

20.7 (160)

Copy No.

# TWO-LANE ROAD ANALYSIS METHODOLOGY IN THE HIGHWAY CAPACITY MANUAL

NCHRP Project 20-7 (160)  
MRI Project 110252

FINAL REPORT

September 2003

Prepared for

National Cooperative Highway Research Program  
Transportation Research Board National Research  
Council

TRANSPORTATION RESEARCH BOARD  
NAS-NRC  
PRIVILEGED DOCUMENT

This report, not released for publication, is furnished only for review to members of or participants in the work of the National Cooperative Highway Research Program (NCHRP). It is to be regarded as fully privileged, and dissemination of the information included herein must be approved by the NCHRP.

Midwest Research Institute  
425 Volker Blvd. Kansas City,  
Missouri 64110

20- 7 (160)

# TWO-LANE ROAD ANALYSIS METHODOLOGY IN THE HIGHWAY CAPACITY MANUAL

NCHRP Project 20-7 (160)  
MAI Project 110252

FINAL REPORT

September 2003

Prepared for

National Cooperative Highway Research Program  
Transportation Research Board National Research  
Council

by

Douglas W. Harwood, Ingrid B. Potts, and  
Karin M. Bauer Midwest Research Institute

James A. Bonneson  
Texas A&M University

Lily Elefteriadou  
Pennsylvania State University

## CHAPTER 1

### INTRODUCTION

An improved methodology for operational analysis of two-lane highway segments was developed in NCHRP Project 3-55(3), *Capacity and Quality of Service for Two-Lane Highways*, and published in the year 2000 edition of the HCM (1). The HCM2000 methodology is an update of the previous two-lane highway segment operational analysis methodology presented in the 1997 edition of the HCM (2), which, in turn, was identical to the operational analysis methodology developed in NCHRP Project 3-28A for the 1985 edition of the HCM (3).

The HCM2000 has now been in use for approximately two years and user feedback is beginning to be obtained. Two concerns have been called to the attention of the Transportation Research Board (TRB) Committee on Highway Capacity and Quality of Service (HCQS) by HCM users:

- Service volumes provided by the HCM2000 directional analysis procedure are lower than those provided in the HCM1997
- The HCM2000 procedures for two-lane highways do not address two-lane highways in developed areas

The issues were discussed at the meeting of the HCQS Two-Lane Highway Subcommittee in January 2002 in Washington, DC. The subcommittee discussions established that:

- It was not the intention of the HCQS committee to bring about any major reduction in service volumes, except for two-lane highway facilities with lower design speeds. A change was made to the level of service (LOS) thresholds for percent time spent following (see HCM2000 Exhibits 20-2 and 20-4) that was intended to raise service volumes, not lower them.
- The two-way analysis procedure in HCM Chapter 20 appears to function properly, but there may be an error in the directional analysis procedures in HCM Chapter 20 that results in service volumes that are lower than intended. This difference appears to be most pronounced for two-lane highways with nearly equal directional splits. This has led HCM users to note that they are getting different LOS estimates from the two-way and directional analysis procedures.
- Analysis of two-lane highways in developed areas and two-lane highways with occasional signals (signal spacing greater than 3 km or 2 mi) does not appear to be adequately addressed by either the two-lane highway analysis procedures in HCM Chapter 20 or the arterial analysis procedures in HCM Chapter 15. In the HCM2000 and its predecessors, this type of facility appears to fall through the cracks between HCM Chapters 15 and 20.

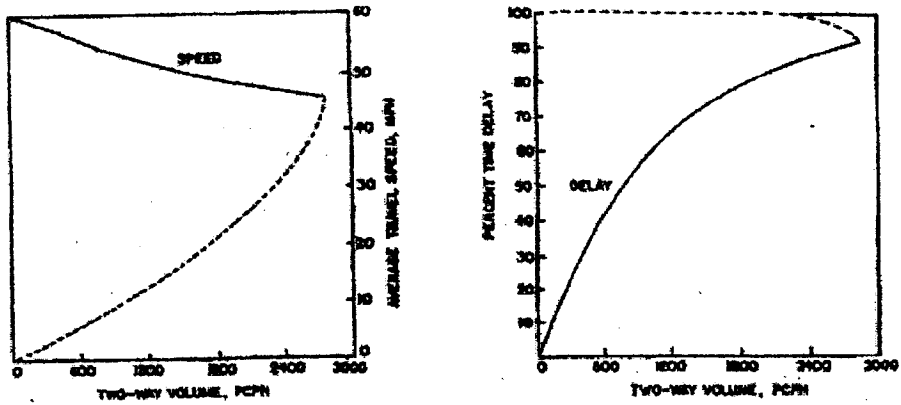


Figure 1. Relationships of percent time delay and average travel speed to flow rate used for two-lane highway segments in the 1997 HCM(2,3).

**TABLE 1. Level of Service Criteria for General Terrain Segments on Two-Lane Highways in the 1997 HCM (2,3)**

| Level of service | Percent time delay on general terrain segments |
|------------------|--|
| A                | ≤ 30   |
| B                | ≤ 45   |
| C                | ≤ 60   |
| D                | ≤ 75   |
| E                | > 75   |
| F                | 100  |