

Improving Operational Capacity of Approach-Roads of Any Bridge for Future Traffic Management

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Abstract- Junctions are most vulnerable places. Especially at signalized junctions, right turning movement is mainly responsible for congestion and accident. In this highway at each junction, 4 right turns and 2 crossings are prevented by continuous divider and 4 left turns and 2 crossings are allowed. The rest 4 right turns and 2 crossings are done by 2 U-loops at 2 ends. So no signal is needed to be introduced. So the flow is continuous and capacity increased by almost 10 times than signalized junctions. So if the junctions along the length of approaching roads on both sides of any bridge or other essential new construction are avoided by constructing a superhighway, so in future there will be no risk of capacity exhaustion and also it will reduce the accident rate at initial stage. So though the construction is costly, it will be cost effective and one of the best solutions of congestion and accident at approach roads. Main necessities of super highway near approach road are as all signals are avoided so, there will be no delay. Most economic trip will be generated. At initial stage, the traffic volume will be less and speed will be very high. So collision will be higher with severity. Super highway can be able to reduce the accident rate on a large scale.

Keywords- Ramp, U-loop, continuous divider, roundabout.

I. INTRODUCTION

A superhighway is a highway without any signalized junction along it.



Figure 1 Superhighway

II. NECESSITY OF SUPER HIGHWAY AT APPROACH ROAD

As all signals are avoided so, there will be no delay. Most economic trip is generated through super highway. At initial stage, the traffic volume will be less and speed will be very

high. So collision will be higher with severity. Super highway can be able to reduce the accident rate on a large scale.

III. PRE-REQUISITE FOR SUPERHIGHWAY

- 1) Super highway should not cross other roads at grade. That means, super highway need be arterial road.
- 2) If it is necessary to build a primary road or another superhighway across a superhighway, then it is required to build it at separate grade.
- 3) Sufficient available space is required to construct this highway especially when the specialization will be created at grade.
- 4) Fund should be available because construction is costly.

IV. ELEMENTS OF SUPERHIGHWAY

- 1) Continuous Divider: To prevent two direct crossing and four right turning movements.
- 2) U-Loop: To provide facility for rest two crossing and the four right turns.
- 3) Service Road: Service road serves for local people. For people of local road users (such as office going people landed from superhighway etc.), generally two parallel service road is provided on both sides of superhighway.
- 4) U-Element: The U-shaped element by which four restricted right turning and two restricted crossing vehicles move to their destination. Ramps are provided to use these U-loops for grade separated U-turn. So it is used to divert the turning traffic to direct traffic.
- 5) V-Element: Connecting part of service road and superhighway which is just shaped as V and so called as V-element. The functions of V-loop are to increase mobility of service road users so that they can move to superhighway. V-element provides this facility. Another function is to increase accessibility of superhighway users so that they can move to office or work place, school etc. They can use V-element to divert from superhighway to service road.



Figure 2 Superhighway elements

V. ADVANTAGES OF SUPERHIGHWAY

- 1) No signal is required. So no congestion & delay will be produced.
- 2) Travel time and vehicle operating cost will be low. So benefit of the construction of super highway will be more than cost of this construction.
- 3) Overall economic and quick development of the city will be possible within a short time.
- 4) Conflict/accident will be minimized because of removal of signalized intersections which are hazardous road locations.

VI. U-LOOPS IN SUPER HIGHWAY

There are two types of U-loops use in super highway. At grade U-loop where the U-loop is at ground and grade separated U-loop where the U-loop is over or below the ground. 3.1. At grade U-loop is suitable for rural area (open area). Because land space is available there to provide sufficient space and turning radius to construct at-grade U-turn facility. The flow volume should be low at road. Because when flow volume is very much higher generally grade separation is needed in that case. In rural area volume is lower than urban area. Grade separated U-loop is suitable when flow volume is too much higher, then grade separation is needed. As volume of urban area is larger than rural area so it is suitable for urban area. It is suitable for urban area (Built up area). Because there is insufficient land space available for large number of existing structures.

Considerations for at grade U-loop construction:

- 1) Flow volume should be small and the area needs to be open area (rural).
- 2) In this type interchange to use U-loop it is needed to take right turning from the right lane which is highest velocity lane.

So exclusive right turning lane option should be provided to reduce accident risk and also reduce congestion.

3) Sufficient land requisition is necessary for constructing this type interchange.

4) Turning radius should be sufficient.

Considerations for at grade U-loop construction:

1) Flow volume should be high and the area needs to be built-up area (urban).

2) Turing radius should be kept sufficient so that sharp bending could not occur.

3) Longitudinal slope will be minimum because have to move against gravity. Otherwise speed will be reduced and as a result productivity will be less.

4) Exclusive left lane is required for continuous merging and diverging action of U-loop users.

VII. CONCLUSION

Superhighway increases both physical and operational capacity of a road. It reduces delay and saves travel time. It is also safer. So it is preferable to construct to handle a large volume of traffic that will appear in that road in future. Though construction is costly, the value of travel time is larger than congestion cost and accident cost, so finally the benefit will be higher than the cost. So the not only developed countries but also the developing countries may use this concept.

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