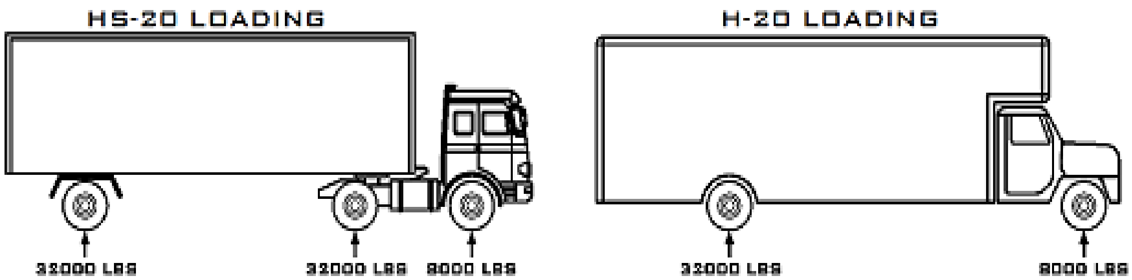
CHECKER BLOCK TECHNICAL NOTE

TRAFFIC LOADING CALCULATION EXAMPLE

The following calculations demonstrate that Checker Block, a permeable reinforced grid paver, satisfies the requirements of meeting or exceeding an H20 or HS20 loading by comparing the theoretical design loads to the compressive strength of Checker Block.



<u>Step #1) Determine the maximum wheel load:</u>

W_L = 32,000 lb/ 2 (divide by 2 since there are two tires per axle) W_L = 16,000 lb

<u>Step #2) Increase the load by 30% to account for dynamic forces associated with moving vehicles:</u>

$W_{L\text{-Dynamic}} = W_L \times 1.30$ $W_{L\text{-Dynamic}}$ = 20,800 lb

<u>Step #3) Determine the tire contact area:</u>

FHWA has defined an acceptable default tire contact area as a rectangle with an area of $0.01W_L$ (in^2) with a length-to-width ratio of 1:2.5.

$A_{contact} = 0.01\ W_L$ $A_{contact} = 0.01 \times (16{,}000\ lb) = 160\ in^2$

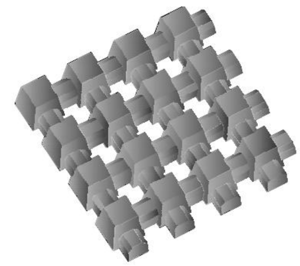
Check dimensions of contact area by confirming that $A_{contact}$ also = 160 in^2

$L = \sqrt{\frac{160}{2.5}} \cdot in$ $W = (2.5 \times L)$ L= 8 in W = 20 in

$A_{contact} = L \times W = 8\ in \times 20\ in = 160\ in^2$ … checks.

Step #4) Determine the stress exerted per tire in the dynamic load:

$$\sigma_{tire} = \frac{W_{L\text{-dynamic}}}{A_{contact}} \qquad 20{,}800\ \text{lb}/160\ \text{in}^2 \qquad \sigma_{tire} = 130\,\frac{\text{lb}}{\text{in}^2}$$



Step # 5) Compare Checker Block strength to H20 or HS20 loading:

Checker Block is manufactured to ASTM C1319 standards requiring a minimum compressive strength of 5,000 psi, which is well in excess of any H20 or HS20 theoretical loading scenarios. As illustrated above, the maximum theoretical tire pressure exerted is 130 psi, so stresses are effectively transferred to the base and subgrade using Checker Block. This significant factor of safety, along with unique steel reinforcement, makes Checker Block the strongest concrete grid paver on the market. Checker Block is castellated, with a 75% turf surface area; optimized for grass establishment. No lattice grid paver can compare to the safety, strength, and turf coverage of Checker Block.

The subgrade soil and base preparation are critical to the performance of any pavement or paver system subjected to vehicular traffic. The subgrade soil and base, in addition to the paver product, must be able to safely transfer the load into the underlying foundation subgrade soil in a stable manner. The above calculations demonstrate that Checker Block is capable of supporting heavy vehicular design loading, but it is up to the design engineer to ensure that an adequate base thickness is specified and that verification of subgrade soil occurs prior to installation of any paver product. All pavement design is site-specific based on actual soil conditions and anticipated vehicular loading patterns.

Nicolock offers the following base thickness guidelines for typical Checker Block applications:

Minimum Dense-Graded Aggregate Base Thickness Guidelines for Checker Block[1]

Conditions	**Subgrade Soil Types**	**Residential Loading** Driveways, walkways, paths, cart paths, trails	**Commercial Loading** Streetways, emergency access, erosion control, slopes, boat ramps
Stable, firm, dry granular soils (CBR > 10)	GP, GW, GC, SW, SP, SC	**8-inch base**	**8-inch base**
Ground ruts with vehicular traffic (5<CBR<10)		**10-inch base**	**12-inch base**
Ground is soft, moist, and ruts easily (CBR<5)	ML, CL, MH, CH	**12-inch base**	**16-inch base**

[1] notes:

- Subgrade is compacted to 95% of standard Proctor density.
- No free-standing water is observed and a 6 oz woven separation fabric is installed to separate the subgrade from the base material.
- A 1” to 1.5” thick leveling sand bed is used to set the Checker Block grid pavers.

GO TO [WWW.CHECKERBLOCK.COM](http://www.checkerblock.com) FOR MORE INFORMATION, OR CALL (631) 867-5110