RTANK HD

Stormwater Management System

The RTank^{HD} system provides underground stormwater storage for:

- Infiltration
- Detention
- Retention / Harvesting

The system is an alternative to stormwater basins and a more efficient system than other underground options.

The RTank^{HD} system can be utilized under:

- Parking Lots
- Driveways
- Landscaping
- Streets
- Athletic Fields
- Swales & Channels
- More…

RTANK HD

Stormwater Management System

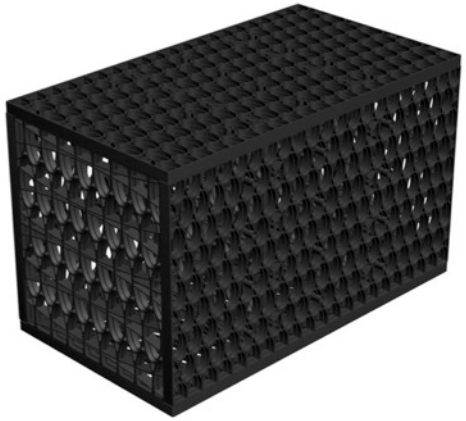
Individual Panels are Assembled to Create Stormwater Management Modules

1. Connect five small panels into one large panel using the short pegs

2. Next, working from one end to the other, attach a second large plate on the opposite side of the first

3. Once the top and bottom panels are attached, two more side plates are attached to complete the sides of the RTank^{HD} unit

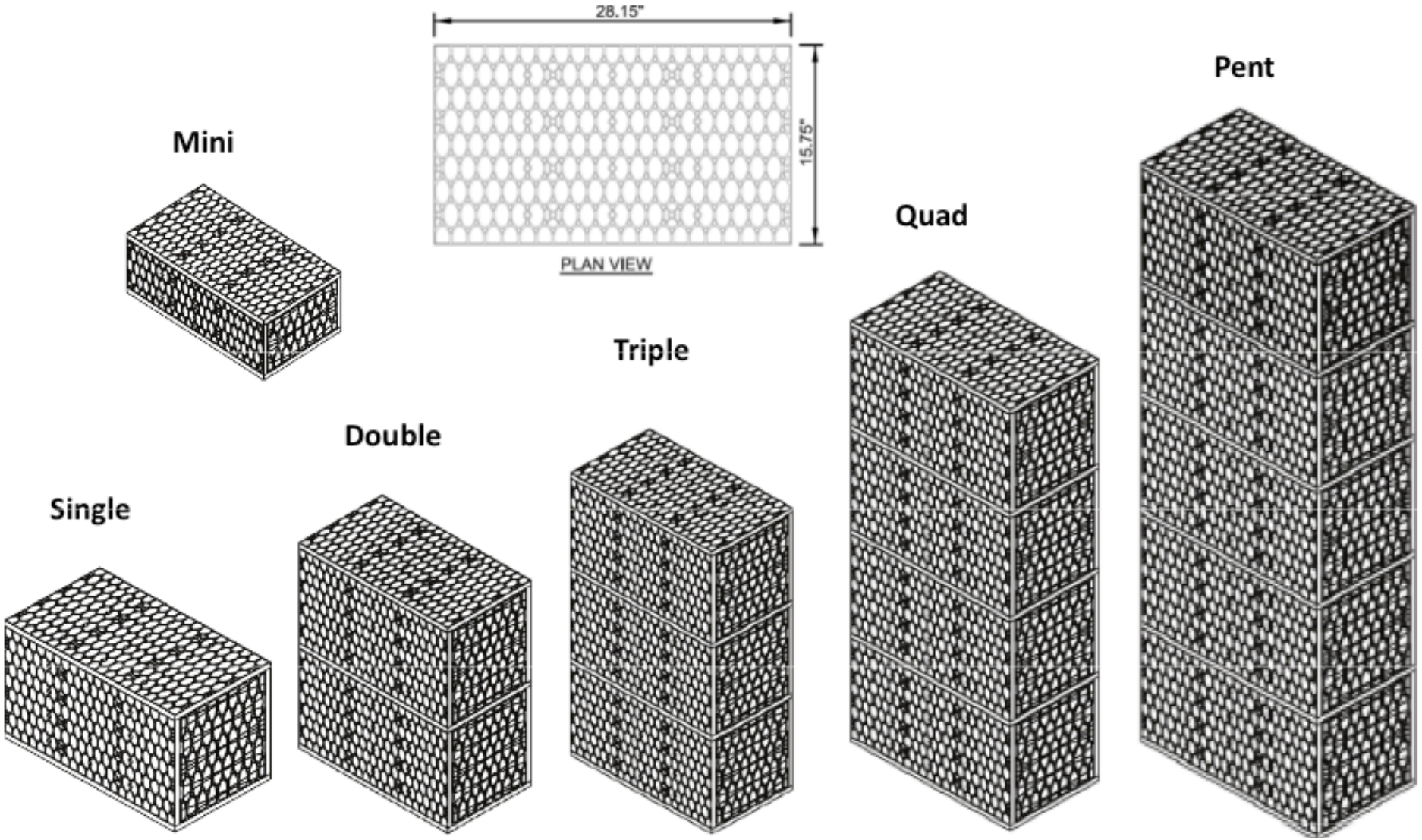
4. This completes one single RTank^{HD} unit, to build bigger unit the process starts again from the top panel of the single unit



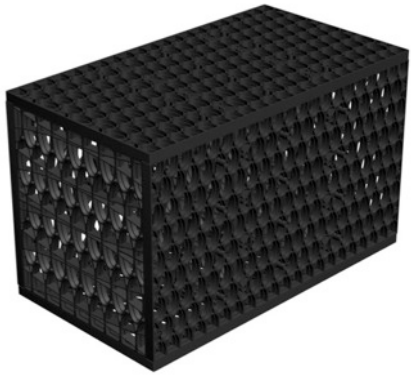
RTANK HD

Stormwater Management System

The RTank^{HD} is a modular system and can be assembled to a variety of heights from 91/2” to just under 7’ .

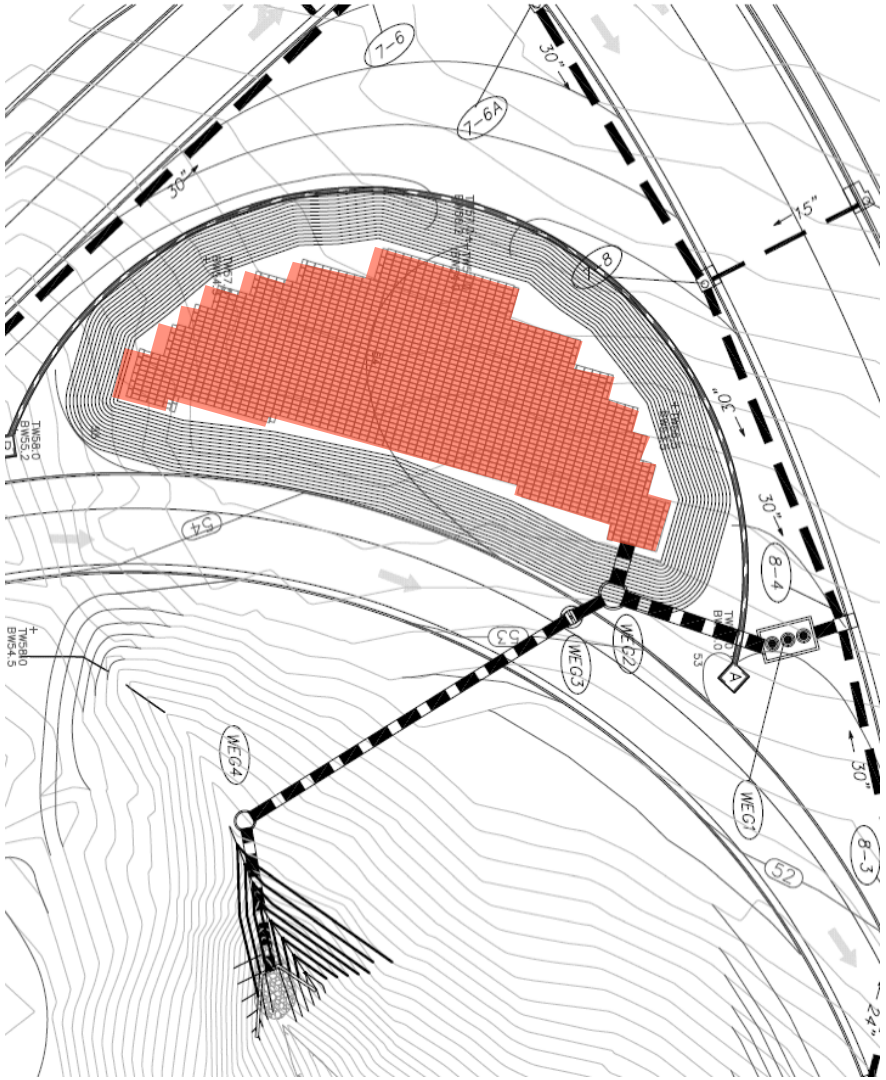


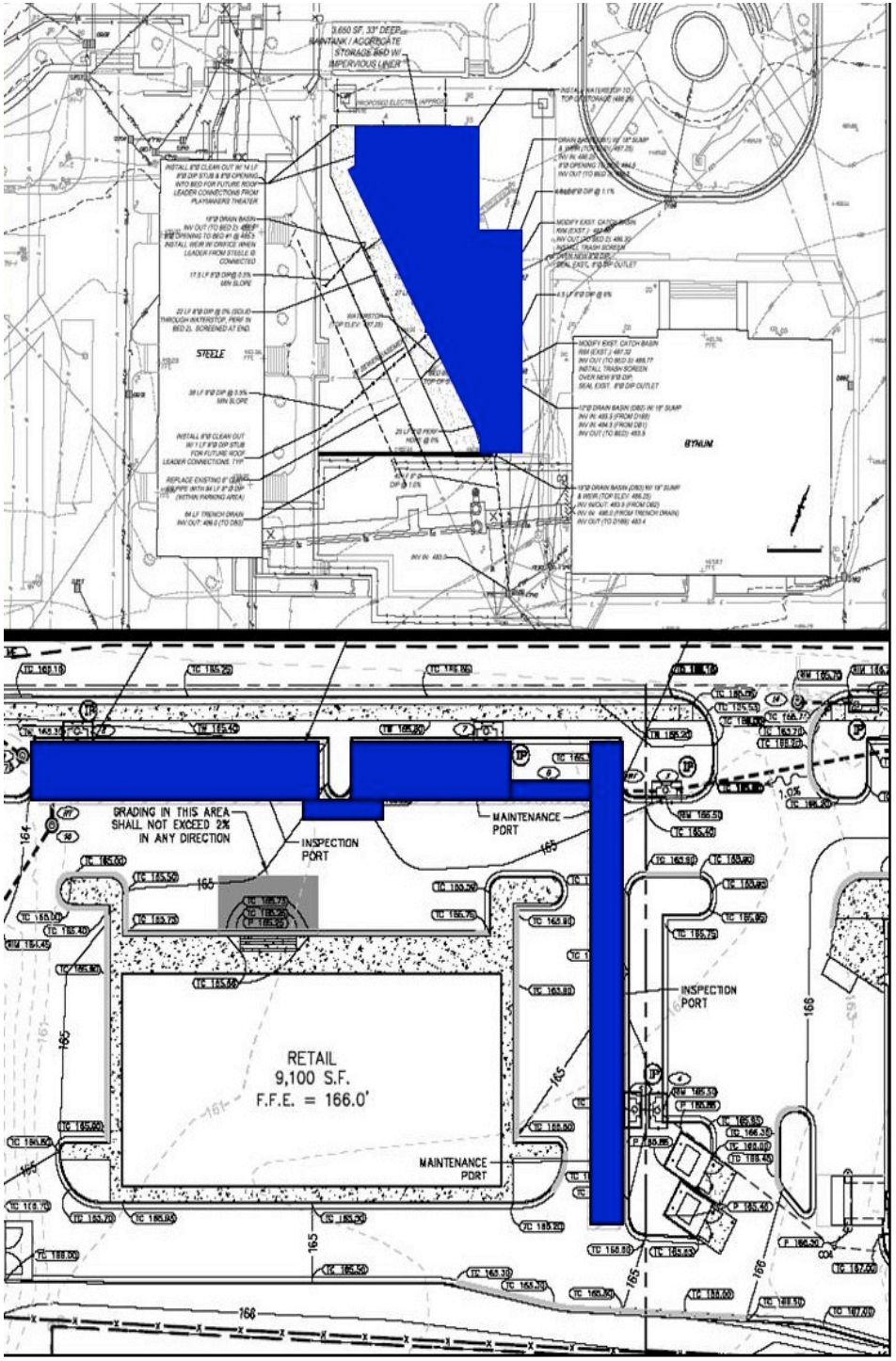
RTank^{HD} provides 95% void space, requiring minimum excavation for maximum storage capacity and efficiency.



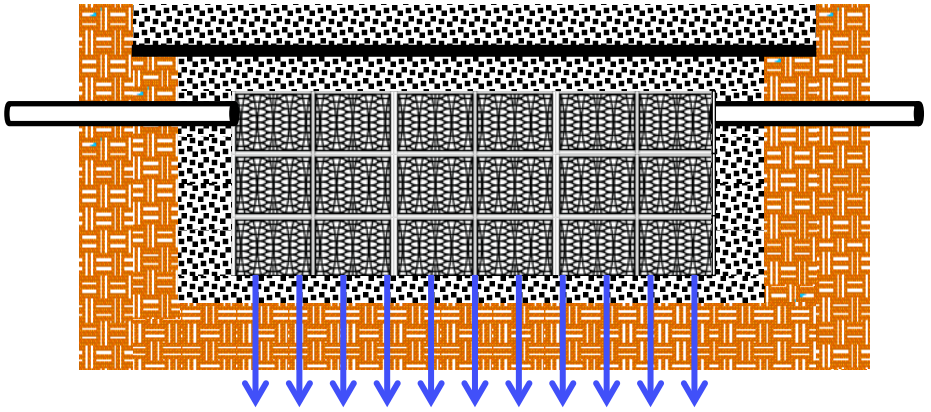
RTank^{HD} “squared” shape makes calculations and installation easy.

Design Flexibility:
Complex Shapes

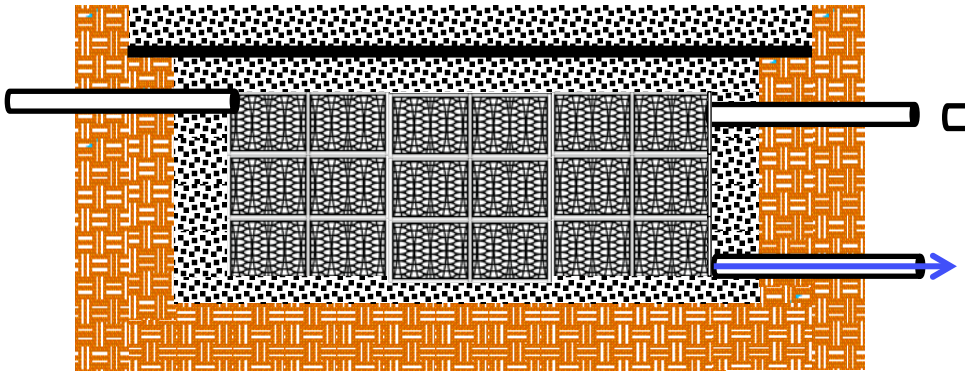




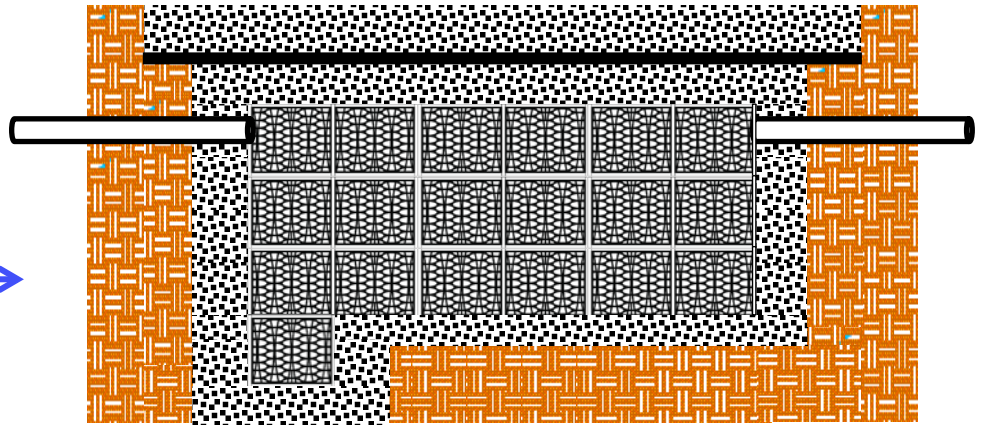
Typical RTank^{HD} Designs Include: Infiltration, Detention And Retention Applications



Design: #1 Infiltration



Design: #2 Detention



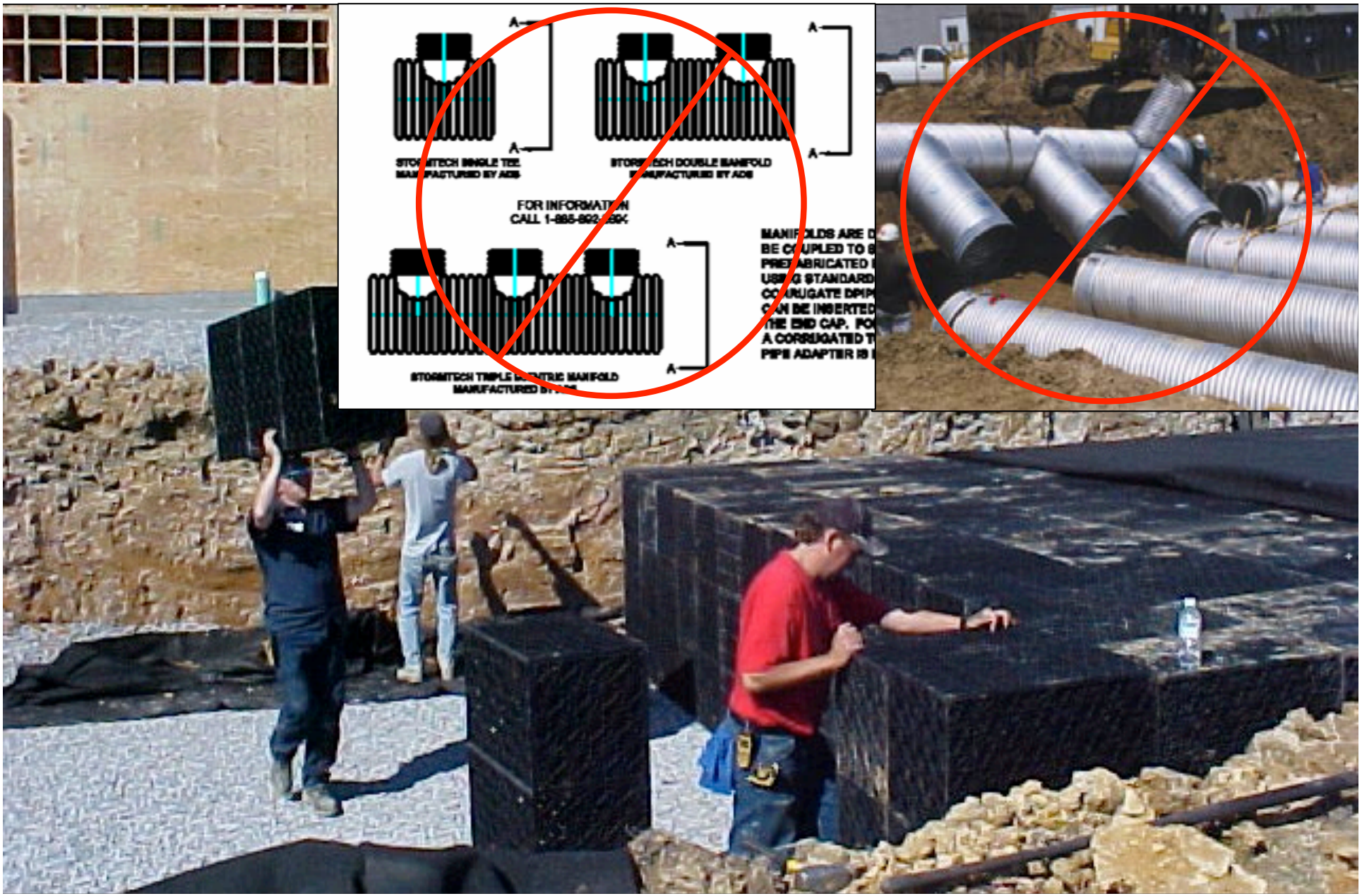
Design: #3 Retention

RTank^{HD} is freight friendly, modules are shipped as unassembled panels and then assembled on or near site.

The RTank^{HD} modules are then easily hand placed in the prepared and lined excavated area.

The RTank^{HD} system will significantly reduce the need for, and cost of, heavy equipment and trucks needed for stone based systems. Improved efficiency!

RTank^{HD} is self contained: No manifolds or connections that are expensive, hard to estimate and can slow down field operations.



RTank^{HD} Strength: The system approach using specific cover thickness and geogrid provides H-20 load support with an additional F.O.S.

Technical

R-Tank & HS-20 Loads

The R-Tank system is capable of easily supporting AASHTO HS-20 loads with safety factors well above the AASHTO requirement. The system has been used in a variety of applications around the world with tremendous success. Read on and we'll explain how the R-Tank handles heavy loads, and why it will work under HS-20 loads for your project.

Bearing Capacity

The R-Tank's ultimate design load comes from the results of a crush test performed on an unconfined unit. This type of test yields very conservative results. That's why you won't see similar test results for any of the competitive underground detention/retention systems: they won't hold up under a load without the confining pressure of the backfill. But the R-Tank is different. It's a structural unit that delivers a dependable design load in a testing scenario far worse than any acceptable field application. And this sturdy foundation is just the beginning.

Typical Load Calculation

The AASHTO HS-20 Standard uses a 32,000 lbs axle as the design load. To conservatively model the R-Tank's performance under these types of traffic loads, several steps are taken and additional factors considered:

- The axle load is distributed to two sets of dual wheels, each 10" x 20" at 80 psi
- The tire contact area is transferred down through the cover layers at a conservative 1:2 angle (33%) to determine the Area of Applied Load on the top of the R-Tank
- A dynamic factor is added to account for the movement of the load (1.2)
- Weight of cover material in a saturated condition is added (130 lbs/cf)

With these factors in place, the HS-20 load can be modeled and the resulting safety factor determined. The following chart shows how the R-Tank performs at various depths of cover. Note that different configurations are specified at different cover depths, and that the Safety Factor never drops below 2.0. In fact, it's often much higher.

While a Safety Factor exceeding 2.0 is already highly conservative, remember that we're comparing the applied load to the strength of the R-Tank as derived from testing in an unconfined condition! Further, all HD-20 installations require the use of a geogrid, which will make the design even more conservative.

R-Tank has been chosen for rough applications.

Unconfined Compression Test

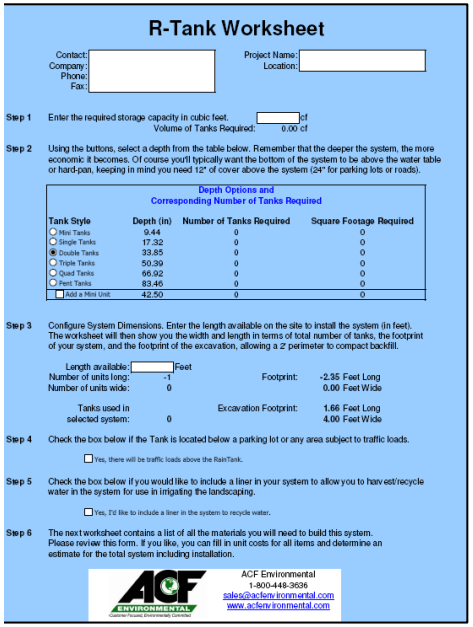
R-TANK
2831 Cardwell Road
Richmond, VA 23234
800-448-3636
www.actenvironmental.com

RTank^{HD} can be used for new construction

RTank^{HD} can be used for basin retrofits

The added parking area above the functional storm water detention system provides better utilization and more value that the traditional open basin approach.

Comprehensive Design Tools & Support are Available!



R-Tank Worksheet

Contact:
Company:
Phone:
Fax:

Project Name:
Location:

Step 1 Enter the required storage capacity in cubic feet. ____ cf
Volume of Tanks Required: 0.00 cf

Step 2 Using the buttons, select a depth from the table below. Remember that the deeper the system, the more economic it becomes. Of course you'll typically want the bottom of the system to be above the water table or hard-pan, keeping in mind you need 12" of cover above the system (24" for parking lots or roads).

Depth Options and Corresponding Number of Tanks Required

Tank Style	Depth (in)	Number of Tanks Required	Square Footage Required
○ Mini Tanks	9.44	0	0
○ Single Tanks	17.32	0	0
◉ Double Tanks	33.85	0	0
○ Triple Tanks	50.39	0	0
○ Quad Tanks	66.92	0	0
○ Pent Tanks	83.46	0	0
☐ Add a Mini Unit	42.50	0	0

Step 3 Configure System Dimensions. Enter the length available on the site to install the system (in feet). The worksheet will then show you the width and length in terms of total number of tanks, the footprint of your system, and the footprint of the excavation, allowing a 2' perimeter to compact backfill.

Length available: ____ Feet

Number of units long:	-1	Footprint:	-2.35 Feet Long
Number of units wide:	0		0.00 Feet Wide
Tanks used in selected system:	0	Excavation Footprint:	1.66 Feet Long
			4.00 Feet Wide

Step 4 Check the box below if the Tank is located below a parking lot or any area subject to traffic loads.

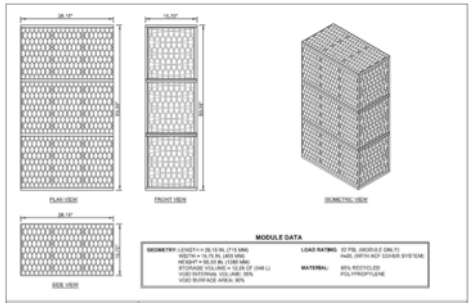
☐ Yes, there will be traffic loads above the RainTank.

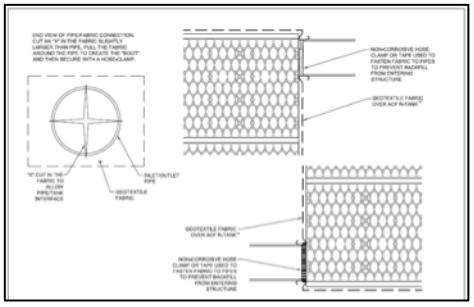
Step 5 Check the box below if you would like to include a liner in your system to allow you to harvest/recycle water in the system for use in irrigating the landscaping.

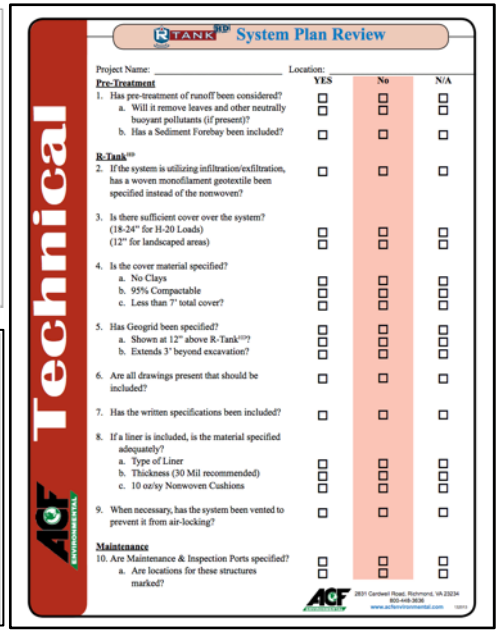
☐ Yes, I'd like to include a liner in the system to recycle water.

Step 6 The next worksheet contains a list of all the materials you will need to build this system. Please review this form. If you like, you can fill in unit costs for all items and determine an estimate for the total system including installation.

ACF Environmental
1-800-448-3636
sales@acfenvironmental.com
www.acfenvironmental.com







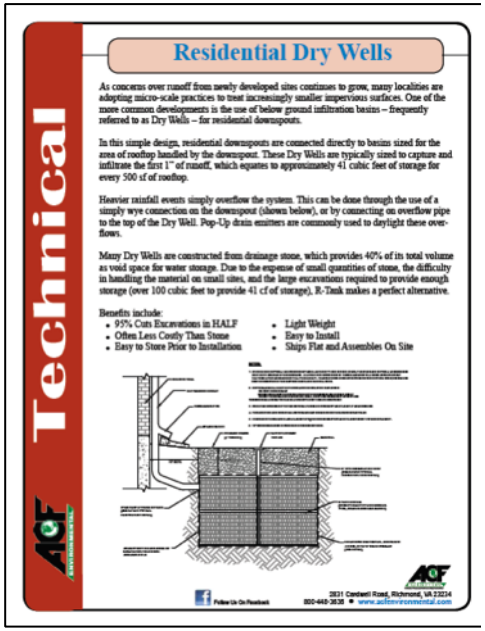
Technical

R-TANK HD System Plan Review

Project Name: _____ Location: _____

	YES	No	N/A
Pre-Treatment			
1. Has pre-treatment of runoff been considered?	☐	☐	☐
a. Will it remove leaves and other neutrally buoyant pollutants (if present)?	☐	☐	☐
b. Has a Sediment Forebay been included?	☐	☐	☐
R-Tank HD			
2. If the system is utilizing infiltration/exfiltration, has a woven monofilament geotextile been specified instead of the nonwoven?	☐	☐	☐
3. Is there sufficient cover over the system?			
(18-24" for H-20 Loads)	☐	☐	☐
(12" for landscaped areas)	☐	☐	☐
4. Is the cover material specified?			
a. No Clays	☐	☐	☐
b. 95% Compactable	☐	☐	☐
c. Less than 7' total cover?	☐	☐	☐
5. Has Geogrid been specified?	☐	☐	☐
a. Shown at 12" above R-Tank HD?	☐	☐	☐
b. Extends 3' beyond excavation?	☐	☐	☐
6. Are all drawings present that should be included?	☐	☐	☐
7. Has the written specifications been included?	☐	☐	☐
8. If a liner is included, is the material specified adequately?			
a. Type of Liner	☐	☐	☐
b. Thickness (30 Mil recommended)	☐	☐	☐
c. 10 oz/sy Nonwoven Cushions	☐	☐	☐
9. When necessary, has the system been vented to prevent it from air-locking?	☐	☐	☐
Maintenance			
10. Are Maintenance & Inspection Ports specified?	☐	☐	☐
a. Are locations for these structures marked?	☐	☐	☐

ACF Environmental
2831 Cardwell Road, Richmond, VA 23234
800-448-3636
www.acfenvironmental.com



Technical

Residential Dry Wells

As concerns over runoff from newly developed sites continues to grow, many localities are adopting micro-scale practices to treat increasingly smaller impervious surfaces. One of the more common developments is the use of below ground infiltration basins – frequently referred to as Dry Wells – for residential downspouts.

In this simple design, residential downspouts are connected directly to basins sized for the area of rooftop handled by the downspout. These Dry Wells are typically sized to capture and infiltrate the first 1" of runoff, which equates to approximately 41 cubic feet of storage for every 500 sf of rooftop.

Heavier rainfall events simply overflow the system. This can be done through the use of a simply wye connection on the downspout (shown below), or by connecting an overflow pipe to the top of the Dry Well. Pop-Up drain emitters are commonly used to daylight these overflows.

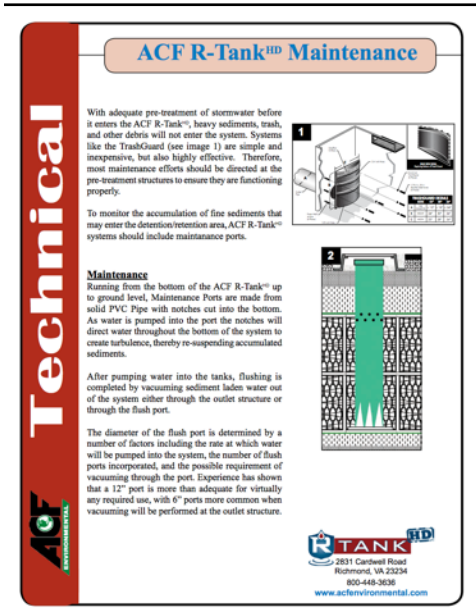
Many Dry Wells are constructed from drainage stone, which provides 40% of its total volume as void space for water storage. Due to the expense of small quantities of stone, the difficulty in handling the material on small sites, and the large excavations required to provide enough storage (over 100 cubic feet to provide 41 cf of storage), R-Tank makes a perfect alternative.

Benefits include:

- 95% Cuts Excavations in HALF
- Often Less Costly Than Stone
- Easy to Store Prior to Installation
- Light Weight
- Easy to Install
- Ships Flat and Assembles On Site

Follow Us On Facebook

2831 Cardwell Road, Richmond, VA 23234
800-448-3636 • www.acfenvironmental.com



Technical

ACF R-Tank HD Maintenance

With adequate pre-treatment of stormwater before it enters the ACF R-Tank HD, heavy sediments, trash, and other debris will not enter the system. Systems like the TrashGuard (see image 1) are simple and inexpensive, but also highly effective. Therefore, most maintenance efforts should be directed at the pre-treatment structures to ensure they are functioning properly.

To monitor the accumulation of fine sediments that may enter the detention/retention area, ACF R-Tank HD systems should include maintenance ports.

1

2

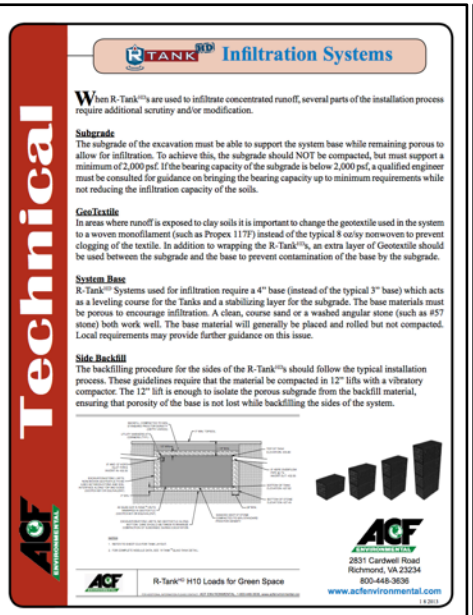
Maintenance

Running from the bottom of the ACF R-Tank HD up to ground level, Maintenance Ports are made from solid PVC Pipe with notches cut into the bottom. As water is pumped into the port the notches will direct water throughout the bottom of the system to create turbulence, thereby re-suspending accumulated sediments.

After pumping water into the tanks, flushing is completed by vacuuming sediment laden water out of the system either through the outlet structure or through the flush port.

The diameter of the flush port is determined by a number of factors including the rate at which water will be pumped into the system, the number of flush ports incorporated, and the possible requirement of vacuuming through the port. Experience has shown that a 12" port is more than adequate for virtually any required use, with 6" ports more common when vacuuming will be performed at the outlet structure.

R-TANK HD
2831 Cardwell Road
Richmond, VA 23234
800-448-3636
www.acfenvironmental.com



Technical

R-TANK HD Infiltration Systems

When R-Tank HD's are used to infiltrate concentrated runoff, several parts of the installation process require additional scrutiny and/or modification.

Subgrade

The subgrade of the excavation must be able to support the system base while remaining porous to allow for infiltration. To achieve this, the subgrade should NOT be compacted, but must support a minimum of 2,000 psf. If the bearing capacity of the subgrade is below 2,000 psf, a qualified engineer must be consulted for guidance on bringing the bearing capacity up to minimum requirements while not reducing the infiltration capacity of the soils.

GeoTextile

In areas where runoff is exposed to clay soils it is important to change the geotextile used in the system to a woven monofilament (such as Propex 117F) instead of the typical 8 oz/sy nonwoven to prevent clogging of the textile. In addition to wrapping the R-Tank HD's, an extra layer of Geotextile should be used between the subgrade and the base to prevent contamination of the base by the subgrade.

System Base

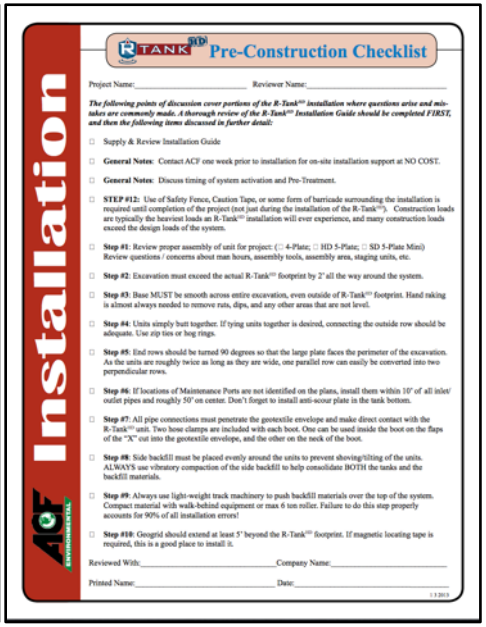
R-Tank HD Systems used for infiltration require a 4" base (instead of the typical 3" base) which acts as a leveling course for the Tanks and a stabilizing layer for the subgrade. The base materials must be porous to encourage infiltration. A clean, course sand or a washed angular stone (such as #57 stone) both work well. The base material will generally be placed and rolled but not compacted. Local requirements may provide further guidance on this issue.

Side Backfill

The backfilling procedure for the sides of the R-Tank HD's should follow the typical installation process. These guidelines require that the material be compacted in 12" lifts with a vibratory compactor. The 12" lift is enough to isolate the porous subgrade from the backfill material, ensuring that porosity of the base is not lost while backfilling the sides of the system.

R-Tank HD H10 Loads for Green Space

2831 Cardwell Road
Richmond, VA 23234
800-448-3636
www.acfenvironmental.com



Installation

R-TANK HD Pre-Construction Checklist

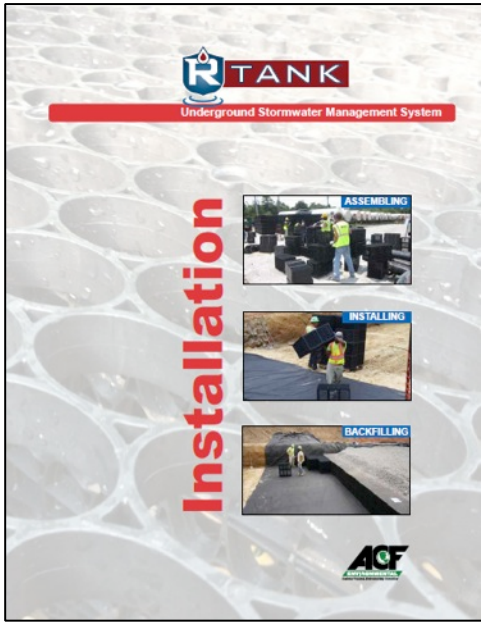
Project Name: _____ Reviewer Name: _____

The following points of discussion cover portions of the R-Tank HD installation where questions arise and mistakes are commonly made. A thorough review of the R-Tank HD Installation Guide should be completed FIRST, and then the following items discussed in further detail:

- ☐ Supply & Review Installation Guide
- ☐ **General Notes**: Contact ACF one week prior to installation for on-site installation support at NO COST.
- ☐ **General Notes**: Discuss timing of system activation and Pre-Treatment.
- ☐ **STEP #12:** Use of Safety Fence, Caution Tape, or some form of barricade surrounding the installation is required until completion of the project (not just during the installation of the R-Tank HD). Construction loads are typically the heaviest loads an R-Tank HD installation will ever experience, and many construction loads exceed the design loads of the system.
- ☐ **Step #1**: Review proper assembly of unit for project: (□ 4-Plate; □ HD 5-Plate; □ SD 5-Plate Mini) Review questions / concerns about man hours, assembly tools, assembly area, staging units, etc.
- ☐ **Step #2**: Excavation must exceed the actual R-Tank HD footprint by 2' all the way around the system.
- ☐ **Step #3**: Base MUST be smooth across entire excavation, even outside of R-Tank HD footprint. Hand raking is almost always needed to remove ruts, dips, and any other areas that are not level.
- ☐ **Step #4**: Units simply butt together. If tying units together is desired, connecting the outside row should be adequate. Use zip ties or hog rings.
- ☐ **Step #5**: End rows should be turned 90 degrees so that the large plate faces the perimeter of the excavation. As the units are roughly twice as long as they are wide, one parallel row can easily be converted into two perpendicular rows.
- ☐ **Step #6**: If locations of Maintenance Ports are not identified on the plans, install them within 10' of all inlet/outlet pipes and roughly 50' on center. Don't forget to install anti-scour plate in the tank bottom.
- ☐ **Step #7**: All pipe connections must penetrate the geotextile envelope and make direct contact with the R-Tank HD unit. Two hose clamps are included with each boot. One can be used inside the boot on the flaps of the "X" cut into the geotextile envelope, and the other on the neck of the boot.
- ☐ **Step #8**: Side backfill must be placed evenly around the units to prevent shoving/tilting of the units. ALWAYS use vibratory compaction of the side backfill to help consolidate BOTH the tanks and the backfill materials.
- ☐ **Step #9**: Always use light-weight track machinery to push backfill materials over the top of the system. Compact material with walk-behind equipment or max 6 ton roller. Failure to do this step properly accounts for 90% of all installation errors!
- ☐ **Step #10**: Geogrid should extend at least 5' beyond the R-Tank HD footprint. If magnetic locating tape is required, this is a good place to install it.

Reviewed With: _____ Company Name: _____

Printed Name: _____ Date: _____



R-TANK
Underground Stormwater Management System

Installation

ASSEMBLING

INSTALLING

BACKFILLING