

## **R-TANK & HS-20 LOADS**

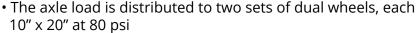
The R-Tank system is capable of easily supporting AASHTO HS-20 loads with safety factors of 1.75 or higher. The system has been used in a variety of applications around the world with tremendous success. Read on and we'll explain how the R-Tank handles heavy loads, and why it will work under HS-20 loads for your project.

### **Bearing Capacity**

The R-Tank's ultimate design load comes from the results of a crush test performed according to ASTM D 2412 & ASTM F 2418, which are the industry standard tests for loading of underground detention systems. Testing was performed by TRI Environmental, and their report along with a technical note about the test methodology is available to supplement this document.

### **Typical Load Calculation**

The AASHTO HS-20 Standard uses a 32,000 lbs axle as the design load (two axles at 25,000 lbs each at depths greater than 38"). To conservatively model the R-Tank's performance under these types of traffic loads, several steps are taken and additional factors considered:



- 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
- An impact factor is added to account for the movement of the load
- 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 table on page 2 shows how the R-Tank performs at various depths of cover, and it suggests which module should be used. Since most projects are designed for HS-20 loads in parking lots, this table is ideal for most installations.

If you are designing for HS-25 loads, or if you are considering applications with multiple HS-20 loads regularly travelling in multiple parallel lanes (for example, active roadways or shipping terminals), tables for these specific circumstances are available.



R-Tank has been chosen for tough applications.



**Unconfined Compression Test** 



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### **Third Party Verification**

Modeling product performance using engineering equations to ensure a successful project is important. But what really matters is product performance in the field. That's why we've done real-world testing with third party agencies who have installed the R-Tank and subjected it to brutal testing. One test involved installing 18" of sand cover over a standard R-Tank unit (the R-Tank<sup>SD</sup> should have been used at this depth) without geogrid, and driving a 31 ton dump truck over the system. Even in these harsh conditions, the R-Tank has supported the loads, passing every field test that's been done.



#### **Real World Performance**

Your project REQUIRES a proven system. With thousands of installations around the world, R-Tank has proven itself again and again as one of the strongest systems available for underground detention/retention. Specify R-Tank and you can be confident your system will support the traffic loads above. Call ACF today to discuss your project's requirements.



| HS-20 Loading & LRFD Alternate Loads - Single Lane Traffic |                      |        |        |        |         |         |         |         |         |         |         |         |         |
|--|----------------------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|  | Cover Depth (inches) |        |        |        |         |         |         |         |         |         |         |         |         |
| Item   | 6                    | 18     | 20     | 30     | 38      | 48      | 60      | 72      | 84      | 96      | 108     | 120     | 144     |
| Axle Load (lbs)  | 32,000               | 32,000 | 32,000 | 32,000 | 25,000* | 25,000* | 25,000* | 25,000* | 25,000* | 25,000* | 25,000* | 25,000* | 25,000* |
| Tire Load (lbs)  | 16,000               | 16,000 | 16,000 | 16,000 | 12,500  | 12,500  | 12,500  | 12,500  | 12,500  | 12,500  | 12,500  | 12,500  | 12,500  |
| Tire Contact Area<br>(10" x 20" = 200 inch <sup>2</sup> )  | 200                  | 200    | 200    | 200    | 200     | 200     | 200     | 200     | 200     | 200     | 200     | 200     | 200     |
| Area of Applied Load<br>at 33% Angle of Repose (inch²)     | 416                  | 1,064  | 1,200  | 2,000  | 2,784   | 3,944   | 5,600   | 7,544   | 9,776   | 12,296  | 15,104  | 18,200  | 25,256  |
| Unmodified Wheel Load<br>Applied to R-Tank                 | 38.46                | 15.04  | 13.33  | 8.00   | 8.98    | 6.34    | 4.46    | 3.31    | 2.56    | 2.03    | 1.66    | 1.37    | 0.99    |
| Impact Factor (per<br>AASHTO Standard)                     | 50.36                | 19.07  | 16.82  | 9.82   | 10.77   | 7.38    | 5.02    | 3.59    | 2.66    | 2.03    | 1.59    | 1.26    | 0.83    |
| Cover Material Pressure<br>at 130 lbs/cf (psi)             | 0.45                 | 1.35   | 1.50   | 2.26   | 2.86    | 3.61    | 4.51    | 5.42    | 6.32    | 7.22    | 8.13    | 9.03    | 10.83   |
| Total Load Applied to<br>R-Tank (psi)                      | 50.81                | 20.42  | 18.32  | 12.07  | 13.63   | 11.00   | 9.53    | 9.00    | 8.98    | 9.26    | 9.71    | 10.29   | 11.66   |
| Capacity of R-Tank Unit (psi)                              | 320.00               | 42.90  | 33.40  | 33.40  | 33.40   | 33.40   | 33.40   | 33.40   | 42.90   | 42.90   | 42.90   | 320.00  | 320.00  |
| Safety Factor  | 6.30                 | 2.10   | 1.82   | 2.77   | 3.04    | 3.04    | 3.50    | 3.71    | 4.78    | 4.64    | 4.42    | 31.10   | 27.44   |



\*LRFD Alternate Load controls at depths of 38" or more.





