
Report on Case Study

Subject: Highway Engineering

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Case Study on “ Curve Design for Improvements to Existing Master Plan Roads”

Introduction:

The present case study deals with development of existing roads to master plan roads. The roads from NH-5 junction to kommadi village, NH-5 to Navodhaya School, are located in Visakhapatnam city in India. Particularly these areas are densely populated and occupied with housing units, schools and commercial buildings. As these roads could not meet the present & and future demand, new road proposals was put forward by Visakhapatnam development authority (VUDA) to widen the existing road to master plan road. The present condition of the road is in deteriorated state which is sacrificed and new pavement design is proposed according to IRC-37:2001 recommendations. The studies involves collection of details such as road width, gradient, deflection angle, length of curve and radius of curve and design them to the prescribed standards of IRC code. The curve parameters have been measured using theodolite by traversing along center line of the curve.

Types of Curves:

The following types of horizontal curves are used in the alignment of highway:

- A. **Simple Curve** It is a circular curve which consists of a single arc of uniform radius
- B. **Compound Curve** This is the circular curve which is comprised of a series of two or more simple curves of different radii which turn in the same direction.
- C. **Reverse Curve** This is a circular curve consisting of two simple curves of same or different radii which turn in the opposite direction.
- D. **Transition Curve** A transition is the curve having a radius which decreases from infinity at the tangent point to a designed radius of the circular curve.

Methodology of Curves:

The study involved collection of details of the existing road. The main features of the road such as road width, gradients, deflection angle of existing curves, length of curve, radius of curvature etc. The gradients of the existing road have been collected and the present longitudinal section of the road has been plotted. The curve parameters have been measured using theodolite by traversing along the center line of the curve for a length of 1.20km. The details so gathered are compared with the IRC specifications vide IRC 37-2001. The existing curves whose radius is less than permissible radius as prescribed in the IRC code have been studied so as to flatten further. However if the condition doesn't permit, an alternate alignment proposal for a patch shall be proposed at some locations.

Further the existing condition of road, marking, cross drainage, road stability, safety features other miscellaneous parameters have been studied and necessary improvements have been. The present roads comes under the category "Village and Other District Roads" and the carriage way width, shoulder width and total road way width are 3.75m, 2 X 1.0m and 5.75m respectively.

Design and Drawing of Proposed Curves:

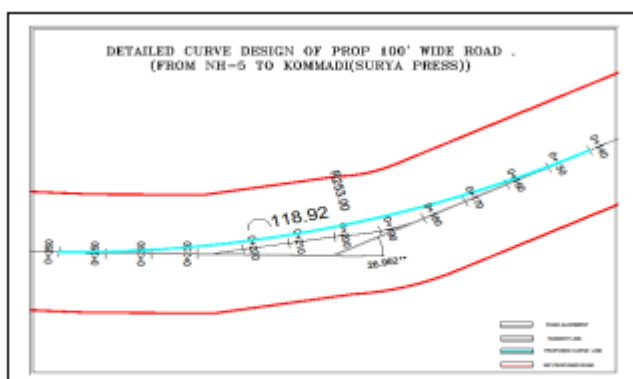


Fig. 2: Detailed curve design at chainage 140 m to 260 m (from NH-5 to Kommadi Village)

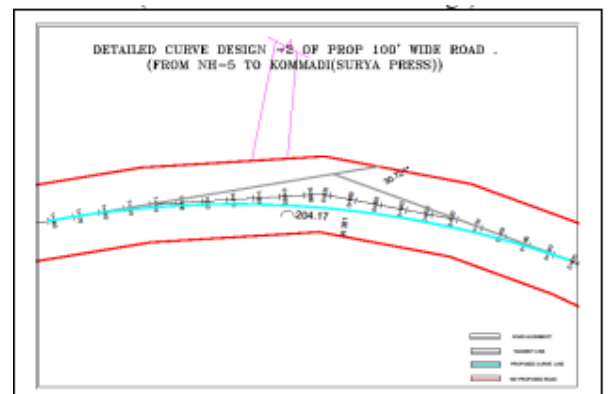


Fig. 3: Detailed curve design at chainage 870 m to 1080 m (from NH-5 to Kommadi Village)

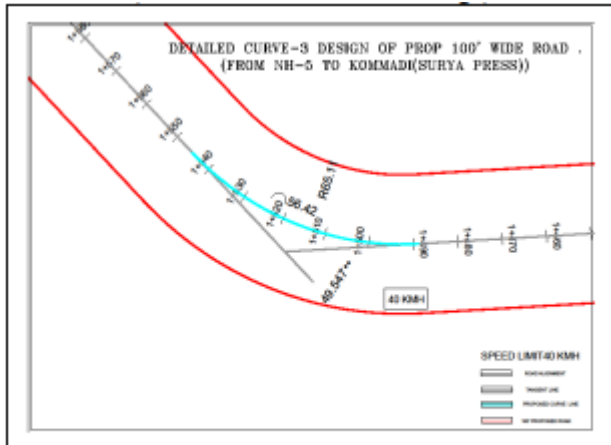


Fig. 4: Detailed curve design at chainage 1490m to 1550m (from NH-5 to Kommadi Village)

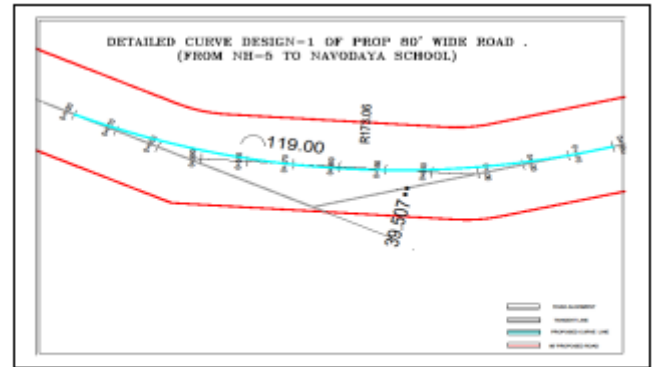


Fig. 5: Detailed curve design at chainage 500m to 620m (from NH-5 to Navodaya School)

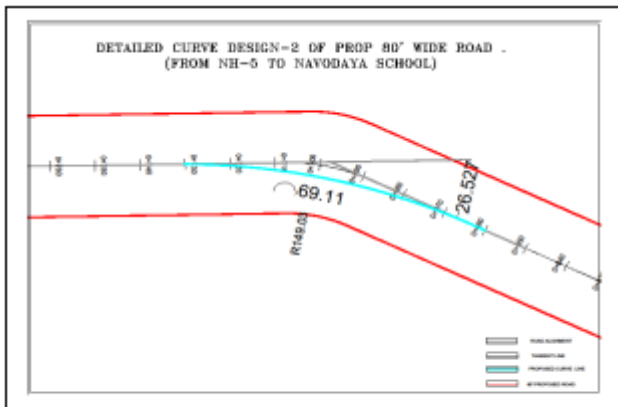


Fig. 6: Detailed curve design at chainage 660m to 730m (from NH-5 to Navodaya School)

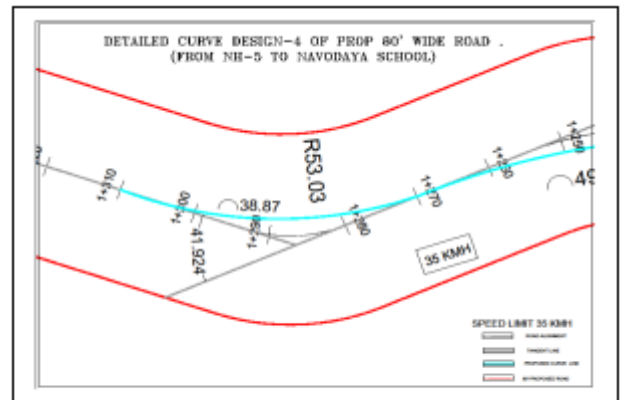


Fig. 8: Detailed curve design at chainage 1270m to 1310m (from NH-5 to Navodaya School)

List of Curves: The list of curves and their parameters such as deflection angle, radius, direction, length etc., of widened roads from NH-5 to kkommadhi village, yendada jn. To GITAM college, madhurawada jn. To bakanna palem have been measured, calculated and listed below with the help of theodolite. AutoCAD Drawings and the relations stated above and listed below. The road from NH-5 to Kommadi Village (Surya Press) and NH 5 to Navodaya School Visakhapatnam city. Particularly this area's are densely populated and occupied with educational institutions, commercial buildings etc. As these roads could not meet the present and future demand, a proposal was put forward to carry out the improvements to this road under IRC recommendations.

Conclusion:

1. Curves are provided according to the topography of the area to avoid excessive cutting and filling. 2. For all curves below the desirable standards, warning signs are proposed to restrict the speed of vehicles.

3. The road from NH-5 junction to kommadhi village at chainage- 140m to 260m is designed, with a design speed of 65kmph for a radius of 253m. From chainage- 870m to 1080m, with a design speed of 65kmph for a radius of 381.00m and from chainage- 1490m to 1550m, with a design speed restricted to 40kmph for a radius of 65.00m.

4. The road from NH-5 junction to Navodaya school at chainage- 660m to 730m is designed with a design speed of 65 kmph for a radius of 149.00m. from chainage 1220m to 1270m, with a design speed rest 40kmph for a radius of 101.00m, from chainage- 1270m to 1310m, with a design speed restricted to 35 kmph for a radius of 53.00m and from chainage- 2050m to 2120m, with a design speed of 65kmph for a radius of 169.00m