Proposal to Conduct a Geophysical Investigation of Three Sites in Deadwood, SD

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For:
City of Deadwood
108 Sherman Street
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Overview

This is a proposal by Archaeo-Physics, LLC (Archaeo-Physics) to conduct a non-invasive geophysical investigation of three sites in the City of Deadwood, South Dakota. Geophysical survey will be used for subsurface mapping of historic structures, graves, and other features. The results are intended for historic preservation and planning. Four geophysical methods will be available: ground penetrating radar, electrical resistance, magnetic field gradient, and EM conductivity/magnetic susceptibility survey. At least two methods will be used at each site to improve feature detection and interpretation.

The sites to be surveyed are:

1. Gordon Park, adjacent to the Deadwood Recreation & Aquatic Center. Survey area will be approximately 0.1 acres (440 square meters). Ground penetrating radar survey is anticipated to be the principal geophysical method, with electrical resistance or EM conductivity/magnetic susceptibility survey as secondary methods.
2. Oakridge Municipal Cemetery. Survey area will be approximately 0.79 (3,200 square meters). Electrical resistance survey is anticipated to be the principal geophysical method, with magnetic field gradient or EM conductivity/magnetic susceptibility survey as secondary methods.
3. 66 Taylor Avenue, a residential lot formerly a historic cemetery. Survey area will be approximately 0.08 acres (330 square meters). Electrical resistance survey is anticipated to be the principal geophysical method, with EM conductivity/magnetic susceptibility survey as a secondary method.

The anticipated survey methods are based on available information regarding soils and environmental conditions and expected targets. On-site assessment may suggest alternative methods as most appropriate. The available methods are adaptable to a wide range of conditions and target types.

Geophysical survey methods

Prior to geophysical data collection, the survey areas would be divided into rectangular survey "grids" marked with wooden stakes. The survey grid system forms the basis for spatial control during data collection. A total station would be used for grid stakeout, and the grid system would be geographically referenced with high-accuracy gps.

With all of the instruments, data will be collected in parallel lines, with a spacing of 50cm or less between lines and multiple samples per meter along each line. Sample densities will vary with each method, but will be appropriate for high-resolution mapping.

Data will be conducted on site by Archaeo-Physics, LLC personnel, consisting of one Lead Investigator and one Field Technician.

Instrumentation and survey parameters:

Ground penetrating radar
GPR survey will be conducted using a Sensors & Software Noggin GPR system with an operating frequency 500 MHz. Data sample density would be at least 40 samples per square meter. Data would be modeled in three dimensions for planview and profile mapping.

Electrical resistance survey
A Geoscan Research RM15 resistance meter will be used to perform the resistance survey. Typically, this might be used in twin-electrode or square-array configuration, with array and electrode spacing selected based on site conditions. Data sample density will be at least 4 samples per square meter.

Magnetic field gradient survey
Magnetic survey will use a Geoscan RM85/FAB1/FGM650 fluxgate gradiometer. Data sample density will be be at least 16 points per square meter.

Electromagnetic conductivity/magnetic susceptibility survey
A CMD Mini-Explorer will be used to simultaneously collect both conductivity and magnetic susceptibility data from multiple depths. Data sample density would typically be at least 8 samples per square meter.

Interpretation and Reporting

All geophysical data will be processed using a variety of filtering and analysis techniques to enhance the detectability of possible features while suppressing geologic and modern "clutter," statistical noise, and systematic error. Graphic displays of data will be optimized for cultural interpretation.

A technical report will discuss geophysical methods, survey design and data processing parameters, and results with interpretations. Results will be presented graphically within the technical report as high-resolution color and grayscale images.

Schedule

It is anticipated that fieldwork will be conducted during the spring of 2022, dates to be determined. If fieldwork occurs during the June-September field season, the cost of investigation will reflect higher lodging costs. It is estimated that data collection will require 3-4 days to complete (unless delayed by weather). Preliminary interpretation will be available within on week of completion of fieldwork. A formal report and invoice will be delivered within six weeks of completion of fieldwork.

Site access

The City of Deadwood will ensure access to the investigation areas during scheduled fieldwork. This includes: any permissions required; necessary landowner contact; conflict with other work or events; and ensuring that areas will be reasonably clear of obstacles that might limit coverage.

Deliverables

Deliverables will be the report of investigation, survey results maps, and data files. Unless otherwise requested, all deliverables will be delivered in digital formats. Archaeo-Physics personnel will also provide post-survey support and consultation.

Cost of Investigation

Two options are presented below, representing different seasonal lodging rates:

Option 1 (If fieldwork is conducted outside the June-September tourist season)

The cost of the services described will be be a fixed fee of $11,665.00

If services outside of the above scope are requested by the City of Deadwood, They will be invoiced at the following rates:

Hourly rate for Lead Investigator: $85
Hourly rate for Field Technician $40/hour

Per diem lodging, per person: $96
Per diem meals, per person: $74
Per diem meals first and last day of travel, per person: $55.5
Vehicle transport, per mile: $0.585
Materials: at cost

Option 2 (If fieldwork is conducted during June-September)

The cost of the services described will be be a fixed fee of $11,990.00

If services outside of the above scope are requested by the City of Deadwood, They will be invoiced at the following rates:

Hourly rate for Lead Investigator: $85
Hourly rate for Field Technician $40/hour
Per diem lodging, per person: $128
Per diem meals, per person: $74
Per diem meals first and last day of travel, per person: $55.5
Vehicle transport, per mile: $0.585
Materials: at cost

Approvals (signature)

City of Deadwood	***Archaeo-Physics, LLC***
Authorized signature:	Authorized signature:
Date:	Date: