



SPECIFYING ACSW TESTING

Guidance Note SSGN001

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Introduction

The SoilSafe Advanced Continuous Surface Wave (ACSW) testing system provides a cost-effective means of providing non-intrusive ground profiling information in a construction environment, including accurate stiffness (G & E) and shear wave velocity (V_s) profiles. The system also provides Rayleigh wave velocities (V_r) data for applications such as high-speed rail. A range of SoilSafe guidance notes are available on the application of ACSW data via the SoilSafe website, as well as a detailed specification and test layout.

While ACSW is a very flexible testing system capable of working in most construction environments, there are some limitations and basic requirements for testing which should be considered when specifying ACSW for any particular project.

Numbers of tests

Numbers and locations of ACSW tests will depend on the purpose of the investigation in the same way as for conventional intrusive testing. The geotechnical designer will need to consider the information on ground conditions available and their design requirements. The designer should also consider whether the typical depth of ACSW investigation (10 to 15m, varying with ground stiffness) is compatible with their objectives for testing.

The number of ACSW tests required will increase with the size of sites and the potential for ground variability. However, as ACSW testing provides a measurement of bulk soil properties over a large volume of soil at each test location, its use allows representative ground stiffness profiles to be established more easily than laboratory soils testing or in-situ testing, techniques which both record stiffness over very small soil volumes. Guidance on the spacing of ground exploratory points is provided in national standards and guidance documents.



Larger numbers of tests will give greater confidence and allow any unrepresentative results to be identified; at least 12 ACSW tests per shift are



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usually possible with normal site access; with good access 20 to 30 tests per shift are often possible. SoilSafe C-DAS software allows ACSW data to be readily compared on site, to assess data quality, provide initial results and to allow the test layout to be adjusted as required.

Location of tests

Locating some ACSW tests adjacent to exploratory holes is helpful for ground truthing purposes, though ACSW analysis can be conducted without the benefit of other ground investigation data. Ordinarily the orientation of the test set up is not significant unless there are pronounced lateral soil anisotropies.

ACSW testing is most rapidly undertaken from the specially adapted 4WD test vehicle, located within 30 metres of the test position. Using the test vehicle, a single SoilSafe test technician can complete up to 40 tests in standard shift.



SoilSafe have also developed a small 400kg tracked testing system which can be used for test locations with challenging access.

However, all equipment is fully de-mountable, and testing can be undertaken at any location where safe pedestrian access is possible. Where working away from the test vehicle, special transport arrangements and/or labour support will be required and rates of testing will be lower.

Each test location requires a level stable area about 1m x 5m, free of significant mud, standing water, obstructions, debris or vegetation. Other than this, the ACSW system can operate in all normal weather conditions in a normal construction environment. The system will filter out most site noise, but where nearby heavy activity is taking place, this may need to be temporarily suspended for the duration of data acquisition (around 6 minutes per test).

ACSW testing can be undertaken directly on a suitable hard, level surface (such as asphalt or concrete up to 400mm in thickness) entirely without excavation using plinths or tripods. However, on loose/soft surfaces shallow hand excavation and geophone spike penetration may be required (no more than 5cms).



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Vibrations caused by the ACSW shaker are no more significant than heavy vehicle movements. However, any very shallow or sensitive utilities should be avoided at test locations. The presence of large utilities (such as sewer pipes) immediately below ACSW test locations could also impact on data quality and should be avoided when selecting test locations.

Testing in high electrical noise environments may cause interference with test equipment. Normally this can be resolved by changing the test array, but HV sources (such as cables) should be avoided wherever possible.

Basic information to be provided by Clients

As part of any ACSW testing proposal or specification, information should be provided to the testing contractor which allows them to confirm the suitability of the site for ACSW testing and to plan testing activities effectively. This information should include:

- Site location and working constraints
- Anticipated schedule (including working hours)
- Any site-specific requirements (such as certifications)
- Details of site and nearby activities likely to be occurring during testing
- Access & security arrangements
- Safe systems of work in place for construction or operational sites
- Ground surface and any site preparation
- Anticipated ground conditions - helpful in making sure there are no problematic ground conditions that might prevent testing, and in some case in interpreting unusual signal responses

Test results for problematic soils such as peat or sensitive/collapsible soils will require critical review, as would results in such materials derived by any other stiffness measurement technique. Highly laterally variable and/or disturbed ground as well as welded materials may provide poorer test responses which may require discussion prior to specification.



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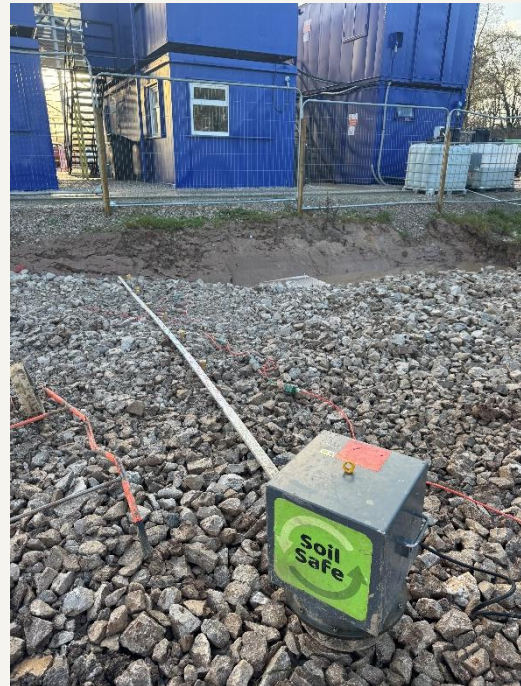
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Where access is complicated (for example rail sites) a pre-start inspection is highly desirable to minimise delays or problems with testing.

Fieldwork requirements & site preparation

The following is required from the client for ACSW testing:

- Stable area at each test location about 1m x 5m, free from significant standing water or obstructions.
- Setting out, clearance and as necessary surveying-in of test locations (note that surveying can be undertaken by SoilSafe on request).
- Attendances to address lone working risks (ACSW testing is normally undertaken by a single test technician).
- Suitable safe access as a minimum for a small 400kg tracked vehicle to get to within 30 metres of test locations with safe pedestrian access to each test location, or specific arrangements to transport equipment by hand.
- Use of 230v portable petrol generator for electrical power either within test vehicle or remotely as required (diesel generators can be provided but this must be discussed in advance).
- Provision of a necessary safe system of work, including inductions & welfare facilities.
- Provision of any barriers, traffic management or fencing necessary to prevent access to test areas.
- Reinstatement of test locations and access routes (if required).



References

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