

INDIAN ROADS GEOMETRIC DESIGN

Awari Mahesh Babu

(Professor – Civil Engineering)

Tirumala Engineering College, Telangana, INDIA.

INDIAN ROAD GEOMETRIC DESIGN

Copyright © : Awari Mahesh Babu
Publishing Rights ® : VSRD Academic Publishing
A Division of Visual Soft India Pvt. Ltd.

ISBN-13: 978-93-86258-14-4
FIRST EDITION, JANUARY 2017, INDIA

Typeset, Printed & Published by:
VSRD Academic Publishing (A Division of Visual Soft India Pvt. Ltd.)

Disclaimer: The author(s) are solely responsible for the contents of the papers compiled in this book. The publishers or its staff do not take any responsibility for the same in any manner. Errors, if any, are purely unintentional and readers are requested to communicate such errors to the Editors or Publishers to avoid discrepancies in future.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photo-copying, recording or otherwise, without the prior permission of the Publishers & Author.

Printed & Bound in India

VSRD ACADEMIC PUBLISHING

A Division of Visual Soft India Pvt. Ltd.

REGISTERED OFFICE

154, Tezabmill Campus, Anwarganj, KANPUR – 208003 (UP) (IN)
Mb: 99561 27040, Web: www.vsrdpublishing.com, Email: vsrdpublishing@gmail.com

MARKETING OFFICE (NORTH INDIA)

Basement-2, Villa-10, Block-V, Charmwood Village, FARIDABAD–121009 (HY)(IN)
Mb: 98999 36803, Web: www.vsrdpublishing.com, Email: vsrdpublishing@gmail.com

MARKETING OFFICE (SOUTH INDIA)

340, FF, Adarsh Nagar, Oshiwara, Andheri(W), MUMBAI–400053 (MH)(IN)
Mb: 99561 27040, Web: www.vsrdpublishing.com, Email: vsrdpublishing@gmail.com

P R E F A C E

The main objective of the **Indian Roads Geometric Design** is to give engineering students and research scholars information of Indian roads geometric design parameters. The number of text books, journals and references are studied for the preparation of this book. This book is useful for engineering students.

I offer my sincerest gratitude to my teacher, Dr. K.M. Lakshaman Rao, Head and Professor, Dept. of Transportation Engineering, JNTUH, Hyderabad. Feeling gratitude and not expressing it is like wrapping a present and not giving it. I am thanking my spouse Mrs. Sreelatha and daughters Shivani and Deekshitha, on whose constant encouragement, love, keen interest and moral support, their creativity, assistance and patience truly helped me to complete this book in all aspects and finally, I would like to thank all who's direct and indirect support helped me to complete my work.

 *Dr. A. Mahesh Babu*

CONTENTS

CHAPTER 1 : INTRODUCTION.....	1
1.1 INTRODUCTION.....	3
1.2 ROLE OF TRANSPORTATION IN SOCIETY.....	4
1.3 ECONOMIC ROLE OF TRANSPORTATION	4
1.4 SOCIAL ROLE OF TRANSPORTATION:	5
1.5 POLITICAL ROLE OF TRANSPORTATION:	6
1.6 OBJECTIVES	7
1.7 QUESTIONS	7
CHAPTER 2 : FUNCTIONAL CLASSIFICATION OF HIGHWAY SYSTEM	9
2.1 GENERAL	11
2.2 HISTORY OF THE FUNCTIONAL CLASSIFICATION SYSTEM.....	11
2.3 FACTORS AFFECTING GEOMETRIC DESIGN	13
2.4 ROAD CLASSIFICATION	15
2.4.1 NAGPUR CLASSIFICATION	17
2.4.2 MODERN-LUCKNOW CLASSIFICATION	19
2.4.3 BASED ON USAGE	20
2.4.4 BASED ON CARRIAGE WAY	20
2.4.5 BASED ON PAVEMENT SURFACE	20
2.4.6 OTHER CRITERIA	21
2.5 ROAD ALIGNMENT	21
2.5.1 FACTORS CONTROLLING ALIGNMENT	22
2.6 SPECIAL CONSIDERATION FOR HILLY AREAS.....	25
2.7 PAVEMENT SURFACE CHARACTERISTICS	26
2.7.1 FRICTION.....	26
2.7.2 UNEVENNESS.....	28
2.7.3 LIGHT REFLECTION.....	28
2.7.4 DRAINAGE.....	29
2.8 QUESTIONS	29

CHAPTER 3 : CROSS SECTIONAL ELEMENTS.....	31
3.1 OVERVIEW	33
3.2 CAMBER.....	33
3.2.1 WIDTH OF CARRIAGE WAY	34
3.2.2 KERBS.....	35
3.2.3 ROAD MARGINS	37
3.2.4 WIDTH OF FORMATION	39
3.2.5 RIGHT OF WAY	40
3.2.6 SUMMARY.....	42
3.3 QUESTIONS	43
CHAPTER 4 : GEOMETRIC DESIGN OF HIGHWAY ELEMENTS	45
4.1 SIGHT DISTANCE	47
4.2 TYPES OF SIGHT DISTANCE	47
4.3 STOPPING SIGHT DISTANCE	49
4.4 OVERTAKING SIGHT DISTANCE.....	52
4.4.1 OVERTAKING ZONES	56
4.5 SIGHT DISTANCE AT INTERSECTIONS.....	57
4.6 HORIZONTAL ALIGNMENT.....	58
4.6.1 DESIGN SPEED.....	59
4.6.2 HORIZONTAL CURVE	59
4.6.3 ANALYSIS OF SUPER-ELEVATION	63
4.7 EXTRA WIDENING	67
4.7.1 MECHANICAL WIDENING	67
4.7.2 PSYCHOLOGICAL WIDENING.....	69
4.8 HORIZONTAL ALIGNMENT.....	70
4.8.1 LENGTH OF TRANSITION CURVE	72
4.9 SETBACK DISTANCE	75
4.10 VERTICAL ALIGNMENT	75
4.11 GRADIENT	76
4.11.1 EFFECT OF GRADIENT	76
4.11.2 TYPES OF GRADIENT	77
4.12 SUMMIT CURVE	80
4.12.1 TYPE OF SUMMIT CURVE	80

4.13 VALLEY CURVE.....	82
4.14 QUESTIONS	85
CHAPTER 5 : CONCLUSION	87
REFERENCES.....	91

