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Geometric Design of Highway using Civil 3D

Manoj Mandal[1], Dr. Prashant Pawade[2], Prashant Sandel[3]
[1]*M-Tech,* [2]*HOD, Transportation Engineering, G.H.Raisoni College of Engineering, Nagpur*
[3]*Design Engineer & Senior Manager, Real Strength Infrastructure, Pune*

***Abstract:** India is one the country having population increase day by day it's mean traffic also increase. A rural area is fast developed in the country its mean furtherance of transportation facilities are also developed. A survey is carried out to give the best-proposed alignment in the road. The geometric design is the most concern the design of road alignment that related to the site conduction. The geometric design of highway deals with visible features of highway likes bridge, hump pipe culvert, ROW, cross section, sight distance, alignment, curves, Superelevation. The basic object is optimize efficient traffic and safety of highway and minimizing cost and environmental damages. Design the road is familiar with the basic of road geometric and next step to enhance their value is by learning software for application of the basic knowledge.*

I. INTRODUCTION

Transportation is the most important part of everyday life, it's divided into some party or categories such as railway, water supply, metros, and highways. Every person travels somewhere almost every day of life, where its go like an office, school, shopping purposed, farm or entertainment purpose.There are so many ways of transportation, but in this document, we concern on road transportation. The road infrastructure is an essential part of the infrastructure service provider. The construction of high-quality road network directly affected the economical increased and reduced the travail time and cost. Highway is also expected to cause minimum damage to the environmental conduction and reduced pollutions to the environmental. The geometric design of highways deals with the dimensions and layout of visible features of the highway. The emphasis of the geometric design is to address the requirement of the driver and the vehicle such as safety, comfort, efficiency, etc. The features normally considered are the cross section elements, sight distance consideration, horizontal curvature, gradients, and intersection. The geometric design of roads can be subdivided into three main parts: horizontal alignment, vertical alignment, and cross-section, which when combined provide a three-dimensional layout for a highway. Horizontal alignment of a highway defines its location and orientation in plan-view. It comprises three geometric elements, including tangents (straight sections), circular curves and transition spirals between tangents and curves. The vertical alignment (or roadway profile) is the longitudinal section of the road, comprising such geometric elements as crest and sag curves, and the gradients (straight grade lines) connecting them. The highway cross section shows the position and number of vehicle and bicycle lanes and sidewalks along with their cross slopes; shoulders, drainage ditches, etc. The safe, efficient and economical operation of a highway is governed to a large extent by the care with which the geometric design has been worked out. Safety or the lack of it is an immediate corollary of the various features of the highway. AutoCAD Civil 3D is a software application used by civil engineers and professionals to plan and design the projects for building constructions, road engineering projects, water include construction of dams, ports, canals, embankments, etc. AutoCAD Civil 3D associate design and production drafting, greatly reducing the time it takes to implement design changes and evaluate multiple situations. A change made in one place immediately updates an entire project, helping you complete projects faster, smarter and more accurately. Civil 3D provides to create 3D models of the project and helps to adopt for both small and large scale projects. It helps to imagine the things in 3D visualization, reduces the time and budget. It also inherits many benefits of using Civil 3D.

II. LITERATURE REVIEW

Raghu veer et al(2018) paper is disused about the alignment properties and safety purposed. It's disused about the same papers which base of the road, 2.5m shoulder wide addition safety, and curves should provide the sufficient length. The second one told about formulas in pavement widening on horizontal curves. To prevent off tracking, extra widening of pavement is provided at horizontal curves which are called mechanical widening. Third paper discuss about fuel consumption development model based on highway geometric characteristics like grades, length, and location of crest& vertical curves, speed& road surface type& condition. Fourth MX Road software is the preferable and optimistic one for designing highway. So that it has default values for classification of factors influencing the design of highway . it's mean all papers are discuses explained the geometric design of highway considering various geometric elements such as alignment, profile, cross- section, etc and concluded that horizontal curve at grade separation is more dangerous and causes 30% of more accidents.

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Ali Aram (2010) studied safe factors on the horizontal curve of two-lane highway and added that horizontal curves have higher crash rates than straight section of similar length and traffic composition and its particularly significant at radius below 200m.

Golakati(2015) carried out study a between Chhatra and bhorpur consider a geometric feature of a road such as horizontal radius, superelevation, K-value, visibility, etc and carries out a regression analysis for his study be to conclude that geometric feature has to be given more important while designing a road.

Shah and Shinkar (2016) carried out planning and design of purposed bypass road used civil 3D and carries out a capacity analysis by projection traffic volume data for 15 years and concluded that high design precision and saving in time were achieved by using Autodesk Civil 3D.

Nazimuddin et al (2017)carried out a study on the geometric design of highway using MX ROAD and achieved high design precision and prepare the alignment to cost-saving and accuracy for given set of data.

Neeraj and Kazal (2015) carried out a study on the geometric design of highway. Each factor describes to his function of geometry design and planning factor. To initial alignment is proposed then lock about the traffic in the road and there topographic. Always traffic factor is the main part of the design the alignment , the traffic growth consideration the future growth of traffic flow and possibility of the road being upgraded to a higher category or to a higher design speed standard at a later stage as it is very expensive and rather difficult to improve the geometric elements of a highway in stages at a later date. Their study was mainly emphases on the importance of planning and design of geometric feature of the highway during the initial alignment itself taking into consideration the future growth of traffic flow and possible of the road upgrading to higher categories.

Neeraj and Kazal(2015) emphasized on the importance of planning and designing of geometric features of the highway during the initial alignment itself taking into consideration the future growth of traffic flow and possibility of the road being upgraded to a higher category or to a higher design speed standard at a later stage as it is very expensive and rather difficult to improve the geometric elements of a highway in stages at a later date.

Vayalamkuzhi and Amirthalingam(2016) studied Influence of geometric design characteristics on safety under heterogeneous traffic flow. They found that Operating speed, access point, median opening and horizontal curvatures (inverse radius) are identified as the significant factors influencing road crashes in a divided highway under heterogeneous traffic using the same carriageway.

Nisarga and Amate (2018) studied geometric design of rural road using AutoCAD civil 3d. they explained that Geometric design plays a major role in every road and it is weighty in the road alignment. AutoCAD Civil 3D is a software application used by civil engineers and professionals to plan and design the projects & change made in one place immediately updates an entire project, helping you complete projects faster, smarter and more accurately.

Anitha and Dhanya(2013) carried out to study in this paper is based on the safety of the geometry of the highway. Were curves are state and end, their curves are insufficient length and radius is causes accident. In multiple horizontal curves are provided in alignment which should be safe and speed properly maintained. It Takes 30 sites visited in Kerala state and takes the data of its.

The following criteria were adopted while selecting the sites.

A. No stop-controlled or signalized intersections nearby.
B. Not located close to towns or built-up areas that may significantly affect the speed patterns on the curves.
C. Marked and paved roadway.
D. A minimum tangent length of 100 m on a flat terrain prior to the first curve.
E. Good pavement condition.

III. CONCLUSION

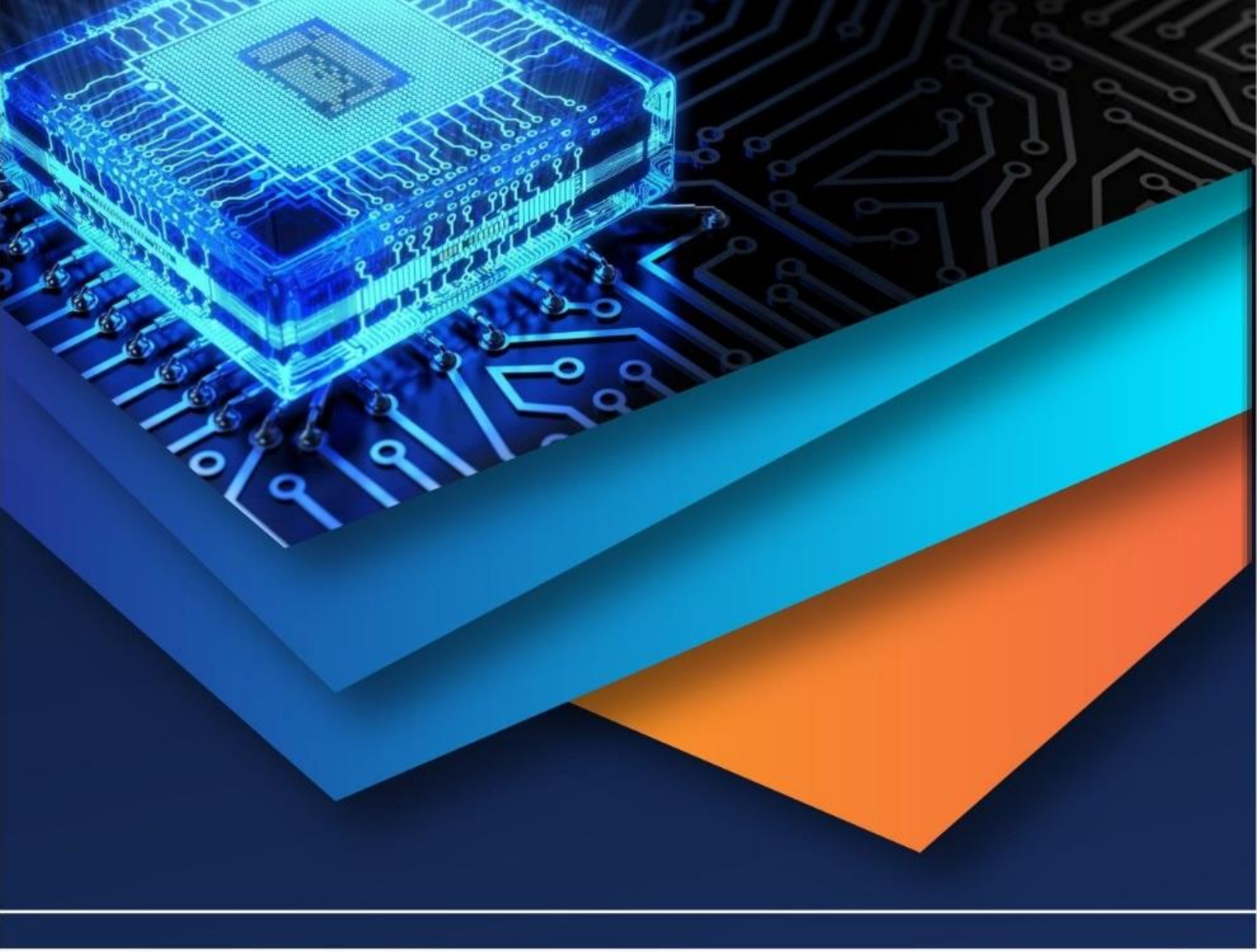
(i) Its give a smooth alignment.
(ii) Alignment should be matched in an existing cross drain.
(iii) Design speed should be a change where alignment changes.
(iv) AutoCAD Civil 3D helps to complete the design process in a relaxed and comfortable way within time and also it preserves a lot of time and effort.
(v) Horizontal and vertical curves should be provided as per IRC suitable.
(vi) Collection of traffic data, examination of the existing study area helps us to align the road which is feasible and sound in an effective way.
(vii) To study traffic calculation.
(viii) The *spiral* transition curve fulfills the requirement of an ideal transition curve.

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