

RAILWAY SURVEYS

REASONS FOR LAYING A NEW RAILWAY LINE

1. Strategic consideration:

Sometimes it becomes essential to join two points by a railway line for strategic purposes so that in case of emergency, the army can be transferred from one point to the other.

2. Linking of trade centres:

Two trade centres may not be linked up by a railway line. In such cases, a new railway line is proposed between two such trade centres.

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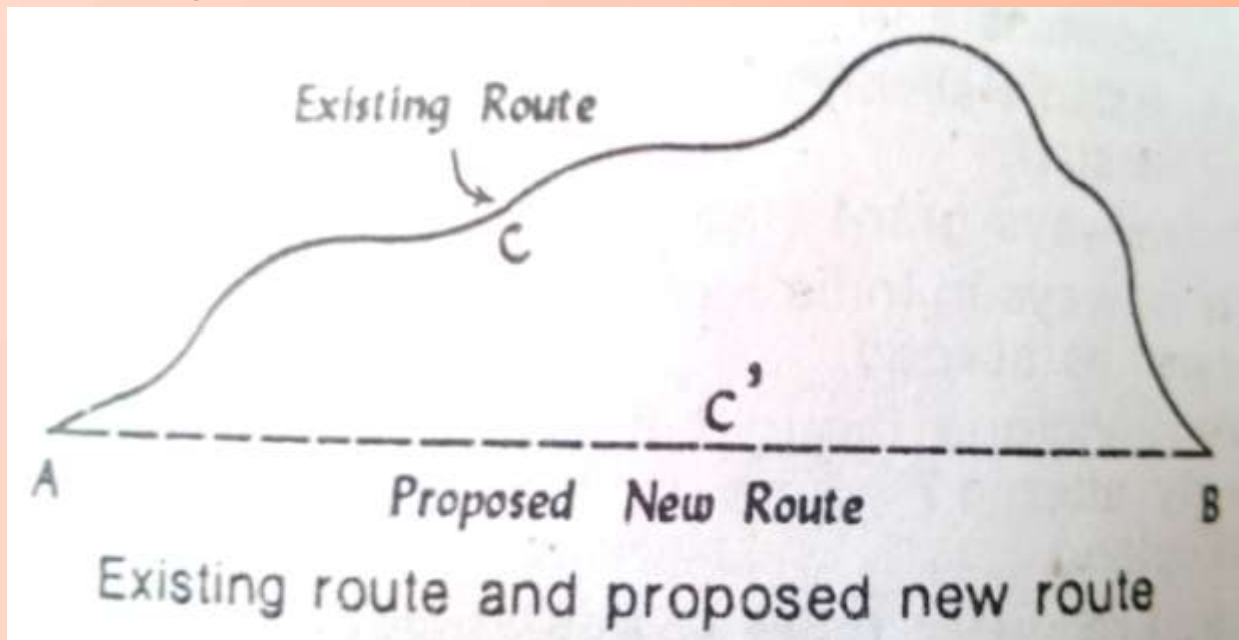
3. Connecting port with the interior of the country:

A port is sometimes not connected with the interior of the country. In such cases, it becomes essential to have a new railway line joining the port and the trade centres of the interior of the country.

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4. Shortening existing route:

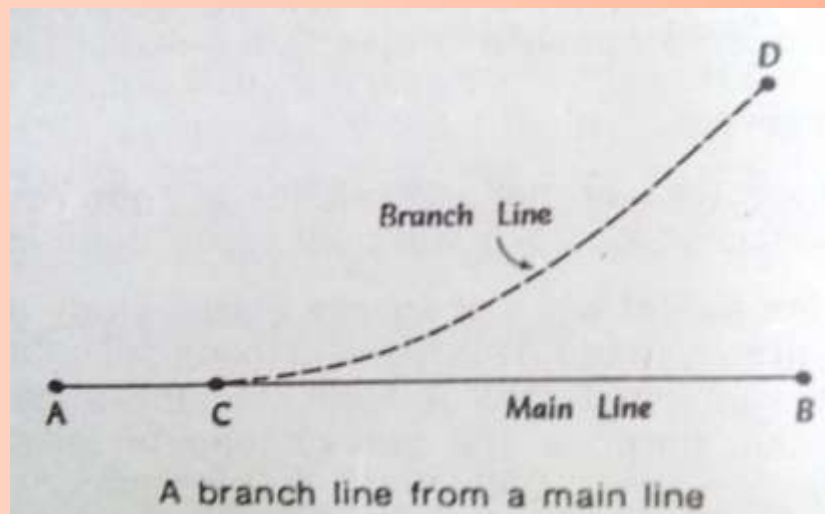
A route exists between two points. But if it is possible to shorten the existing route, a new railway line is to be laid.



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5. Laying of a branch line:

It becomes necessary sometimes to lay a branch line to an existing main line to develop certain other cities on the proposed branch line. The new branch line will serve as feeder line for the existing main railway line.



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6. Undeveloped area:

A new railway line is laid to develop an area which may be rich in mineral resources or other natural wealth like timber resources.

Factors influencing the proposed route:

I. Cost:

❖ *Should be minimum*

❖ *Is composed of:*

{capital cost of the project + maintenance cost + renewal expenditure + working expenses}

❖ *The route should be so selected as to bring the sum of all these costs to a minimum.*

Factors influencing the proposed route:

II. Safety:

- ❖ *The available passenger and goods traffic should be transported safely,*
- ❖ *Route should be so laid as to have minimum chances of train accidents*

III.Speed:

- ❖ *Route should be so selected as to have reasonable speed of trains.*

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In order to have a proper and satisfactory new route, various surveys are carried out:

- 1) Reconnaissance Survey***
- 2) Preliminary Survey***
- 3) Location Survey***

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1) Reconnaissance Survey:

- *It is the first engineering survey.*
- *It is carried out in territory which has not been previously surveyed for the purpose of laying a new railway line.*
- *The main objects are as follows:*
 - i. *To obtain general knowledge of the whole territory, and*
 - ii. *To obtain information regarding the salient features of the territory.*

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Importance of reconnaissance survey:

- *A number of possible alternative routes between two points can be worked out.*
- *It is not a science but it is an art.*
- *Personal factors play an important role in the reconnaissance survey.*
- *The successful conduct entirely depends on the personal qualities of the engineer such as his training and experience, his capacity of observation and interpretation*

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Information gathered in reconnaissance survey:

A reconnaissance survey can broadly be divided into two categories:

- 1. Traffic reconnaissance survey*
- 2. Engineering reconnaissance survey*

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Traffic reconnaissance survey:

This consists of collection of the information regarding the following:

- a) The general character of the country and the extent of cultivation;*
- b) Information regarding the local industries and religious festivals;*
- c) The general condition as regards prosperity of people in the locality and density of population and its distribution;*

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- d) *The probable amount of traffic to be served by new railway line;*
- e) *The probable new traffic lines to be opened up to join large centres of trade;*
- f) *Nature and volume of exports and their destination;*
- g) *The amount of imports and centres of their distribution;*
- h) *Possibilities of development of industries as a result of the new railway line;*

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- i) Visiting all trade centres and consultation with prominent citizens and local authorities regarding the most suitable route for the railway;*
- j) Standard of construction required for carrying the probable traffic;*
- k) Study of the existing means of transport*

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Engineering reconnaissance survey:

This consists of collection of information regarding the following:

- a) Physical features of the country;*
- b) The surface formation of the ground;*
- c) Nature of soil and its classification;*
- d) Streams and rivers of the immediate vicinity, especially those which are likely to cross the proposed railway line;*
- e) Positions of hills and lakes;*

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- f) Samples of water from wells, rivers, etc. so as to ascertain whether the water is suitable for use in locomotive or not;*
- g) Availability of materials and labour for use during construction.*

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Factors to be kept in view during reconnaissance survey:

Following factors should be kept in view; otherwise, the results are likely to be misleading:

- 1) Area:** A reconnaissance survey should be carried out for the whole area of the country. It should never be carried out for a line only.*
- 2) Existing roads:** The survey should not be guided by the existing roads because the ground which is favourable for construction of roads may not be useful for the construction of a railway line.*

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- 3) Starting of route:** *The engineer should not reject a particular route simply because it starts badly i.e. with curvature or with sudden rise or fall, etc. He must ascertain that the route continues badly for a long distance.*
- 4) Assumptions:** *The assumptions should be made very carefully as sometimes they are likely to be proved wrong, when tested by actual observations.*

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5) Survey route:

6) Ocular illusions: *Ocular illusions should be prevented. Most common are:*

- ✓ *estimating wrong length of line or offset;*
- ✓ *Estimating wrong curvature;*
- ✓ *Overlaps of hills which may appear as a continuous ridge from a distance.*

7) Revenue: *The probable revenue from the proposed railway line may be worked out.*

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2) Preliminary Survey:

Object of preliminary survey:

- ❑ *To conduct the survey work along the alternative routes found out by reconnaissance survey and;*
- ❑ *to determine with greater accuracy the cost of the railway line along these alternative routes.*

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Importance of preliminary survey:

- a. *It decides the final route and recommends only one particular route in preference to other alternative routes;*
- b. *Thus, should be carried out with great precision as on it depends the alignment of the final route.*

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3. Location Survey:

Object of location survey:

- ❑ *To carry out the detailed survey along the route which has been found and fixed as the most economical route from the data of the preliminary survey.*
- ❑ *It establishes the centre-line of the actual track to be laid.*
- ❑ *As soon as the location survey is completed, the construction work is started.*

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Work of location survey: *It is carried out in two stages:*

1. PAPER LOCATION

2. FIELD LOCATION

1. PAPER LOCATION:

- ✓ *The final route selected is put up on paper and details such as gradient, curves, contours, etc. are worked out;*
- ✓ *All the working drawings are prepared, even of minor structures such as signal cabins.*

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- ✓ *After the paper location is over, the field work is started and the centre-line of the track is fixed.*

2. FIELD LOCATION:

- ✓ *The field location transfers paper location on the ground;*
- ✓ *It gives all the requirements of the construction engineer such as bench-marks, levels, measurements, etc.;*
- ✓ *The centre-line pegs are driven at every 300 metres along the centre-line of the track;*

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- ✓ Every change of direction, the beginning and end of the curve and also the intersecting points are clearly marked;
- ✓ In addition to the fixing up of the centre-line of the track, the centre-lines of bridges, culverts, tunnels, station buildings, signal cabins, etc. should also be fixed.