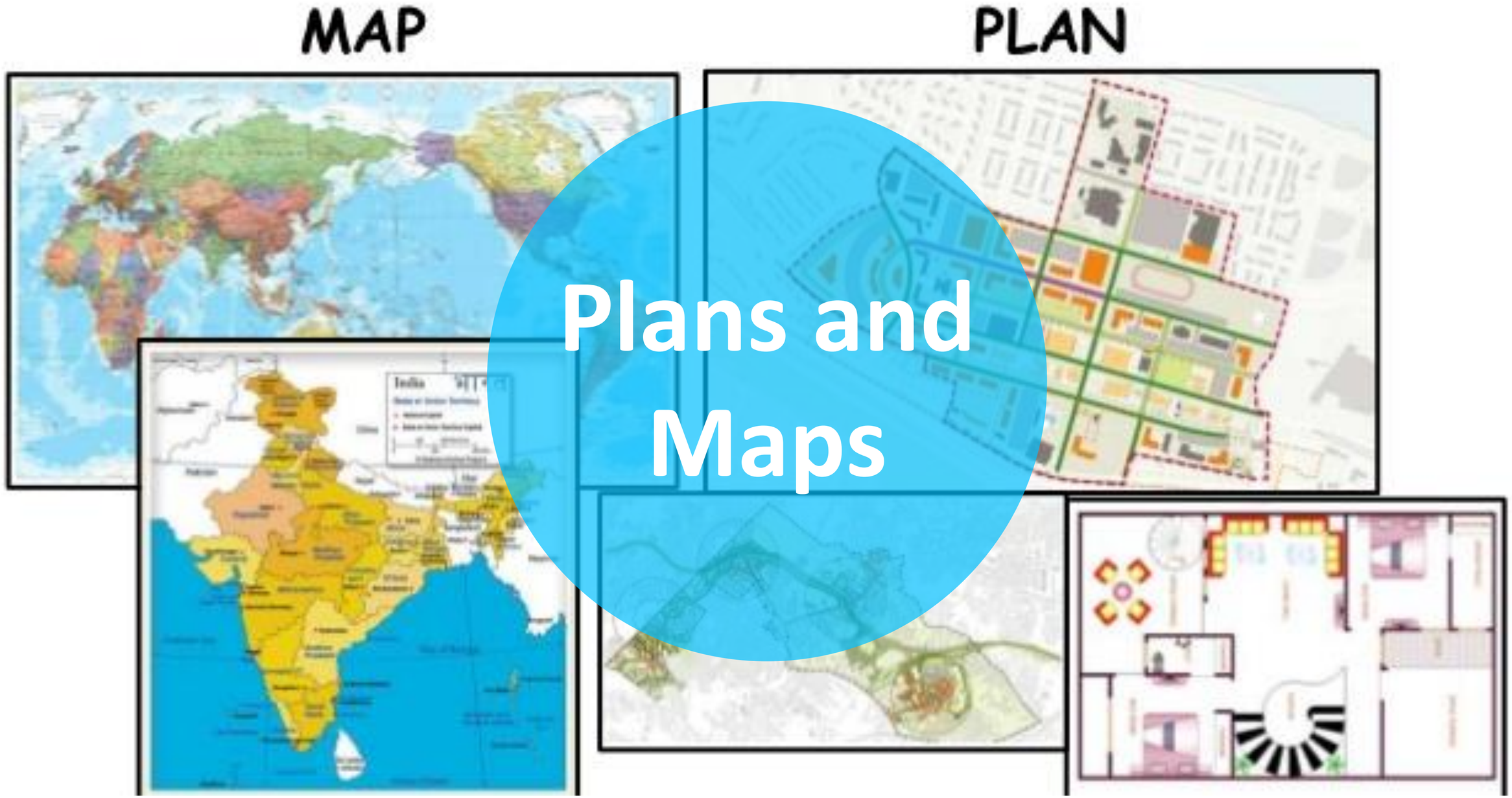


Ibrahim Almohanna, 2019

Plans and Maps

Topographical plans and maps are drawings which show the main physical features on the ground, such as buildings, fences, roads, rivers, lakes and forests, as well as the changes in elevation between land forms such as valleys and hills (called vertical relief). You base these plans and maps on the information you collect from topographical surveys.

Ibrahim Almohanna, 2019

Is it a Plan or a Map?

- Plans are usually large-scale drawings.
- Maps are usually small-scale drawings.

➢ It is a plan if the scale is larger than 1 cm for 100 m (1 : 10000),

for example 1 cm for 25 m;

➢ It is a map if the scale is equal to or smaller than 1 cm for 100 m (1 : 10000),

for example 1 cm for 200 m or 1 cm for 1000 m

Ibrahim Almohanna, 2019

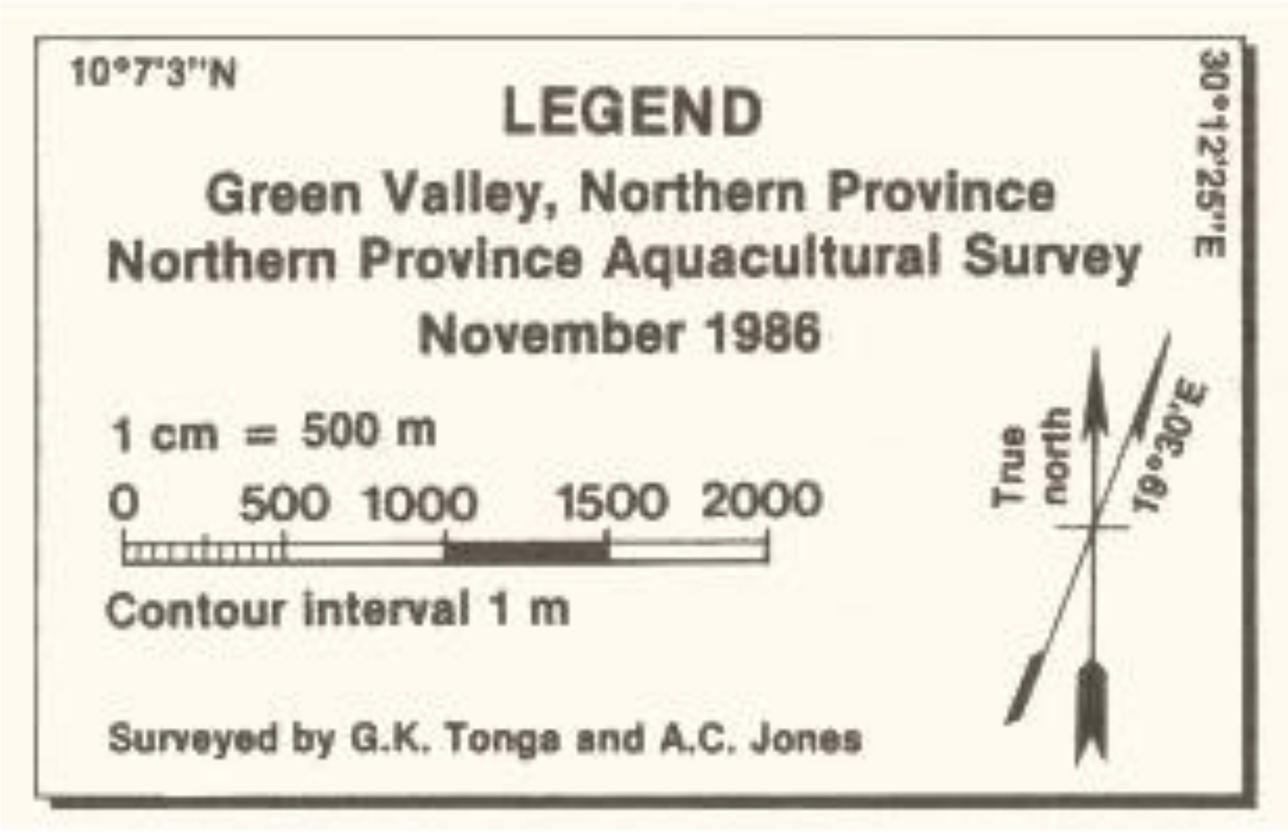
Starting topographical plans and maps

- Before you begin a topographical survey, you should try to get any available topographical plans and maps of the area, even though they may not be exactly the kind of plan or map that you need.
- General topographical maps are available from governmental organizations which are responsible for geological surveys or land surveys,
- for example. National geographical institutes, soil survey departments and agricultural development agencies can also usually provide existing topographical maps. The cadastral department (that calculates land taxes) of your local government may provide local topographical plans.

Ibrahim Almohanna, 2019

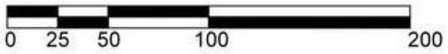
You should always look for:

- The name of the area or piece of land mapped, and/or the name of the type of project for which it is used;
- The exact location of the piece of land;
- The name of the person or people who made surveys on which the plan or map is based;
- The date(s) on which the surveys were made;
- The direction of magnetic north;
- The scale at which the plan or map was drawn.
- the contour interval, if the vertical relief is shown.
- A key, or guide, to the symbols used in the drawing.



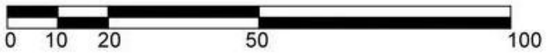
Map Scale

- To represent distances you have measured in the field on a piece of paper, you need to scale them down.
- This means that you must reduce the size of the distances proportionally according to a scale.
- The scale expresses the relationship which exists between the distance shown on a drawing or map and the actual distance across the ground.
- Note: a ratio with a smaller number is a larger scale, that is, 1: 500 is a larger scale than 1 : 1000.



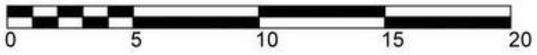
SCALE BAR 1:1250

SCALE BAR 1:1000



SCALE BAR 1:500

SCALE BAR 1:250



SCALE BAR 1:100

SCALE BAR 1:50

Expressing a scale

- There are three ways of expressing the scale of the map:

1. Numerical Equivalent such as (1 cm = 20 m), which you should read as (1 cm on the plan represents 20 m on the ground); also known as Engineering Scale.
2. Ratio such as (1: 2000) which you should read as (1 cm on the plan represents 2 000 cm on the ground); or Representative Fraction: written as: 1/2000
3. Graphically, with a line that is marked off into drawing distances that correspond to convenient units of distance on the ground.

- A (graphical) bar (plane) scale may be a suitable physical ruler which can be used to measure distance on the map.

Expressing a scale

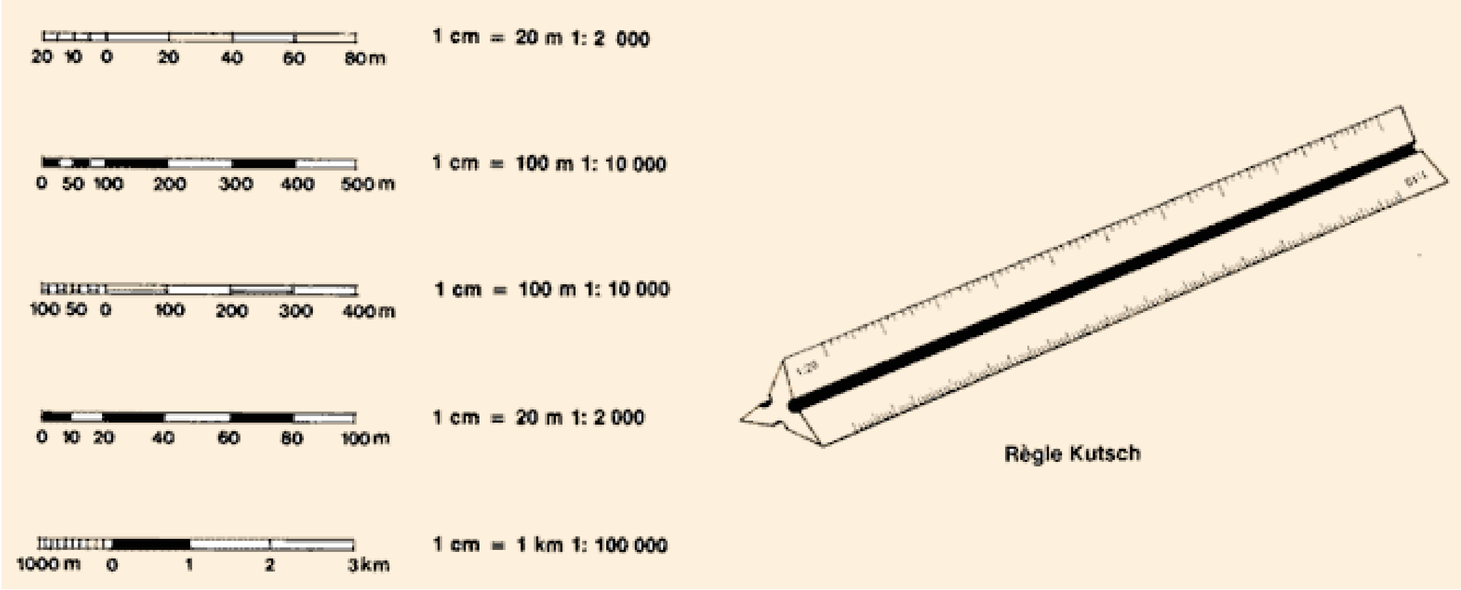
- True ground distances are calculated by measuring the distance on the map (in any measure) and then multiplying by the inverse of the scale fraction. True ground areas are calculated by measuring the area on the map (in any measure) and then multiplying by the inverse of the scale fraction squared.

- Examples of Map Scales

1. 'one centimetre to one hundred meters’ or 1:10,000 or 1/10,000
2. 'one centimetre to one thousand kilometres’ or 1:100,000,000 or 1/100,000,000

- The first is an example of a large scale map whilst the second is an example of a small scale map. This usage relates to the expressions as fractions. The fraction 1/10,000 is much larger than 1/100,000,000.

Using a scale



- Example of using Scale:
- A map is drawn to a scale 1:2500. A distance ab representing ground distance AB is measured on the map as 80mm, compute the ground distance.
- Solution

  Ground distance = map distance / map scale

  Distance AB = 80mm / (1/2500)

  = 80*2500 mm

  = 80*2500/100 m

  = 200.00 m

Choosing a scale

- General topographical maps usually have scales ranging from 1:50000 to 1:250000. You can use these for general planning and development.
- To show greater detail, plans are drawn to a larger scale, showing individual structures or land areas. The scales most often used in plans are 1 :500, 1 :1000, 1 :2000, 1:2500 and 1:5000.
- Detailed engineering drawings use scales much larger than 1:500, for example: 1 : 100 or 1: 10.

Choosing a scale

- Scale = length available on paper ÷ maximum actual length to in field.

- Example:

  If 25cm size drawing paper is available, and we want to draw a sketch of a land where the maximum dimension to be plot is 300 m what scale should we use?

- Solution:

  Scale = length available on the paper / Maximum length of the land

  = 25 cm / 300 m ➔ 1 cm / 12 m

  = 1 cm / 1200 cm ➔ 1:1200

Choosing a scale

- Example:

  If 25cm size drawing paper is available, and we want to draw a sketch of a land where the maximum dimension to be plot is 140 m what scale should we use?

- Solution:

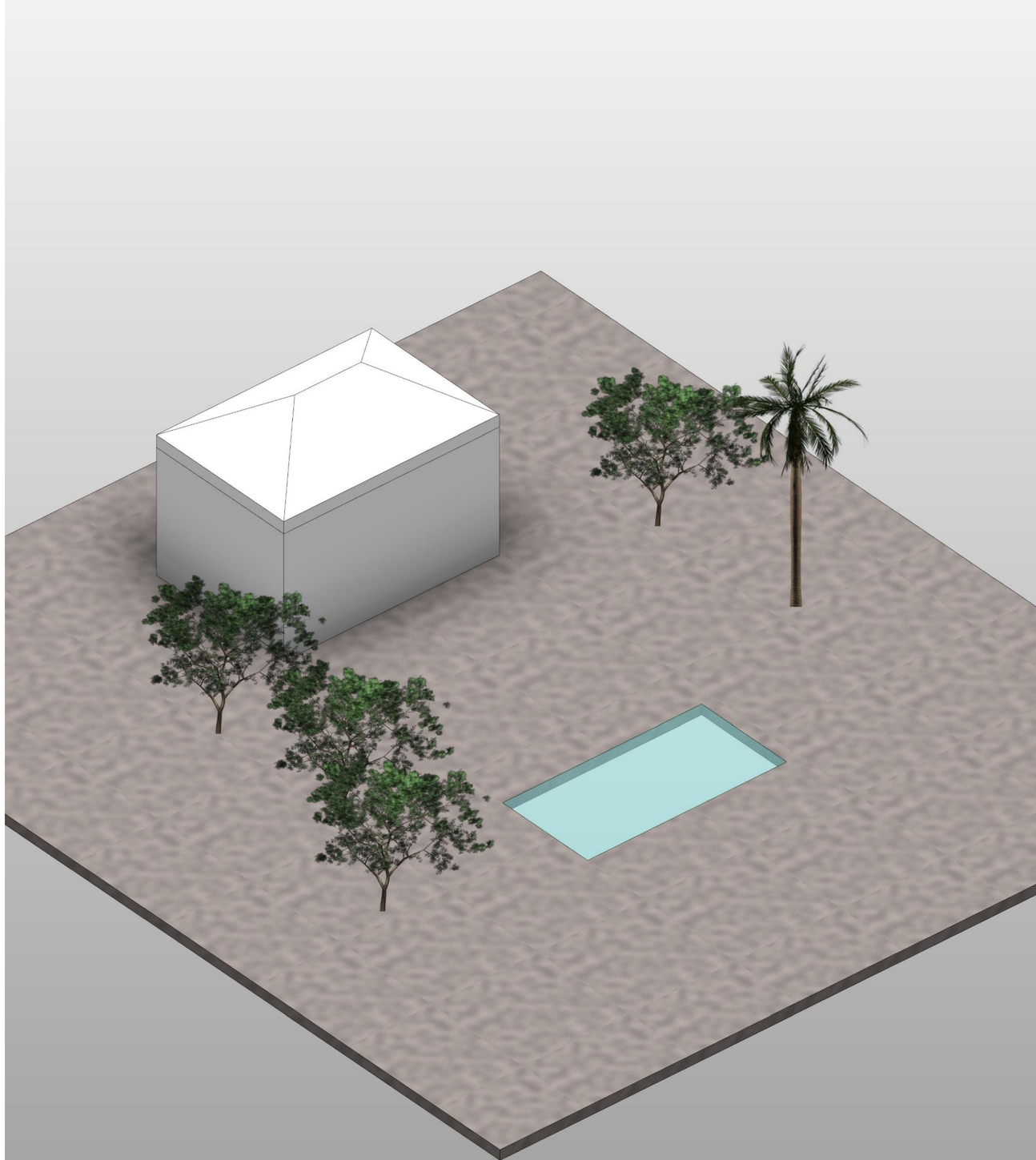
  Scale = length available on the paper / Maximum length of the land

  = 25 cm / 140 m ➔ 1 cm / 5.6 m say 1 cm / 6 m

  = 1 cm / 600 cm ➔ 1:600

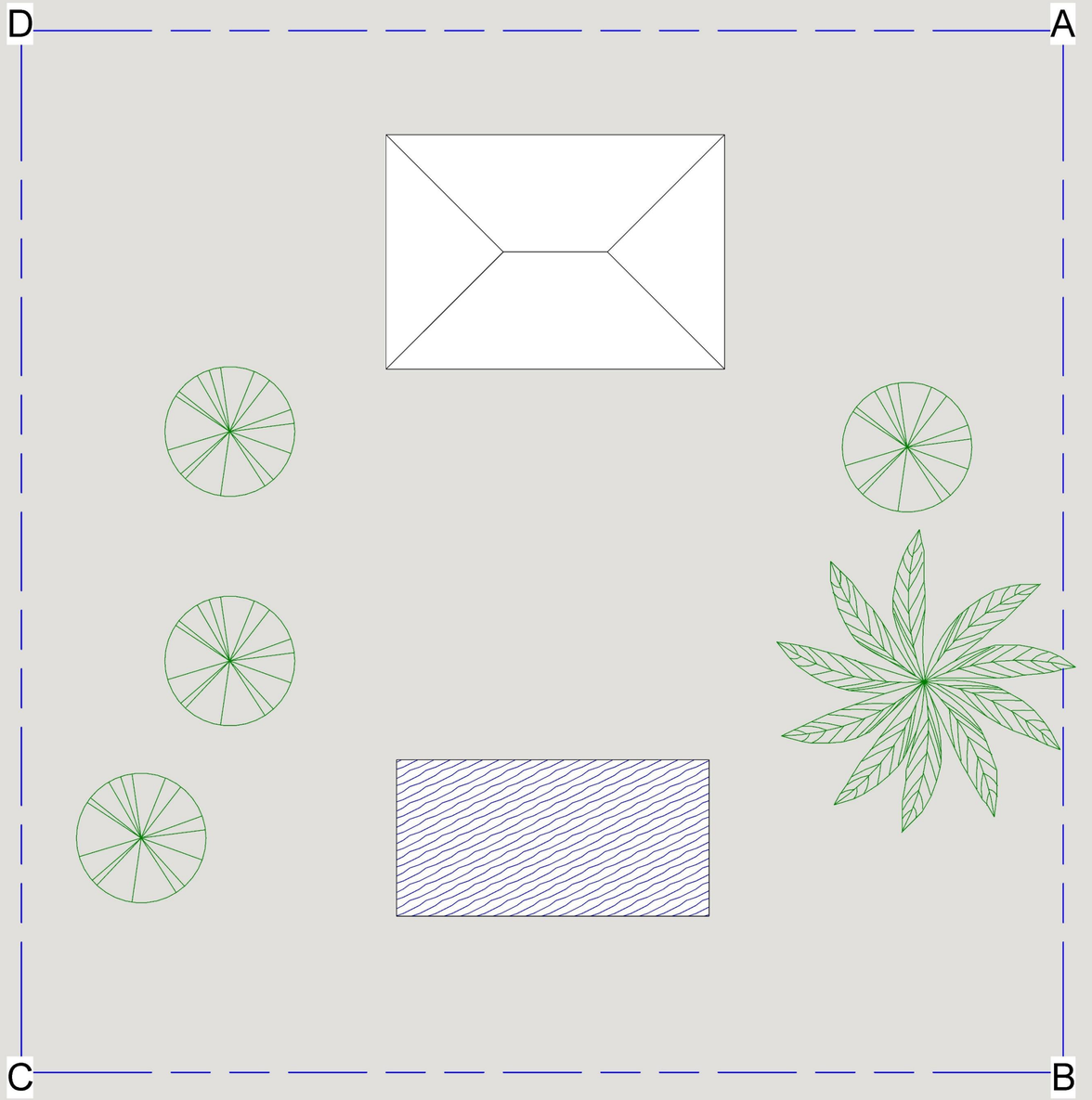
Mapping an Area

- To start mapping an area, the following steps are needed:
- Step 1: Make a visit to the area and draw a sketch for its main details.



Mapping an Area

- Step 2: Select control points at reasonable positions to be clearly identified and observed from other points. This set of points form a triangulation net that can be plotted on map sheet to the required scale..



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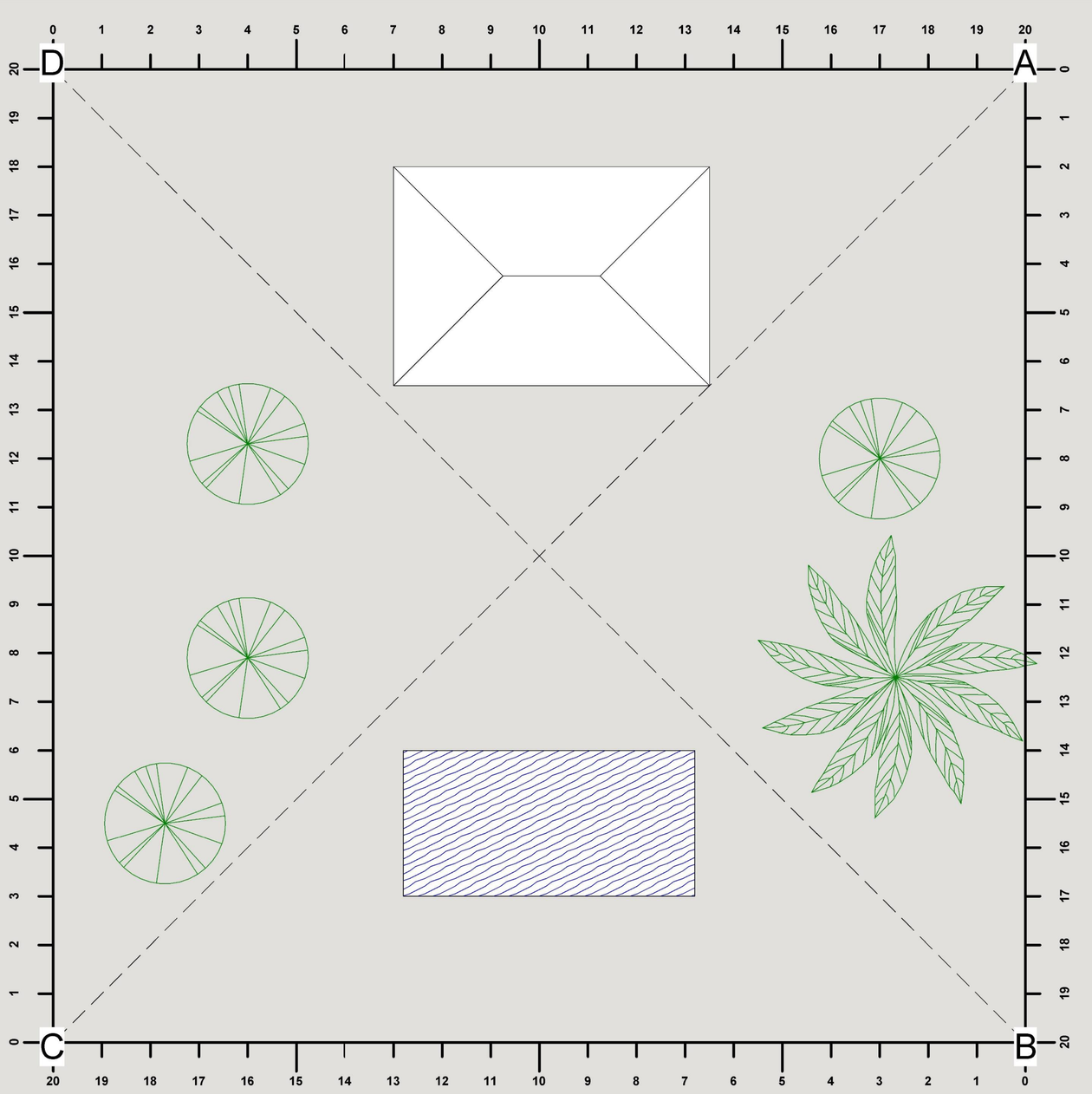
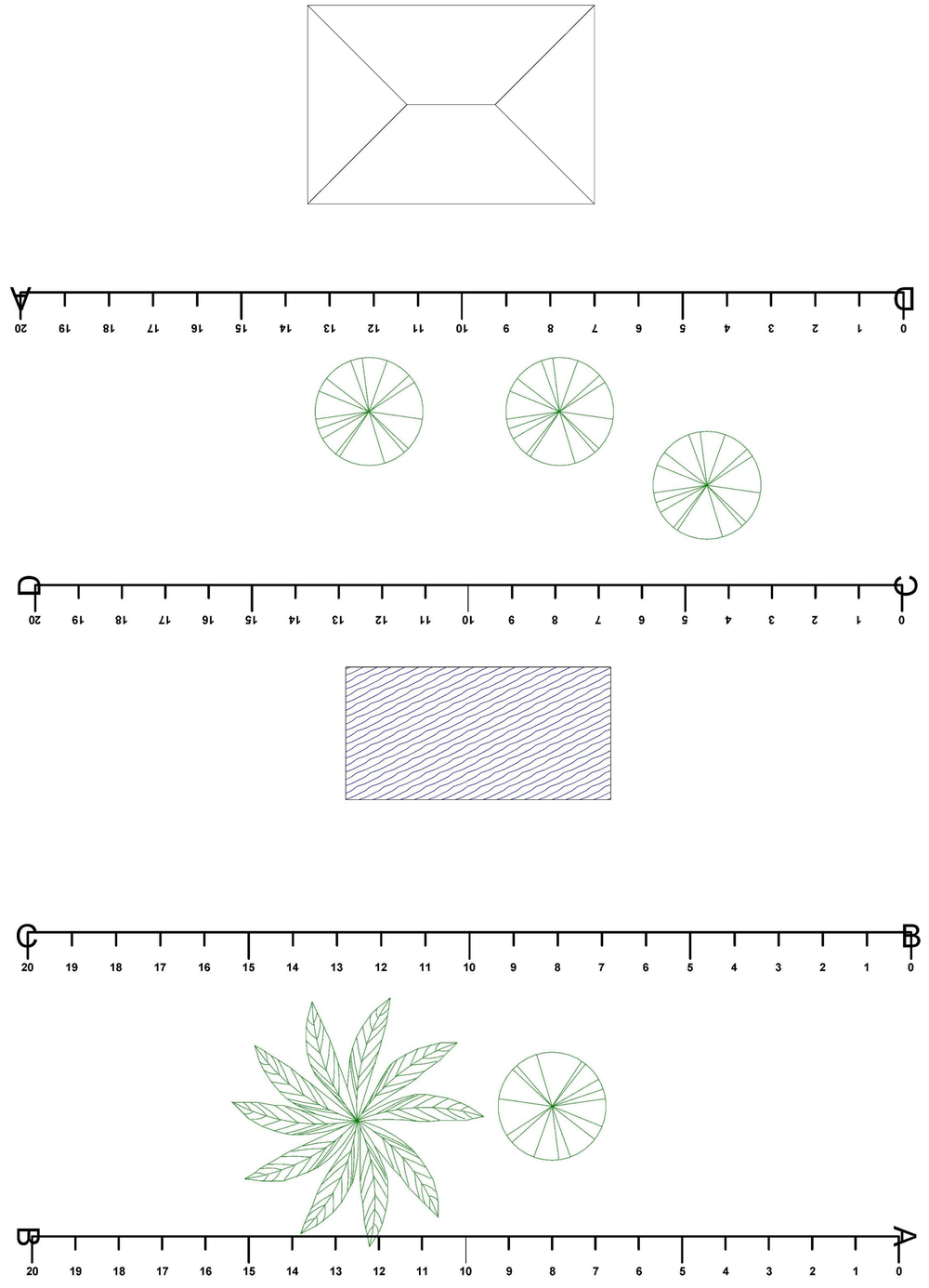


Mapping an Area

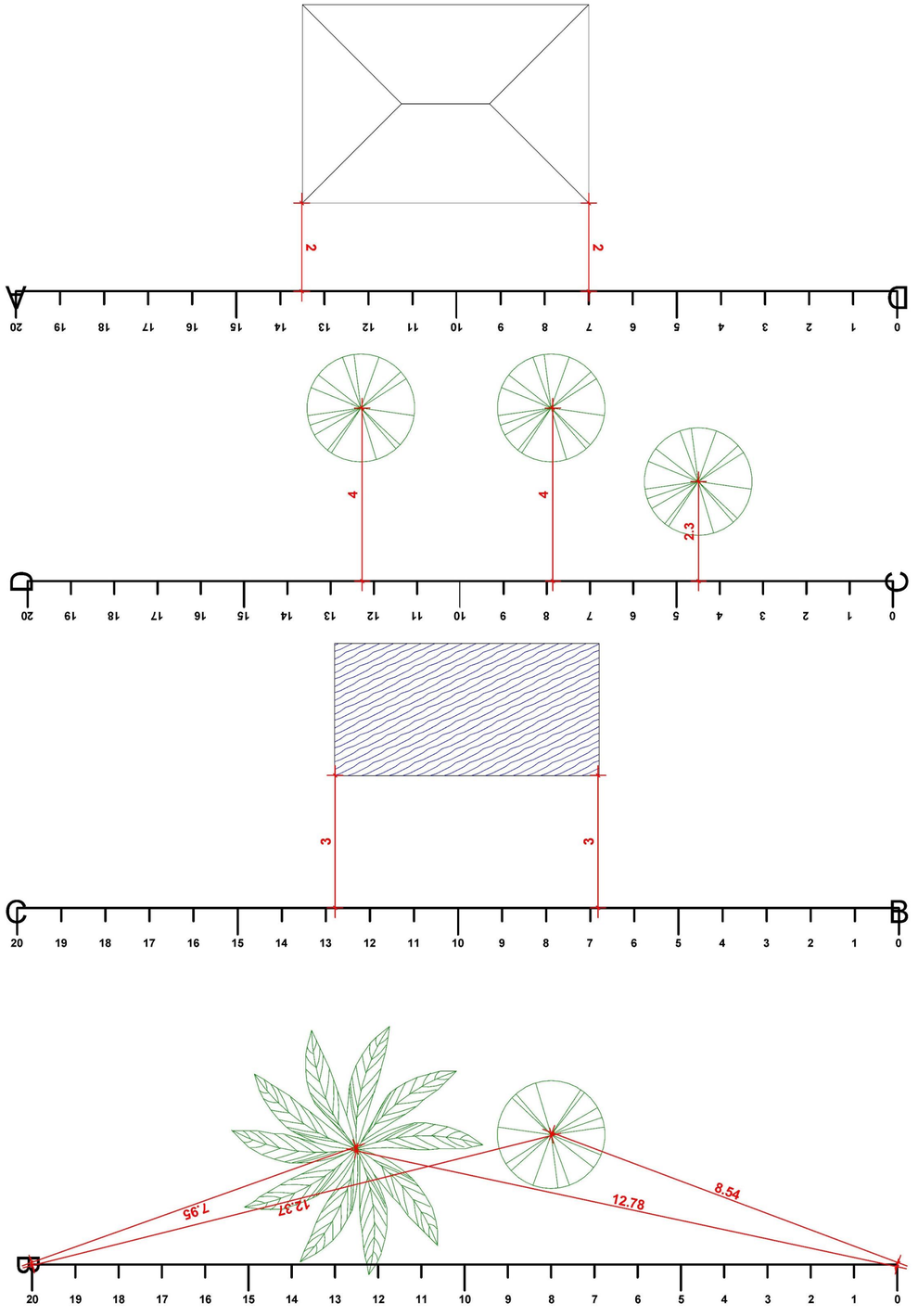
- Step 3: Detail Collection
- For each survey line connecting two control points specify a page of your field book to collect details nearby. Details can be collected by either of the following means:



Mapping an Area

- Offset Method:

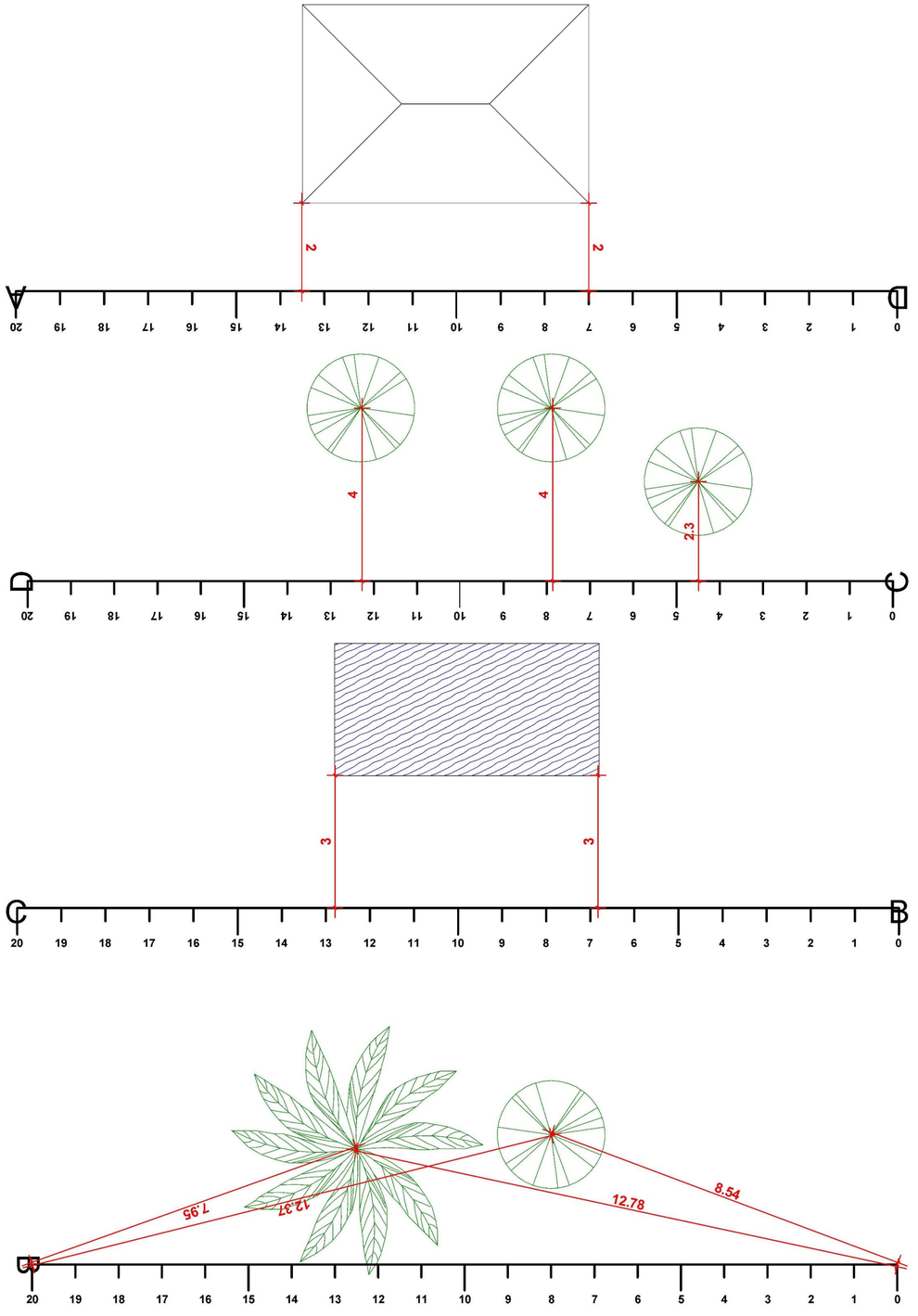
Distances along a line are measured to points at right angles to the feature to be mapped. The offset distance (or perpendicular distance) is then measured to the feature. The data acquired is not usually computed but plotted directly (allowing for chainage corrections).



Mapping an Area

- Distance/Distance Intersection (Tie Method):

Two distances from either end of a base line are measured to the feature to be mapped. The distances can be plotted directly to scale, or can be reduced to coordinates using the fundamental triangle formulae.



Mapping an Area

- Step 4: Plotting:
- Start by plotting control points forming the net of triangles, then plot details collected to the map scale.