar sends radar waves into the earth, which reflect off buried objects and materials

This technique is one of the newest methods available to archaeology, and gives a very different kind of information. Magnetometry and electrical resistance data are two-dimensional, which means that only a flat map can be made, such as the ones above. GPR results, however, are three dimensional, which means that they also give “depth” data indicating how far down things lie beneath the surface. This third dimension is useful, because it tells archaeologists how deep they must dig to find a wall or floor of the trading post and it means that maps from different depths can be created.



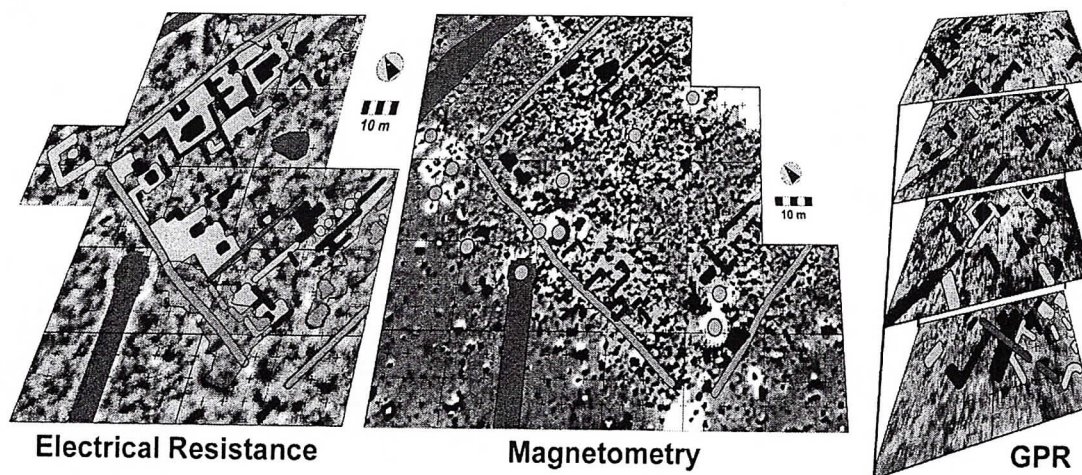
16. While magnetometry and electrical resistance data only give a two-dimensional map of the subsurface, ground-penetrating radar is *three-dimensional*, meaning that maps can be made of different depths

At Fort Pierre Chouteau the small block of GPR data yielded very different maps from each depth. This shows archaeologists that some of the trading post's architecture lies deeper and some lies shallower. After all, this historic place was occupied and used for more than 25 years, so many buildings probably changed through time. After the fur trader's moved out in 1855, and the Army moved in, many things probably changed, and this is reflected in the GPR results.

Putting it All Together

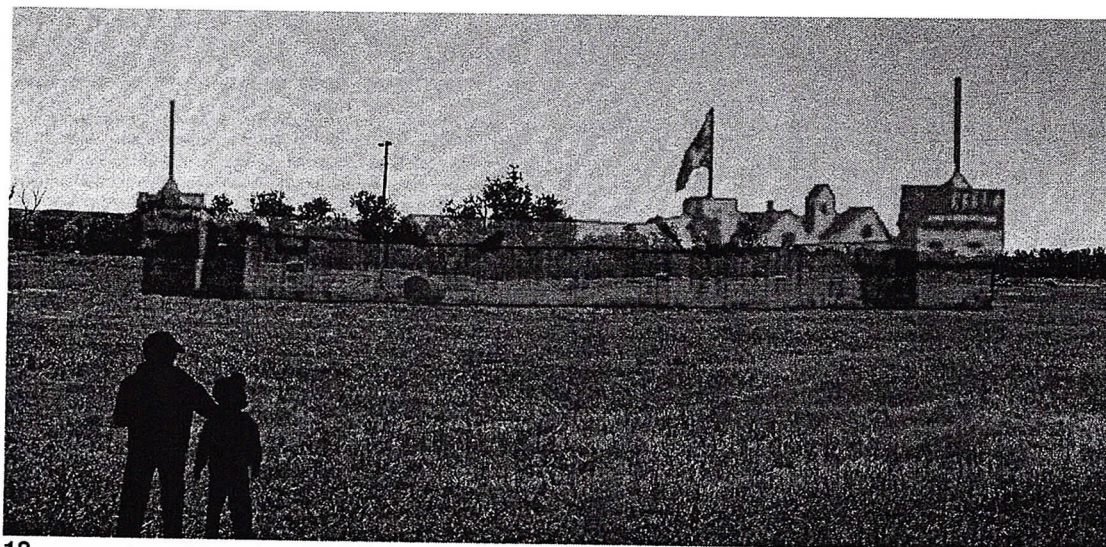
Each geophysical instrument records something different about the subsurface. Magnetometry showed iron artifacts. Electrical resistance revealed walls and floors. So too did GPR, but that method indicated walls and floors at different depths.

If we look at these findings, and put them all together, we begin to see that the Fort Pierre Chouteau trading post was truly a complex place, rich in architecture and activities that were at the center of peoples' lives for a very long time.



17. Interpretations of magnetometry, electrical resistance and ground-penetrating radar (GPR), in color, testify to a rich archaeological record of the many human activities that occurred at Fort Pierre Chouteau

We might even try to blur our eyes, and step back a bit. In so doing we might learn that we can still see evidence of this old fort, and realize that the past is always with us.



18.

The End