

# Table of Contents

<b>100 Pavement Requirements</b>	<b>100-1</b>
<b>101 Design Responsibility</b>	<b>100-1</b>
<b>102 Structural Design Period</b>	<b>100-1</b>
102.1 Priority System Design Period .....	100-1
102.2 General System Design Period.....	100-2
102.3 Urban System Design Period.....	100-2
<b>103 Subgrade Strength Parameters</b>	<b>100-2</b>
<b>104 Pavement Type Selection</b>	<b>100-2</b>
104.1 Pavement Designs Considered.....	100-2
104.2 Principal Factors .....	100-3
104.3 Life-Cycle Cost Analysis .....	100-3
104.4 Secondary Factors.....	100-4
104.5 Pavement Selection Committee.....	100-4
104.6 Reanalysis of Selections.....	100-5
104.7 Ramp Pavement Type .....	100-5
<b>105 Pavement Edge Treatments</b>	<b>100-5</b>
105.1 Safety Edge Treatment .....	100-5
105.2 Standard Edge Treatment.....	100-6
<b>200 Pavement Design Concepts</b>	<b>200-1</b>
200.1 Introduction .....	200-1
<b>201 Serviceability</b>	<b>200-1</b>
201.1 Initial Serviceability .....	200-1
201.2 Terminal Serviceability .....	200-1
201.3 Design Serviceability Loss .....	200-1
<b>202 Traffic Considerations</b>	<b>200-1</b>
202.1 Traffic Loading .....	200-2
202.2 Calculation of ESALs .....	200-3
202.3 ESAL11 .....	200-3
<b>203 Subgrade Soil Characterization</b>	<b>200-3</b>
203.1 Subgrade Resilient Modulus .....	200-4

203.2 California Bearing Ratio .....	200-4
203.3 Group Index .....	200-4
203.4 Subgrade Stabilization .....	200-4
<b>204 Reliability</b>	<b>200-5</b>
204.1 Overall Standard Deviation .....	200-5
<b>205 Subsurface Pavement Drainage</b>	<b>200-5</b>
205.1 Types of Drainage Systems .....	200-5
205.2 AASHTO Drainage Coefficient.....	200-7
<b>300 Rigid Pavement Design</b>	<b>300-1</b>
300.1 Introduction .....	300-1
300.2 Types of Concrete Pavement.....	300-1
<b>301 Design Parameters</b>	<b>300-2</b>
301.1 Modulus of Rupture.....	300-2
301.2 Modulus of Elasticity .....	300-2
301.3 Load Transfer Coefficient.....	300-2
301.4 Composite Modulus of Subgrade Reaction.....	300-2
301.5 Loss of Support.....	300-2
301.6 Effective Modulus of Subgrade Reaction .....	300-3
<b>302 Thickness Determination</b>	<b>300-3</b>
302.1 Ramps and Interchanges.....	300-3
<b>303 Jointing and Shoulder Considerations</b>	<b>300-3</b>
303.1 Transverse Joints.....	300-3
303.2 Expansion and Pressure Relief Joints .....	300-3
303.3 Longitudinal Joints .....	300-4
303.4 Intersection Joint Details.....	300-4
303.5 Shoulder Considerations.....	300-4
303.6 Edge Course Design.....	300-5
<b>304 Concrete Pavement Usage Guidelines</b>	<b>300-5</b>
304.1 Item 451 Reinforced Concrete Pavement .....	300-5
304.2 Item 452 Non-Reinforced Concrete Pavement .....	300-5
304.3 Item 884 Warranty Concrete .....	300-5
304.4 Item 305 Concrete Base .....	300-5
304.5 Class of Concrete .....	300-6

<b>305 Warranty Concrete</b>	<b>300-6</b>
<b>306 Smoothness Specifications</b>	<b>300-6</b>
<b>307 Composite Pavement</b>	<b>300-6</b>
307.1 Composite Pavement Design.....	300-6
307.2 Composite Pavement Typical Section Design .....	300-7
307.3 Composite Pavement Warranty .....	300-7
307.4 Composite Pavement Smoothness Specifications.....	300-7
<b>400 Flexible Pavement Design</b>	<b>400-1</b>
400.1 Introduction .....	400-1
<b>401 Design Parameters</b>	<b>400-1</b>
<b>402 Structural Number Determination</b>	<b>400-1</b>
402.1 Ramps and Interchanges.....	400-1
<b>403 Typical Section and Buildup Considerations</b>	<b>400-1</b>
403.1 Typical Section Design .....	400-1
403.2 Shoulder Buildups.....	400-2
403.3 Edge Course Design.....	400-2
<b>404 Asphalt Concrete Acceptance</b>	<b>400-3</b>
404.1 Acceptance Guidelines .....	400-4
<b>405 Superpave Asphalt Concrete</b>	<b>400-5</b>
<b>406 Lift Thickness and Usage Guidelines</b>	<b>400-5</b>
406.1 Surface Courses .....	400-6
406.2 Intermediate Courses.....	400-7
406.3 Base Courses .....	400-9
406.4 Item 407 Tack Coat.....	400-9
406.5 Item 408 Prime Coat.....	400-10
406.6 Anti-Segregation Equipment .....	400-10
406.7 Asphalt Binder Grades.....	400-11
<b>407 Warranty Asphalt Concrete</b>	<b>400-11</b>
<b>408 Smoothness Specifications</b>	<b>400-12</b>
<b>409 Special Use Asphalt Concrete Items</b>	<b>400-12</b>
409.1 Item 803 Rubberized Open Graded Asphalt Friction Course..	400-12

409.2 Item 826 AC Surface and Intermediate Course, Type 1 & 2, Fiber Type A, B, or C.....	400-12
409.3 Item 857 AC with Gilsonite, Surface Course, Type 1 and Intermediate Course, Type 2.....	400-12
409.4 Item 859 AC with Verglimit .....	400-12

**410 Small Quantity Guidelines **400-13****

410.1 Transition to Structures.....	400-13
410.2 Overlaying Pavement and Bridges Simultaneously .....	400-13
410.3 Bridge Deck Overlays with Transitions .....	400-13
410.4 Turn Lane Additions.....	400-14
410.5 Landslides, Washouts, Collapses, etc. ....	400-14

**500 Pavement Design Procedures for Minor Rehabilitation **500-1****

500.1 Introduction .....	500-1
--------------------------	-------

**501 Non-Destructive Testing **500-1****

501.1 Falling Weight Deflectometer .....	500-1
501.2 Other Non-Destructive Testing.....	500-1

**502 Deflection Testing and Analysis **500-2****

502.1 Testing .....	500-2
502.2 Analysis .....	500-3
502.3 Factors Affecting Deflections .....	500-3

**503 Overlay Design Procedure **500-4****

503.1 Introduction .....	500-4
503.2 Rigid Pavements.....	500-5
503.3 Flexible Pavements.....	500-5
503.4 Composite Pavements.....	500-5

**504 Minor Rehabilitation Strategies **500-6****

504.1 Asphalt Considerations .....	500-6
504.2 Pavement Planing.....	500-6
504.3 Pavement Repair .....	500-7
504.4 Reflective Crack Control .....	500-9
504.5 Concrete Pavement Restoration.....	500-10
504.6 Geometric Issues.....	500-10
504.7 Pavement Widening.....	500-11

504.8 Shoulder Use for Maintenance of Traffic.....	500-12
--	--------

<b>550 Surface Treatments</b>	<b>550-1</b>
-------------------------------	--------------

550.1 Introduction .....	550-1
--------------------------	-------

<b>551 Crack Sealing</b>	<b>550-1</b>
--------------------------	--------------

551.1 Project Selection .....	550-1
-------------------------------	-------

551.2 Design Considerations .....	550-1
-----------------------------------	-------

<b>552 Chip Sealing</b>	<b>550-2</b>
-------------------------	--------------

552.1 Project Selection .....	550-2
-------------------------------	-------

552.2 Design Considerations .....	550-3
-----------------------------------	-------

<b>553 Microsurfacing</b>	<b>550-3</b>
---------------------------	--------------

553.1 Project Selection .....	550-3
-------------------------------	-------

553.2 Design Considerations .....	550-4
-----------------------------------	-------

<b>554 Fine Graded Polymer Asphalt Concrete</b>	<b>550-4</b>
---	--------------

551.1 Project Selection .....	550-5
-------------------------------	-------

551.2 Design Considerations .....	550-5
-----------------------------------	-------

<b>555 Rejuvenating Agents</b>	<b>550-5</b>
--------------------------------	--------------

<b>556 Diamond Grinding</b>	<b>550-5</b>
-----------------------------	--------------

556.1 Project Selection .....	550-6
-------------------------------	-------

556.2 Design Considerations .....	550-6
-----------------------------------	-------

<b>600 Major Rehabilitation Design</b>	<b>600-1</b>
--	--------------

600.1 Introduction .....	600-1
--------------------------	-------

600.2 Subgrade Determination .....	600-1
------------------------------------	-------

<b>601 Unbonded Concrete Overlay</b>	<b>600-1</b>
--------------------------------------	--------------

<b>602 Fractured Slab Techniques</b>	<b>600-2</b>
--------------------------------------	--------------

602.1 Crack & Seat.....	600-2
-------------------------	-------

602.2 Rubblize & Roll .....	600-3
-----------------------------	-------

<b>603 Whitetopping</b>	<b>600-3</b>
-------------------------	--------------

<b>604 Shoulder Use for Maintenance of Traffic</b>	<b>600-3</b>
--	--------------

Pavement for Maintaining Traffic .....	600-3
--	-------

**700 Life-Cycle Cost Analysis** **700-1**

**701 Introduction** **700-1**

701.1 Discount Rate ..... 700-1

**702 Initial Construction** **700-1**

**703 Future Rehabilitation** **700-1**

703.1 Introduction ..... 700-1

703.2 Rehabilitation Schedules ..... 700-2

**704 Total Cost** **700-3**

704.1 Discounting ..... 700-3

**705 Results Presentation** **700-3**

**Reserved for Future Use** **Appendix A**

**Pavement Guidelines for Treatment of High Stress Locations**

**Appendix B**

**Simplified Pavement Designs for Short Projects** **Appendix C**

# List of Figures

<u>Figure</u>	<u>Date</u>	<u>Subject</u>
201-1	July 2016	Serviceability & Reliability
202-1	July 2016	Traffic Factors
203-1	July 2008	Group Index Charts
203-2	July 2015	Subgrade Resilient Modulus
205-1	July 2016	Typical Pipe Underdrain Locations
205-2	July 2016	Typical Pipe Underdrain Locations
205-3	July 2016	Typical Pipe Underdrain Locations
205-4	July 2016	Typical Pipe Underdrain Locations
205-5	July 2016	Typical Pipe Underdrain Locations
205-6	July 2016	Typical Pipe Underdrain Locations
205-7	July 2016	Typical Aggregate Drain Locations
205-8	July 2016	Typical Aggregate Drain Locations
205-9	July 2016	Typical Rock Cut Underdrain
205-10	July 2016	Typical Pipe Underdrain Locations
301-1	July 2016	Rigid Pavement Design Parameters
301-2	July 2008	Composite Modulus of Subgrade Reaction ( $k_c$ )
301-3	July 2008	Effective Modulus of Subgrade Reaction ( $k$ )
302-1	July 2016	Rigid Pavement Design Example
302-2	July 2008	Rigid Pavement Design Chart Segment 1
302-3	July 2016	Rigid Pavement Design Chart Segment 2
303-1	July 2008	Surface Treated Shoulder and Stabilized Aggregate Shoulder Typical Sections
401-1	January 2019	Flexible Pavement Structural Coefficients
402-1	July 2016	Flexible Pavement Design Example
402-2	July 2008	Flexible Pavement Design Chart Segment 1
402-3	July 2008	Flexible Pavement Design Chart Segment 2
403-1	July 2008	Surface Treated Shoulder and Stabilized Aggregate Shoulder Typical Sections
406-1	January 2019	Asphalt Concrete Quick Reference Guide

503-1	July 2015	Overlay Design Inputs
551-1	July 2015	Poor Crack Seal Candidates
551-2	July 2015	Crack Seal Quantity Estimate
553-1	July 2015	Cracks Requiring Repair Prior to Microsurfacing
553-2	July 2016	Microsurfacing Rut Fill Quantity Estimate
601-1	July 2015	Unbonded Concrete Overlay Example
602-1	July 2015	Fractured Slab Examples
704-1	July 2014	Discounting Example