Chapter 19

Section Capacity

Section Capacity

Section Capacity:

- The section capacity is the maximum number of trains that can be run on a section of railway in 24 hours.
- It is calculated by dividing the total time of 24 hours by the running time of the slowest train plus the block operation time.
- The running time is the time it takes a train to run between two block stations.
- The block operation time is the additional time required to close the section, normalize the signals and points, report to the station in rear, grant/receive line clear for the next train, set route, and take off signals.

Section Capacity

- The maximum number of trains that can be dealt on a given section of Railway during the period of 24 hours, is called the Section Capacity.

- It is expressed as number of trains each way on single line

- Scott's FORMULLA:

$$C = \frac{24 \times 60}{T + t} \times E \times 1/2$$

Where, C = Section Capacity

T = Running Time of slowest train to pass Ruling Block Section

t = Average Time required for Sginalling and Block operations

E = Efficiency factor (80%)

Section Capacity

The GIP Railway Modified formula:

- Consider the slowest train on the section, typically a goods train
- Use the refined formula by GIP Railway to calculate the available capacity for running goods trains
- Deduct the total time consumed by passenger trains from the total time available
- Calculate the number of trains that can be run in the remaining time

$$Cg = \frac{1440 - (Tp + t) \times K \times ½}{Tg + t}$$

- **This formula efficiency factor (K) is taken as 50% as number of gaps between passenger trains may not be usable for running of goods trains**
- **Tp= Passenger trains**
- **Tg= Goods trains**
- **t= Block Operation time**

Section Capacity

$$C = \frac{1440}{T + t} \times E \times \frac{1}{2}$$

- **On single line section the line capacity can be augmented by improving `T' and `t' of Scott's formula, as well as the `E' factor, T can be reduced by**

  – Reducing the length of block section by providing additional crossing stations.

  – Increasing speed by providing better mode of traction, tracks, rolling stocks and signalling.

  `t' may be reduced by introducing

  - Higher standard of interlocking
  - Tokenless block instruments
  - Panel interlocking
  - CTC and Automatic signalling

Section Capacity

$$C = \frac{1440}{T + t} \times E \times \frac{1}{2}$$

- **`E' (Efficiency factor) can be improved by proper time tabling, punctuality, staff efficiency, upkeep of equipments,**
- **Efficient operation, adequate number of loop lines, suitable length of block section and IBS on double line, etc.**
- **Simplification of rules, training of staff is also the factors to improve the operating efficiency.**

Section Capacity

South Eastern Railway had employed once an American consultant to suggest more accurate formula for working out the section capacity. This formula is known as STEINBECK's formula which is as under:

$$C = \frac{1440}{S} \times Y$$

Where, S = Ta + Tb + O + W
Ta = Running time on `a' side
Tb = Running time on `b' side
O = Block operation time for two trains
W = Waiting time for next train y = Efficiency factor (70)

Note: All these formulae are however, theoretical and do not take into consideration of physical features over the entire section.

Section Capacity

- Indian Railways adopt 'chart plotting' method
- Assess section capacity
- Plot running of trains on time-distance graph
- Relate time of all scheduled passenger trains on the graph
- Insert as many goods trains as possible in the gaps between different scheduled trains
- Maximize section capacity


THANK
YOU

Section Capacity

- The maximum number of trains that can be run on a given section of railway during a period of 24 hours is called the section capacity.
- It is calculated as the number of trains that can be run each way on a single line during this period. On double line sections, it is worked out separately.
- To calculate section capacity, the total time of 24 hours is divided by the "Running Time" of the slowest train over this section, plus the "Block Operation Time".
- The "Running Time" is the time it takes a train to run between two block stations.
- The "Block Operation Time" is the additional time required to close the section, normalize the signals and points behind the train, report to the station in rear, grant/receive line clear for the next train, set route, and take off signals.