

Railway Survey | Survey for New Railway Line

To construct anything haphazardly is not engineering. Prior to survey the available maps of proposed area are studied. This helps in fixing suitable alignment facilitate various surveys work. The various engineering surveys which are carried out for the choice of route of a new railway line can broadly be divided in to three categories.

1. Reconnaissance Survey
2. Preliminary Survey
3. Location Survey

1. Reconnaissance Survey

A reconnaissance survey is the first engineering survey which is carried out in territory which has not been previously surveyed for the purpose of laying a new railway line. The main objects of reconnaissance survey are as follows:

- To obtain a general knowledge of the whole territory and
- To obtain information regarding the salient feature of the territory.

Importance of Reconnaissance Survey

By reconnaissance survey, a number of possible alternative routes between two points can be worked out. This information becomes useful at a later stage in the selection of best possible route between two points. The successful conduct of the reconnaissance survey entirely depends on the personal qualities and abilities of engineers such as training and experience, capacity of observation and interpretation of the features of the territory etc.

Reconnaissance Survey and Information Gathered

The information are generally gathered in the following two categories

- Traffic Reconnaissance Survey
- Engineering Reconnaissance Survey

Traffic Reconnaissance Survey

This consists of collection of the information regarding the following:

1. General character of the country and extent of cultivation
2. Local industries and religious festivals
3. The general conditions such as prosperity of people in the locality and density of population and its distribution
4. The probable amount of traffic to be served by a new railway line
5. The probable new traffic lines to be opened up to join large trade centers
6. Nature and volume of exports and their destination and origin
7. The amount of imports and centers of their distribution

8. Possibilities of development of new industries and irrigation schemes as a result of new railway lines

Engineering Reconnaissance Survey

Engineering Reconnaissance Survey, the following information is collected

1. Physical features of a country
2. The surface formation of the ground
3. Nature of soil
4. Streams and rivers in the area especially those likely to be crossed by the track, their direction of flow, approximate width and depth
5. Positions of hills and lakes

Instruments Used in Reconnaissance Survey

- Aneroid Barometer
- Prismatic Compass
- Binocular telescope
- Pedometer

2. Preliminary Survey

The object of preliminary survey is

1. To conduct the survey work along the alternative routes (found out by reconnaissance survey) with the help of theodolite and leveling instruments
2. To determine the greater accuracy the cost of railway line along these alternative routes involving cost of removing obstruction, construction of bridges etc
3. To decide the most economical and efficient route

Importance of Preliminary Survey

The preliminary surveys decide the final route and recommend only one particular route in preference to other alternative routes. Thus, the preliminary survey should be carried out with greater precision as the alignment of final route depends on it.

Works of Preliminary Survey

The x-sections of all representative points along the route and feature of the country are marked. The cross sections are taken at 500ft interval normally. Similarly where the route crosses a river, the river is surveyed in detail for about one mile on either the upstream and downstream sides. The detail maps are prepared and the cost of different alternatives is calculated accurately to select the most economic routes.

Instrument Used in Preliminary Survey

- Dumpy level

- Prismatic compass
- Tachometer
- Plane table
- Appropriate helping instruments

3. Location Survey

It is the final survey used to locate the centre line of the railway line the main object of this survey is to carry out the detailed survey along the route which has been fixed as the most economical route from the data of preliminary survey.

Importance of Location Survey

The location survey established the center line of actual track to be laid and hence as soon as the location survey is completed, the construction work is started.

Work of Location Survey

The location survey is carried out in two stages

- Paper Location
- Field Location

Paper Location

The final route selected is put up on paper and details such as gradient, curves, contours etc are worked out. The long sections and formation levels are sorted out and working drawings are prepared for all small and large structures.

Field Location

The field location transfers the paper location to the ground to have a good profile as in paper location. It also gives the requirements of the construction engineer such as benchmarks, levels, measurements etc. The centre line pegs are driven at every 1000 ft or 300 m along the centre line of the track. Every change in direction, the beginning and end of a curve and the intersection of tangents are clearly marked. Sufficient benchmarks are established at a distance not more than $\frac{1}{2}$ miles along the alignment to which levels can be referred and gradients can be transferred. The centre line and other pegs are surrounded by stone masonry or concrete pillars on which the changes and levels are marked. The centre lines of culverts, bridges, tunnels, stations buildings, yards, signal cabins etc should also be fixed. The construction work should also be possible after completion of location survey.

Instruments Used in Location Survey

- Theodolite
- Precise Level
- Steel Tape