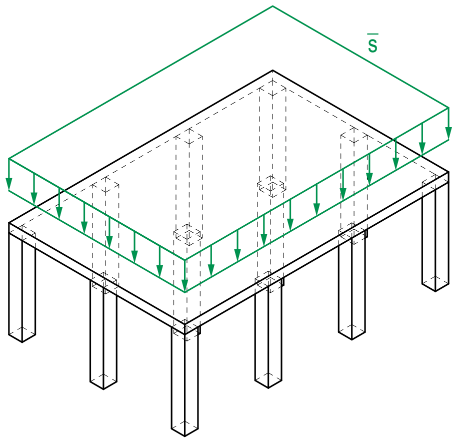
Tributary Areas

A surface load acts on the entire structure. To determine the load that a relevant vertical element must carry, the so-called tributary area is determined. This is a partial area of the area load. As a general rule, loads directly go to the nearest support. Therefore, the distance between two load-bearing elements is halved in each case to find the dimensions of the respective tributary area.

Tributary area of a column

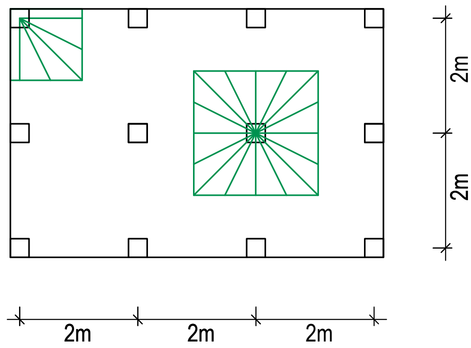
A load situation is given with an applied surface load acting on a slab, which in turn rests on a series of supports. If the distances between the supports are halved, the respective tributary areas of the supports are created. In the following example, the tributary area on a central column is four times as large as that on a corner column. Therefore, when dimensioning, the centre column is considered, as it experiences the largest force. To calculate the resulting point load on the centre column, the area load is multiplied by the size of the tributary area.



$A = 2\ m \cdot 2\ m = 4\ m^2$

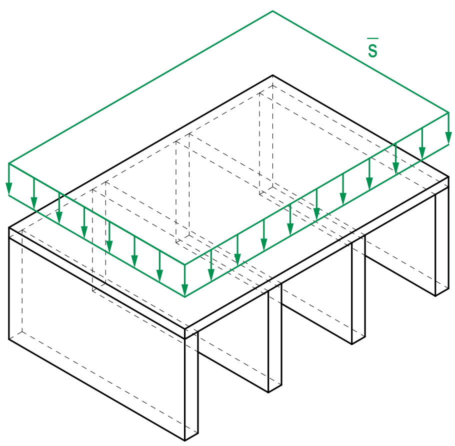
$\bar{s}_d = 1\ kN/m^2$

$R = \bar{s}_d \cdot A = 4\ kN$



Tributary area of a beam

A load situation is given with an applied surface load acting on a plate, which in turn rests on a series of beams. Analogous to the example above, the respective tributary areas are created when the distances between the beams are halved. In the following example, the tributary area of a middle beam is twice as large as that on a beam at the edge of the slab. When dimensioning, therefore, the middle beam is again considered, as it experiences the largest force. In order to calculate the resulting point load, the area load is multiplied by the size of the tributary area. Since the wall is a linear element, the magnitude of the line load might also be of use. This is calculated by dividing the resultant by the length of the element.



$A = 2\ m \cdot 4\ m = 8\ m^2$

$\bar{s}_d = 1\ kN/m^2$

$R = \bar{s} \cdot A = 8\ kN$

$g_d = R / l = 8\ kN / 4\ m = 2\ kN/m$