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GEOVOLT®
INSTALLATION GUIDE

This guide is designed to provide standard procedures for using Geovolt® with electrical leak survey methods. Geovolt®, a conductive medium can be placed below a non-conducting waterproofing barrier to locate leaks in both exposed and covered containment applications.

INTRODUCTION

Electrical Leak Location methods rely on the geomembrane being an electrical insulator. An electrical charge is induced between the top and the bottom of the geomembrane. The leakage of current will show the location of discontinuities in the geomembrane. Please refer to Guide ASTM D6747 for various electrical leak location methods. Standards procedures for the relevant leak location methods are described in Practices ASTM D7002 and ASTM D7007. Installation of Geovolt® is like placing a non-woven geotextile prior to placing a geomembrane on a prepared subgrade. Like geotextile, Geovolt® provides a cushion under a geomembrane and in addition provides a conductive medium underneath the geomembrane for electrical leak location.

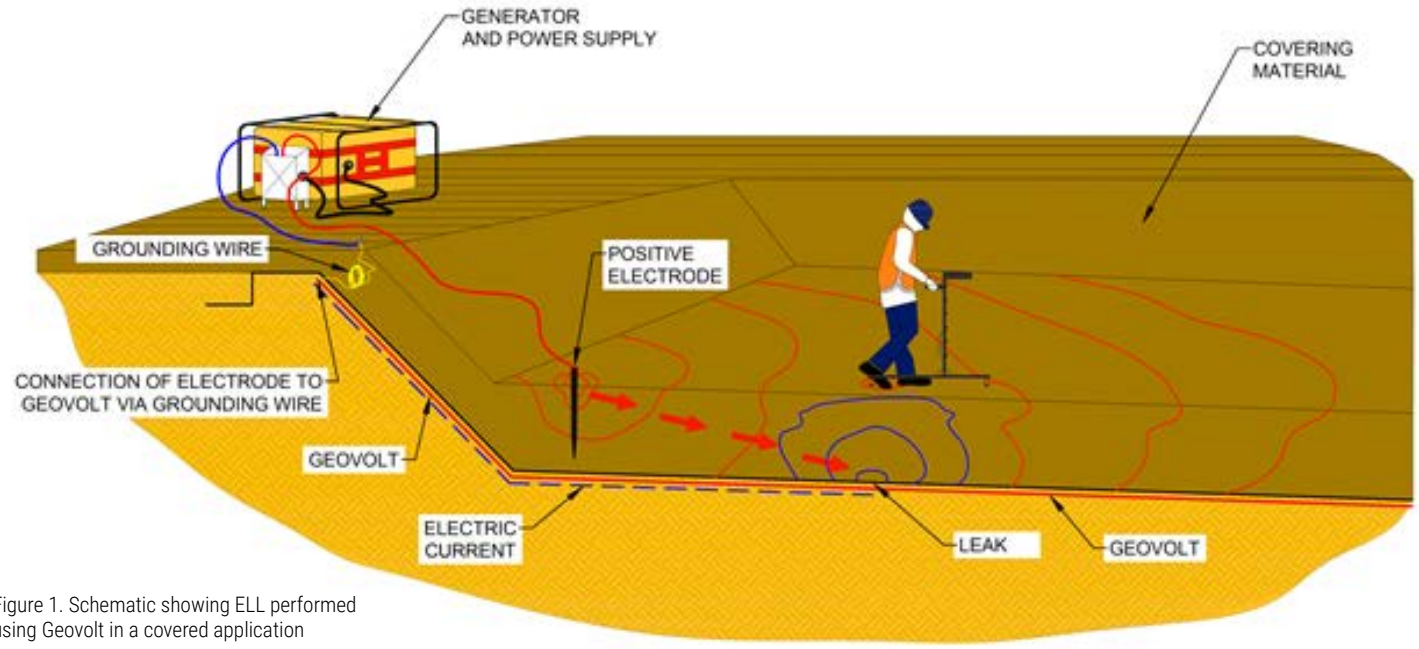

Figure 1. Schematic showing ELL performed using Geovolt in a covered application

STORAGE AND HANDLING

- Upon material delivery to site, QA personnel will inventory all materials needed on the project. Each roll of Geovolt® has a label with information such as lot/ roll number.
- Any visible damage to roll materials should be noted and rolls should be inspected prior to placement. Geovolt® should be stored in a flat, dry, and well drained area.
- Contact with dirt, oil and other contaminants that could affect the conductive properties should be avoided.
- Geovolt® should be stored such that it is protected from rain and direct sunlight. Do not expose Geovolt® to direct sunlight for more than 15 days.
- A forklift or front-end loader fitted with a tapered pole is recommended for loading and unloading Geovolt® rolls.

DEPLOYMENT OF GEOVOLT®

- Place the roll of Geovolt® at the top of the slope/grade and roll down grade, overlap successive and adjacent rolls by 16” (450 mm) minimum.
- Geovolt® rolls should be placed as closely as possible to the designated install location to minimizing any dragging of the Geovolt® against the ground surface.

Figure 2. Geovolt® placement on the site

- The Geovolt® shall be free of tension, folds, and wrinkles. Do not allow vehicles to drive directly on the Geovolt®.
- Geovolt® shall be sewn, heat tacked or overlapped. Heat tacking using a hot air gun should be performed with most caution as too much heat and contact time can result in material burn out. Please follow all safety protocols when using a propane torch for seaming. When overlapping the panels ensure the area of the overlap is free of any contaminants or foreign matter.
- Geovolt® must be deployed with the electrically conductive surface facing upwards. An ohmmeter is the easiest way to confirm which side of the sheet is electrically conductive. Use the probes attached to the ohmsmeter to check the conductive side, place both probes onto the same side of the sheet while making sure not to touch the metal parts of the probes with your hands. For the conductive side the electrical resistance will show a reading, while the non-conducting surface will show "OL" on most equipment.

Figure 3. Using ohmmeter to qualify conductive side

ELL METHODS FOR GEOVOLT® TESTING

WARNING: The test methods described in this guide could use high voltages, resulting in the potential for an electrical shock or electrocution hazard. The electrical leak survey should be performed by a competent professional using specialized test equipment specifically designed for the task. Test equipment should be used following the manufacturer's instructions and executed following the applicable ASTM standard.

Perform ELL survey as specified in the project specifications following geomembrane deployment. A realistic test of the leak detection sensitivity should be performed and documented as part of the leak location survey. An actual or artificial leak simulation can be used. The corresponding standard practice for the various leak location systems can be used to determine size, construction, use, and operation of the actual or artificial leak simulator for that system. See the reference section in the end of this guide for various survey methods.

4.2. WATER LANCE:

In the water lance survey (ASTM D7703), electrically charged water is sprayed from a water wand onto the surface of the geomembrane. If a discontinuity exists, the water penetrates through the geomembrane and makes the Geovolt® wet and completes the electrical circuit. This is detected by an audible signal by the operator. Water is delivered from a tank or recycled from a low spot on the geomembrane. The water lance is frequently used to scan the slopes of ponds, especially when a water survey or water puddle methods has been used on the base.

4.3. WATER PUDDLE:

In the water puddle method (ASTM D7002) electrically charged water is pushed ahead of a squeegee to contact the

geomembrane. If a discontinuity exists, the water penetrates through the geomembrane and makes the Geovolt® wet. Geovolt® which is electrically charged with the electrode detects the leak the system completes a circuit; an audible signal is detected by the operator to detect the leak. Water is delivered from a tank or recycled from a low spot on the geomembrane. The water puddle method is used when testing needs to be done before the pond is filled with water as an alternative to the water survey.

4.4. ARC TESTING:

The arc survey method (ASTM D7953) uses proprietary equipment to scan a geomembrane without water. In practice, the equipment operates in almost the same way as the water puddle method; however, no water is needed. This equipment shows a spark along with a signal from the detector when a discontinuity is found. This survey type works best on clean, dry geomembrane.

4.5. SOIL AND WATER SURVEY:

In the soil survey (ASTM D7007), the soil on top of the geomembrane is charged with electrical potential. Electrodes are then used to scan the backfill, which will show a change in potential near a discontinuity. Soil surveys are very effective at finding construction damage due to backfilling in covered geomembranes. One important note about a soil survey is that an electrical break needs to be made between the backfill and the ground. This is usually accomplished by leaving the anchor trench open during the survey. If subsequent surveys are required, then the geomembrane is usually exposed again at the anchor trench before surveying can begin.

In the water survey (ASTM D7007), a quantity of water is placed inside the geomembrane, and an electrical potential is induced between the water and the ground. Current leaks will show discontinuities. The most accurate survey is a wading survey in 2 to 3 ft of water. It is also possible to scan a full pond with a towed sensor from a boat.

Figure 4. Water Puddle Testing

Figure 5. Arc Testing on an exposed geomembrane

Figure 6. Soil and Water survey ELL testing

Geovolt® can be used in ELL testing after the geomembrane is backfilled, either immediately following the installation or after it has been in service. A ground wire can be connected to the Geovolt® during installation

and left exposed to allow technicians to join the Geovolt® to the ground for future testing.

DESIGN PRACTICE

Please contact your Layfield representative for designing with Geovolt®.

Electrical methods will often require some changes to construction details for the best result. Exposed concrete, batten bars, or other structures within the lined area will show “leaks” to the sensor equipment. Concrete and batten bars should be cap-stripped, and pipe penetrations should be constructed to be electrically isolated during testing.

Geovolt® must be connected using clamps or ground plates. The design, number, and spacing of the clamps to connect to Geovolt® depends primarily on the material conductivity and the electrical leak location method. An experienced leak location contractor can determine the conductivity prior to Geovolt® deployment.

Leak Location Contractor shall be an independent third party unrelated by ownership or relation to the

general contractor, CQA firm, engineer, or geomembrane installation contractor.

A test of the material conductivity and leak detection sensitivity for the worst-case points away from the clamp should be performed and documented before the Geotextile is covered by the geomembrane.

A realistic test of the leak detection sensitivity should be performed and documented as part of the leak location survey.

An actual or artificial leak simulator can be used. The corresponding standard practice for the various leak location systems can be used to determine the size, construction, use, and operation of the actual or artificial leak simulator for that system.

REFERENCES

ASTM D6747: Standard Guide for Selection of Techniques for Electrical Detection of Leaks in Geomembranes

ASTM D7002: Standard Practice for Leak Location on Exposed Geomembranes Using the Water Puddle System

ASTM D7007: Standard Practices for Electrical Methods for Locating Leaks in Geomembranes Covered with Water or Earthen Materials

ASTM D7703: Standard Practice for Electrical Leak Location on Exposed Geomembranes Using the Water Lance System

ASTM 7852: Standard Practice for Use of an Electrically Conductive Geotextile for Leak Location Surveys

ASTM D7953: Standard Practice for Electrical Leak Location on Exposed Geomembranes Using the Arc Testing Method

DISCLAIMER