



Topic Seven: Triangle Networks and Geodesic Budget

7.1 Geodesic Budget:

It is one of the types of budgets conducted for large areas, and its procedure includes taking into account the effect of refraction and the sphericity of the Earth.

It is of two types:

- 1. Accurate budget**
- 2. Triangular budget**

1. Accurate budget :

It is used in work that requires determining levels with high accuracy, as precise cadastral scales with special specifications and accurate measurements are used.

The main purpose of the precision budget is to determine the levels of a group of points with high accuracy relative to the average sea level.

These points are called first-degree Roberts and are placed at large distances from each other that may reach 60 kilometers. Rings branch out from them to connect fixed points called second-degree Roberts. Then, other rings branch out from them to connect third-degree Roberts. Second—and third-degree Roberts are used to adjust the levels of detail when implementing and designing projects.

All these Roberts have a special accuracy in measurement and permissible error, as the levels of the points of the baselines of the triangle networks are determined by the precision budget. An accurate budget is similar to a regular budget in its procedures, except that high-precision devices are used for monitoring and correction.



7.2 Budget purposes:

1. Establishing a stable structure for normal balances by establishing first-order Roberts.
2. Geodetic researches are dealing with gravity and comparison between the surfaces of seas and oceans.
3. Research into the movements and falls of large buildings.
4. Determining the locations of levels for precise engineering projects such as bridges and dams.
5. Research the rise and fall resulting from the movement of the Earth's crust.

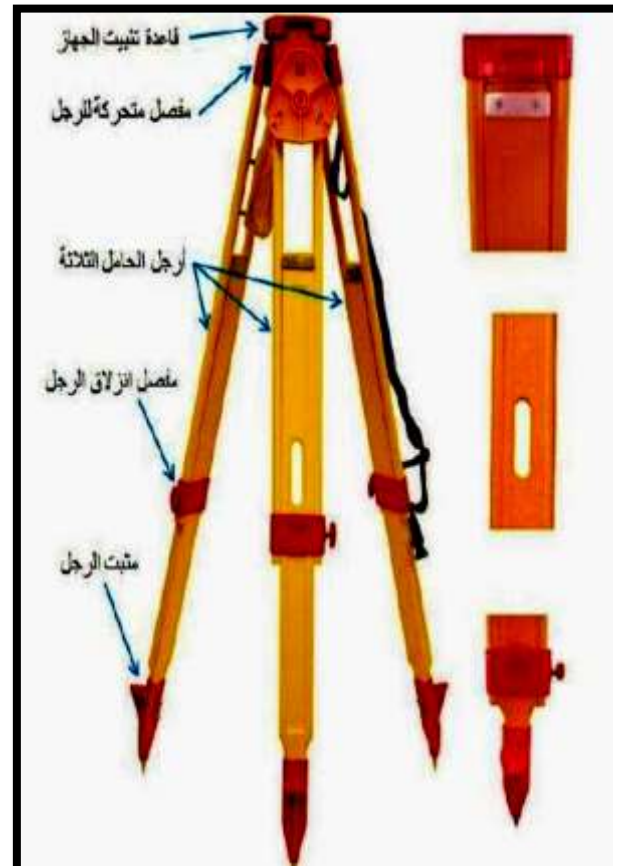
7.3 Devices used in accurate budgeting:

A. Accurate scale: It differs from the regular scale in the following points:

1. Magnification power: It ranges between (30-50) times.
2. The line of sight can be tilted with a special screw until the leveling bubble is in the middle of its course at the moment of reading the stature.
3. The device contains stadia hairs for tachymetric measurement.
4. The leveling scale in the device is of the type with a fixed-length bubble (its length does not change with temperature changes).
5. The scope and leveling scale is covered with a metal cover to protect them from the effects of heat and weather fluctuations.
6. A crystal plate called a parallel plate is used with the level to change the fractions of the stature divisions with an accuracy of up to parts of a millimeter. This plate is placed in front of the lens and the stature fractions are read using a special micrometer.

- Components of Accurate scale (level):

1. The telescope consists of:
 - A- Objective lens.
 - B- Eyepiece lens.
 - C- Hair clarification screw.
 - D- Hair holder.
 - E- Vision clarification screw.
 - F- External guidance mark.
2. Base: The three leveling screws are fixed on it to adjust the horizontality of the leveling scale (bubble).
3. Slow horizontal movement screw: It is for the slow horizontal movement of the device.
4. Device holder (base): It consists of three legs and can be raised or lowered according to the required length.



B. Exact dictionaries:

It is made of a single piece of sturdy wood, (2-3) meters long, with reinforcements to keep it completely vertical, and is treated with paraffin oil to prevent it from being affected by weather factors.



7.4 Features of dictionaries:

1. The stature gradation is done specially and visibly.
2. The stature sections represent (0.5) cm or (2) mm and some measurements reach (1) mm.
3. There are graduations on both sides of the stature, each of which differs from the other in terms of reading only.
4. The wooden stature is subject to expansion and contraction due to the effects of temperature and humidity.
5. A level is fixed to the back of the list to adjust its perpendicularity and is provided with two handles for easy grip.
6. An iron base is placed under the precise stature, which has three small pointed branches, and when working, it is fixed well in the ground by pressing on it.