Aqua-Barrier®
Water-Inflated Dams

Instruction Manual



Matthew 11:28 “Come unto me, all ye that labor and are heavy laden, and I will give you rest”

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Introduction
Aqua-Barriers® are a U.S. patented #5865564 water-inflated damming devices produced from flexible reinforced PVC membrane material. The Aqua-Barriers® are used as a temporary water diversion system in construction projects, flood protection and numerous other applications. Aqua-Barriers® are characterized by being light-weight, easily deployed and removed, compact in storage, repairable and reusable.

Stabilization Components
Three components interact together to stabilize the Aqua-Barrier® water-inflated dam.

The internal baffle system
The patented internal restraint baffle(s) lock into place when the barrier is exposed to uneven hydrostatic pressure on one side.

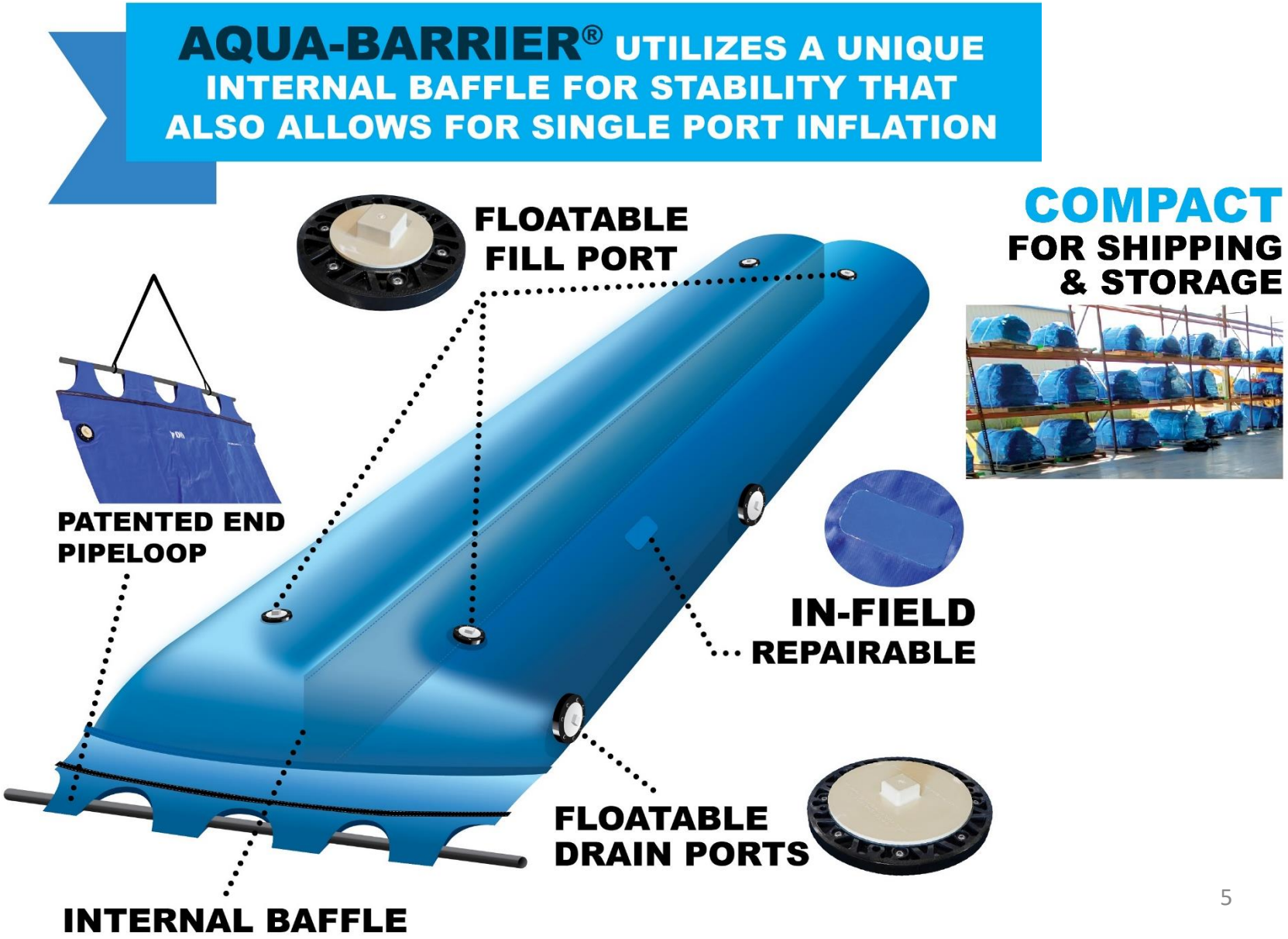
Freeboard (amount of inflated barrier above the surrounding water level)
A minimum of at least 25% freeboard required in all Aqua-Barrier® installations. Freeboard requirements may increase if the barrier is exposed or has the potential to being exposed to high water velocities (3-ft or more per second), slick soil conditions and other relevant hydrostatic conditions.

Surface Friction
The Aqua-Barriers also require surface friction to stabilize when exposed to uneven hydrostatic pressures. Barriers that are exposed to weak soils and/or slick soil conditions may require pipe support, a wider footprint or additional freeboard

STABILIZATION COMPONENTS



AQUA-BARRIERS ARE EQUIPPED WITH UNIQUE ACCESSORIES FACILITATE INSTALLATION AND REMOVAL



AQUA-BARRIER BAFFLE BEHAVIOR

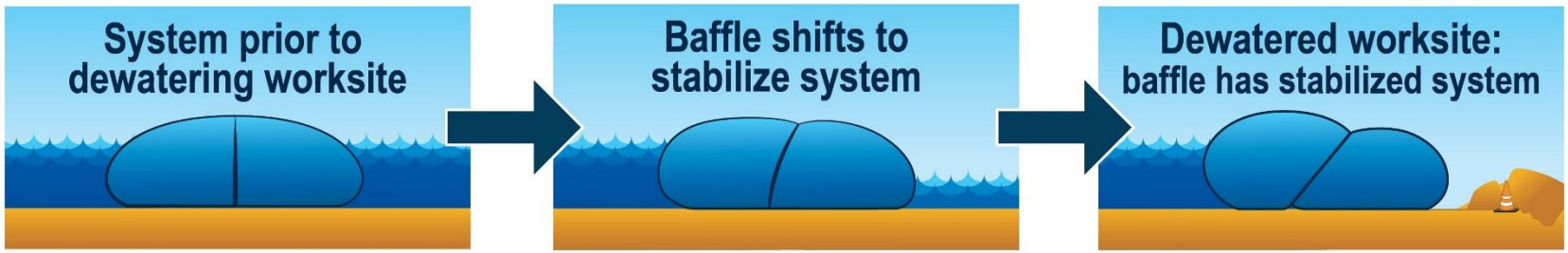
The Aqua-Barrier system gains its stability through the tensioning of the inner restraint baffle(s).Once the system is inflated the baffles prevent the barrier from rolling. As the barrier is exposed to water pressure there is a natural adjustment towards the side of the least hydrostatic (water) pressure.

MEASURE BARRIER HEIGHT FROM THE LOWEST ELEVATION
ALWAYS INFLATE AN AQUA-BARRIER TO ITS FULLEST HEIGHT

These adjustment lengths are based upon a barrier being inflated to its recommended height with the baffle being cross-sectional centered. The barrier adjustment length could increase or decrease if not properly inflated and or if slopes or grades are present. These adjustments should be considered when determining the installation location of the barriers.

The chart below illustrates the maximum adjustment per each barrier height

Barrier height	Maximum adjustment length
2’	1’
3’	1.5’
4’	2’
5’	2.5’
6’	3’
7’	3.5’
8’	4’



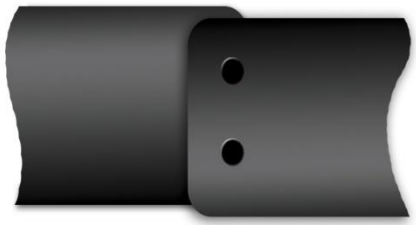
CONNECTION METHOD

Aqua-Barriers are joined together by an overlapping technique. Once the initial Aqua-Barrier has been inflated, the adjoining barrier is positioned and pulled up onto the end of the inflated barrier. The chart below illustrates the standard barrier overlap lengths.

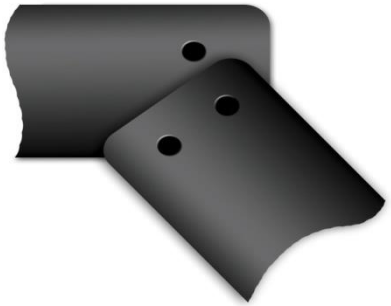
MEASURE BARRIER HEIGHT FROM THE LOWEST ELEVATION
ALWAYS INFLATE AN AQUA-BARRIER TO ITS FULLEST HEIGHT

Aqua-Barrier Inflated Height (ft)	Overlap Length (ft)
2	3
3	4.5
4	6
5	7.5
6	9
7	10.5
8	12

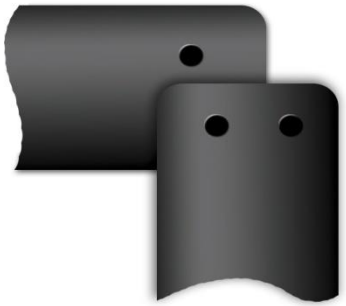
The barrier positioned on top of the inflated barrier is then inflated. The weight of the second barrier will provide downward force to seal the connection joint. Barriers can be joined end to end or at various other angles as shown on the configuration page 18.



End to End

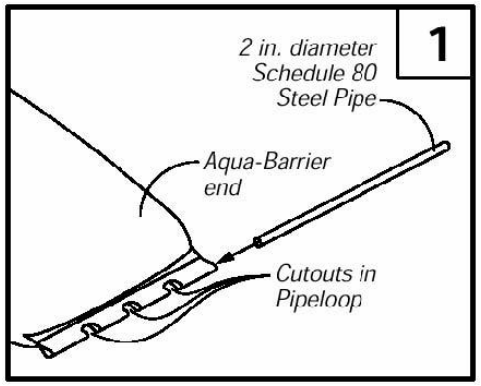


45 Degree Angle

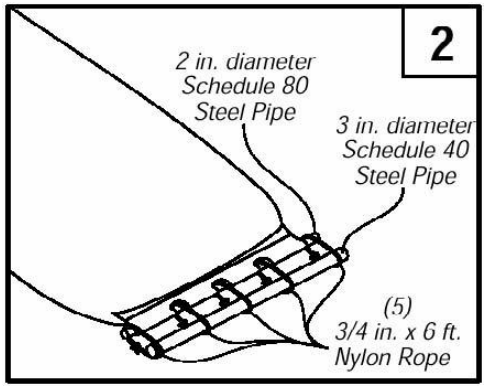


Corner to Corner

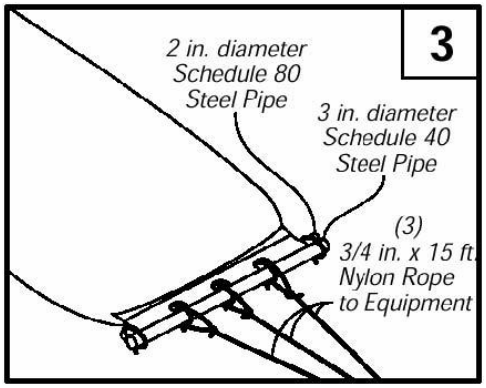
LIFTING PIPE INSTALLATION PROCEDURE
ALL STEEL PIPES MUST BE CONTINUOUS LENGTHS WITH NO JOINTS OR CONNECTIONS



Step 1: Insert 2 inch diameter schedule 40 steel pipe into pipe loop. See Figure 1 for pipe lengths.



Step 2: Locate cut outs along pipe loop. Connect additional 3 inch schedule 40 steel pipe parallel to the pipe in the pipe loop by using (5) 3/4 inch x6 feet long sections of nylon rope.



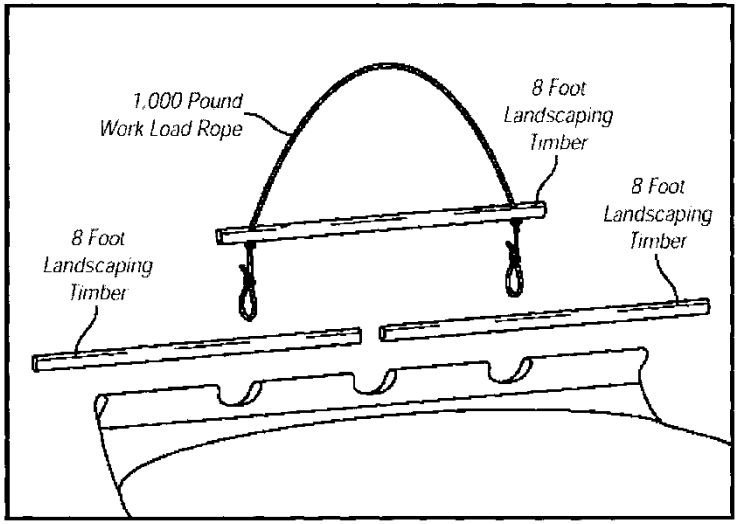
Step 3: Attach (3) 3/4 inch x 15 feet nylon ropes to the 3 inch diameter pipe at the cut outs. These three ropes should then be attached to the lifting apparatus.

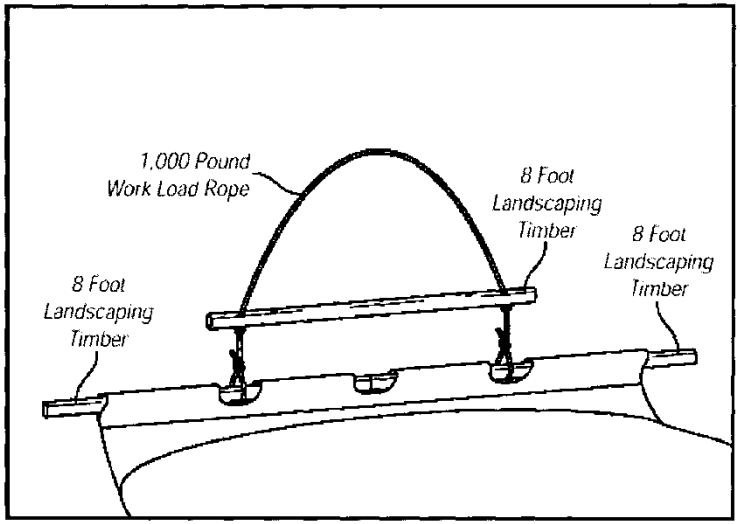
Figure 1:
Required Pipe Lengths

Barrier Height	Pipe Length
3'	8'
4'	10'
5'	15'
6'	15'
7'	21'
8'	21'

LIFTING TIMBERS INSTALLATION PROCEDURE:
NOT TO BE USED IN MOVING WATER INSTALLATIONS

5', 6', 7' & 8' HIGH BARRIER LIFTING CONFIGURATION USING TIMBERS





WORKSITE SAFETY

When working within the Aqua-Barrier dewatered area it is required that all federal, state and local safety procedural laws are followed. At a minimum, the company utilizing the Aqua-Barrier system must comply with OSHA trench and excavation safety procedures. These regulations can be found online at www.osha.gov. A competent person(s) is required onsite at each work shift during the use of the Aqua-Barrier system when workers are present. The competent site person is required to inspect the barriers if there has been any change in water depth, height of inflated barrier(s) or change in position. The OSHA definition of a competent person is as follows:

COMPETENT PERSON is an individual who is capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate or control these hazards and conditions.

HAZARDS

• Due to close proximity of water, HSI Services, Inc. recommends the use of a Coastal Guard approved Personal Floatation Device during the installation and removal process of an Aqua-Barrier.
• Aqua-Barriers can slide into the dewatered worksite in the event that the designated freeboard requirement provided by the HSI Services, Inc. representative is exceeded. Minimum freeboard requirements are 25%. Aqua-Barriers can be pushed or floated downstream in a moving water environment.
• Aqua-Barriers can slide into the dewatered area if the surface friction is not stable enough to support the barrier.
• Aqua-Barriers can lose their stability and be forced into the dewatered area if its recommended inflation height is not maintained.
• Aqua-Barriers®can be vandalized by cutting the exterior of the system or removing the drain ports.
• Please inquire and adhere to all Overhead Power Line Safety laws and OSHA requirement when elevating the Aqua-Barriers. HSI Services, Inc. Cares about the safety of those working near electrical sources. Accidents involving contact with high voltage can result in serious injury or death. When power lines are present on or near the work site, the safety of the equipment operation is the responsibility of the personnel in charge of the work site. Before setting up or operating equipment on any project: EVALUATE THE WORK SITE FOR ELECTRICAL HAZARDS, including both overhead and underground, and if present EXERCISE EXTREME CAUTION.

The preceding list of hazards does not represent every conceivable potential hazard that may appear at a given worksite. Any change in the Aqua-Barriers original installation positions must be evaluated before workers and equipment are allowed into the work area. The local HSI Services, Inc. representative or our installation department (800/ 245-0199) must be contacted to discuss the safety of the Aqua-Barrier system before workers or equipment are allowed back into the work area.

SAFEGUARDS AND PRECAUTIONS

Caution: Read the safeguards and precautions prior to installing or removing Aqua-Barrier water inflated dams. Follow instructions and heed all warnings in this manual. The below stated precautions are only a few of many. Each potential Aqua-Barrier installation location may require different precautions. **It is required that a HSI Services, Inc. representative be contacted and consulted prior to installing or removing Aqua-Barriers.** See Aqua-Barrier Worksite Training document for more information on safety, installation and removal procedures.

- The OSHA trench & excavation guidelines should be followed at all times when working with Aqua-Barrier
- Due to proximity of water, HSI Services, Inc., Inc recommends the usage of a Coastal Guard approved PFD (Personal Floatation Device) during the installation and removal of an Aqua-Barrier
- Each individual involved with installing Aqua-Barriers® is required to have a cutting tool (i.e. knife, razor) readily accessible in the event of being trapped by a barrier.
- Every work site should have a deployment and recovery plan. Assistance can be provided regarding this plan by your local HSI Services, Inc. representative
- Recommended safety space between workers and inflated barrier is 10ft to 12ft. If excavation is occurring near an Aqua-Barrier® more distance may be needed
- Personnel should avoid walking on inflated or deflated Aqua-Barriers
- A 10-ft operating distance should be maintained between heavy equipment and inflated Aqua-Barriers
- Personnel involved in the installation process should *never* position themselves beneath any elevated portion of an Aqua-Barrier® or piece of equipment. Please inquire and adhere to all Overhead Power Line Safety laws and OSHA requirement when elevating the Aqua-Barriers

SAFEGUARDS AND PRECAUTIONS

- When work requires excavating in a dry environment provided by the Aqua-Barriers® and the excavation depth will exceed 1-ft, allow an additional easement area of 1ft in addition to the required 10-12ft from barriers and excavation area for each additional foot excavated

- When installing, working around inflated barriers, or removing Aqua-Barriers a minimum crew size of 3 workers is mandatory

- In construction applications it is recommended to monitor the inflated Aqua-Barriers 24-hours a day. This will deter any vandalism and also be a source of information if any problems occur

- If barriers are installed near major roads, overpasses, or recreational boating areas it is recommended a puncture resistant cover be placed on barriers to protect against thrown objects

- An Aqua-Barrier, empty or inflated, should never be dragged or pulled across any surface. This may cause permanent surface damage to the barrier. Aqua-Barriers are only a surface treatment. Water can transmit under the barriers depending on soil porosity. Sump pump area(s) are required in all dewatering projects. The size and number of sump pumps will depend upon the porosity of the soil. The review of a completed Worksite Assessment Sheet by an authorized HSI Services, Inc. representative will determine the effectiveness of the Aqua-Barrier for a particular work environment.

SITE PREPARATION

Installing Aqua-Barrier in any type of environment requires thorough preparation. The following represents several general guidelines that need to be complied with when installing Aqua-Barriers

- All ground objects that could puncture Aqua-Barriers (i.e. sharp rocks, broken glass) should be carefully removed or avoided when deploying. If deploying in a standing or moving water environment, manually walking the site or drag netting will insure a properly cleared area. When the deployment site cannot be totally cleared of problem objects, it is required that a protective material be installed on the site (i.e. non-woven geo textile or other forms of puncture and abrasion resistant plastic sheeting) prior to deployment.

- In construction and flood protection applications, 24-hour monitoring is recommended. This will deter any vandalism and also be a source of information if a barrier failure occurs.

- Avoid deploying Aqua-Barriers near any electrical source (i.e. ground transformers, power poles and lines, junction boxes and switch gears). Please inquire and adhere to all Overhead Power Line Safety laws and OSHA requirement when elevating the Aqua-Barriers. HSI Services, Inc. Cares about the safety of those working near electrical sources. Accidents involving contact with high voltage can result in serious injury or death. When power lines are present on or near the work site, the safety of the equipment operation is the responsibility of the personnel in charge of the work site. Before setting up or operating equipment on any project: EVALUATE THE WORK SITE FOR ELECTRICAL HAZARDS, including both overhead and underground, and if present EXERCISE EXTREME CAUTION.

- Assessment of slopes and land contours is very important when evaluating an optimal area for installing Aqua-Barriers. If the area needing protection is characterized by hills and valleys, barriers may only be needed in the valleys. A barrier will only fill to its expected inflated height at the lowest point it encounters along its length. It is important to consult your local Aqua-Barrier representative for assistance prior to deployment if faced with extreme land contours. Identify the water source that will be used to inflate barriers and maintain clear access to it. Deploy barriers where fill ports will be in close proximity with water source. Using the shortest length of hose to fill the Aqua Barriers is preferred because less hose transmits more water volume.

INSTALLING IN FREEZING CONDITIONS

In freezing conditions, it is recommended that all ice and snow be removed prior to installation. Failure to do so may affect barrier stability and integrity.

The barrier material is good to -22F. Anything below -22F makes the material brittle. Typically water inside the barrier is 10 degrees warmer than outside temperature.

You can keep the water inside from freezing solid by using products such as glycol tubes (www.thawbuster.com) – see next slide

You can use ground heaters to warm up the barriers from the bottom (www.onsiteco.com/ground-thaw/ground-blankets)

Thermal pool blankets to cover the top (www.backyardpoolsuperstore.com) may also be helpful.

If you think the barriers will freeze you need to leave the fill ports open and release a little water out of the barriers. Water expands at a rate of 10% when it freezes. You want to make room inside the barriers to prevent rips in the material as water turns to ice.

If the body of water in which the barriers are installed starts to freeze you may risk damage from ice ramming the barriers. To minimize this damage you can cover the barriers with a geo textile protective membrane or place something in front of them to “catch” chunks of ice. Concrete jersey barriers work well and sometimes PE construction fence has been used

When it comes time to remove the barriers they must be fully thawed and drained before the track hoe begins to pull them out of the water. Do not attempt to remove a barrier with ice inside as it could cause damage.


GLYCOL TUBES REST ON TOP OF THE AQUA-BARRIERS

IMPORTANT INFORMATION WHEN USING WATER INFLATED COFFERDAM SYSTEMS

Establishing a temporary cofferdam system and dewatering the enclosed area is a process with inherent problems. These problems arise from the inability to gather exact site conditions because water coverage prevents visibility of the underwater surface conditions. Soil conditions directly under the visible surface may also pose unexpected problems such as objects that could damage the barrier and or porous soil conditions. Extensive site evaluations can be performed; however, it is impossible to precisely determine all relevant hydrological conditions that could affect the success of the water inflated cofferdam system

Debris removal: It is imperative that all surface debris (ex. sharp rocks, rebar, stumps, etc.) that can puncture a plastic membrane be removed from the area where the barriers will be installed. An additional protective membrane can be deployed to provide additional puncture protection. The membrane must be formidable enough to provide the proper puncture protection according to the debris that the barriers will be exposed. If the debris is not removed you can potentially experience one or more of the following problems:

- Complete inability to keep a barrier inflated if large punctures occur. Recommended solution to problem is to remove barrier, perform onsite repair, and remove debris that caused the problem or apply protective membrane. If the damage has rendered the barrier un-repairable, a replacement unit will be needed.

- Loss of inflation due to small leaks in the barrier. Recommended solution would be either one of two options: 1. remove barrier, perform onsite repair, and remove debris that caused the problem or apply protective membrane. 2. Maintain recommended inflated height of barrier by adding water as needed.

Thorough site preparation is essential to avoiding the costly problems mentioned above

IMPORTANT INFORMATION WHEN USING WATER INFLATED COFFERDAM SYSTEMS

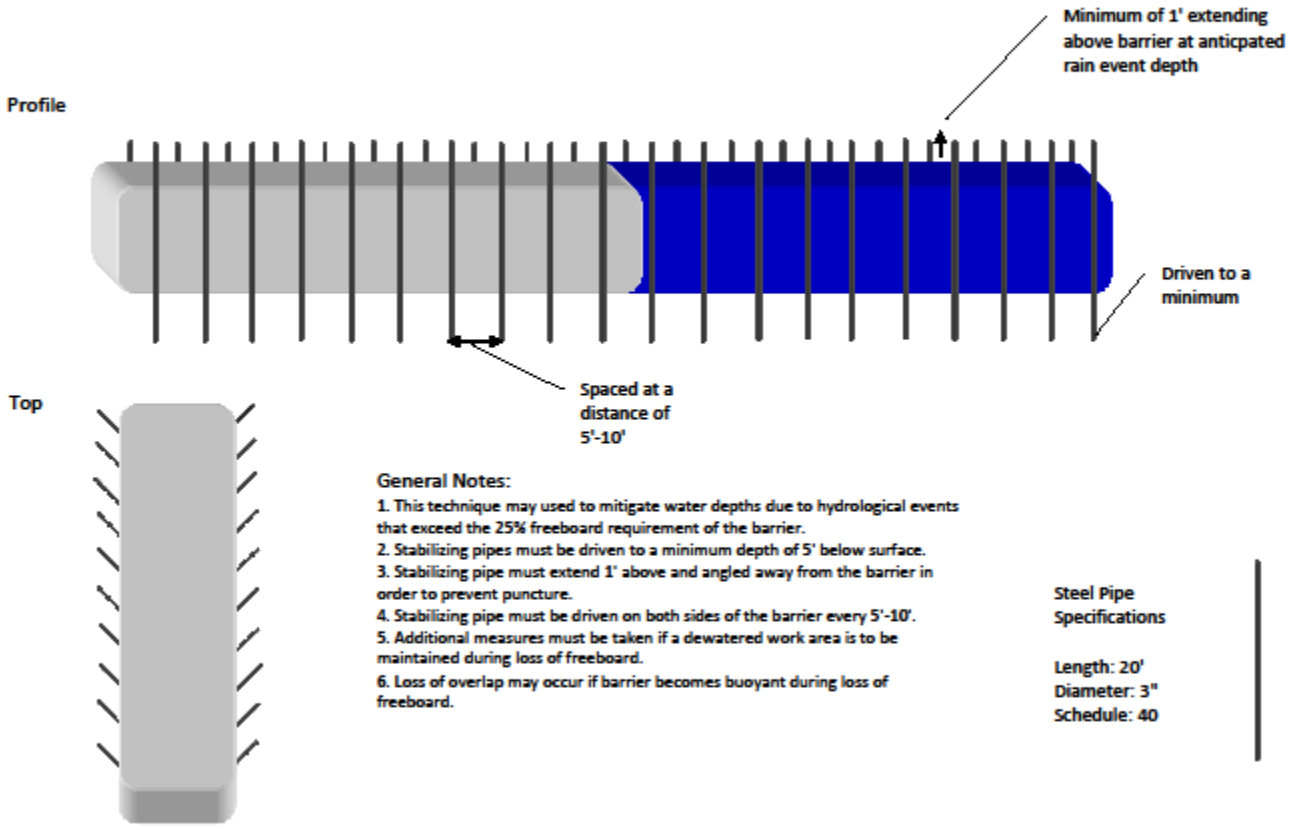
Moving water environments: Bodies of moving water can behave in unusual ways when partially or completely blocked with a temporary damming system. Reducing the normal channel dimensions can cause water depths and velocities to increase. Rain events, channel flows, irregular surface conditions, soil makeup, and other relevant hydrological information may affect the overall effectiveness of the damming system. Do to these unknown behaviors; the original cofferdam design may require alterations.

Slick soil conditions: In environments exhibiting limited surface friction; adjustments to the freeboard (amount of inflated barrier above the surrounding water) and or a temporary structure may be required for barrier stabilization. Environments such as lakes, ponds, or other standing water environments are susceptible to long term silt build up. This soft silt media offers very little surface friction. Slopes, grades, and other relevant hydrological data can affect the ability of the inflated barrier to perform successfully in these environments. In the event that not enough soil friction exists to stabilize the system, a structural support such as steel pipes system can be used to achieve stability and prevent sliding.



Use steel pipes to support barriers on slick surfaces, fast moving water or freeboard loss

20ft long
3” diameter
Schedule 40
Driven 5ft into the ground
Spaced 5-10ft apart



General Notes:

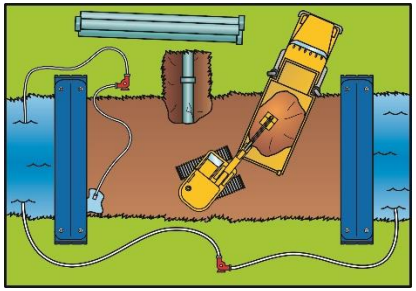
1. This technique may used to mitigate water depths due to hydrological events that exceed the 25% freeboard requirement of the barrier.
2. Stabilizing pipes must be driven to a minimum depth of 5' below surface.
3. Stabilizing pipe must extend 1' above and angled away from the barrier in order to prevent puncture.
4. Stabilizing pipe must be driven on both sides of the barrier every 5'-10'.
5. Additional measures must be taken if a dewatered work area is to be maintained during loss of freeboard.
6. Loss of overlap may occur if barrier becomes buoyant during loss of freeboard.

Steel Pipe Specifications

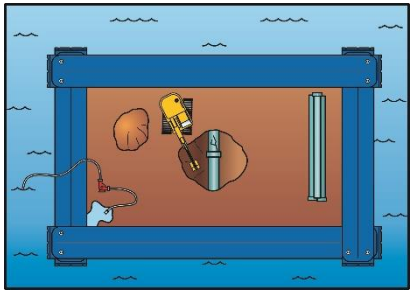
Length: 20'
Diameter: 3"
Schedule: 40

INSTALLATION CONFIGURATIONS

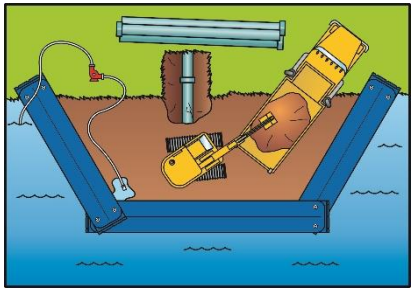
The drawings below represent the more commonly used configurations
Aqua-Barriers are not limited to just these choices



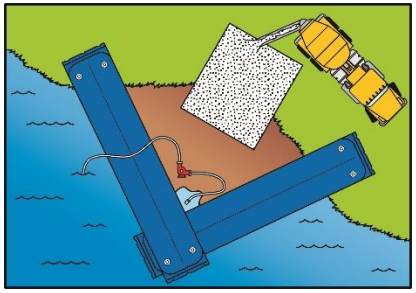
Canal Block



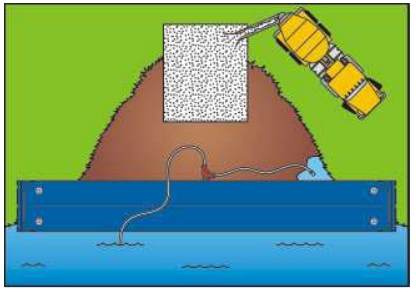
Complete Enclosure



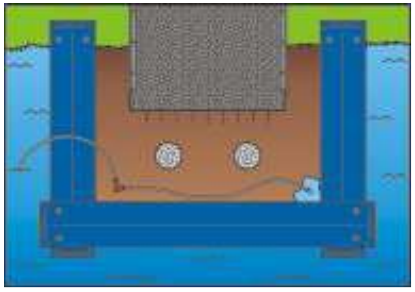
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Tee-Pee Configuration

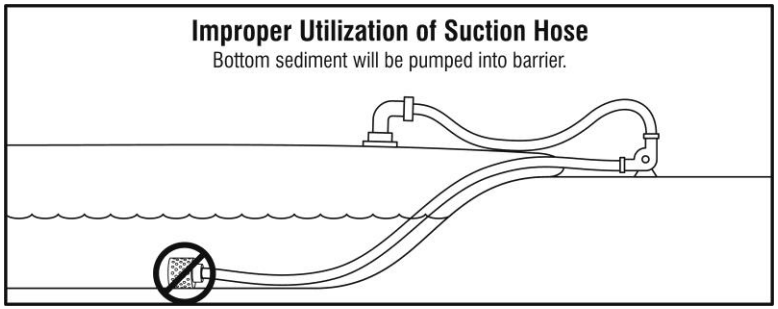


Straight Shoreline

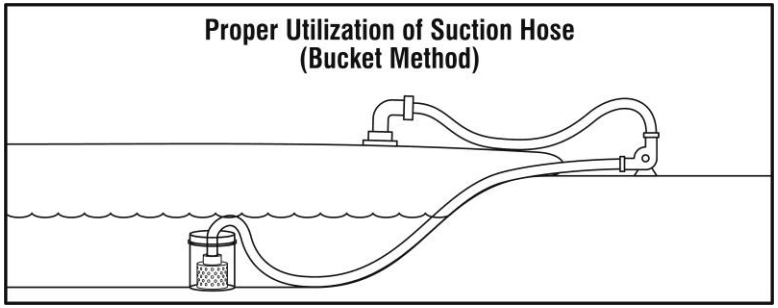


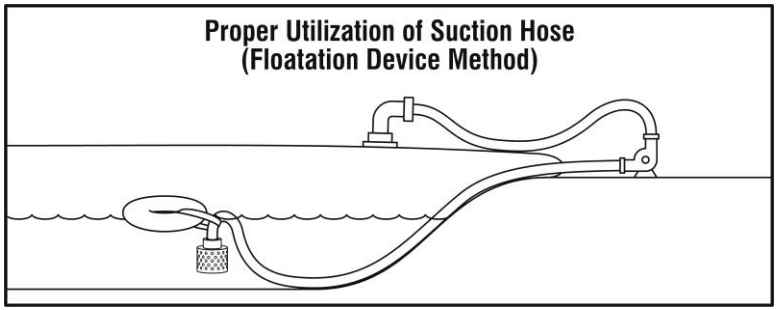
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PROPER USE OF A SUCTION HOSE



CAUTION: AVOID INFLATING THE BARRIERS WITH ANY SOLIDS THAT CANNOTBE REMOVED DURING THE DEFLATION PROCESS. ADDITIONAL CHARGES WILLAPPLY IF THE BARRIER INCURS DAMAGE BEYOND NORMAL WEAR AND TEAROR IF THE RETURN FREIGHT IS HIGHER DUE TO EXTRA WEIGHT OF THE SHIPMENT.





EVACUATION PROCEDURES

In the event the water depth where the Aqua-Barriers are to be installed is expected to exceed the recommended 25% freeboard or recommended freeboard requirement, the worksite should be evacuated.

The evacuation plan is as follows:

All personnel should be evacuated from the dewatered worksite. The worksite equipment can be evacuated if the competent person believes that it is safe.

The Aqua-Barrier removal process can begin if it is determined that there is sufficient time for removal of the barriers before the 25% freeboard requirement is exceeded.

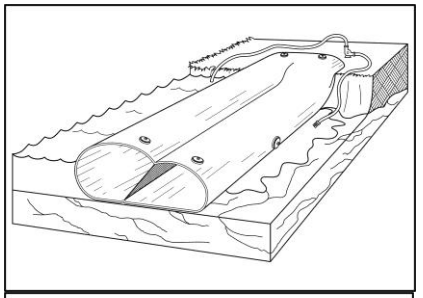
All personnel involved with the removal process should position themselves on the upstream side of the barriers before the actual removal process begins. Water should then be released from the barriers into the drained worksite area to equalize the water pressure on both sides of the barriers before opening the drain ports on the dewatered side of the barrier.

Each installed Aqua-Barrier is to be removed from the worksite. A HSI Services, Inc. trained advisor will instruct onsite personnel with regard to the proper removal process during the installation training and removal session which may take place on site or by telephone prior to installation.

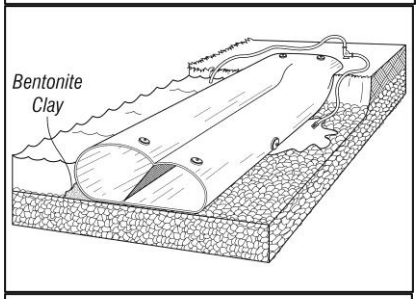
SEEPAGE DISCLAIMER

The Aqua-Barrier water inflated dam system when properly installed is a temporary barrier against surface water. HSI Services, Inc. accepts no responsibility for water migrating under the Aqua-Barrier system. The volume of water migrating under the Aqua-Barrier is a function of soil porosity. A sump area where water can gather and be evacuated during the life of the project is required. The size and number of sump areas would depend on the size of the area being dewatered and porosity of the soil.

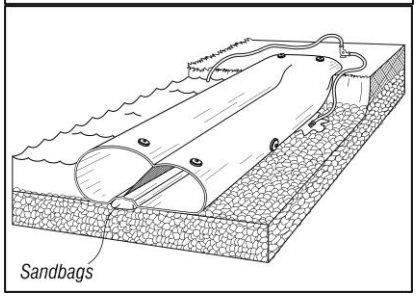
Use a pump on the dry side to control seepage that may occur under the barrier due to weak and porous soil.



To control seepage you can apply bentonite clay on the watered side of the barrier.



Another option to control seepage is to apply a row of sand bags on the watered side of the barrier



DIVERSION PIPE AND BYPASS PUMP APPLICATIONS

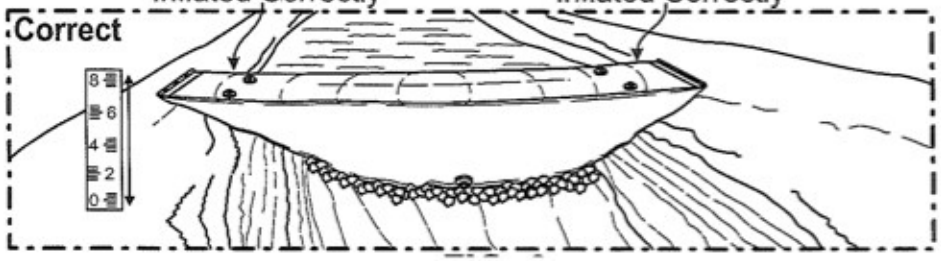
In applications that require the water flow of a river or creek to be completely cut off, such as the canal block it may become necessary to maintain water flow using diversion pipes or bypass pumps .
Below are examples of how this is done.

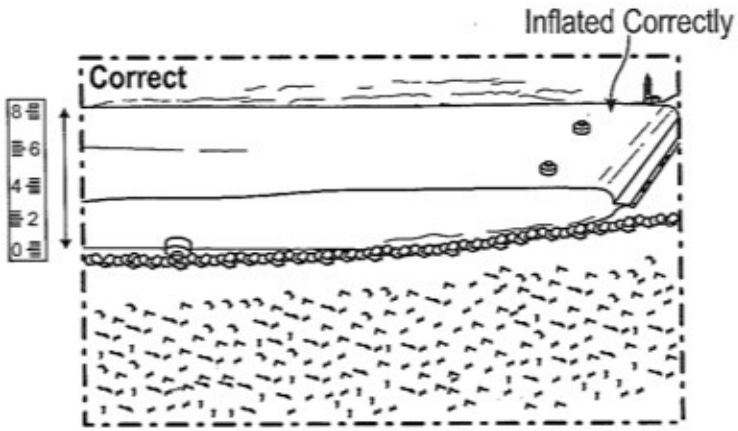


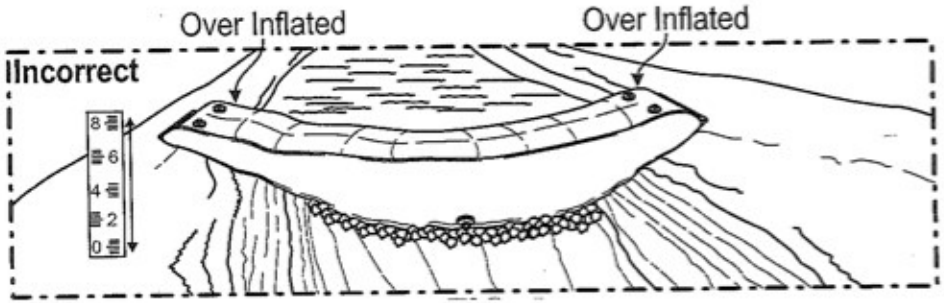


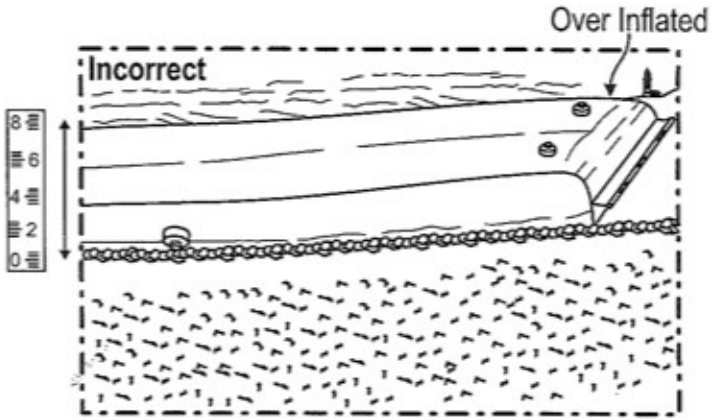
OVER-INFLATION PREVENTION

ALWAYS MEASURE BARRIER HEIGHT FROM THE LOWEST POINT OF ELEVATION TO AVOID OVER-INFLATING THE BARRIER. ALWAYS INFLATE AN AQUA-BARRIER TO ITS FULLEST HEIGHT

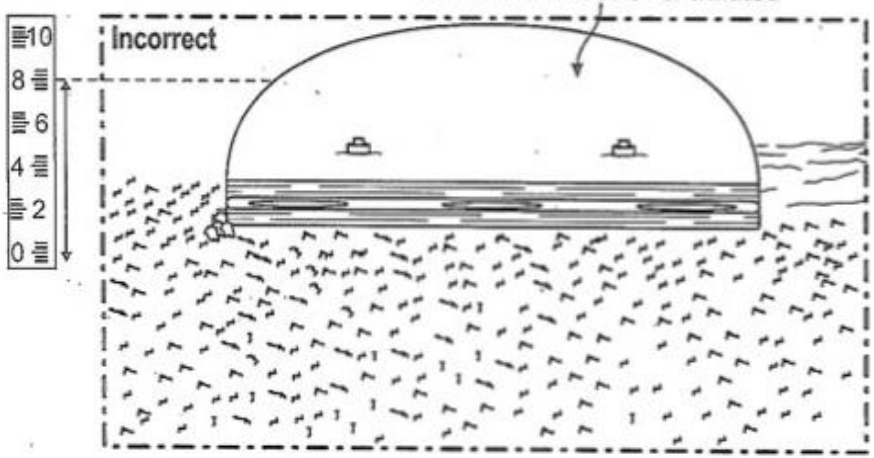


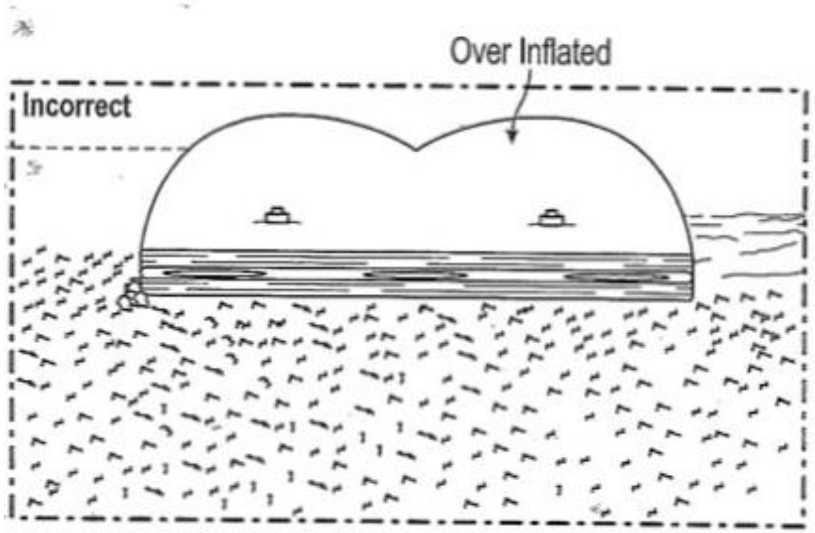


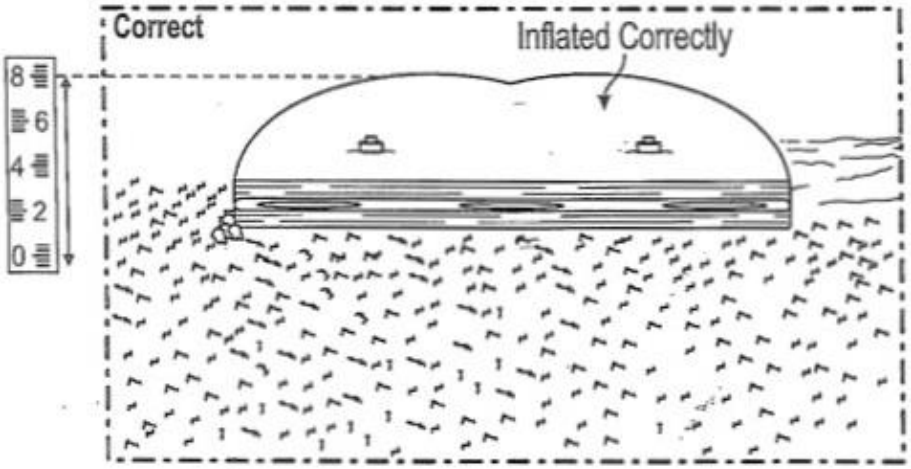




OVER-INFLATION PREVENTION







INSTALLATION PROCEDURE

There are three primary types of Aqua Barrier installations. The following descriptions of the various types of installations are simplified, and are only meant to give a general overview of the installation process. More detailed installation information must be provided by a trained HSI Services, Inc. representative on all Aqua-Barrier installations.

During all Aqua-Barrier installations the barriers can tractor or rotate toward the side which possesses less hydrostatic pressure or water depth. The maximum length of movement toward the side of least water resistance is 1/2 of the properly inflated barrier height (i.e.,6 ft high barrier can adjust as much as 3 ft).The same adjustment behavior can occur if a slope or grade exists from one side of a barrier to the other. Barriers which are not inflated to their proper height can tractor toward the dewatered area more than 1/2 of the recommended inflated height. (See Baffle Behavior page 6)

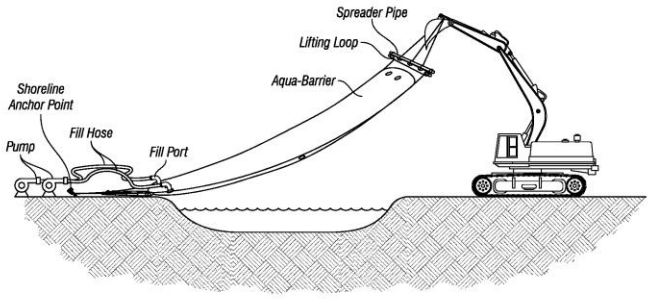
Dry surface installation:
The location where the barriers are to be installed has no water present. The barriers are simply unrolled and inflated. This style of installation is generally used in anticipation of flood waters.

Static water installation:
Non-moving water is present at installation location. The barriers are buoyant and float on the waters surface. The barriers are placed at the waters edge, unrolled on the waters surface and floated into position.

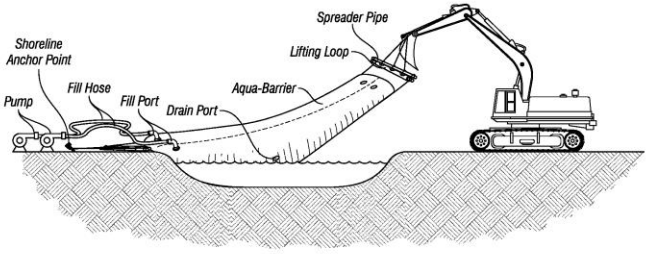
Dynamic water installations:
Dynamic or moving water is present at installation location. Barriers are positioned properly by controlling the ends of the unit with hydraulic equipment (i.e. 200 series or larger track hoe, crane) and/or anchoring at least one end of the barrier at the shoreline.

DEPLOYMENT USING 1 TRACK HOE AND SHORELINE ANCHOR

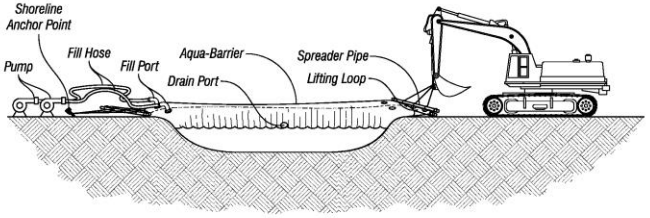
Aqua-Barrier Deployment Method
Using one track hoe and shoreline anchor
Phase 1

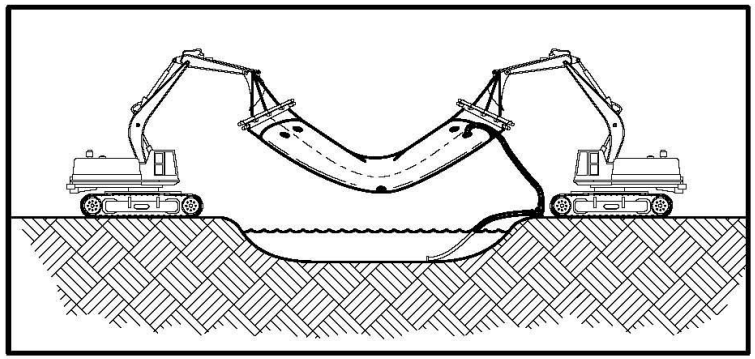


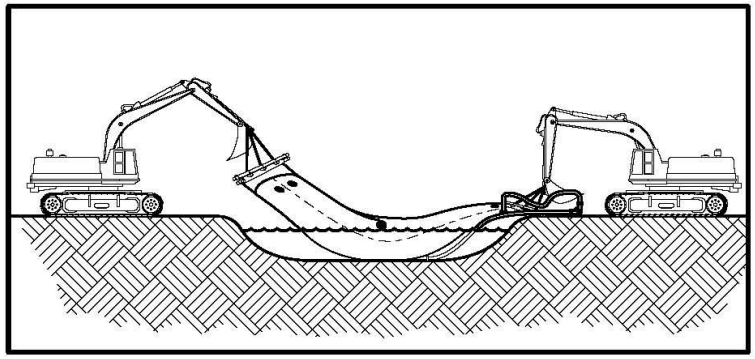
Aqua-Barrier Deployment Method
Using one track hoe and shoreline anchor
Phase 2

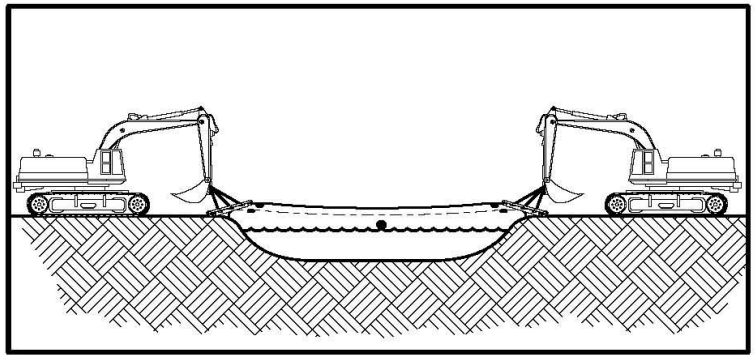


Aqua-Barrier Deployment Method
Using one track hoe and shoreline anchor
Phase 3

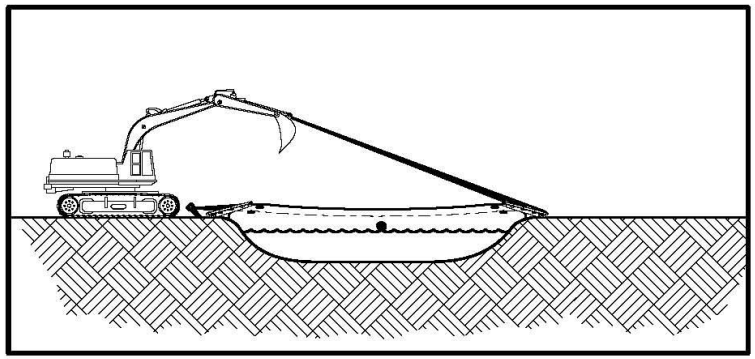


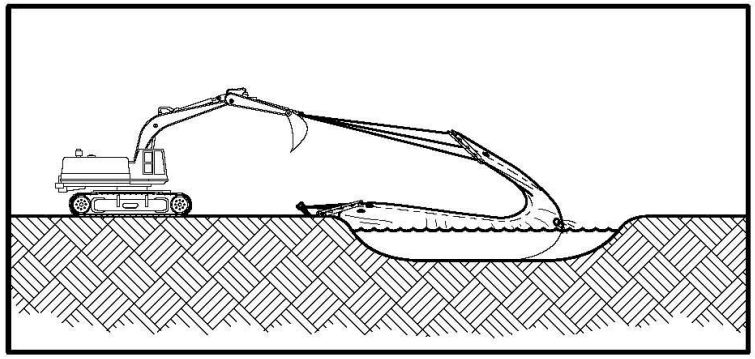


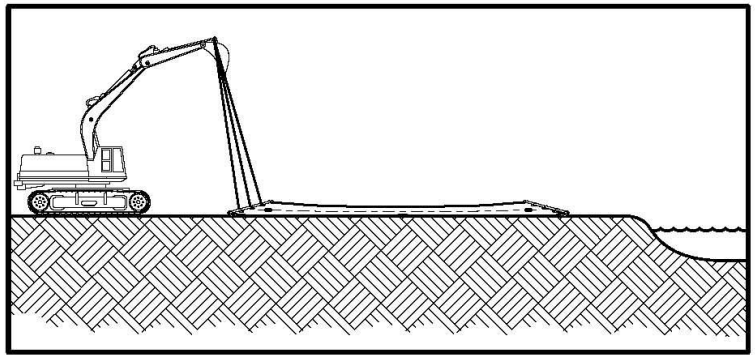




DEPLOYMENT USING 2 TRACK HOES

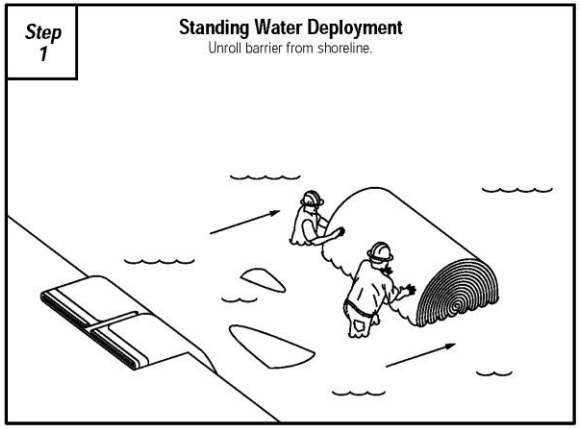


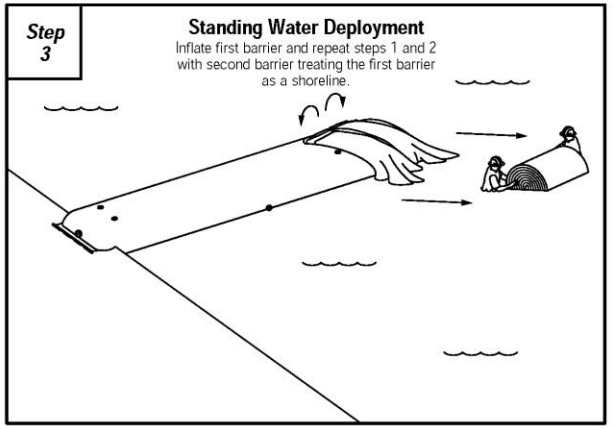


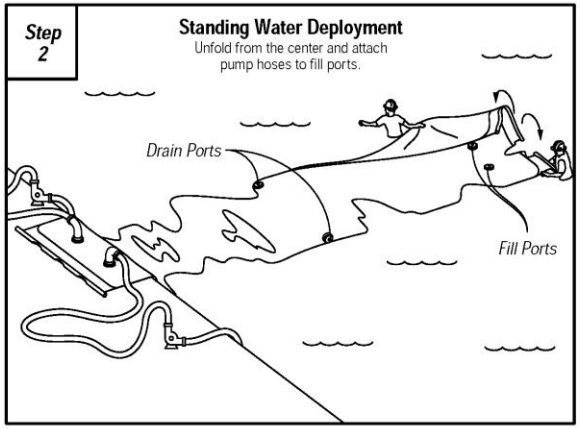


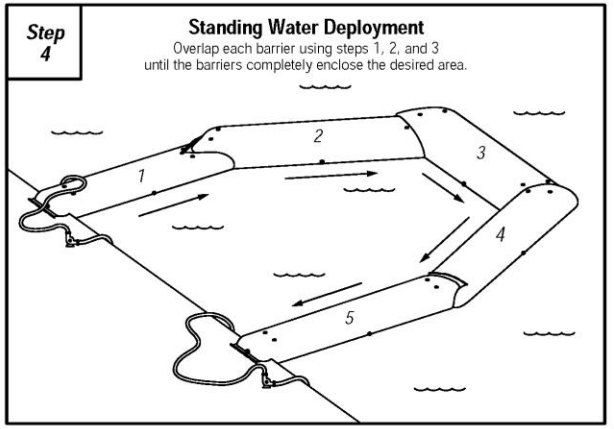
REMOVAL USING 1 TRACK HOE

MANUAL DEPLOYMENT

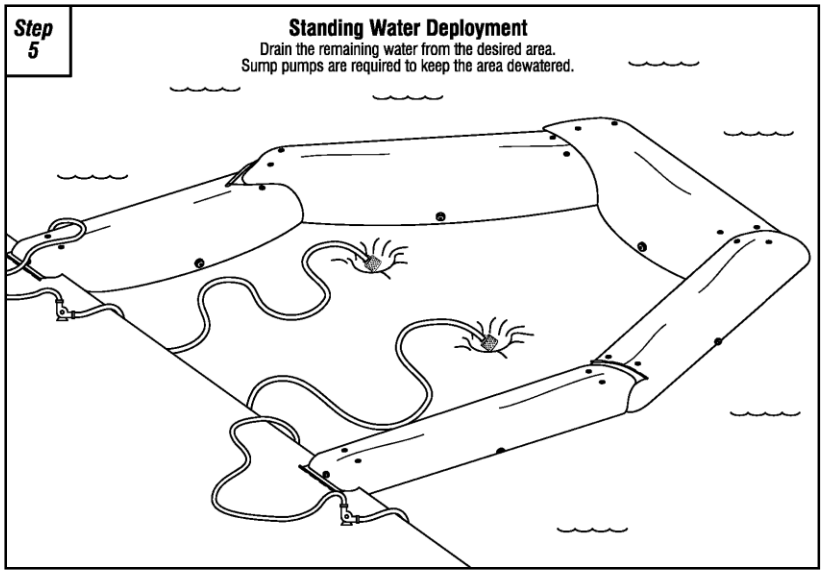








MANUAL DEPLOYMENT



POSTION THE FIRST BARIER IN PLACE, INFLATE TO 6 INCHES ABOVE WATER LEVEL

BRING THE NEXT BARRIER ON TOP, MAKING SURE TO APPLY THE CORRECT AMOUNT OF OVERLAP AS SHOWN ON THE CHART, PAGE 7

INFLATE THIS BARRIER TO WITHIN 6 INCHES ABOVE WATER LEVEL
CONTINUE UNTIL ALL BARRIERS ARE IN PLACE

THE LAST BARRIER (ON TOP) SHOULD BE FULLY INFLATED. MAKING SURE TO MEASURE BARRIER HEIGHT FROM THE LOWEST ELEVATION

TOP OFF ALL BARRIERS TO THEIR FULLEST HEIGHT

IT IS NECESSARY FOR ALL AQUA-BARRIERS TO BE FULLY INFLATED THROUGHOUT THE DURATION OF THE PROJECT

REMOVAL PROCEDURE

There are three primary types of Aqua-Barrier removal procedures. The following descriptions of the various types of Aqua-Barrier removal procedures are simplified and are only meant to give a general overview of the removal process. More detailed removal procedure information must be provided by a trained HSI Services, Inc. representative on all Aqua-Barrier removals.

Dry surface removal

When no water is present on either side of the Aqua-Barriers: Locate all drain ports along the sides and ends of the barrier and remove all plugs. After the majority of the water has drained from the barrier you will be able to force the remaining water toward a drain port by pushing on the barrier with your hands. Evacuate all water. Fold and the roll the barrier to fit on the pallet it arrived on making sure no part is hanging off the pallet.

Standing water removal

When standing water is present on one side of the barrier only: First attach one end of the barrier to the hydraulic equipment arm (ie: track hoe, crane). Water must be equalized on both sides of the Aqua-Barrier prior to removing it from the water. Locate the drain ports on the dry side of the barrier only and remove all plugs. Once the majority of the water has drain from the barrier you can remove the plugs on the opposite side of the barrier. You can now pull one end of the barrier over the top and down the length of the barrier. This process will evacuate the remaining water and prevent cuts and abrasions on the bottom of the unit. Fold and the roll the barrier to fit on the pallet it arrived on making sure no part is hanging off the pallet.

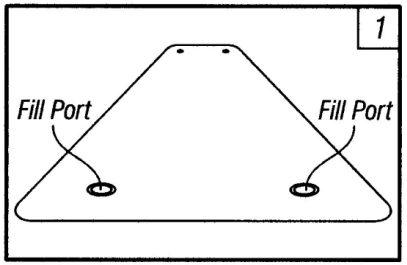
Moving water removal

When moving water is present on one side of the barrier only: First attach both ends of the barrier to the hydraulic equipment arm (ie: track hoe, crane). Water must be equalized on both sides of the Aqua-Barrier prior to removing it from the water. Both ends of the Aqua-Barrier must have attached pipes controlled by hydraulic equipment arm (i.e. track hoe, crane). Locate the drain ports on the dry side of the barrier only and remove all plugs. Once the majority of the water has drain from the barrier you can remove the plugs on the opposite side of the barrier. You can now pull one end of the barrier over the top and down the length of the barrier. This process will evacuate the remaining water and prevent cuts and abrasions on the bottom of the unit. Fold and the roll the barrier to fit on the pallet it arrived on making sure no part is hanging off the pallet.

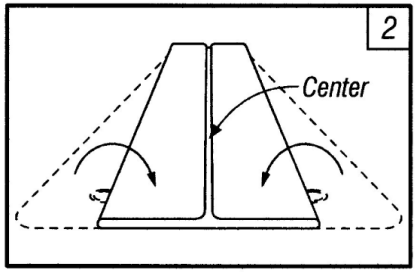
FOLDING PROCEDURE

Barrier must be secured on the pallets from Hydro Solutions with <u>NO OVERHANG</u>

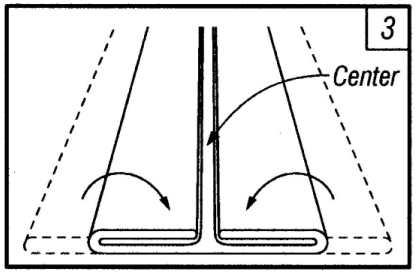
STEP ONE:
After all plugs are attached to each fill and drain port lay barrier out flat



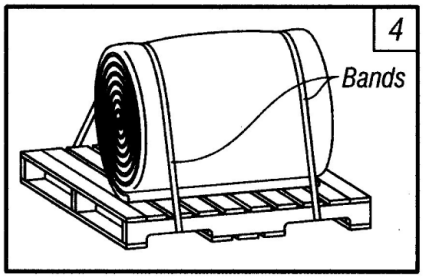
STEP TWO:
Fold one side to center
Then fold the other side to center



STEP THREE:
Take both sides and fold to center again

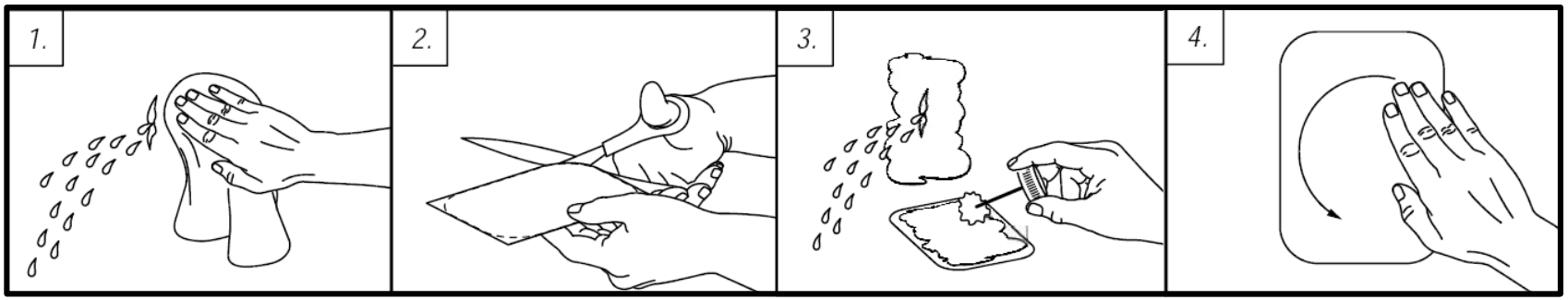


STEP FOUR:
Roll and place on pallet (It is recommended to use a protective covering on the pallet)
Secure to pallet using rope or plastic banding strap



REPAIR INSTRUCTIONS

Locate the puncture, cut, tear, or abrasion on the barrier surface. Locate the patch material and cut an appropriate size patch for problem area. The patch should extend at least two inches beyond the damaged area on the barrier surface. Round the corners of patch material prior to applying patch. Clean both the barrier surface and patch material surface with water. Apply a generous layer of the vinyl contact cement to both the patch and the barrier surface. Allow a few minutes for the adhesive to dry. The adhesive has dried sufficiently to apply patch when it exhibits a frosty white color and is tacky to the touch. Apply the patch to the barrier surface with a back and forth rubbing motion for approximately one minute. Disclaimer: The HH66 vinyl-coated adhesive loses adhesion properties when applied in temperatures below 40° F. It is recommended that the adhesive be stored in an area where temperatures do not fall below 40° F.



1.Clean barrier surface.
2.Cut appropriate size patch of vinyl fabric and round corners.
3.Generously apply HH66 vinyl adhesive to both the barrier surface and patch. Allow a few minutes for the glue to dry. The drying process is complete when the glue exhibits a frosty color and is tacky to the touch.
4.Apply patch material rubbing into place continually for 1 minute.

See HH66 MSDS for additional safety precautions and recommendations

MAINTENANCE * STORAGE * DEFINITIONS

MAINTENANCE:

To maintain Aqua-Barriers simply repair worn and punctured areas with the available repair material. Repairing is best accomplished when the barrier surface has been cleaned. Follow the repair instructions provided in this manual or on the can of Vinyl adhesive HH66. If additional repair adhesive is needed, call R H Products at 781-259-9464 to locate the nearest distributor. It is recommended that the Aqua-Barriers be inflated with air in order to inspect for problem areas, and repair as needed. Always allow the barrier surface to dry before tightly rolling up for storage.

STORAGE:

Store Aqua-Barriers in a covered area, away from harmful UV rays. Do not store where barriers will be in contact with solvents, acids or rodents. Do not store in an area that experiences temperatures that fall below 32° F or above 150° F.

DEFINITIONS:

Dynamic Load – Water pressure created by moving water and/or wave action.
Free Board – part or height of barrier extending above water surface
Hydrostatic Pressure – Water pressure
Static Load – Water pressure created by standing or non-moving water
PVC – Vinyl Coated Polyester. Material used to produce Aqua-Barriers

Aqua-Barrier®
Water-Inflated Dams

Aqua-Barrier Material Specifications
Technical Characteristics

	Test Method	Unit	**KPF-30**
Total Weight	ASTM D-3776	oz / sq.yd	**30**
Coating			**PVC**
Base Fabric Denier			**Polyester** **1500D**
Base Fabric Weight		oz / sq.yd	**12**
Vinyl Weight		oz / sq.yd	**18**
Surface			**Matt**
Tensile Strength	ASTM D 751	lbs. / inch	**700X650(±30)**
Tear Strength	ASTM D 751	lbs.	**170 X 140(±20)**
Adhesion	ASTM D 751	lbs. / inch	**20 X 17(±2)**
UV Resistance			**Ultra Violet Protected**
Cold Crack	MIL-C-20696	°F	**-22**
Color Fastness to Light	ISO105 B02:2000 Xenon-Arc.-Lamp	Grade	**Above 5**
Available Width		inch	**61.5**
Standard Roll Length		yd / roll	**50**
Remark			

Statement of Limited Warranty

A. General. This warranty is intended solely for the benefit of the original (retail) purchaser ("Purchaser") of the products ("the Products") supplied by HSI Services, Inc.This warranty is effective only in the United States of America.

B. Limited Warranty. HSI Services, Inc. warrants its products against manufacturing defects for 90 days from the date of the original purchase of the Products. The Aqua-Barriers and all parts and accessories associated with them are warranted for only the purchaser's first installation, which is the inflation, draining, and repositioning, or site removal, of the Aqua-Barrier. After an Aqua-Barrier has been partially or completely drained, repositioned, or removed from the initial installation location, no stated or implied warranty or product protection shall apply. The Company's responsibility for defects in the Products is limited to the Company's choice of repair, or replacement. This warranty gives purchasers of the Products specific rights, and such purchasers may also have other rights that vary from state to state. This warranty shall be effective only if the Products manufactured by the Company have not been subjected to negligent use, misuse, or abuse (including any usage not in accordance with the Product instructions, or failure to perform the required preventive maintenance). This warranty is limited to the cost of the manufactured Products that are found to be defective. No agent, employee, or officer of the Company, or any other person, is authorized to give any other warranty, or to assume any other liability on behalf of the Company.

HSI Services, Inc. is not responsible for barrier replacement or repair if static water levels exceed 75% of the proper barrier inflation height, i.e. 4.5 ft water level on a 6ft high properly inflated Aqua-Barrier. In moving water environments, or potentially moving water environments, HSI Services, Inc. will designate a maximum water percentage height on a given barrier height. If water levels exceed either of these limitations, this warranty shall be null and void.

Aqua-Barriers are not warranted in moving water environments unless a HSI Services, Inc. agent or representative is on site to monitor the project from commencement to end. A moving body of water shall be defined as any body of water that exhibits movement or any static body of water that becomes dynamic (i.e. rainfall runoff, water released by a dam, etc). THE COMPANY SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES OF ANY NATURE WHATSOEVER, WHETHER TO THE PURCHASER OF THE PRODUCTS, OR TO THIRD PARTIES, IN TORT, CONTRACT, OR OTHERWISE (some States do not allow the exclusion or limitation of incidental or consequential damages, so the preceding limitation or exclusion may not apply to all Purchasers).

THE COMPANY ASSUMES NO REPSONSIBLITY OR LIABILITY, WHETHER EXPRESSED OR IMPLIED, WHETHER IN TORT OR IN CONTRACT, AS TO THE CAPACITY OF ITS MANUFACTURED PRODUCTS TO SATISFY THE REQUIREMENT OF ANY LAW, RULE, SPECIFICATION, OR CONTRACT PERTAINING THERETO, INCLUDING, BUT NOT LIMITED TO, ANY CONTRACT BETWEEN ANY PURCHASER OF ITS PRODUCTS AND CONTRACTING PARTIES WITH WHOM SUCH PURCHASER HAS CONTRACTED. THE WARRANTIES EXPRESSED HEREIN ARE IN LIEU OF ALL TORT LIABILITY AND ALL OTHER WARRANTIES OR REPRESENTATIONS, WHETHER EXPRESSED OR IMPLIED, BY LAW OR BY CONTACT. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED, OR IMPLIED INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR PURPOSE, AND OF ANY OTHER OBLIGATION OR LIABILITY ON THE PART OF THE COMPANY (SOME STATES DO NOT ALLOW CERTAIN LIMITATIONS ON IMPLIED WARRANTIES, SO THE PRECEDING LIMITATION MAY NOT APPLY TO ALL PURCHASERS).

Repair and Replacement. As a condition precedent to any remedy described herein or otherwise available to Purchaser. Purchaser shall seek and accept the Company's reasonable effort to repair or replace the allegedly defective or nonconforming Products (hereinafter "Affected Products: In furtherance of such undertaking, if Purchaser reasonably believes that (1) any Product contains a defect or nonconformity for which the Company is responsible; or (2) the Purchaser otherwise has a claim pursuant to the warranties contained herein, Purchaser shall inform the Company (in writing by completing a customer complaint form), of the nature of such defect, nonconformity, or claim in reasonable detail and shall request authorization from the Company to return the Affected Products to the Company for repair or replacement. All Products authorized for return shall be shipped prepaid to the Company's facility or authorized service center

HSI Services, Inc.
20581 FM 362
Waller, TX 77484
1-800-245-0199

If the Company repairs or replaces the Affected Products within a reasonable time (normally six to eight weeks) after Purchaser has so returned them to the Company, Purchaser shall be entitled to no further remedy at law or equity.

D. Certain Hazards Related to Products. Purchaser acknowledges that there are hazards associated with the use and storage of the Product(s) delivered hereunder, and Purchaser acknowledges that Purchaser understands and accepts such hazards. Purchaser shall be responsible for warning and protecting Purchaser's employees and others who may be exposed to such hazards due to Purchaser's storage and/or use of Product(s). Purchaser assumes all liability for loss, damage, or injury to persons or to property of Purchaser or others arising out of the delivery, presence or use of the Products whether used singly or in combination with other Products.

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