PREPARATIONS AND REQUIREMENTS GUIDE

PLUMB BOB METHOD

The Plumb Bob Method for Water Surveys is:

- Applicable to single geomembrane liner systems for geosynthetic applications (single-lined systems).
- Performed when the geomembrane liner is covered with a minimum liquid solution depth of 6 in (15 cm).
- Conducted on smooth or textured geomembrane sidewall areas that are covered with liquid solution.

Please note that this guide:

- Includes key preparations and requirements for the electrical leak detection survey.
- Should be reviewed carefully, modified and/or combined accordingly to fit the specifications format per ASTM Standard.
- May be changed, revised, or updated accordingly from time-to-time.
- Is only a reference guide and may not apply to all geomembrane-lined geosynthetic systems or applications.

Please contact **Beyond Leak Detection** for any comments, concerns, or questions regarding the leak detection service or this guide.

The General Contractor shall be responsible for preparing the application for the Electrical Leak Detection Water Survey using, specifically, the Plumb Bob Method. These preparations and requirements are to:

- **Provide any safety training, site specific training, drug tests, vehicle driving tests or inspections to obtain any clearances.** The General Contractor must provide transportation if technicians cannot obtain a vehicle permit pass for on-site transportation. The General Contractor will be responsible for expenses required in organizing any clearances for technicians to perform the service.

- **Provide an AC source with approximately 110 to 125 Volts and a current capability of approximately 15 to 20 Amps.** A 4,000 Watt portable generator or an outdoor AC outlet would be sufficient and must be within a proximity of 50 ft (15 m) near the edge of the survey area.

- **Provide supervised laborers to assist in the leak detection service during the preparation, survey, or investigation process.** The laborers will be assigned certain duties and responsibilities to assist technicians throughout th entire leak detection service such as, but not limited to, digging holes or trenches, moving objects or machinery that may interfere with the survey, safety patrol, cleanup, etc. Since the “Buddy System” is supported as a monitoring safety measure during the service, at least one laborer is required to work the same hours as technicians and must accompany them at all times while on site. All laborers must be competent, aware, and have knowledge of on-site safety and emergency procedures if an unexpected issue or situation were to occur.

- **Assist in developing a grid or coordinate system throughout the entire application or along the perimeter.** A coordinate system is required to provide survey lanes to help assist technicians from maintaining the intended survey line. The system also provides reference and location coordinates to leaks or anomalies that were located and pinpointed throughout the survey. The coordinate system will be developed on site after assessment of the application. Depending on the type of survey required and the application, this may consist of survey flags, string, twine, rope, sand bags, floating devices, non-toxic marking paint, or other materials to create, develop, or layout the grid or coordinate system. The coordinate system is temporary and will be removed after the survey or investigation process has been completed. The non-toxic marking paint will fade and disappear in direct sunlight after 30 days.

- **Disconnect and remove conductive materials and isolate ground sources that are electrically connected with the liquid solution inside the application.** Conductive materials may include metal pipes, cables, wires, ladders, pumps, etc. Ground sources may include concrete structures, batten strips, metal strainers, drains, valves, etc. If feasible, isolating, eliminating, or insulating these conductive current channels will help increase the leak detection sensitivity and minimize masking of smaller leaks in their proximity.

- **Completely remove sandbags, heavy debris, netting, cords, or any items submerged in the liquid solution.** Any floating items or materials such as bird balls, loose contaminants or debris, buoys, aerators, layers of ice, or items that may interfere, obstruct or disturb the survey must also be removed (if practical). These items will cause ergonomic interferences that may hinder or slow down the survey process.

- **Provide a temporary, electrical isolation area, channel, or trench, throughout the entire perimeter of the application (if earthen materials are in contact with the liquid solution and surrounding subgrade or earth ground).** This isolation will increase leak detection sensitivity and consists of an area of exposed geomembrane that electrically separates the subgrade material (material underneath the geomembrane and around the perimeter of the application) and the liquid in the application covering the liner. Excavating or removal of sediment along the perimeter to a minimum width of approximately 6 to 24 in (15 to 60 cm) should be sufficient. Excavation is not necessary if the perimeter around the water line has exposed geomembrane.

- **Zone segments of the survey area to prevent technicians from surveying into a restricted, non-required or unintended area.** Depending on the type of survey required and the application, this is accomplished by using survey flags, string, twine, rope, sand bags, floating devices, non-toxic marking paint, or with any type of physical guideline.

- **Maintain a constant depth of liquid solution on top of relative geomembrane during the entire survey.** Liquid must be added or removed to either raise or lower the liquid on top of the relative geomembrane in order to maintain the required survey depth. Areas where liquid does not cover the geomembrane will not be surveyed. Therefore, it is critically important to cover any areas of exposed geomembrane with liquid for testing.

- **Verify the liquid solution in the application is not frozen or contain a surface layer of ice.** Technicians cannot perform a survey in frozen liquid or if a layer of ice is present.

- **Confirm the layering directly underneath the geomembrane to be tested contain a properly-prepared subgrade or medium with sufficient conductivity.** Some conductive mediums are required for sufficient conductivity: conductive-backed geomembranes, conductive geotextiles, a geosynthetic clay liner, or a layer of drainage/filtration soil.

- **Minimize or remove trapped air pockets (aka “hippos” or “ballooning”) and wrinkles.** These areas will decrease leak detection sensitivity since an air void is present preventing intimate contact with the underlying conductive layer.

- **Fill the application with liquid solution to a minimum depth of 6 in (15 cm) and up to the maximum operating capacity or leak detection survey limit.** The leak detection survey limit consists of a required survey area up to the level where the exposed geomembrane begins. Only areas covering the relative geomembrane will be tested. Anomalies that may be present on exposed areas of the geomembrane will not be detected.

- **Check the viscosity level (thickness) of liquid solution in the application is less than 2,000 cP at 70 °F (21 °C) during the entire survey process.** Viscosity level greater than the recommended amount will prolong the survey process and may hinder the survey efficiency.

- **Verify the top plate of walls can be walked on without slipping, tripping, or falling.** It is highly important that when surveying vertical standing walls, a stable, solid, non-slip surface is required such as a berm, ledge or subsurface platform.

- **Location and reference marks on the geomembrane must not be erased or covered until the documentation, pinpointing, and repair process is complete.** The documentation process from the leak detection survey will require reference and location marks relative to the location of each anomaly or leak. These marks cannot be erased or covered until the repair process from the repair field crew is complete. Erasing or covering of these marks may compromise the location of the pinpointed anomaly or leak. This may result in a repair of geomembrane in an area where a leak may not be present.