

**CHAPTER 10
FREEWAY FACILITIES CORE METHODOLOGY**

CONTENTS

1. INTRODUCTION..... 10-1

 Overview..... 10-1

 Chapter Organization..... 10-1

 Related HCM Content..... 10-2

2. CONCEPTS 10-3

 Overview..... 10-3

 Sections, Segments, and Influence Areas..... 10-3

 Free-Flow Speed..... 10-10

 Freeway Facility Capacity..... 10-11

 LOS: Component Segments and the Freeway Facility..... 10-14

3. METHODOLOGY..... 10-17

 Scope of the Methodology 10-17

 Required Data and Sources 10-20

 Overview..... 10-21

 Computational Steps 10-21

4. EXTENSIONS TO THE METHODOLOGY 10-40

 Work Zone Analysis 10-40

 Managed Lanes Analysis 10-46

 Active Traffic and Demand Management 10-51

5. APPLICATIONS..... 10-53

 Example Problems 10-53

 Related Content in the HCMAG..... 10-53

 Example Results 10-54

 Planning, Preliminary Engineering, and Design Analysis..... 10-56

 Use of Alternative Tools..... 10-57

6. REFERENCES..... 10-63

LIST OF EXHIBITS

Exhibit 10-1 Influence Areas of Merge, Diverge, and Weaving Segments Without Managed Lanes.....	10-4
Exhibit 10-2 Sections and Segments on an Urban Freeway.....	10-5
Exhibit 10-3 Typology of Managed Lane Access Point Designs.....	10-9
Exhibit 10-4 Sample Facility with Five Sections.....	10-11
Exhibit 10-5 Example of the Effect of Capacity on Demand and Actual Flow Rates on a Freeway Facility.....	10-11
Exhibit 10-6 LOS Criteria for Urban and Rural Freeway Facilities	10-15
Exhibit 10-7 Required Input Data, Potential Data Sources, and Default Values for Freeway Facility Analysis.....	10-20
Exhibit 10-8 Freeway Facility Methodology.....	10-22
Exhibit 10-9 Example Freeway Facility for Time-Space Domain Illustration.....	10-23
Exhibit 10-10 Example Time-Space Domain for Freeway Facility Analysis.....	10-23
Exhibit 10-11 Defining Analysis Segments for a Ramp Configuration.....	10-25
Exhibit 10-12 Defining Analysis Segments for a Weaving Configuration.....	10-26
Exhibit 10-13 Node-Segment Representation of a Freeway Facility.....	10-34
Exhibit 10-14 Mainline and Segment Flow at On- and Off-Ramps	10-34
Exhibit 10-15 Lane Closure Severity Index Values for Different Lane Closure Configurations	10-42
Exhibit 10-16 Example of Minimum Lateral Clearance in Work Zone	10-45
Exhibit 10-17 Freeway Work Zone with One Open Lane, Trucks, and a Long Upgrade.....	10-46
Exhibit 10-18 Graphical Illustration of the Managed Lane Segmentation Method	10-50
Exhibit 10-19 Cross-Weave Movement Associated with Managed Lane Access and Egress	10-50
Exhibit 10-20 List of Example Problems.....	10-53
Exhibit 10-21 Facility Travel Time Sensitivity to Free-Flow Speed	10-54
Exhibit 10-22 Facility Travel Time Sensitivity to <i>d/c</i> Ratio on Critical Segment.....	10-55
Exhibit 10-23 Facility Travel Time Sensitivity to Percentage Drop in Queue Discharge Rate	10-55
Exhibit 10-24 Limitations of the HCM Freeway Facilities Analysis Procedure	10-58