Isometric Drawing of a Grillage Foundation: A Clear Step-by-Step Guide

Original tasks 1, 2 / complete keys

Task 1

Draw an isometric view of a grillage foundation with a 2000 mm by 2000 mm grid, beams at 1000 mm spacing, and footings 500 mm by 500 mm by 200 mm deep. Use a scale of 1:50. Label axes and dimensions.

Answer: The paper grid is 40 mm by 40 mm. Beam spacing is 20 mm. Footings are 10 mm wide and offset 4 mm downward. There are 3 by 3 = 9 footings. The drawing should show X and Y axes at 30 degrees, vertical Z axis, lower and upper beams, and footings at each intersection. Check: measure the grid sides (40 mm), count 9 footings, confirm X and Y lines are at 30 degrees and all vertical lines are parallel.

Reason: Scale 1:50 means 1000 mm becomes 20 mm. The grid is 2000/50 = 40 mm. Footing width 500/50 = 10 mm; depth 200/50 = 4 mm. The number of footings is the product of the number of beam lines in each direction: 3 along X and 3 along Y, so 9.

Check: Measure the paper grid sides; they should be 40 mm. Count footings; there should be 9. Check that all vertical lines are parallel and that X and Y lines are at 30 degrees.

Task 2

A grillage foundation has a 4000 mm by 3000 mm grid with beams at 1000 mm spacing. Footings are 800 mm by 800 mm by 300 mm deep. Use a scale of 1:100. Draw the isometric view and label the axes and dimensions.

Answer: The paper grid is 40 mm by 30 mm. Beam spacing is 10 mm. Footings are 8 mm wide and offset 3 mm downward. There are 5 by 4 = 20 footings. The drawing should show the beam grid and footings at each intersection. Check: measure the grid (40 mm by 30 mm), count 20 footings, and confirm beam spacing is 10 mm along both axes.

Reason: Scale 1:100 means 1000 mm becomes 10 mm. Grid sides: 4000/100 = 40 mm, 3000/100 = 30 mm. Footing width 800/100 = 8 mm; depth 300/100 = 3 mm. Number of footings: 5 beam lines along X and 4 along Y, so 20.

Check: Measure the paper grid; it should be 40 mm by 30 mm. Count footings; there should be 20. Verify that the beam spacing on paper is 10 mm along both axes.

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Original tasks 3, 4 / complete keys

Task 3

Draw an isometric view of a grillage foundation with a 3000 mm by 1500 mm grid, beams at 750 mm spacing, and footings 600 mm by 600 mm by 250 mm deep. Use a scale of 1:25. Label axes and dimensions.

Answer: The paper grid is 120 mm by 60 mm. Beam spacing is 30 mm. Footings are 24 mm wide and offset 10 mm downward. There are 5 by 3 = 15 footings. The drawing should show the beam grid and footings at each intersection. Check: measure the grid (120 mm by 60 mm), count 15 footings, and confirm beam spacing is 30 mm along both axes.

Reason: Scale 1:25 means 1000 mm becomes 40 mm. Grid sides: 3000/25 = 120 mm, 1500/25 = 60 mm. Beam spacing 750/25 = 30 mm. Footing width 600/25 = 24 mm; depth 250/25 = 10 mm. Number of footings: 5 along X and 3 along Y, so 15.

Check: Measure the paper grid; it should be 120 mm by 60 mm. Count footings; there should be 15. Check that the beam spacing on paper is 30 mm along both axes.

Task 4

A grillage foundation has a 2500 mm by 2500 mm grid with beams at 500 mm spacing. Footings are 400 mm by 400 mm by 200 mm deep. Use a scale of 1:50. Draw the isometric view and label the axes and dimensions.

Answer: The paper grid is 50 mm by 50 mm. Beam spacing is 10 mm. Footings are 8 mm wide and offset 4 mm downward. There are 6 by 6 = 36 footings. The drawing should show the beam grid and footings at each intersection. Check: measure the grid (50 mm by 50 mm), count 36 footings, and confirm beam spacing is 10 mm along both axes.

Reason: Scale 1:50 means 1000 mm becomes 20 mm. Grid sides: 2500/50 = 50 mm. Beam spacing 500/50 = 10 mm. Footing width 400/50 = 8 mm; depth 200/50 = 4 mm. Number of footings: 6 along X and 6 along Y, so 36.

Check: Measure the paper grid; it should be 50 mm by 50 mm. Count footings; there should be 36. Verify that the beam spacing on paper is 10 mm along both axes.

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Source rubric / reflection

- [ ] Isometric axes are drawn at 30 degrees above horizontal and labeled.
- [ ] All vertical lines are parallel to the Z axis.
- [ ] Beam grid spacing matches the labeled dimensions and scale.
- [ ] Footings are drawn at every intersection and offset below beam bottoms.
- [ ] Upper beams are shown crossing over lower beams with breaks or gaps.
- [ ] Dimensions, scale, and units are labeled clearly and consistently.
- [ ] Drawing is clear and checkable, with a convention note.

Reflection: What did you check, what did you change, and what will you try next?