



LANDFILL COVERS INSTALLATION GUIDELINES

Field Installation Procedures ~ GRIFFOLYN® COVER SYSTEMS

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Fab Tape™ Seam



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Reef Industries, Inc. products.

This document provides information related to the installation of Griffolyn® Cover Systems. Included in this document is information to assist the customer in accessing the site, guidance on site preparation, estimating staffing and support necessary for the installation and finally, information on installing the cover.

This document does not attempt to address all aspects of an installation for all applications. This general information is presented in order to familiarize the individual with the overall scope of the project. Specific site criteria should be addressed prior to the start of the project to insure a successful installation.

Section I

Determining Cover Size Requirements

To assure that the panel (or panels) ordered will sufficiently cover the area requiring a cover and that the cover will perform as required, a thorough site review is required. Items to be considered are substrate, utilities that may travel over, under or through the area, debris that may accumulate in the covered area and access to the site by personnel or animals. All of these items should be considered to insure the installation proceeds smoothly and the material will perform as required after installation.

The site should be measured to determine sizes required. As built dimensions can vary significantly from blueprints or designed dimensions. Allowances should be made for anchor trenches or other anchoring system required. Measurements should be generous instead of conservative to allow for slack in the cover once installed. An oversized sheet can always be cut to fit, an undersized panel has to be field patched or enlarged and is more difficult and may not perform as desired.

The area should be measured in both directions. The measuring tape should be placed at the approximate location of the anchor trench and allowed to follow the contours of the slopes or uneven terrain. Additional length or width should be added to this measurement to account for the anchor trench. Normally 4'-6' per anchor trench is sufficient.

Pipe intrusions such as drain lines, fill lines, overflow lines should be located and identified. At least 1'-2' of pipe needs to be exposed to allow for pipeboot installation. To secure the material to the pipe intrusion, pipeboots will be required to be fabricated and sealed to the material in the field. Each pipe outside diameter should be measured and recorded. Also the slope where the pipe is located should be recorded (i.e. 3:1 side slope for a fill line) Notations should also be made if valves are installed on the pipes. Information on pipe intrusions must be provided to Reef Industries so that pipeboots can be fabricated and provided as an accessory to the material for field installation.

Information on your site layout should be provided to Reef Industries along with any requirements for pipeboots (See Section II).

Section II

Site Evaluation and Preparation

One of the most important steps in protecting a cover is correct site preparation. Insufficient effort in this area will most likely cause short term and long term problems with the materials performance.

Subgrade preparation is the most important portion of the site work. The surface the material will come in contact with needs to be smooth and free of rocks, debris and old vegetation. Ideally, the material should be placed over a sand base, but if not practicable work can be performed on existing subgrade. In some cases, compacting existing subgrade materials and correction of any erosion damage which may exist will provide an adequate surface. Chunks of clay or dirt should be leveled or removed. Also, material such as crushed rock is not an acceptable surface for the material since foot traffic on top of the material may cause punctures due to the sharp subgrade materials.

Vegetation removal is also important. Dry weed stalks or brush become brittle and when broken can act as ideal sources for punctures. Tree roots or stumps should be completely removed or covered with fill dirt.

Underground utilities in the area should be marked to prevent damage during installation of the anchor trench. Utilities which may be present are telephone, gas, electrical, cable TV, or storm drains. Line locations should be marked prior to start of any dirtwork. If pipe penetrations are required for vent lines, monitor lines, prefabricated pipeboots can be provided and installed in the field.

All water should be drained from the area prior to material installation and the site allowed to dry. Large sheets cannot be pulled across a muddy surface since the mud will act as a vacuum and make installation extremely difficult. Installation of a cover on a muddy surface is not recommended.

An anchor trench is normally used to secure the perimeter edge of the material. The anchor trench can be mechanically or manually dug and is normally 5"-8" wide and 12"-

16" deep. **See Anchor Trench drawings.** Dirt should be placed to the outside of the trench for easy backfilling.

The anchor trench can be dug just prior to placement of the material or during installation of the material. Anchor trenches dug too early may fill up with dirt requiring the trench to be cleaned out during material installation.

Section III

Estimating Manpower and Equipment for Installation

Determining what materials, equipment and personnel will be required to install a material is not an exact science. Each project presents its own unique challenges and complicates what appeared to be a straight forward task. The information presented here is based on previous installation experience and aids in insuring the project progresses as smoothly as possible.

A 100' x 100' cut flat sheet of Griffolyn® TX1200 weighs approximately 350 lbs and is normally packaged in a cardboard box approximately 4' x 4' x 4'. Total package weight: about 400 lbs.

A 200' X 200' cut flat sheet of Griffolyn® TX1200 weighs approximately 1400 lbs. Sheets of this size will be rolled on a 8' long cardboard core, overwrapped and strapped to a pallet. Total Package weight: about 1500 lbs.

The two package sizes are provided to give you a relative idea of the size of the panel sizes you are ordering. The materials are normally shipped via common carrier, therefore arrangements must be made to receive your material and unload it from the enclosed trailer. The crate is built sturdy enough for shipment, but care should be taken to prevent forks or other items from puncturing the container during handling.

In addition to heavy equipment which is necessary to move the crates, slings, chain or rope should also be available for pulling or lifting the crate/material. Smaller rope is used to secure the material in the event of wind.

Sandbags are used to secure the cover material during and after installation. Normally sandbags are installed on the cover material on a 15' x 15' grid and along the perimeter on 4'- 6' increments. On a 10,000 square foot cover, approximately 150 sandbags would be required. If high winds are expected more sandbags should be used. The sandbags do not need to be filled completely. Bags that are too heavy slow down placement or removal of the bags. Tires may be used instead of sandbags if available.

Handtools normally required are hammers and pry-bars for opening the crates, shovels and rakes for performing last minute preparation of the site and filling sandbags. Gloves should be available for personnel who will be pulling the material into position.

The number of personnel required is dependent on the size and quantities of sheets or panels to be installed. For

a 10,000 square foot cover, 4-6 people would be sufficient. For a 40,000 square foot material, a minimum of 8 people are required and 10 are strongly recommended. Prior to the material being placed, personnel may be used for last minute site work, assisting with crate preparation and placement and for filling sandbags.

Other items may be required depending on location and conditions. Where access is difficult or the unloading point for the common carrier is at a far point from the final location for the material, a flatbed trailer may be required to transport the crates.

Section IV

Unpacking and Positioning of Cover Systems

These instructions are meant to be used as general guidelines for the installation of cover materials. Other conditions may apply depending on the size of the individual panels and project. These instructions should be used in conjunction with any additional installation instructions provided.

A deployment area must be designated for each site and sufficient access for crate positioning allowed. Normally roadways are used if sufficiently prepared to prevent material damage. A recommended width for the deployment area is 20-30 feet.

Griffolyn® materials are shipped in either large cardboard boxes or overwrapped and secured on a pallet depending on the size of the individual sheets. Smaller sheets will be accordion folded, then rolled and placed into cardboard boxes. Larger panels are accordion folded and then rolled on a core. Information may also be provided with the cover on how to remove and install your material. The information is similar to what is being presented here.

Rolled tarps in cardboard boxes

Smaller materials or tarps are packaged to allow them to be unrolled at the cover site. As a general rule, cut flat sheets 15,000 square feet and below are accordion folded and then rolled (**See Accordion folding Drawing**). Sheet sizes larger than 15,000 are accordion folded and rolled onto a core. Smaller rolled materials are packaged and shipped in cardboard boxes. The roll of material is tipped on its end to fit into the cardboard box, therefore the

Section IV

rolled sheet must be turned and positioned correctly at the site for deployment. Package size is approx. 4'x 4' x 5' high weighing about 600 lbs. The larger rolls are placed horizontally on a pallet and strapped to the wooden pallet for shipment.

The roll of material should be positioned at one corner of the deployment area. To determine how the package should be positioned and in which direction to turn the material, the top should be removed. Once these factors have been determined and the box positioned, the sides of the box should be opened. The cardboard sides can remain in place to protect the material from any sharp edges on the pallet. The material should be rotated and oriented so that the end of the material faces the deployment end of the area to be covered. (**See Deployment Procedures – Option 1**) The material can then be unrolled along the side of the area. Section V addresses the actual placement of the material.

The larger rolls can be deployed one of several ways. First, the large roll can be placed at one edge of the area to be covered and unrolled. Secondly, the roll can be supported by the core, the leading edge of the cover secured at the edge of the area and the roll carried along an area, (**See Deployment Procedures – Option 2**) unfurling the roll as it is moved to the opposite end of the area to be covered. Larger construction equipment will be required to handle these rolls and a spreader bar with slings, etc needed to support the rolls.

Based on the method chosen to deploy the material, a fair number of personnel may be required. If a roll weighs 1300 lbs, it may take 8-10 people to move the roll. If the roll will be lifted and unspooled along the pond, some method of anchoring the leading edge should be determined. Ballast with cushioning can be used. NOTE: Only personnel wearing soft soled shoes should be allowed to work on the material to protect against damage. Personnel should continually watch the deployment area for sharp rocks or other debris which may damage the material as it is being deployed.

Section V

Placement of the Griffolyn® Cover System

Once the pallet and other packaging materials, tools and other construction items have been removed from the immediate area, the material is ready for deployment. The

area should be inspected to insure no materials or other items will be covered by the material once installed. This is also a good time to inspect the site to insure it has been properly prepared i.e. all rocks, wood debris, etc. are removed and that the site is smooth. Five minutes spent now doing a review of the site is a good investment. Ballast materials should also be positioned to secure the material after deployment. These materials must be placed on the material as soon as the material has been placed. Sandbags are commonly used, along with backfill dirt. Sandbags or other materials should be placed around the area to be covered so they are readily available and can be used as needed.

At this point, wind conditions are critical. Covers should not be installed during windy or strong breeze conditions. If excessive wind is allowed under the material during deployment, the material will act as a sail and personnel will not be able to control or retain the material. If the wind is too strong to allow deployment, sandbags or other ballast should be used to secure the material. Another recommendation is to take short lengths of rope and cinch the material on about a 20'-30' spacing along the entire length. If the wind picks up and catches the material edge, this method of securing the material limits the amount of exposed surface area.

Light breezes blowing across the site towards the deployment side are actually an aid since a small amount of air under the material will allow the cover to "float" on a cushion of air during the deployment stage. Also wind conditions can increase during the deployment stage, therefore deployment should be scheduled to insure the wind does not jeopardize this stage of the project.

Personnel should be spread evenly along the deployment edge. The optimum spacing for personnel is about 20'-30' apart, so on a 200' long material 9-11 personnel would be required. The leading edge should be held firmly and the material pulled across the site evenly. A site supervisor should coordinate movement across the area to insure the material is pulled in unison. As mentioned early, a small amount of air trapped under the cover aids in deployment. If the wind increases in intensity or it appears too much air is traveling under the cover, the leading edge of the cover should be held closer to the ground or held down temporarily until the wind gust dissipates.

If the material cannot be pulled across the entire width in one pull, the leading edge should be secured, and personnel moved back to the remaining accordion folded section of the material. Personnel should then pull the extra material across the site. Utilizing this method, the material can be "indexed" into position.

The material should not be pulled too tight. Wrinkles or folds will not affect the performance of the material. The material will stretch in warm or hot weather and contract in cool or cold weather. The covered area should be walked after deployment to insure that the material is lying flat in all areas. Sandbags should be spread out across the exposed area to protect against wind damage.

Sufficient slack should also exist throughout the cover. A certain amount of material allows the panels to contract or move initially to insure the material is not under tension when the seaming or prior to perimeter anchoring. A common tendency is to install the cover and remove all wrinkles and creases. Due to the expansion and contraction of the cover during summer and winter seasons, a 5% allowance of excess material in both directions should be incorporated into the cover during installation. The excess material should be spread as uniformly as possible throughout the cover.

At this point, the perimeter of the material should be temporarily secured in the anchor trench. Allowing the material to contract overnight due to cooler weather will indicate if sufficient slack is available or additional material is required. If the cover is already permanently anchored the cover may be placed under tension. Once a determination has been made that sufficient material exists, the edge of the material can now be anchored or secured in the anchor trench or totally secured with backfill or other ballast materials.

MULTIPLE PANEL PROJECTS:

If the site requires more than one panel to cover the area, the additional panels should be deployed following the same procedures as the first panel. The second and subsequent panels should be deployed so that the panels when positioned correctly will overlap approximately 4'-6'. The overlap is required to compensate for contraction of the material as it cools. Section VI provides information on using tape for field seams

The usual approach to field seams is a combination of Fab Tape™ and pressure sensitive tape. Fab Tape is a double sided butyl tape which is applied between the overlapping panels. The pressure sensitive tape secures the exposed top edge of the top panel to the second panel. See Drawing called Fab Tape Seams for positioning of tape.

The surfaces which will receive the tape should be clean and dry. The tape will not adhere or give the level of performance required if the surfaces are not properly prepared. Dirty or wet surfaces should be completely cleaned with water, paper towels, dry rags or other materials which will prepare the surface for the tape. Accumulations of dust should also be removed to insure a secure sealed seam.

Both of the products used obtain their optimum adhesion when the surfaces to be bonded are warm. The surfaces should be at least 60°F to insure an acceptable bond. In order to obtain a bond at lower temperatures, heat may be required to be applied to the taped areas. To install the tape, the overlapping top edge should be pulled back approximately one foot. A row of fab tape should be placed about 6" away from the uncovered edge. The tape should be applied as straight and as uniformly as possible. The tape should be allowed to follow the contours of the panel and should not be stretched tight. Apply firm pressure to insure that the tape is sealed to the material.

After the Fab Tape™ has been installed, the release paper should be removed from the Fab Tape and the top panel secured to the bottom. Again, do not pull the material tight during the securing process since excess tension will eventually result in numerous wrinkles which are difficult to seal. All voids or wrinkles if they exist should be sealed with fab tape. The exposed edge of the panel may now be secured to the bottom sheet with a layer of pressure sensitive tape. Again, the material should be clean and dry. Apply the tape so that half of the tape is on one panel and half on the second panel. Press into place and insure that the tape is secure.

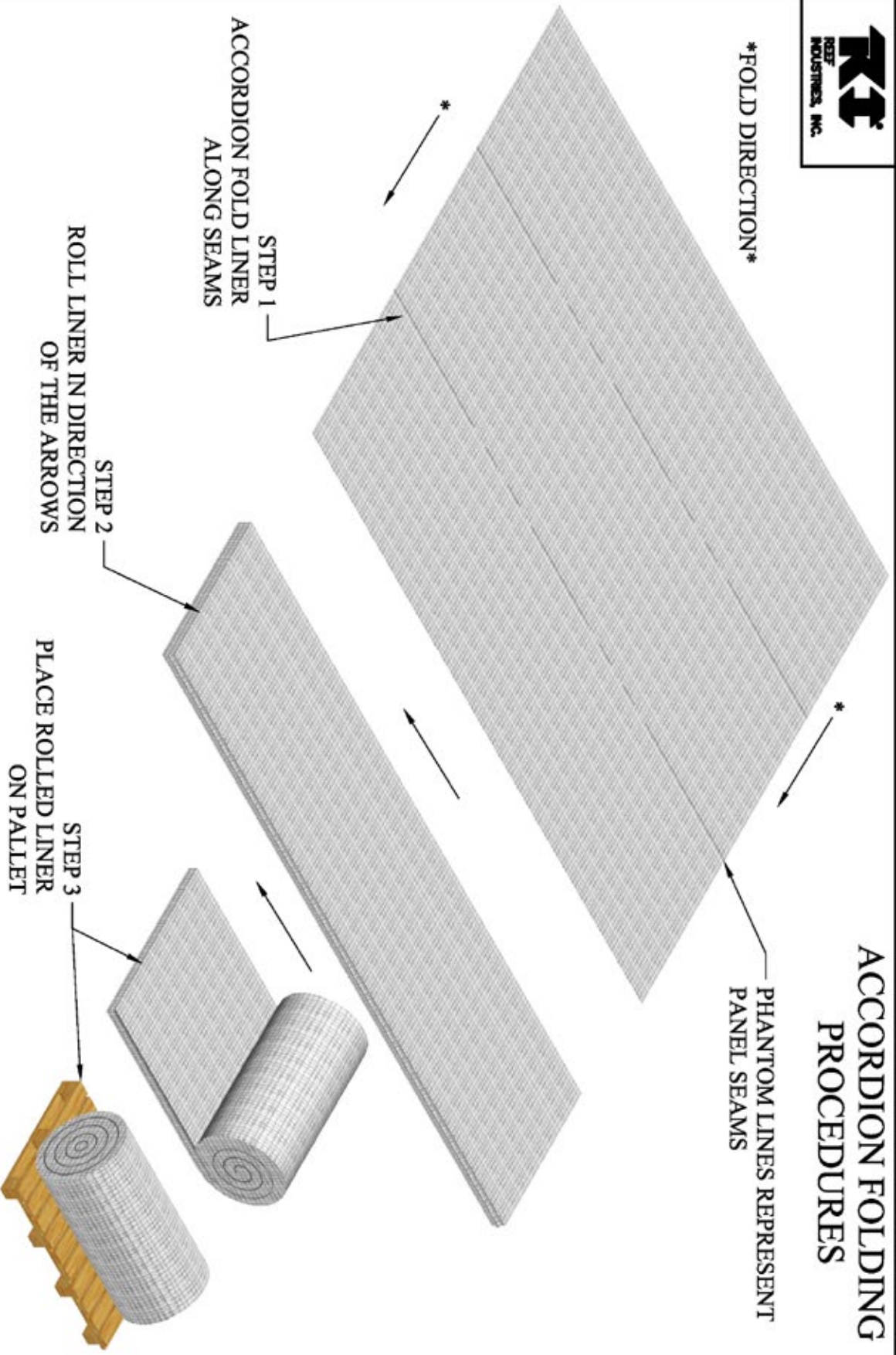
An alternate option is to sew the panel edges. A lap seam is not practical for field sewing, therefore a flat or "prayer" seam should be used or an alternate is the J-type style. Synthetic thread should be utilized with a maximum stitch density of 5 stitches per inch. This type of seam will not be waterproof because of the stitching. A row of tape may be applied over the sewn seam to prevent water egress.

Section VI

Fab Tape™ Seam

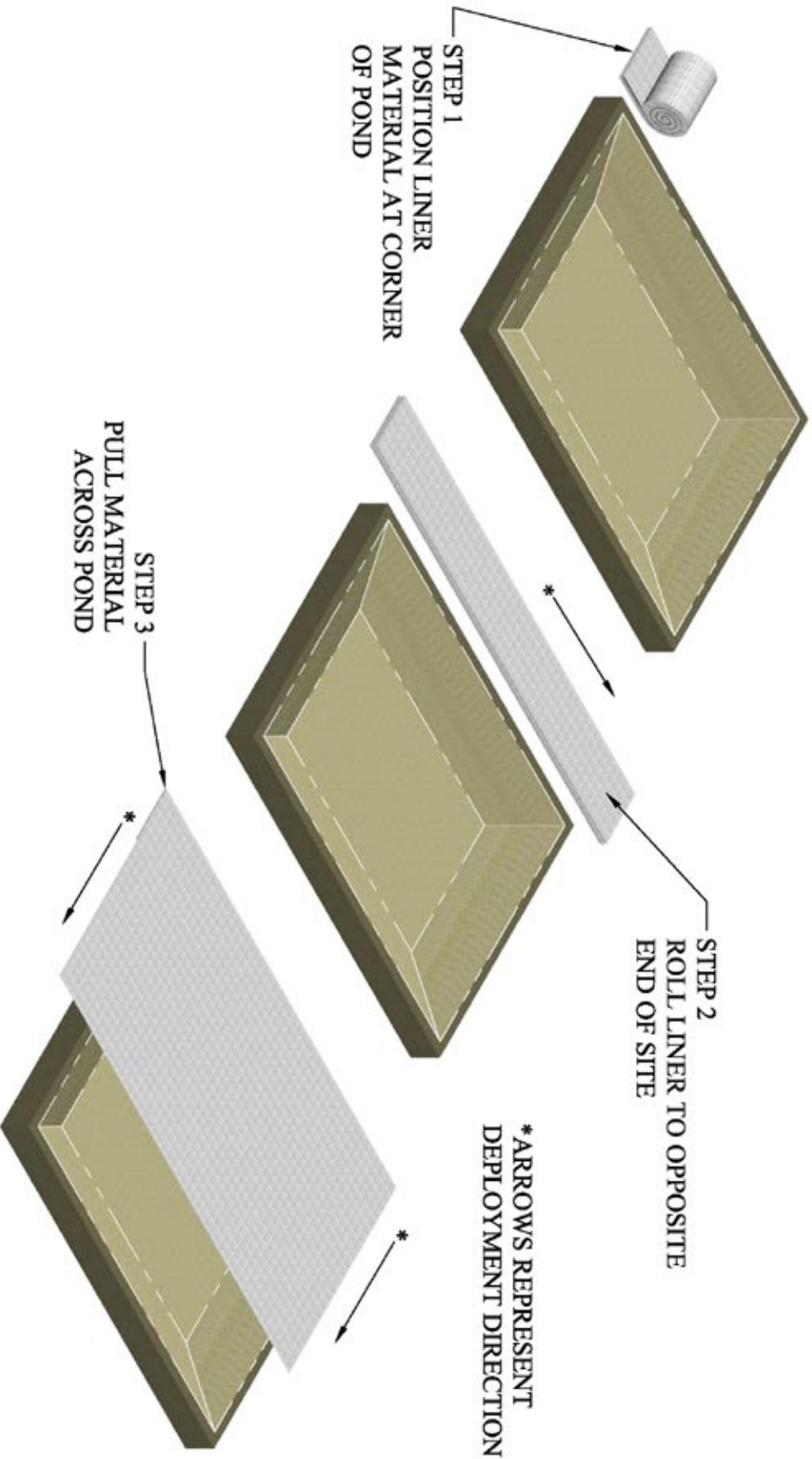
Griffolyn® material used for cover systems are fabricated in as large of panels as practical to reduce or eliminate field seams. For those projects where it is impractical to make the cover in a single sheet, multiple panels are used and require field seams.

ACCORDION FOLDING PROCEDURES



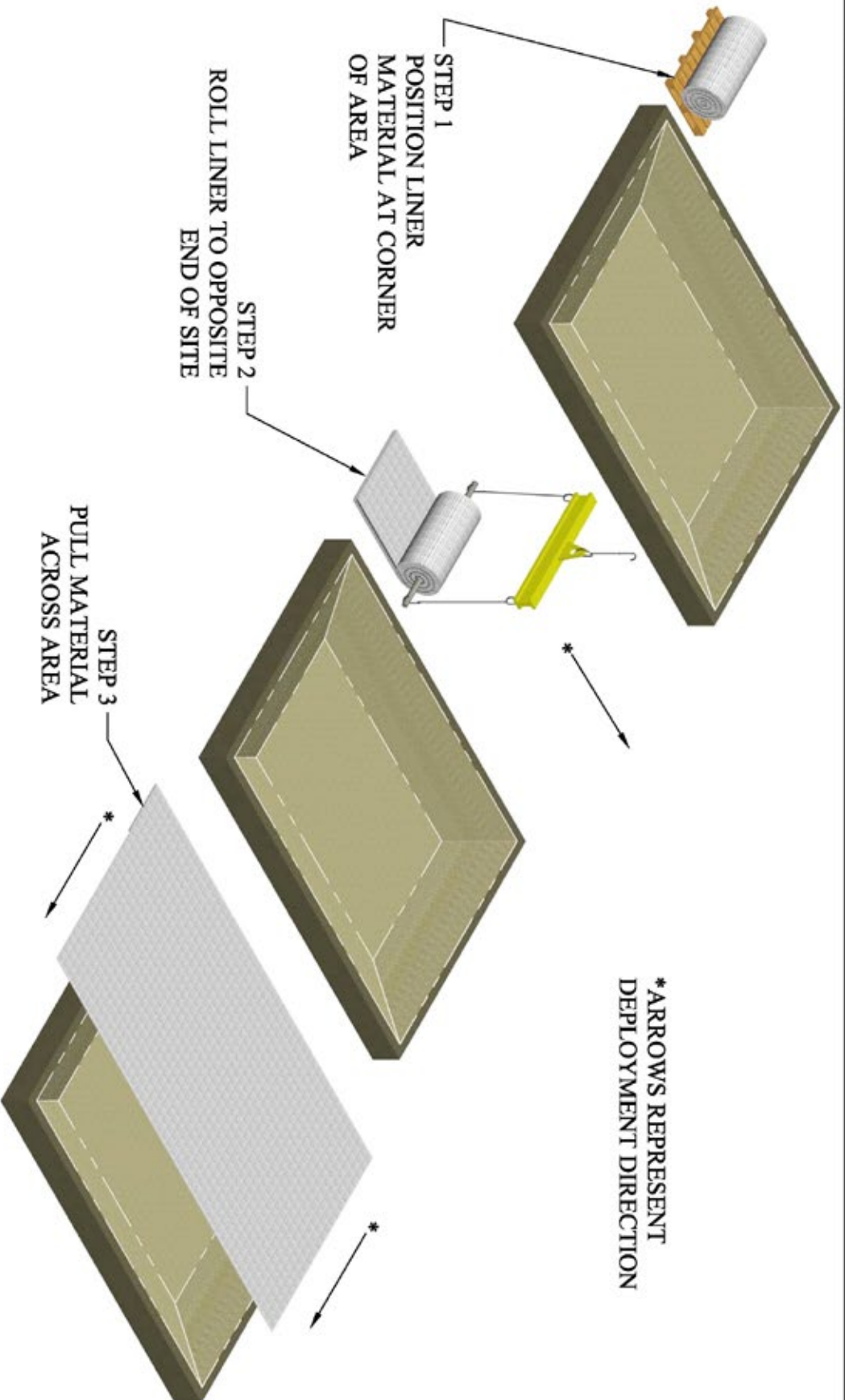
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DEPLOYMENT PROCEDURES (OPTION 1)



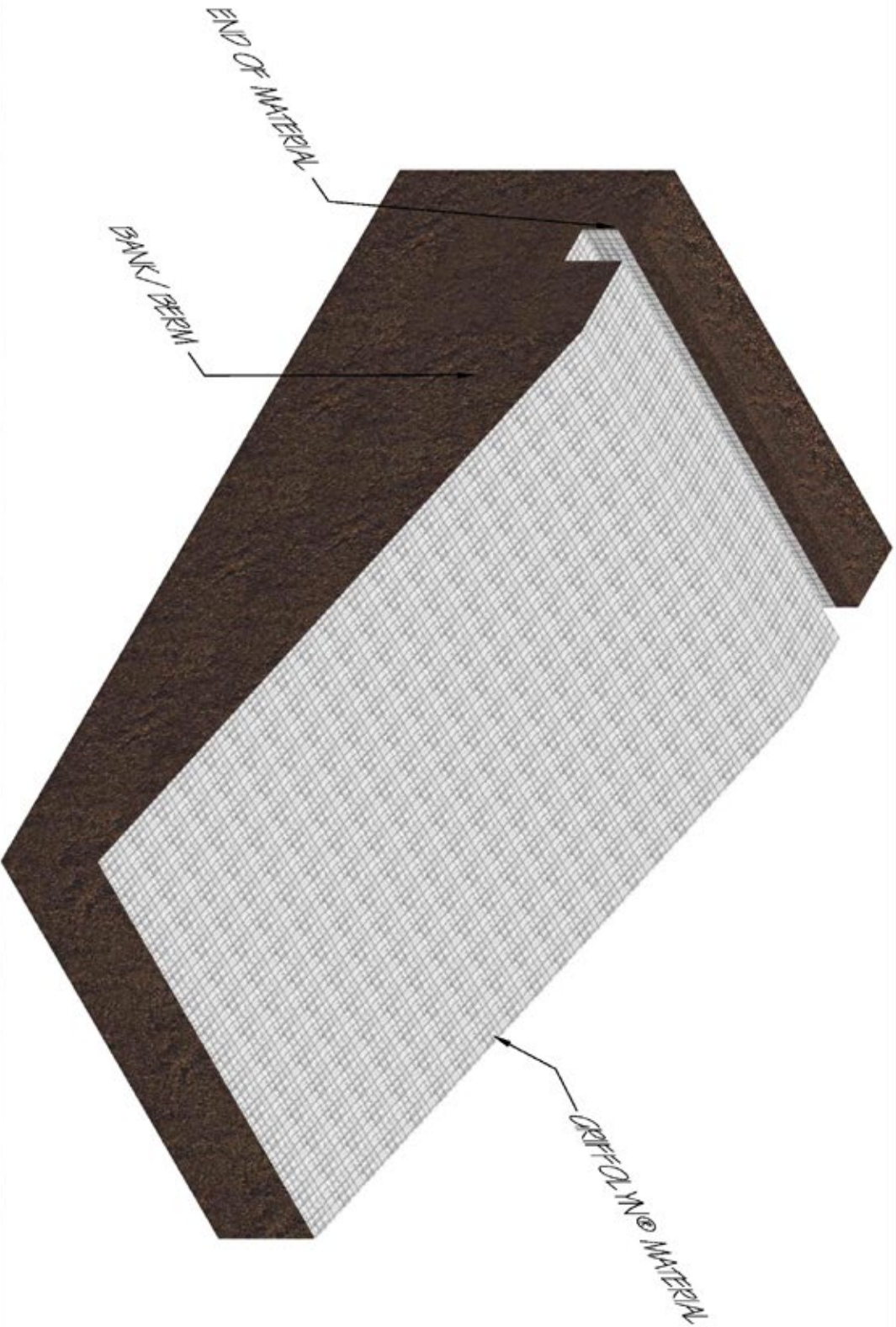
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DEPLOYMENT PROCEDURES (OPTION 2)



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ANCHOR TRENCH



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FAB TAPE™ SEAM

