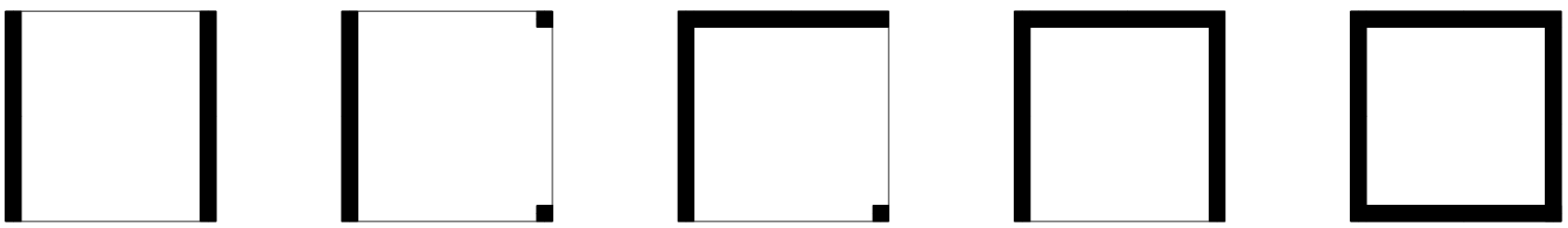
## Task 1 Tributary area

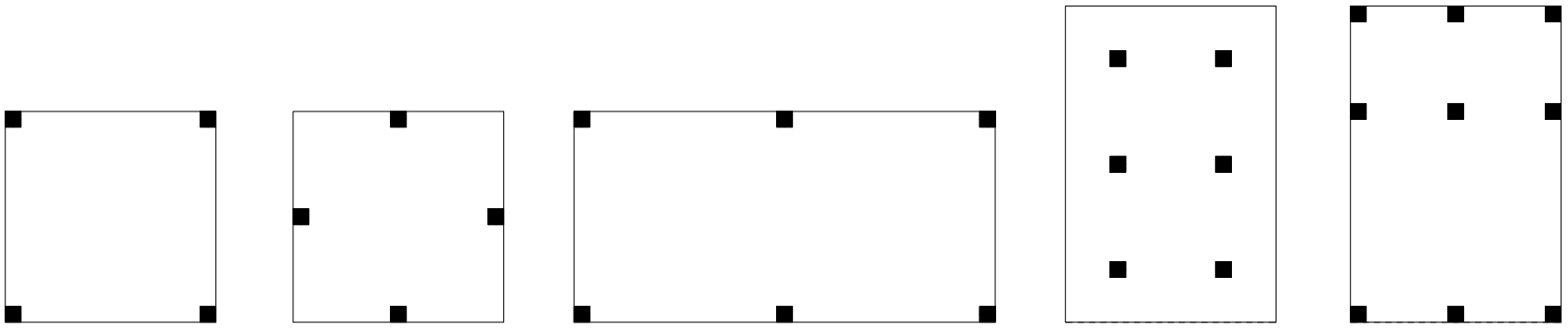
a) Divide each plate into the tributary areas resulting from the placement of the load bearing walls and columns.

b) Draw the tributary areas of the plate on the columns and colour the area which is relevant for dimensioning.

a)

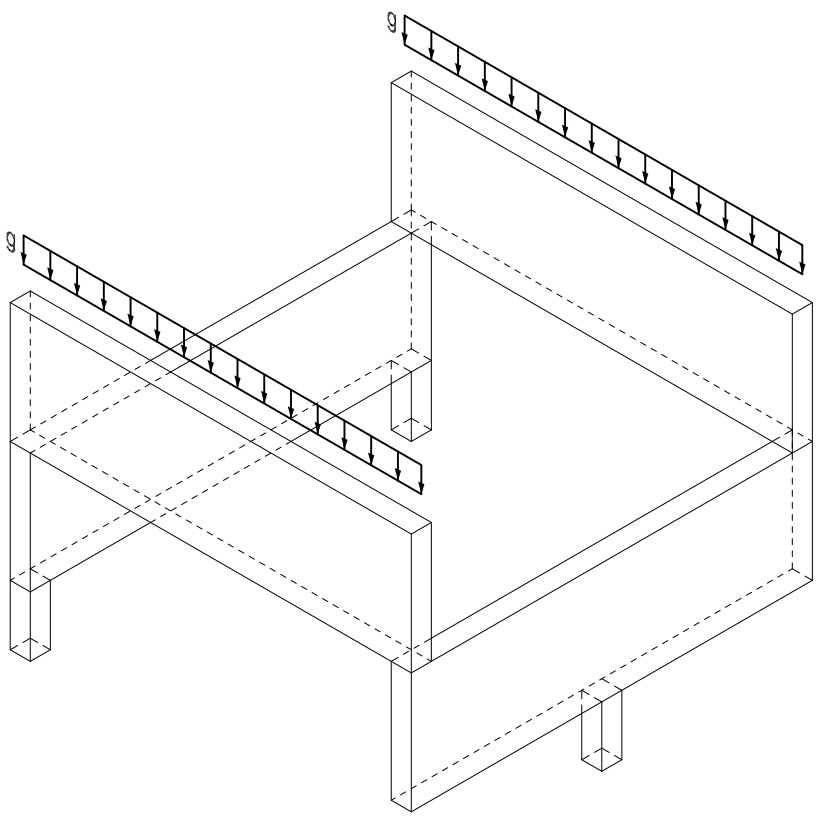


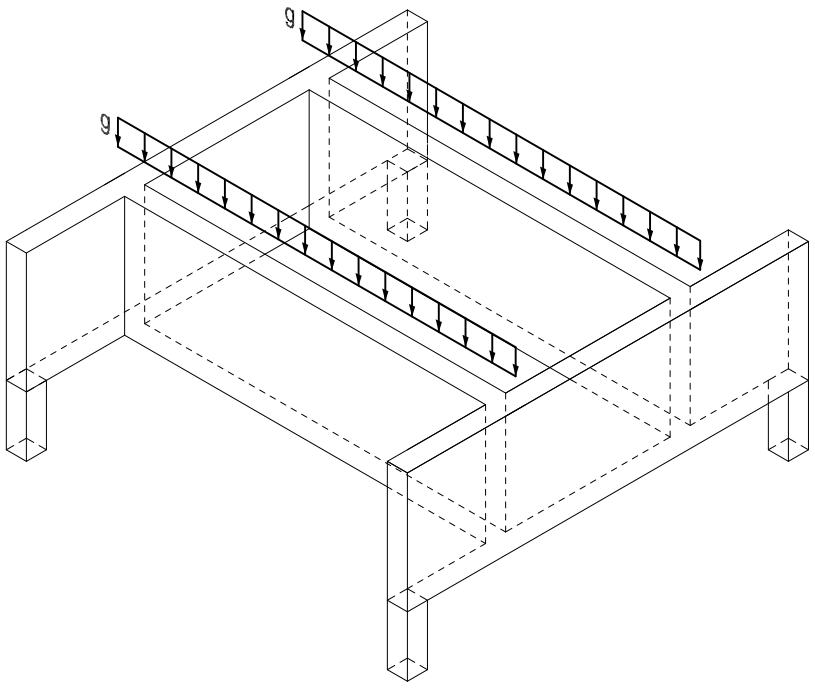
b)



## Task 2 Qualitative internal force flow

Draw a qualitative internal force flow and the reaction forces into the axonometric drawing of the two following structures. Indicate tension forces with red, compression forces with blue and reaction forces with green.




*axonometric drawings*

## Task 3 Transferring vertical loads

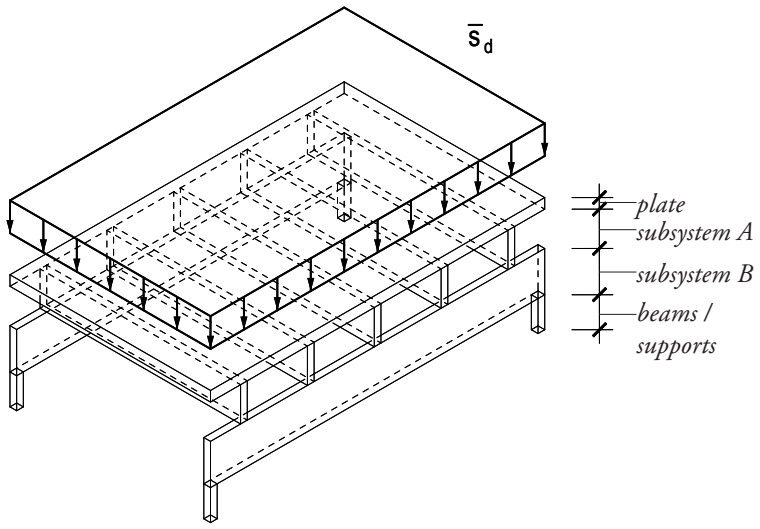
The plate is loaded by a dead area load of $\bar{s}_k$ = 1 kN/m².

a) Calculate the design value of the constant area load. Draw the relevant tributary area for one of the five beams (subsystem A) into the floor plan. Calculate the line load $g_d$ over the relevant beam.

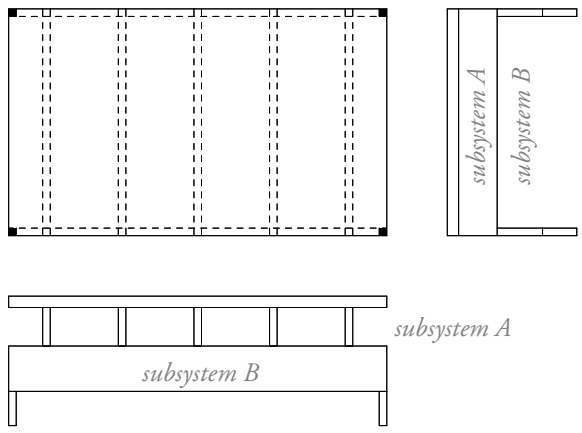
b) Draw a possible internal force flow in the beam (subsystem A) for the line load found in a). Draw the corresponding force diagram. Indicate tension forces with red and compression forces with blue.

c) The reaction forces from b) are the same for all five beams that support the plate. These are further transferred to two longitudinal beams (subsystem B). First draw the applied forces. Secondly, find an internal force flow in one of these longitudinal beams with the aid of the force diagram, considering that the maximum compression force is 310 kN. (Hint: In simple arch-cable structures, the elements at the supports are subjected to the maximum force.) Indicate tension forces with red, compression forces with blue and reaction forces with green.

a)

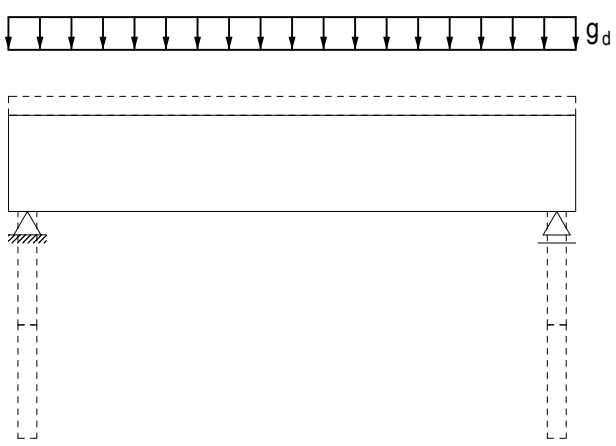



*axonometric drawing*




*plans 1:500*

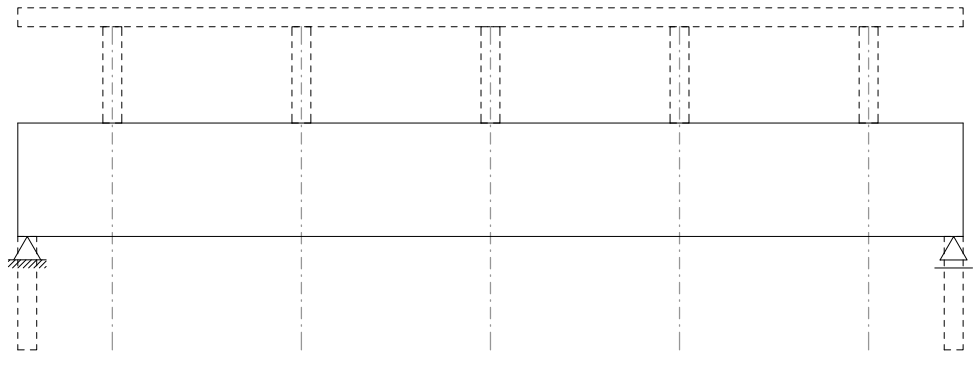
b)




*form diagram subsystem A 1:200*

*force diagram 1cm ≙ 50kN*

c)



*form diagram subsystem B 1:200*

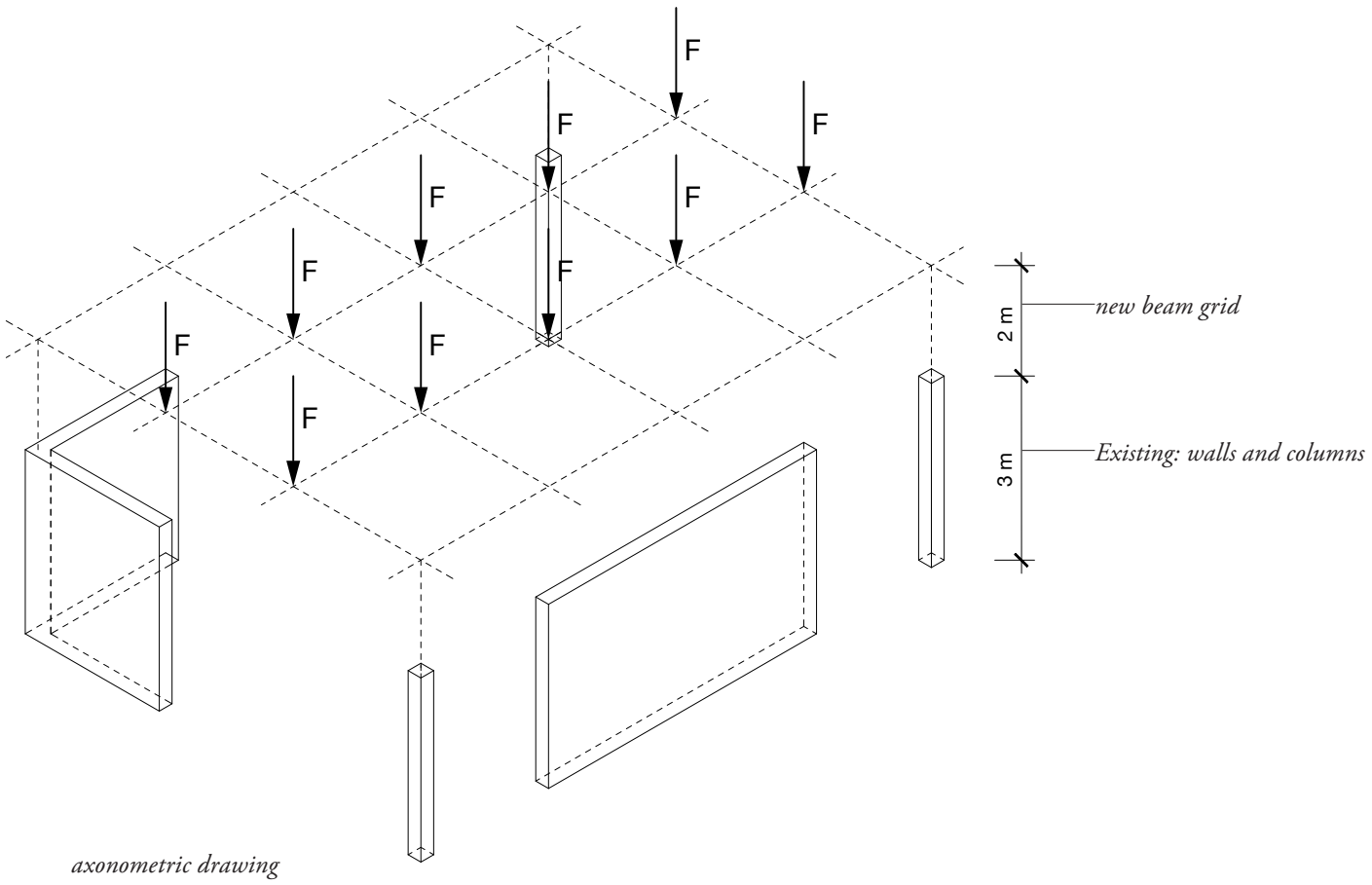
*force diagram 1cm ≙ 50kN*

## Creative Task Beam grid pavilion

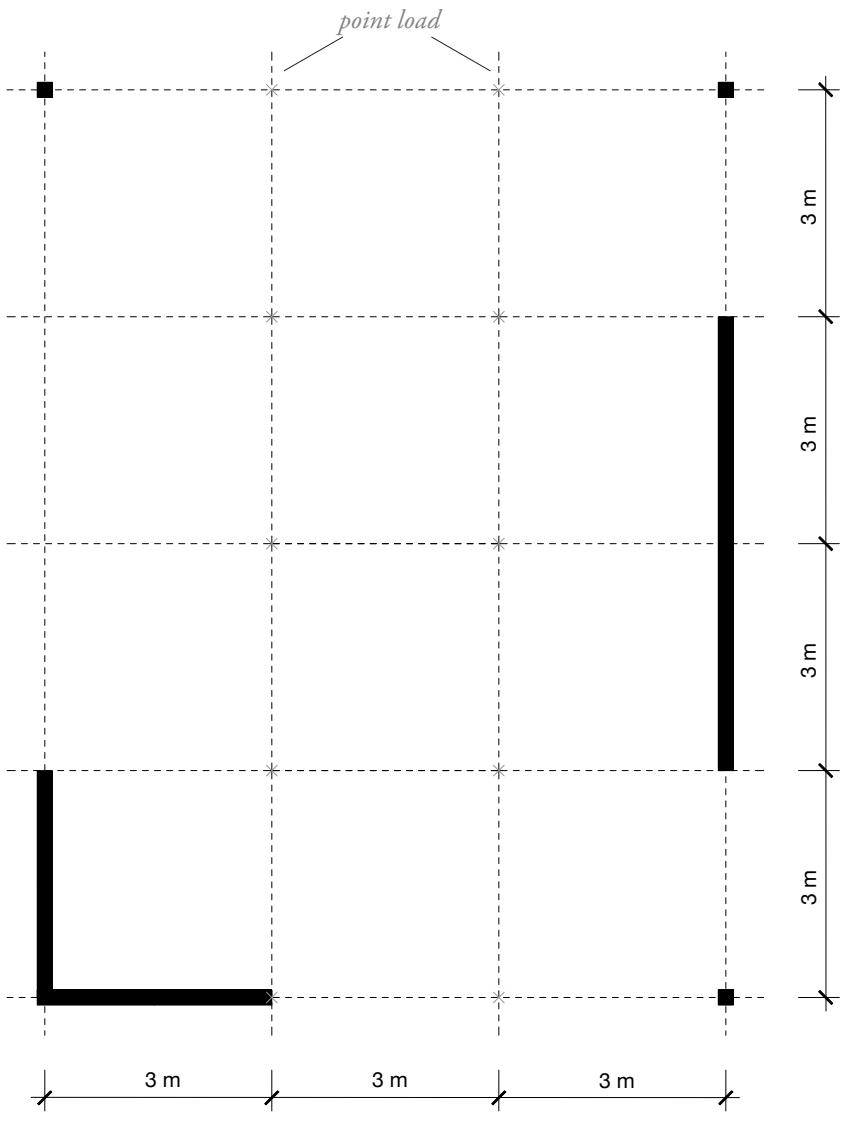
An existing pavilion consisting of walls and columns gets a new supporting structure to carry the roof. Given are the point loads resulting from the new roof covering and the position of the walls and columns.

a) Design a beam grid through which the loads of the roof can be transferred to the existing walls and columns. Note that the maximum length of the beams is 9 meters and that each beam has a hight of 2 meters. Draw your design in both, floor plan and axonometric drawing.

b) Using the axonometric drawing, consider how the forces are transferred through the beams into the walls and columns. Then draw an elevation of each type of beam in scale in the form diagram and find the respective force flow in it. Indicate tension forces with red, compression forces with blue and reaction forces with green.




*axonometric drawing*




*floor plan 1:100*

*Views beams 1:100*