How to estimate width of a power straps during floorplanning

Peak current demand + Sheet resistance < mitigate Pwr EM

R = using Sheet Resistance

Inputs:

- 1) I = Peak current
- IR drop limit (budget)
- Resistivity (Rho)
- Current Density limit (Jmax)

2) Vmax= I peak X R

3) R=ρ· (L) / W·t

$$R = R_{sh}\frac{L}{W} \text{ ohms}$$

$R = \rho \times \frac{L}{(\text{Width} \times \text{thickness})}$

Power EM = add more parallel Stripes

4) Reqd. Strap width (W) $= \boldsymbol{\rho}\ \frac{L}{t.R} = \boldsymbol{\rho}\ \frac{L.\ (I\ )}{t.\ (Vdrop)} = R_{sh}\frac{L.\ (I\ )}{(\Delta V\ maxdrop)}$

5) Parallel power straps (Wtotal) = $\boldsymbol{\rho}\ \frac{L.\ (I\ )}{t.\ (Vdrop)X\ N}$

R(sh) is the sheet resistance of the metal layer = resistivity rho divided by the thickness of the routing layer

$R_{SH} = \rho / \text{Thickness}$

$W_{IR} = 0.1\ \Omega/\square\ x\ \frac{500um\ x\ 100mA}{50mV\ (5\%\ drop\ of\ 1V)}$ = 100µm