

Pre-Construction Checklist

A Tools You'll Need

- Laser or Transit
- Measuring Tape (long enough to mark R-Tank^{HD} footprint)
- Razor Knife
- Screw Driver / Nut Driver Set (for pipe boots)
- String Line
- Marking Paint
- Reciprocating Saw (to cut in Inspection & Maintenance Ports)



Most contractors find installing an R-Tank[®] system surprisingly easy.

If you're assembling R-Tanks^{HD}:

- Dead-Blow Mallets
- Work Tables (3/4" plywood placed on R-Tanks^{HD} works well)

B Materials You'll Need

- R-Tank^{HD} Units
- Geotextile
- Geogrid (Only for Load Bearing Applications)
- Liner (only if required by plans)
- Base & Backfill Material (95% Compactable angular sand or stone 1/2" - 2", free of debris – NO CLAY)
- Pipe Boot Kits (If not using kits, you'll need duct tape and a stainless steel band clamp for each inlet and outlet pipe, and for each inspection or maintenance port.)
- Pipe for Inspection & Maintenance Ports (Typically 6" and 12" schedule 40 PVC, respectively)
- Maintenance Port Kits (If not using kits, you will need non corrosive rigid anti-scour pad [15" x 15" to fit below Maintenance Ports - Plexiglass works well.], fabric pipe boot, duct tape, stainless steel band clamp and H2O loaded ring and cover.)
- Metallic Tape

C Equipment You'll Need

- Forklift and other equipment/tools needed to unload box truck
- Pallet jack (to unload material from box truck)
- Walk-Behind Trench Roller (Plate compactor may work for smaller projects)
- Low Ground Pressure (LGP) tracked Skid Steer or Loader (<7.0 psi Gross Operating Pressure)
For Larger Projects (>10,000cf):
 - LGP Dozer
 - Roller - 6 Ton Max Gross Vehicle Weight

Note: This list does not include equipment or tools needed to excavate or level the floor of the excavation.

D

General Notes:

Be sure to contact your local Site Supply Representative at least two weeks prior to installation at 800-465-0900. We will provide you with on-site installation support AT NO CHARGE in order to facilitate your installation.

All pictures, illustrations and instructions have been included to guide you through a typical installation. The approved engineering drawings should ALWAYS take precedence over these instructions.

Coordinate the installation of R-Tank^{HD} System at the end of the construction activities to minimize the construction traffic over the system. If the installation is completed during construction activities, then the system MUST be roped off and construction traffic routed around the system (including excavators, loaders, dump trucks, fork lifts, concrete trucks, material delivery trucks and cranes). The installation contractor is responsible for all loads placed or driven over the R-Tank^{HD} during the construction process. Rope off the area to prevent unauthorized traffic from driving over the R-Tank^{HD}. If sequencing of the project makes this impossible, a construction road or pad may be constructed over the R-Tank^{HD} System. Consult the project engineer and/or Site Supply for assistance before allowing construction traffic on system. (See **Step #12: Secure the Installation** for additional information.)

After installation of the R-Tank^{HD} system, stormwater should not be allowed to enter the R-Tank^{HD} until the site is completely stabilized and all pre-treatment systems (designed to remove debris and heavy sediment) are active. Otherwise, the R-Tank^{HD} may become prematurely contaminated with sediments from the project. For more information on Pre-Treatment systems, contact Site Supply and request a copy of our Pre-Treatment Tech Note.

Throughout this document you will see three types of notes:

TIP: Ideas to improve your profitability on the installation.

IMPORTANT: Steps that require extra attention.

WARNING: Critical issues that MUST be handled correctly to ensure a good installation.

Any questions or issues not covered by these instructions can be directed to Site Supply at 800-465-0900.

1

Excavation

The excavation limits and the location of the R-Tank^{HD} System should be staked out. The design drawings should be used to determine these locations. If the excavation limits are not shown on the plans, then add 2' on each side of the R-Tank^{HD} System to determine the limits.

Excavate the designated surveyed area according to plans following all relevant local, state and OSHA guidelines. Typical excavations should include:

- Two foot perimeter around R-Tank^{HD} to allow for proper compaction of backfill.
- Enough depth to accommodate a minimum 3" base (if required) below the R-Tank^{HD}.

Level the bottom of the excavation (Fig. 4) as shown on plans. Most excavations have a flat bottom while some will slope toward the outlet pipe.

Prepare the subgrade according to plans. Base of excavation must be smooth, level and free of debris. Compact to at least 95% Standard Proctor Density (or as required by Engineer) unless infiltration of stormwater into subgrade is desired. A minimum bearing capacity of 2,000 psf must be achieved prior to beginning installation of R-Tanks^{HD}.



Fig. 4 Excavate according to plans, following all governmental regulations.

Excavation - Continued

If the subgrade is pumping or appears excessively soft, the design engineer should be consulted for advice. In many cases a stabilization geotextile and 6” of compactible material that drains well will be sufficient to amend the bearing capacity of the soil.

2 Assemble R-Tank^{HD} Units

If R-Tank^{HD} units arrive on your project in flat panels they will need to be assembled on-site. Building the units should take 2-3 minutes per segment. This is a conservative estimate used to approximate the total man hours needed for assembly. The estimate includes the workers doing the assembly as well as material handling people to keep the assembly workers moving.

Unit	Time
Mini	2-3 Minutes
Single	2-3 Minutes
Double	4-6 Minutes
Triple	6-9 Minutes
Quad	8-12 Minutes
Pent	10-15 Minutes

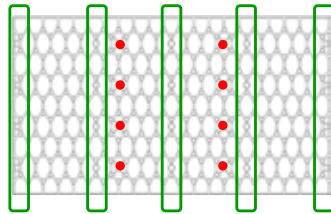


Fig. 1 For standard R-Tank^{HD} units attach small plates at locations circled in green, do not use the holes indicated in red.

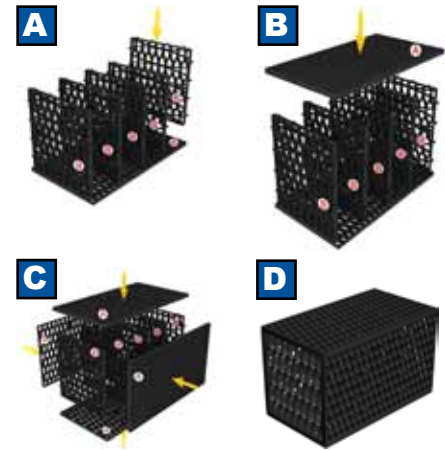


Figure 2 Follow these steps to assemble a 5-plate R-Tank^{HD}.

Assembly Instructions - following the drawings in Fig. 2: Connect five small panels into one large panel using the short pegs (Fig. 2A). Attach small panels onto the large panel at the locations marked in green on Fig. 1. Do NOT use the two rows of pin-holes directly off of the center row (as marked in red on Fig. 1) unless you are building a 4-plate R-Tank. Use 4-plate units only for light duty, non traffic applications.

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

Once the top and bottom large plates are attached, two more side plates are attached to complete the sides of the R-Tank^{HD} unit (Fig. 2C). This is a SINGLE R-Tank^{HD}.

To build a DOUBLE unit (or larger), follow the directions above, starting at “Assembly Instructions:” using the top of the existing unit as the large plate.

Completed R-Tank^{HD} units should be staged as close to the installation area as possible.



Fig. 3 Installation can be sped up by either assembling the tanks in the excavation or placing the pre-assembled tanks in the excavation.

TIP: To increase the speed of the installation, many contractors choose to assemble the R-Tank^{HD} units prior to or during excavation and base preparation (Step 1). Other contractors wait until these steps are completed and then perform the assembly IN THE EXCAVATION (Fig. 3) allowing completed units to be placed into their final location as they are assembled. Consider which option will work best for your project.

TIP: Site Supply offers an on-site assembly service. Call to request a quote, 800-465-0900.

3 Prepare Base

A thin layer (3") of material is recommended to establish a level working platform.

In regions with sandy soils meeting the requirements noted and where the subgrade elevation is above the groundwater table, imported base materials may not be needed. (For more information see specification section 2.03 B.)

Standing water in the excavation will prevent proper base preparation and must be removed, if present.

Install base materials. Base materials must be:

Compaction	95% Compactable
Shape	Angular
Size	Less than 1.5" in diameter
Consistency	Free of lumps, debris, and sharp objects that could cut the geotextile
Applicability	Stone or sand is acceptable if it meets these requirements <i>In no case shall soils with >10% clays be used.</i>

Grade and level base as shown on plans with more than 1/2" variance. Base must be free of debris and large rocks.

TIP: Creating a smooth, level platform will allow for faster installation of R-Tanks^{HD}, as they will fit together evenly, eliminating detail work that can delay your progress.



Fig. 4 Base must be smooth to ensure units fit together without gaps.

4 Place Geotextile

Geotextile will be required below the R-Tank^{HD} on most projects, but not all. Check your plans to ensure that geotextile is to be placed between the base and the R-Tank^{HD} units.

Cut full-width strips of Geotextile to the proper length and place them over the base, covering the floor of the excavation. The geotextile should extend at least 2' beyond the edge of the R-Tank^{HD} footprint.

TIP: Some contractors choose to cut the geotextile strips long enough to wrap up the sides and over the top of the R-Tank^{HD} in a single piece (Fig. 5). If space allows and the folded flaps of geotextile will not slow your progress, you may want to consider doing this. If a liner is required on your project, this method should be used to protect the liner.



Fig. 5 Pull wrinkles out of geotextiles so material lays flat.

Geotextiles are flammable. No smoking should be permitted on the geotextile.

Adjacent panels of material should be overlapped by 12" or more, as shown on the plans.

Use pins, staples, sandbags or other ballast to hold the geotextile in place, preventing it from blowing or sliding out of position.

Patch any holes made in the Geotextile by placing a small patch of fabric over the damaged area. The patch must be large enough to cover the damaged area with at least 12" of overlap on undamaged material.

If a liner and/or additional geotextile is required per plans, install these now as shown on the project plans.

TIP: Many contractors find that it is both easier and less expensive to have specialty contractors install the liner (typically used when building a cistern). If you are installing a liner yourself, handle it VERY CAREFULLY to avoid damage.



Fig. 6 Reduced overlaps don't create significant savings and can create delays.

5 Install R-Tanks^{HD}

Determine the starting location. It is often helpful to use an inlet or outlet pipe to guide you. Using a string line, establish two adjacent edges of the R-Tank^{HD} footprint. Ensure that your corner is square. Mark these two edges with marking paint and remove the string line (Fig. 8).

IMPORTANT: If using a liner, be careful not to puncture it with stakes or pins while placing your string line.

Begin placing R-Tanks^{HD} in the corner of the marked area. Do NOT place units on their sides, as this will void the warranty. Check your plans to ensure correct orientation of the R-Tanks^{HD} (Fig. 8).

Check the plans to ensure the R-Tanks^{HD} are running in the correct direction (North/South vs. East/West) to match the footprint shown.

- R-Tank^{HD} Width – 15.75”
- R-Tank^{HD} Length – 28.15”

TIP: Moving R-Tank^{HD} units into the excavation quickly is essential to a profitable installation. Many contractors fabricate a platform that can be lifted by their forklift to quickly move a large number of units with each trip.

R-Tank^{HD} units should fit together evenly. Minor gaps between units (< 1/2”) or variations in the height of the units (< 1/2”) are acceptable (Fig. 9), but reasonable efforts should be made to minimize these variations. Minor gaps will be eliminated during compaction of side backfill material.

No lateral connections between adjacent R-Tanks^{HD} are required.

IMPORTANT: Anyone walking on top of the units should be instructed to keep their weight over the vertical supports of the tank to prevent damaging the units.

The large side plate of the tanks should be placed on the perimeter of the system. This will require that two ends of the tank area will have a row of tanks placed perpendicular to all other tanks (Fig. 10).

Option 1: End column should cover 75% of the final row.

Option 2: End column may extend beyond the final row.

6 Install Inspection / Maintenance Ports

All ports should be made from pipe long enough to extend from the bottom of the R-Tank^{HD} to finished grade. They are typically Schedule 40 PVC pipe, but can be formed from other types of pipe, as well.

Identify the location of all ports and remove the R-Tank^{HD} from each location.

Inspection Ports:

Typically made from 6” Schedule 40 PVC pipe, cut the pipe to length, leaving enough excess to trim the top when final grade is reached (Fig. 11).

TIP: If the location of Inspection Ports is not shown on your plans, use a single Inspection Port located in the middle of the field of R-Tank units. However, not all jobs include Inspection Ports.



Fig. 7 Use a string line and marking paint to square the system footprint.

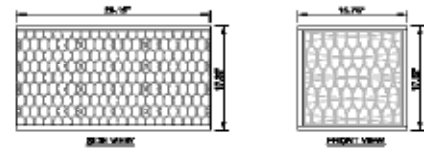


Fig. 8 Make sure the tanks are oriented properly in the excavation.



Fig. 9 Minor variations (less than width of top plate) in tank height are acceptable.

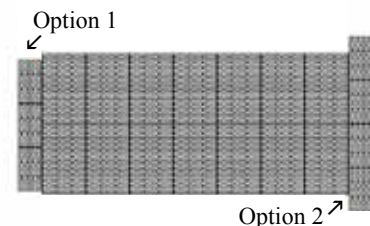


Fig. 10 Plan view showing the end rows turned perpendicular. The corners may not match up perfectly, so two acceptable alternatives are shown. Most plans do not show this configuration. Field adjustments are easily made.



Fig. 11 Installed Inspection Port

Install Inspection / Maintenance Ports - Continued

If the pipe is not already perforated, cut several horizontal slots in the pipe starting at the bottom. Perforations should extend as high as the height of the R-Tank^{HD} units being used. No perforations should be visible above the top of the R-Tank^{HD} once the port is in place.

Using your reciprocating saw, cut the horizontal R-Tank^{HD} plates (Fig. 12) to accommodate the port. If the pipe will not fit between the vertical interior plates, removing the center plate will create adequate space for the port. If space allows, shift the two remaining internal plates to the inner connection points (shown as red dots in Figure 1) to balance the unit.



Fig. 12 Cut the horizontal plates to accommodate all ports.

UNIT	Cut
Mini	1 Plate
Single	1 Plate
Double	2 Plates
Triple	3 Plates
Quad	4 Plates
Pent	5 Plates

IMPORTANT: Do not over-cut the R-Tank^{HD} plates. Minimize the gaps between the pipe and the R-Tank^{HD} plates. This is particularly important with the top plate.

For all units larger than a Single R-Tank^{HD}, you will need to disassemble the R-Tank^{HD} in order to cut the interior plates. Reassemble the R-Tank^{HD} when cutting is completed, and replace the R-Tank^{HD} into the proper location.

TIP: If using Prefabricated Pipe Boot Kits, install them onto the pipe now, leaving the band clamps loose so that final adjustments may be made in Step 7.

Install the pipe into the R-Tank^{HD} unit.

Seal the opening on top of the pipe with a cap or temporary lid to prevent debris from entering the system.

Maintenance Ports:

Typically made from 12" Schedule 40 PVC pipe (check plans for actual size and type of pipe), cut the pipe to length, leaving enough excess to trim the top when final grade is reached.

TIP: If the location of Maintenance Ports is not shown on your plans, include a port within 10' of all inlet and outlet pipes (a single Maintenance Port can cover multiple pipe connections), and include additional Maintenance Ports as needed to prevent the distance between ports from exceeding 50 feet.

Using your reciprocating saw, cut several 8" triangular notches into the bottom of the pipe as shown on plans (Fig. 14). Drill several air vents into the pipe just below where the top of the R-Tank^{HD} will be once the pipe is installed into the tank.



Fig. 13 Additional space for ports can be created by removing the center plate and moving the remaining internal plates toward the center (if possible).



Fig. 14 Cut 8" notches into the bottom of Maintenance Port.

Install Inspection Maintenance Ports: - Continued

To accommodate the maintenance port, remove the center interior small plate. Using your reciprocating saw, cut the horizontal R-Tank^{HD} plates in the center, between the two remaining internal plates. All horizontally oriented plates will need to be cut EXCEPT FOR THE BOTTOM PLATE. In total you will need to cut:

Unit	Cut	Remove
Mini	1 Large Plate	2 Small Plates
Single	1 Large Plate	2 Small Plates
Double	2 Large Plates	4 Small Plates
Triple	3 Large Plates	6 Small Plates
Quad	4 Large Plates	8 Small Plates
Pent	5 Large Plates	10 Small Plates

For all units you will need to disassemble the R-Tank^{HD} in order to cut and/or move the interior plates.

IMPORTANT: Do not over-cut the R-Tank^{HD} plates. Minimize the gaps between the pipe and the R-Tank^{HD} plates. This is particularly important with the top plate.

Reassemble the R-Tank^{HD} when cutting is completed (Fig. 15). Remember to insert the non-corrosive anti-scour pad in the bottom of the R-Tank^{HD} (should fit directly below the Maintenance Port), and replace the R-Tank^{HD} into the proper location.

TIP: If using Prefabricated Pipe Boot Kits, install them onto the pipe now, leaving the band clamps loose so that final adjustments may be made in Step 7.

Install the pipe into the R-Tank^{HD} unit (Fig. 17)

Seal the opening on top of the pipe with a cap or temporary lid to prevent debris from entering the system.

7 Seal R-Tanks^{HD} with Geotextile

Clean off any debris that may be lying on top of the exposed geotextile around the perimeter of the R-Tank^{HD}.

Cut strips of geotextile to fit over the top and down both sides of the R-Tank^{HD} with at least 2' of excess material on each side of the system. This 2' flap should overlay the geotextile placed below the R-Tank^{HD} units, creating a clean 24" overlap to seal the system.

Adjacent strips of geotextile should overlap at least 12" or as shown on plans. Use duct tape, sand bags or other ballast to temporarily secure overlaps.

Where the geotextile intersects an Inspection or Maintenance Port, cut an "X" into the geotextile and pull it over the pipe. The flaps of the "X" should point AWAY from the R-Tank^{HD} (Fig. 19). Use a fabric boot and a stainless steel band clamp to seal the flaps to the pipe.



Fig. 15 If after adjusting the internal plates, the pipe will not fit, the top plate can be cut off-center and one of the internal plates can be removed.



Fig. 16 Installed maintenance port



Fig. 17 Install port into R-Tank^{HD}.



Fig. 18 Maintain 12" overlap on textile.



Fig. 19 Cut an "X" into textile to accommodate pipe penetration.

Seal R-Tanks^{HD} with Geotextile - Continued

Fold geotextile for outside corners similar to sheets on a bed, and lay excess material flat against R-Tank^{HD} (Fig. 20). Leave corners loose to avoid creating weak spots in the material. Temporarily secure excess fabric with duct tape.

IMPORTANT: Take special care with Inside Corners on the footprint of the system. Cut geotextile as needed to ensure that it lays flat against the R-Tank^{HD}. Use additional pieces of geotextile to seal the corner and any cuts that are made (12" overlap).

Connect Inlet & Outlet Pipes

TIP: If using Prefabricated Pipe Boot Kits, install them onto the Inlet and Outlet Pipes, leaving the band clamps loose so that final adjustments may be made.

Where the inlet and outlet pipes connect to the R-Tank^{HD}, cut an "X" into the geotextile so that the pipe makes DIRECT contact with the R-Tank^{HD}. Pull the flaps of the "X" over the pipe so that the flaps of the "X" point AWAY from the R-Tank^{HD}. Use a stainless steel band clamp to seal the flaps to the pipe.

WARNING: Inlet and Outlet pipes must make DIRECT contact with the R-Tank^{HD}, allowing water to flow directly into or out of the R-Tank^{HD} without filtering through the geotextile. Failing to correctly connect pipes will cause the system to malfunction.

If used, adjust all pipe boots so that the fabric lays snug against the R-Tank^{HD}. Tighten the band clamps with a screw/nut driver. Use duct tape to secure the boot flap to the outside of the geotextile envelope.

Walk bottom edge of geotextile to eliminate gaps between the fabric and the bottom corner of the R-Tank^{HD}.

8 Backfill Sides

Place Backfill material (same as Base Materials in Step 3 and as noted in specification section 2.03 B.) around perimeter of the R-Tank^{HD}, distributing the material evenly to prevent shoving of the R-Tank^{HD} units. All backfill material must meet requirements listed in Step 3.

Use a trench roller or plate compactor to compact backfill in 12" lifts (Fig. 23).

IMPORTANT: Vibratory compaction of the side backfill (Fig. 23) is a critical step that both compacts the backfill and eliminates the minor gaps between individual R-Tank^{HD} units. While some backfill materials will yield a 95% proctor density without compaction, **vibratory compaction of the material must be completed to ensure the stability of the system.** Skipping this step will void the manufacturer's warranty.



Fig. 20 Encapsulate R-Tanks^{HD} with geotextile.



Fig. 21 Seal the pipe boot with the included band clamps and duct tape.



Fig. 22 "Walk" the geotextile into the corner to eliminate air gaps.



Fig. 23 Vibratory compaction of side backfill is ALWAYS REQUIRED, regardless of what backfill material is used.

Continue placing and compacting backfill in 12" lifts until the material reaches the top of the R-Tank^{HD} units.

9

Backfill Top

Dump backfill material adjacent to the R-Tank^{HD} and, using your LGP Skid Steer or Dozer, push the material over the R-Tank^{HD} system (Fig. 24). Backfill must meet requirements listed in Step 3 and specification section 2.03 B).

Largest Track Dozers that can be used with 12" of cover over R-Tank^{HD}

Machine	Operating Weight	Track Dimensions	Ground Pressure
Case 850K LGP	20,700 lbs	28" x 92.6" = 2593 si	4.0 psi
Caterpillar D5K LGP	21,347 lbs	26" x 91" = 2366 si	4.52 psi
John Deere 550J LGP	18,252 lbs	24" x 86" = 2064 si	4.2 psi
Komatsu D39PX-21	19,620 lbs	25" x 93" = 2325 si	4.27 psi
New Holland D95 LGP	20,700 lbs	28" x 93" = 2604 si	4.0 psi

This list is not intended to be all inclusive, but representative.

If your machine is not listed, you'll need to find your vehicle's Operating Weight and measure the area where the tracks contact the ground. Take these dimensions and multiply them (Length x Width), then multiply by 2 (since the machine has two tracks), then divide the Operating Weight by the total square inches of contact area to determine the contact pressure of the machine. If the contact pressure is less than 7.0 and the operating weight is less than 20,000 lbs, the machine will work with 12" of cover.

TIP: When pushing backfill over R-Tank^{HD} units, work in the direction of the geotextile overlap to avoid shoving material between the fabric layers.

WARNING: A minimum of 12" of material must be maintained between the Dozer tracks and the top of the R-Tank^{HD}. For best results, push at least 14" (or more if needed) of backfill over the units so that as the material compacts beneath the dozer, a 12" minimum lift is maintained. It is recommended that the dozer drive straight on and then back straight off of the system during backfill placement. Turning movements are likely to shove the backfill material, reducing the thickness of the lift and potentially damaging the units.



Fig. 24 Use an LGP dozer to push backfill over R-Tank^{HD} units.

WARNING: Dump trucks should not drive over or dump material on top of the R-Tank^{HD} without a minimum of 36" of cover and Geogrid reinforcement.

Compact top backfill to 95% standard proctor density or as shown on plans using your walk-behind trench roller. Alternately, a roller (maximum gross vehicle weight of 6 tons) may be used.

WARNING: Some materials will compact significantly while others may shove excessively as you work. Never allow your lift thickness to compact to less than 12" without adding more material.

10

Place Geogrid

Geogrid is required for all load-bearing applications (Fig. 25), such as systems placed beneath parking lots and roads. It is not required above systems used in open space where traffic is prohibited, such as sport fields or natural areas.

Geogrid must be placed 12" above the R-Tank^{HD}. Overlap adjacent panels by 18" minimum or as specified in plans. Roll out Geogrid over the top of the system, with the edges of the grid extending 5' from R-Tank^{HD} footprint or 3' from edge of excavation or more as show on plans (refer to CAD detail H20 loads).



Fig. 25 Overlap Geogrid 18" or as required by plans.

11

Place Additional Cover As Needed

If additional cover or pavement base is required by the plans, begin placing and compacting material in the same manner as discussed in Step 9. Push cover material parallel to the geogrid for best results (Fig. 26). All cover material must meet requirements of specification section 2.03 C.

TIP: To achieve proper compaction requirements, it may be beneficial to begin placing material in 6" lifts.

WARNING: Maximum cover for R-Tank^{HD} system is <7' with 4 internal plates or <10' with 5 internal plates. If your system exceeds these limits contact a Site Supply Rep at 800-465-0900.



Fig. 26 Pushing backfill parallel to the Geogrid prevents the grid from shoving.

12

Secure the Installation

Construction loads are often the heaviest loads that ever drive over the R-Tank^{HD} System, and there are many construction vehicles that exceed the HS20 standard that most detention systems are designed to meet. To prevent damage from these vehicles, the installation should be secured to prevent unauthorized traffic from driving over the system once it has been installed.

Projects nearing completion (within three months) should use warning tape or temporary fencing to secure the installation (Figure 27).

For larger projects with ongoing construction activities, consider a more durable method for preventing unauthorized traffic from accessing the system (Figure 28).

Regardless of what method is selected to secure the installation, it must remain in place until construction activity has concluded and no further access of vehicles exceeding the HS20 standard is necessary.



Fig. 27 Secure the installation with temporary fencing.



Fig. 28 Secured R-Tank^{HD} installation using Jersey Barriers.

IMPORTANT: Some projects require the use of cranes above the R-Tank^{HD}. While it is advisable to avoid this scenario, it may be feasible to utilize a crane over the R-Tank^{HD} based on the depth of the R-Tank^{HD} installation and the size and weight of the crane. Please consult the project engineer or Site Supply for assistance prior to allowing a crane to drive over R-Tank^{HD} system.

13

Install PreTreatment Devices

Install pre-treatment devices prior to activating R-Tank^{HD} System to keep any debris from entering the system.

