environment 21
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Technology That Separates

STORM BULLETIN 17

SERVICE LIFE OF FILTRATION MEDIA

- **Filter media** are available in a wide variety of shapes such as: sand bed, fiber mat, particulate media, cylinder cloth, bag, and screen.

- **A common basis for evaluating filter flow capacity** using the term impedance is as follows where:

  Q = flow rate in ft^3/day,
  V = face velocity in ft/day,
  A = filter face area in ft^2,
  H = head loss across filter in ft, and
  I = filter impedance in days giving

  $$Q/A = V = H/I$$

  - The filter face area equals the full flow surface at the inlet side of the filter. For example, a 2' x 2' x 1/2" thick fiberglass furnace filter has a face area of 4 ft^2, while a 4" diameter x 1' long water filter cartridge has a face area of 1 ft^2.
  - Q/A is often expressed as the application rate. For a face velocity of 1 ft/day the application rate is: ft /day x 7.54 gal/ ft^3 = 7.54 gpd/ft^2 (7.54 gallons takes up one cubic foot of space.)

- Filter impedance is a function of the fluid viscosity, the size and mass of the retained solids, and distribution pattern of the retained solids on the surface or within the media. Values for impedance can be obtained from laboratory tests (ASTM F796-88 with constant head loss) that measure the decay in flow rate as a function of the solids load on the filter.
  - Stormwater filters made from concrete sand can quickly form a clogging mat at the surface of the sand. For example, a 2-ft deep bed of concrete sand has the following typical values for stormwater impedance:

	(clean sand)	(clogging mat)
Solids loading, #/ ft^2 filter face area	0.00	0.60
Water flow impedance, days	0.03	1.0

  Clogged beds of sand with different depths will have the same impedance. The reason for this is the flow restriction is essentially all due to the thin clogging mat formed on the surface of the sand.

- The filter impedance will increase as solids clog the smaller pores of the filter. The filter efficiency will increase depending on the size of the unclogged pores.

- **Environment 21** recommends a design guideline of 20 ppm for the Total Suspended Solids (TSS) influent concentration for 1-2 hours of detention pretreatment.

- **Environment 21** recommends a design guideline of 50 ppm for the TSS influent for typical oil-sand separator pretreatment chambers without detention.