SOIL RETENTION
DESIGNS INC.

Calculations for Infiltration Rates and Storage Volumes for the Drivable Grass® Pavement System

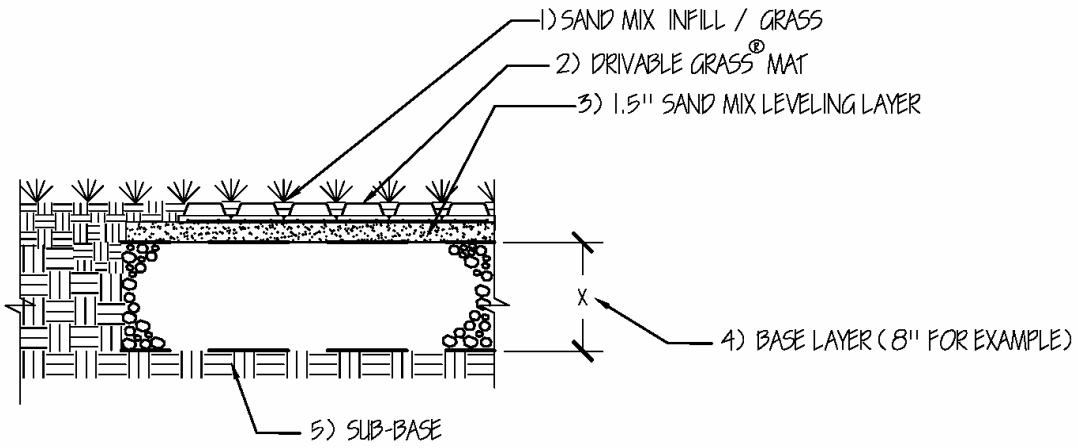
Sample Calculation

Assumptions:

- Product has been installed in accordance with the product specifications
- Infill & 1.5" leveling material (sand mix) is 80% well graded sand & 20% organic
  - void ratio of sand mix = esandmix = 0.30
  - infiltration rate Kinfill = 20 in / hr (conservative estimate based on attached chart)
- compacted Misc. Aggregate Base layer (see note below for higher infiltration / storage requirements)
  - depth = 8"
  - void ratio of base = ebase = 0.25
  - infiltration rate Kbase = 6 in / hr
- underlying sub-base (native material) is of low permeability
- Drivable Grass® mats are considered to be non-porous except for the void spaces at the bottom of the product (the infiltration rate of the Drivable Grass® mat is directly proportional to void space). The void space at the bottom of the Drivable Grass® mat is 12%.

Infiltration components (SEE FIGURE BELOW)

1.) Sand mix infill / grass
2.) Drivable Grass® mat
3.) 1.5" sand mix layer underneath the Drivable Grass® mat
4.) Base layer – compacted misc. aggregate base
5.) Underlying sub-base material (sub-base infiltration rate controls cross sectional design for storage capacity / full exfiltration. Subdrains may need to be incorporated to drain excess water.)



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Drivable Grass® Mat infiltration rate:

Kdg = (Kinfill * edrivablegrass) = (20 * 0.12) = 2.4 in / hr

Where: Kdg = Infiltration rate of the Drivable Grass® mat (in / hr)
Kinfill = Infiltration rate of the Infill Material (sand mix in this case k = 20 in/hr)
edrivablegrass = void space at the bottom of the drivable grass mat = .12

Storage Capacity of Drivable Grass® System

Storage capacity of the system is directly proportional to the volume and void ratio of the infill material and underlying base material

Surface storage: Vsurface = d* Ai * esandmix = 1 * 0.4 * 0.30 = 0 .12 in (will be higher with an established grass mowed 1" - 2" above Drivable Grass® surface)

Sand layer storage: Vlevelinglayer = d(levelinglayer) * esandmix = 1.5 * 0.30 = 0 .45 in

Base layer storage: Vbase = d(base) * ebase = 8 * 0.25 = 2 in

Total Storage Capacity per unit area = Vtotal = Vsurface + Vlevelinglayer + Vbase = 2.57 in

Where: d = depth of infill in product (in)
d(levelinglayer) = depth of sand layer (in)
d(base) = depth of base layer (in)
Ai = area of infill (40% of surface area)
esandmix = void ratio of infill & leveling sand mix material
ebase = void ratio of base material

Note: Infiltration can be increased by using different infill material with larger void ratios. Storage capacity is increased with a thicker base layer. If existing sub-base is impermeable, the Drivable Grass® section can be used as a filtration system and will need a sub-drain at a required elevation.

Soil Infiltration Rates of Stormwater

USCS Soil Classification	Typical ranges for Coefficient of Permeability, k, in./hour (approx m/s)		Relative Permeability when compacted and saturated	Shearing Strength when compacted	Compressibility	Typical CBR Range
GW-well graded gravels	1.3 to 137	(10 -5 to 10 -3)	Pervious	Excellent	Negligible	30-80
GP-poorly graded gravels	6.8 to 137	(5x10-5 to 10-3)	Very Pervious	Good	Negligible	20-60
GM-Silty gravels	1.3x10-4 to 13.5	(10-8 to 10-4)	Semi-pervious to pervious	Good	Negligible	20-60
GC-Clayey Gravels	1.3x10-4 to 1.3x10-2	(10-8 to 10-6)	Impervious	Good to fair	Very Low	20-40
SW-well graded sands	.7 to 68	(5x10-6 to 5x10-4)	Pervious	Excellent	Negligible	10-40
SP-poorly graded sands	.07 to .7	(5x10-7 to 5x10-6)	Pervious to semi-pervious	Good	Very Low	10-40
SM-Silty Sands	1.3x10-4 to .7	(10-9 to 10-6)	Semi-pervious to impervious	Good	Low	10-40
SC-Clayey Sands	1.3x10-5 to .7	(10-9 to 10-6)	Impervious	Good to fair	Low	5-20
ML-inorganic silts of low plasticity	1.3x10-5 to .07	(10-9 to 5x10-7)	Impervious	Fair	Medium	2-15
CL-inorganic clays of low plasticity	1.3x10-5 to 1.3x10-3	(10-9 to 10-8)	Impervious	Fair	Medium	2-5
OL-organic silts of low plasticity	1.3x10-5 to 1.3x10-2	(10-9 to 10-6)	Impervious	Poor	Medium	2-5
MH-inorganic silts of high plasticity	1.3x10-6 to 1.3x10-5	(10-10 to 10-9)	Very Impervious	Fair to Poor	High	2-10
CH-inorganic clays of High plasticity	1.3x10-7 to 1.3x10-5	(10-11 to 10-9)	Very Impervious	Poor	High	2-5
OH-organic clays of high plasticity	NOT APPROPIATE UNDER PERMEABLE PAVEMENTS					
PT-Peat,mulch, soils with high organic content	NOT APPROPIATE UNDER PERMEABLE PAVEMENTS					

Notes: values per Unified Soils Classification System

for stormwater storage capacity values the void ratio of the compacted material will need to be determined