Α

AASHTO STANDARDS ABANDONMENT ABBREVIATIONS ABRASION	Policy on Use of Water Wells Official names	82.3 110.2 61.1 855.2
ACCELERATION LANE	At Rural Intersections	405.1
ACCESS CONTROL	Definition	62.6
		104
Ope	Alignment, Existing Alignment, New Frontage Roads Frontage Roads Financed by Others General Policy Highways, Definition Interchanges Intersections Openings Openings Openings on Expressways enings in Relation to Median Openings Rights, Protection of	104.3 104.3 104.3 104.3 104.1 62.3 504.8 405.6 104.2 205.5 205.1 104.5 104.4
ACCESSIBILITY REQUIREMENTS	Curb Ramps, Guidelines for	105.4
	Driveways Provisions for Disabled Persons Refuge Areas	205.3 105.3 403.7
ACCIDENT DATA	Intersections	402.2
ACCRETION	Definition	806.2
ACQUISITION	Definition	62.6
	Partial of Material and Disposal Sites	62.6 111.5
ADT/AADT	see AVERAGE DAILY TRAFFIC	
	Contour Grading and Slope Rounding	304.4
	In Design Materials and Color Selection Noise Barrier Planting Retaining Walls	109.3 705 1102.6 901.2 210.5
AGGRADATION	Definition	806.2

Index	Highway Desi	gn Manual
July 1, 2020		
AGGREGATE BASE	see BASE Engineering Criteria	663
AGGREGATE SUBBASE	Engineering Criteria	663
AGGRESSIVE	Definition	806.2
AGREEMENTS	Drainage, Cooperative	803.2
	Materials	111.4
AIR POLLUTION	Control of Burning	110.3
	Control of Dust	110.3
AIR RIGHTS		62.6
AIRWAY-HIGHWAY		207
	Clearances Submittal of Data	207.2 207.3
ALIGNMENT	Aesthetic Factors	109.3
	Bridges	203.9
	Channel	862.2 203.3
	Consistency (Horizontal) Controls (Horizontal)	203.3
	Coordination (Horizontal/Vertical)	204.6
	Culverts Horizontal	823.2 203
	Vertical (Grade)	204
ALLEY	Definition	62.3
ALLUVIUM	Definition	806.2
ALTERNATIVES FOR CULVERT PIPE	ES	857
ALUMINUM PIPE		852.5
ANGLE OF INTERSECTION		403.3
APPRAISAL		62.6
APPROACH SLABS, STRUCTURE	New Construction Projects	208.11
	Rehabilitation Projects	209.4
APPROVALS	Nonstandard Design Features	82.2
	Proprietary Items Special Designs	110.10 606.2
AREAS OF CONFLICT	Intersections	403.2
ARTERIAL	Minor, Definition	81.4
	Principal, Definition	81.4
AQUEDUCT	Definition	806.2
AQUIFER	Definition	806.2

Highway Design Manual		Index
		July 1, 2020
		841.2
ARCH CULVERTS		852.3
		852.4
		852.5 852.6
ARMOR		873.3
ARTERIAL HIGHWAYS		62.3
ARTESIAN WATERS	Definition	806.2
ASPHALT CONCRETE	see FLEXIBLE PAVEMNT	
ASPHALT TREATED PERMEABLE BASE	Definition	62.7
	Design, Asphalt Pavement	633.1
	Design, Concrete Pavement	623.1
A117/11/12/11 AND	Pavement Drainage	662.3
AUXILIARY LANES	Interchange	62.1 504.5
AVAILABLE HEAD, USE OF	interchange	821.1
AVAILABLE HEAD, USE OF		821.4
AVERAGE DAILY TRAFFIC		62.8
		103.1
AVULSION	Definition	806.2
AXIS OF ROTATION	Superelevation	202.4
AXLE LOADS, EQUIVALENT SINGLE		
see EQUIVA	ALENT SINGLE AXLE LOADS	
	n	
	В	
BACKFILL, CULVERTS		829.2
BACKWATER	Definition	806.2
		821.4
		864.4
BAFFLE		873.4
BANK	Definition	806.2
	Guide Protection, Definition	873.4 806.2
BANK PROTECTION	otootion, Domitton	870
2	Armor	873.3

Index	Highway Des	sign Manual
July 1, 2020	<u></u>	
	Design, Concepts Design, High Water and Hydraulics Geomorphology and Site Considerations Training	873.1 873.2 872.3 873.4
BARRIER	Concrete on Walls Median Noise Railing	210.6 305.3 1100 208.10
BASE	Definitions	62.7
	Aggregate Asphalt Treated Asphalt Treated Permeable Cement Treated Cement Treated Permeable Description Engineering Criteria Granular, Untreated Hot Mix Asphalt Concrete Lean Concrete Treated Permeable	662.1 662.2 662.3 662.2 662.3 602.1 663 662.1 662.2 662.2
BASEMENT SOIL	see SUBGRADE	
BASIN CHARACTERISTICS	Elevation Land Use Orientation Shape Size Slope Soil & Geology Storage	812.7 812.4 812.8 812.2 812.1 812.3 812.5 812.6
BEDLOAD	Definition	806.2
		851.2
BENCHES	Drains Slope	834.4 304.3
BERM		835
BIKEWAY	Class I, Design Criteria Class II Width Class III Class IV Definitions Design Considerations Facilities	1003 301.2 1003.3 1002.1 62.1 1001.4 404.2 1002

Highway Design Manual	Index
	July 1, 2020
Markings Overcrossings Planning Criteria Railings	208.10
Refuge Areas Standards Traffic Control Devices Trails Undercrossings	403.7 1000 1004 1003.4 208.6
BITUMINOUS Coatings On Pipes	852.4
BORDER INSPECTION STATIONS	107.3
BORROW Definition	62.7
BRANCH CONNECTION	62.4
Freeway-to-freeway Interchange, Entrances and Exits	504.4 504.2
BRIDGE REPLACEMENT & REHABILITATION PROGRAM	43.3
BRIDGES	208
Alignment Approach Railing Clearances Deer Crossing Definition Embankment Slopes Equipment Crossings Falsework Clearance Flood Design Grade Line Overloads Slope Treatment, End Structure Depth Structure, Open End Types of Structures also see GRADE SEPARATION STRUCTURES BROKEN-BACK CURVE	203.9 208.10 309 208.8 62.2 208.5 208.8 204.8 821.3 204.7 110.1 707 204.8 208.5
BULBOUTS see CURB, EXTENTIONS	
BULKHEADS Type	873.3 883.3
BULKING Definition Factors	806.2 813.8 861.2 864.3

Index	Highway Desig	gn Manual
July 1, 2020		
BUSBAYS	see CURB, EXTENTIONS	
BUSBULBS	see CURB, EXTENTIONS	
BUSINESS DISTRICT	Definitions	62.6
BYPASS HIGHWAY		62.3
	С	
CALIFORNIA OPERATIONAL SAFETY A	ND HEALTH (CAL-OSHA)	
	Tunnel Safety Orders	110.12
CALIFORNIA R-VALUE	Definition	62.7
	Measurement of Record Keeping	614.3 605.1
CALIFORNIA ROAD SYSTEM MAP		81.4
CAMBER	Definition	806.2 829.2
CANTILEVER WALLS		210.1
CAPACITY	Drainage Structure	806.2
	Highway Intersection	102 402.1
Opera	tional Features Affecting Design	402.1
	Ramp Intersection Safety Roadside Rests	406 912.1
CAPILLARITY	Definition	806.2
CAPILLARY WATER	Definition	806.2
	2 cililia cil	841.2
CAPITAL PREVENTATIVE MAINTENANG	CE	603.3
CATCH BASIN	Definition	806.2
	Inlets	837.2
CATCH POINT	Clearance to Right of Way Line	304.2
047715 040050	Side Slope Standards	304.1
CATTLE PASSES	aloo aoo DASE Dofinition	208.8
CEMENT TREATED PERMEABLE BASE CENTRAL ANGLE	also see BASE Definition	62.7 203.4
CENTRAL ANGLE CENTRIFUGAL FORCE	Formula	203.4
OLITINII UGAL I ORUE	Superelevation	202.1
	,	

Highway Design Manual		Index
		July 1, 2020
CHAIN LINK	Fences	701.2
	Railings, Bridges	208.10
CHANNEL, ROADSIDE	Alignment & Grade	862.2
	Changes Characteristics Cross Section Design Consideration Flow Classifications Flow Equations Linings Stability Unlined	867 813 863 861 866.2 866.3 865 864 861.9
CHANNELIZATION		62.4
	Design Standards Left-turn Principles of Right-turn	405 405.2 403 405.3
CHANNELIZATION, PRINCIPLES OF	:	403
	Angle of Intersection Areas of Conflict Major Movements Points of Conflict Precautions Prohibited Turns Refuge Areas Signal Control Speed-change Areas Summary Traffic Control Devices Turning Traffic	403.3 403.2 403.1 403.4 403.12 403.8 403.7 403.9 403.5 403.11 403.10 403.6
CHECK DAM	Definition	806.2
CIENEGA	Definition	806.2
CLEANOUT	Definition	806.2 842.4
CLEAR DISTANCE Stopping	Sight Distance on Horizontal Curves	201.6
CLEAR RECOVERY ZONE		309.1
CLEARANCES	Airway-highway Falsework Lateral, for Elevated Structures Minimum	309 207 204.6 309.4 309.1

	Pedestrian Over Crossings Railroad Signs, Vertical Slope to Right of Way Line Structures, Horizontal Structures, Vertical Tunnel	309.2 309.5 309.2 304.2 309.1 309.2 309.3
CLIMATE	Pavement Map	615
CLIMBING LANES	Transitions	206.2
	Sustained Grades	204.5
CLOVERLEAF INTERCHANG	E Local Streets	502.2
	Freeway-to-freeway	502.3
COATINGS	Pipe	852.4
COEFFICIENT OF ROUGHNE	SS Channels	866.3
	Conduit	851.2
COEFFICIENT OF RUNOFF	Definition	806.2
		819.2
COLLECTOR ROAD	Definition	62.3
		81.4
COLLISIONS		402.2
COLORS, SELECTION	Concrete Steel Structures	705.1 705.2
COMFORT FACILITIES		
	Roadside Rests	912
COMFORTABLE SPEEDS	see MAXIMUM COMFORTABLE SPEED	005
COMMERCIAL DRIVEWAYS	IENT DROODAN	205
COMMUNITY NOISE ABATEN		1101.4
COMPOSITE PAVEMENT	Definition Engineering Properties	62.7 642.1
	Mechanistic-Empirical Method New Construction Pavement Preservation Performance Factors Reconstruction Rehabilitation Types	606.3 643 644 642.2 643 645 641
COMPOUND CURVES		203.5
	Superelevation	202.6

Highway Design Manual		Index
		July 1, 2020
CONCENTRATED FLOW	Definition	806.2
CONCENTRATION	Drainage, Definition	806.2
CONCRETE	Base, Lean	62.7
	Gravity Walls Painting Pavement, Rigid Portland Cement Pavement (PCCP) see RIGID PAVEMENT	662.2 210.2 705.1 620
	Retaining Walls	210.2
CONDEMNATION	Definition .	62.6
	Inverse	62.6
CONDUIT	Cross Section	851.2
	Crossover, Irrigation Definition Protective Coating	706.4 806.2 854.3
CONGESTION MITIGATION AND	AIR QUALITY	
IMPROVEMENT PROGRAM (CMA	Q)	43.2
CONNECTIONS	Access Openings on Expressways	205.1
	Branch	62.4
Br	anch Interchange, Entrances and Exits Driveways on Frontage Roads Driveways on Rural Roads Driveways on Urban Roads Financial Responsibility Freeway-to-freeway	504.2 205.4 205.4 205.3 205.5 62.4
	Freeway with Local Roads	504.4 106.2
	Local Facility Private Road Roadway	203.1 205.2 107.1
CONSERVATION OF MATERIALS	AND ENERGY	110.11
CONSTRUCTIBILITY	Pavement	618.2
CONTINUOUSLY REINFORCED C	ONCRETE PAVEMENT	621.2
	also see RIGID PAVEMENT	
CONSTRUCTION F	reeway Connections with Local Roads	106.2
	Initial and Stage Temporary Features Temporary Pavements and Detours	106.1 82.1 612.6
CONTOUR GRADING	. zpo.a., . a. smonto ana botodio	304.4

Index	Highway Desi	gn Manual
July 1, 2020		
	Aesthetics	109.3
CONTRACTORS YARDS/PLANT SITES	7.10.00.10.00.00	112
CONTRAST TREATMENT		704
	Policy	704.1
CONTROL	Drainage, Definition	806.2
	Erosion	110.2
	Traffic, Devices	62.8 403.10
	Traffic, Special Problems	110.7
CONTROL OF ACCESS	see ACCESS CONTROL	
CONTROL OF POLLUTION	see POLLUTION CONTROL	
CONTROLLED ACCESS HIGHWAY		62.3
CONTROLLING CRITERIA		82.1
CONVENTIONAL HIGHWAYS		62.3
	Sidewalks	105.1
COORDINATION WITH OTHER AGENCI	ES	108
	Transit Loading Facilities	108.2
	Divided Nonfreeway Facilities with FHWA	108.1 108.3
COST REDUCTION INCENTIVE PROPOS	SALS Walls	210.4
COUNTERFORT WALLS		210.2
CRASH CUSHIONS		702.1
CRIB WALLS		210.2
CRITICAL	Depth, Definition	806.2
	Flow, Definition	806.2
	Slope, Definition Velocity, Definition	806.2 806.2
CROSS DRAINAGE	velocity, Definition	820
CROSS SECTION	City Streets and County Boads	
CROSS SECTION	City Streets and County Roads Clear Recovery Zone,	308.1 309.1
	Effects on Drainage	833
	Frontage Roads	310.1
	Geometric Grade	62.1 204.2
	Multilane, All Paved	307.5
	Multilane, Divided	307.4
	Multilane, 2R & 3R Criteria	307.6
	Outer Separation	310.2

	Index
	July 1, 2020
State Highway Two-lane, New Construction Two-lane, 2R & 3R Warrants for	307 307.2 307.3 307.1
IGHWAY ROADS	308
City and County Roads	308.1
see CROSS SECTION	
Effects on Drainage	833
Gutter Median Pavement Shoulder Structures	303.2 305.2 301.2 302.2 208.2
Bicycle	208.6
Deer Equestrian Equipment Pedestrian Railroad	208.8 208.7 208.8 208.6 104.3
Irrigation, Conduits	706.3
	62.3
Alignment & Slope Alternative Pipes Anchorage Available Head Backwater Bedding & Backfill Box and Arch Bridges Buoyant Forces Camber Choice of Type Culvert Design System Curvature Definition Design Discharge Design Flood, Definition Design Frequency, Definition Design Storm, Definition End Treatment Entrance Design Entrance Riser	823.4 857 829.5 821.4 825.1 829.2 852.3 821.3 826.3 823.2 851.2 825.3 823.2 806.2 806.2 806.2 806.2 806.2 826.2
	Two-lane, New Construction Two-lane, 2R & 3R Warrants for IGHWAY ROADS City and County Roads see CROSS SECTION Effects on Drainage Gutter Median Pavement Shoulder Structures Bicycle Deer Equestrian Equipment Pedestrian Railroad Irrigation, Conduits Alignment & Slope Alternative Pipes Anchorage Available Head Backwater Bedding & Backfill Box and Arch Bridges Buoyant Forces Camber Choice of Type Culvert Design System Curvature Definition Design Flood, Definition Design Frequency, Definition Design Storm, Definition Design Storm, Definition Design Storm, Definition End Treatment

	Gradeline	823.2
	Headwall	826.3
	Headwater	821.4
	Height of Cover	829.2
		856
	Hydrologic Considerations	821.2
	Improved Inlets	826.4
	Inlet Control Joints	825.2 829.4
	Joints	854.1
	Length	828.3
	Minimum Cover	856.5
	Multiple Pipes	824.2
	Outlet Design	827
	Piping	829.3
	Roughness	851.2
	Sag	829.7
	Service Life	855
	Settlement	829.2
	Slope	823.2
	Transitions	826.4
	Type Selection	824
CURB RAMPS		105.4
	Guidelines for	105.4
	Policy and Procedure	105.3
CURBS	•	303
CONDO	Pridaga	303.5
	Bridges Design Considerations	404.2
	Extensions	303.4
	Frontage Roads and Streets	303.6
	General Policy	303.1
	Grade Separations	303.5
	Gutter Pan, Cross Slope	303.2
	Median	305.4
	Position of	303.5
	Ramps	504.3
	Returns, for City Streets	405.8
	Structures	303.5
	Types and Uses	303.2
CURVES	Broken-back	203.7
	Compound	203.5
	Compound, Superelevation of	202.6
	Horizontal	203
	Length and Central Angle	203.4

Highway Daoign Manual		ladov
Highway Design Manual		Index July 1, 2020
CUT WIDENING	Location of Ramp on Maximum Comfortable Speeds Radius Ramp Widening Reversing Reversing, Superelevation Transition for Spiral Superelevation Three-Center Vertical	504.2 202.2 203.2 504.3 203.6 202.5 203.8 202 405.7 204.4 304.3
	D	
D-LOAD	Cracking D-Load Definition Reinforced Concrete Pipe	856.2 806.2 852.1
DAM		829.9
DEAD END STREET	Definition	62.3 813.8
DEBRIS	Barrier, Definition Basin, Definition Bulking Control Structure Definition Rack, Definition Riser	806.2 806.2 813.8 822.2 806.2 806.2 822.2
DECELERATION LANE		403.4
	Left Turns Right Turns	405.2 405.3
DECISION SIGHT DISTANCE DEER CROSSINGS		201.7 208.8
DEFENSE ROUTE	Rural and Single Interstate Routes	309.2
DEFINITIONS	29.2	62
	Drainage Pavement Structural Section Deflection Studies	806.2 62.7 635.1

Definition

Definition

806.2

62.8

DEGRADATION

DELAY

Index	Highway Design	gn Manual
July 1, 2020		
DENSITY		62.8
DESIGN	Bank Protection	873.1
	Capacities	102
	Designation	103
	Discharge Discharge, Estimating	811.3 819
	Flood, Establishing	818.2
	Frequency, Definition	806.2
	Geometric Standards	200
	Hourly Volume	103.1
	Hourly Volume, Definition	62.8
	Interchange	504
	Intersection	405
	Period Philosophy	103.2 81.1
	Shore Protection	883.1
	Speed (see DESIGN SPEED)	00011
	Standards, Applications	80
	Storm	821.2
	Storm, Definition	806.2
	Wave Heights	883.2
DESIGN DESIGNATION	Design Period	103.2
	Relation to Design	103.1
DESIGN HOURLY VOLUME		62.8
		103.1
DESIGN LIFE	Pavement	612
	Relation to Design Period	103.1
DESIGN SPEED		101
	Definition	62.8
	Entrances & Exits	504.2
	Freeway-to-freeway Minimum	504.4
	Freeway Entrances & Exits	504.2
	Local Facility	101.1
	Scenic Values Selection	109 101.1
	Standards	101.1
DESIGN VEHICLE	Definition	62.10
DESIGN VEHICLE	Denniion	62.10 404
	Transit	404 404.2
	California Truck	404.2
	Offtracking	404.1
	STAA Truck	404.2

Highway Design Manual		Index
		July 1, 2020
	Swept Width Tracking With Turning Templates Wheelbase	404.2 404.2 404.3 404.2
DESIGN VOLUME	see DESIGN HOURLY VOLUME	
DESIGN, FACTORS AFFECTING		401
	Bicycles Driver Environment General Pavement Pedestrian Vehicle	401.6 401.2 401.4 401.1 611 401.5 401.3
DESIGN, OPERATIONAL FEATUR	ES AFFECTING	402
	Accidents Capacity Undesirable Geometric Features	402.2 402.1 402.2
DESIGNATION, DESIGN	Design Period	103.2
DETAUDO	Relation to Design	103.1
DETOURS	Local Roads Used as	110.7 106.2
DETRITUS	Definition	806.2
DHV	see DESIGN HOURLY VOLUME	
DIAMOND INTERCHANGE		502.2
DIKES	Frontage Roads and Streets General Policy Guide, Earthen PCC Grouted Riprap Position of Ramp Toe, Earthen Types and Uses	303.6 303.1 873.4 873.4 303.5 504.3 873.4 303.3
DISCHARGE	Definition Design Estimating Peak	806.2 811.3 819 811.3
DISPOSAL SITES/MATERIALS SIT		111
	Acquisition of Environmental Requirements ation Furnished to Prospective Bidders	111.5 111.1 111.3

DRY WEATHER FLOWS Definition 806.2

DUFF DEFINITION 62.5

Ε

EARTH RETAINING SYSTEMS Anchored Wall 210.2 Cantilever Wall 210.2 Concrete Gravity Wall 210.2 **Counterfort Wall** 210.2 Crib Wall; Concrete, Steel and Timber 210.2 Drainage 210.8 Electroliers and Signs 210.8 **Footings** 210.8 Gabion Basket Wall 210.2 **Gravity Wall** 210.2

L-Type Wall

210.2

	Masonry Wall Mechanically Stabilized Wall	210.2 210.2
	Non-Gravity Cantilevered Walls	210.2
	Proprietary Reinforced Embankments	210.2 210.2
	Rock Gravity Wall	210.2
	Rock/Soil Anchors	210.2
	Safety Railings	210.6 210.2
	Salvaged Material Retaining Wall Secant Soldier Pile Wall	210.2
	Sheet Pile Wall	210.2
	Slurry Diaphragm Wall	210.2
	Soil Mix Wall Soil Nail Wall	210.2 210.2
	Soil Reinforcement Systems	210.2
	Soldier Pile Wall with Lagging	210.2
	Tangent Soldier Pile Wall Tire Anchored Timber Wall	210.2 210.2
	Utilities	210.2
EARTHQUAKE CONSIDERATIONS		110.6
EASEMENT	Definition	62.6
	Definition	806.2
ECONOMIC ANALYSIS	see LIFE-CYCLE COST ANALYSIS	
EDDY LOSS	Definition	806.2
EDGE DRAIN		651.2
	System, Definition	62.7
ELECTROLIERS AND SIGNS	Walls	210.7
EMBANKMENT	Definition	62.7
	Side Slope Standards	304
	Slopes at Structures Structure Approach Embankment	208.5 208.11
EMINENT DOMAIN	Definition	62.6
ENCROACHMENT	Definition	62.6
END OF FREEWAY	Connections with Local Roads	106.2
ENDWALL	Definition	806.2
ENERGY	Dissipator, Definition	806.2
	Dissipator, Definition	827.2
	Grade Line, Definition	806.2
	Head, Definition	806.2

Highway Design Manual		Index
Ingilia y 2001gir manaa		July 1, 2020
ENTRANCE	Design (Hydraulic)	826
	Freeway Interchange Head, Definition Loss, Definition	504.2 806.2 806.2
ENVIRONMENTAL REQUIREMENTS	Transit Loading Facilities Contractor's Yard and Plant Site FHWA Material Sites and Disposal Sites Median Width Project Development	108.2 112 108.3 111 305.1 81.1
	Special Considerations	110
EQUALIZER	Definition 826.3	806.2
EQUESTRIAN TRAILS	see TRAILS, MULTIPURPOSE	
EQUESTRIAN	Definition	62.10
	Undercrossing and Overcrossing	208.7
EQUIPMENT CROSSINGS		208.8
EQUIVALENT SINGLE AXLE LOADS	Definition Conversion ESAL to Traffic Index ESAL Constants Lane Distribution Factors Projections, Truck Traffic	62.7 613.3 613.3 613.3 613.3
EROSION	And Accretion, Definition Control, Channel & Shore Control, Planting Control, Water Pollution Definition	806.2 871.1 901.1 110.2 806.2
EVAPORATION	Vegetative Control Definition	706.2 806.2 812.8 814.4 819.2
EXITS EXPRESSWAY	Freeway Interchange	504.2 62.3
	F	
FAA	Abbreviation Notice Requirements	61.1 207.3

FACTORS AFFECTING INTERSECTION DESIGN

see DESIGN, FACTORS AFFECTING

FALSEWORK		204.8
	Grade Line Vertical Clearance Width of Traffic Openings Worker Safety	204.8 204.8 204.8 204.8
FAN	Definition	806.2
FEDERAL-AID FEDERAL LANDS PROGRAM	Funding Determination Programs (see also PROGRAMS) System	40 44 43 42 43.4
FENCES		701
	Approval Barbed Wire, Type BW Chain Link Exceptions to Standard Types Freeways and Expressways Location of Locked Gates Median on Other Highways Policy and Purpose Retaining Walls Safety Roadside Rests Standard Types Vinyl-clad Weathering Type Steel Wire Mesh, Type WM	701.1 701.2 701.2 701.2 701.2 701.2 701.2 701.3 701.1 210.6 912.1 701.2 705.1 705.1 701.2
FHWA	Approval of Locked Gates Approval of Mandatory Sites Coordination With Federal-aid	701.2 111.6 108.7 40
FILTER FABRIC	i cuciai-aiu	841.5
FLAP GATES	Definition	806.2 821.6 838.5
FLARED END SECTION		826.3 834.4

Index July 1, 2020

	July 1, 2020
FLEXIBLE PAVEMENT Definition	62.7
Aged Residue (AR)	632.1
Analytical Depth	
Transit Pads	636.4
California R-value	633.1
Climate Region	632.1
Cold in-Place Recycled Asphalt	
Concrete Overlay	
Data Collection	
80th percentile Deflection	
Deflection Studies	
Empirical Method	
Engineering Analysis Software	
Full Depth Hot Mix Asphalt	
Gravel Equivalent	
Gravel factor (G _f)	
Grouping	
Hot Mix Asphalt (HMA) Hot Mixed Asphalt Base	
Hot Recycled Asphalt	
International Roughness Index (IRI)	
International Roughness index (IRI)	
Lean Concrete Base (LCB)	
Lime Treated Subbase	
Mainline	
Mill and Overlay	
Open Graded Friction Course (OGFC)	
Park & Ride Facilities	
Pavement Condition Report	635.2
Pavement Preservation	
Percent Reduction in Deflection	635.2
Percent Reduction in deflection required at the Milled depth	
Performance Factors	
Performance Graded (PG)	
Polymer modified binders	
RHMA-G	
RHMA-O	
Ramp Termini	
Reflective crack retardation	
Remove and Replace	
Ride Quality Roadside Facilities	
Safety Roadside Rest Areas	
Rubberized HMA	
SAMI-R	
Shoulders	
Siloulueis	030.2

Stress Absorbing Membrane Interlayers (SAMI) Structural Adequacy Test Sections Tolerable Deflection at the Surface (TDS) Tolerable Deflections Traffic Index (TI) Traveled Way Treated Permeable Base (TPB) Wearing Course Whitetopping	631.8 635.2 635.2 635.2 635.2 633.1 633.1 633.1 635.2
Control Projects Design Design Criteria, Recommended	803.2
Greatest of Record Magnitude Maximum Historical Measurement Plain, Definition Plane, Definition Stage, Definition Waters, Definition	821.3 817 818.1 817.2 806.2 806.2 806.2
FLOW Channel Critical Definition Line Subcritical Supercritical	864.3 806.2 806.2 864.3
FREE Outlet, Definition Water, Definition	806.2
FREEBOARD Definition	
FREEWAY Entrances and Exits at Interchanges Landscape	62.3 504.2
FREEWAY CONNECTIONS WITH EXISTING ROADS	106.2
FREEWAY-TO-FREEWAY CONNECTIONS Branch Connections	62.4 504.4 504.4

Highway Design Manual		Index July 1, 2020
Lane	de Line Grades e Drops letering	204.2 504.4 504.4 504.3 504.4 504.4
FREEWAY-TO-FREEWAY INTERCHANGES		502.3
FRENCH DRAINS De	efinition	806.2 841.5
FRICTION FACTORS		202.1
Cross Section Sta Access Cross S Driv Financed by Headligh Horizontal Cle Outer Sep Railroad Cro	Control Section Curbs veways Others at Glare earance paration possings dewalks	62.3 310 104.3 310.1 303.6 205.4 104.3 310.3 309.1 310.2 104.3 105.1 44 44.1 44.2 403.1
G		
GEOMETRIC CROSS SECTIONS	rainage efinition	841.5 300 62.1
GEOMETRIC DESIGN De	efinition	62.4
Structure Sta Undesirable Geometric Features, Inters GEOTECHNICAL DESIGN REPORT	ections	200 402.2 113
Local Materials S Side Slope Sta	Policy	113.2 111.2 113.1 304.1
Olde Glope Gla	iiiuuius	JUT. I

Index	Highway Des	sign Manual
July 1, 2020		
	Submittal and Approval	113.3
CORE	Oubmittal and Approval	
GORE	O and the ation of Occupant Transfer and	62.4
	Contrasting Surface Treatment Paved Gore	504.2 504.2
GRADE	Cross Section, Position with Respect to	204.2
	to Drain, Definition	806.2
	Freeway Entrance Standards	504.2
	Freeway Exit Standards	504.2
	Freeway-to-freeway Connection Standards General Controls	504.4 204.1
	Horizontal Alignment, Coordination with	204.1
	Ramps	504.2
	Rolling Profile	204.1
	Safety Roadside Rests	912.1
	Separate Lines	204.7
	Separation	62.4
	Separation Structures	208
	Separation, Pedestrian Standards	105.2 204.3
	Stopping Sight Distance at Crests	204.3
	Stopping Sight Distance at Sags	201.5
	Structures	204.8
	Sustained Grades	204.5
	Vertical Curves	204.4
GRADE LINE	Bridge Decks	204.8
	Depressed, Under Structures	204.8
	General	204.1
	Separate	204.7
	Structures	204.8
GRADE SEPARATION STR	RUCTURES	208
(Cattle Passes, Equipment, and Deer Crossings	208.8
	Cross Slope	208.2
	Curbs	303.5
	Equestrian Undercrossing Median	208.7 208.3
	Open End Structures	208.5
	Pedestrian	105.2
	Pedestrian Overcrossings and Undercrossing	208.6
	Railings	208.10
	Railroad Underpasses and Overheads	208.9
	Sidewalks Widths	208.4
		208.1
GRADIENT (SLOPE)	Definition	806.2

Highway Design Manual		Index
		July 1, 2020
GRADING PLANE	Definition	62.7
GRATED LINE DRAIN		837.2
GRAVEL EQUIVALENT		635.2
GRAVITY WALL		210.2
GROIN		883.3
GROUND WATER	Definition	806.2
		841.2
GUARDRAIL	Bridge Approach Railings	208.10
OUDE DANK	References	702
GUIDE BANK	Crass Clans	873.4
GUTTER PAN	Cross Slope General Policy	303.2 303.1
	Uses, Curb Types	303.2
GUTTERS, SIDE		834.3
	Capacity	836.2
	Grade Intersection, at	836.2 836.2
	Types	836.1
	Valley	836.2
	н	
HAULING Overlo	paded Material/Equipment , Design for	110.1
HEAD	Available	821.4
HEADLIGHT GLARE		310.3
HEADLIGHT SIGHT DISTANCE	Grade Sags	201.5
HEADWAY		62.8
HIGH SPEED RAIL	Definition	62.10
	Clearances	309.1
HIGHWAY	0 "	62.3
	Capacity Context	102 81.6
	Controlled Access	62.3
	Conventional Federal Lands Program	62.3 43.4
	Interstate, Definition	81.4
	Landscape Architect Definitions	62.5

	Major	62.3
	National Highway System	42
	Parkway	62.3
	Pedestrian Facilities	105
	Planting	62.5
	Radial	62.3
	Route Numbers	21.2
	Scenic	62.3
	State System	81.4
	Structures, Definitions	62.2
	Structures, Grade Line	204.8
	Through	62.3
	Types, Definitions	62.3
HIGHWAY DESIGN MANUAL STANDARDS		82.1
HORIZONTAL ALIGNMENT	Aesthetic Factors	109.3
	Alignment Consistency	203.3
	Bridges	203.9
	Broken Back Curves	203.7
	Compound Curves	203.5
Cui	rve Length and Central Angle	203.4
	General Controls	203.1
	Grade, Coordination with	204.6
	Radius	203.2
	Reversing Curves	203.6
	Standards for Curvature	203.2
	Spiral Transition	203.8
HORIZONTAL CLEARANCE	Bridges	309.1
	Between Elevated Structures	309.4
	Clear Distance	201.6
	Noise Barriers	1102.2
	Off-track Maintenance	309.5
	Railroad Walkway	309.5
	Railroads, Adjacent to	309.5
	Retaining Walls Structure	309.1 309.1
	Tunnels	309.1
HODIZONITAL DDAING	Turineis	
HORIZONTAL DRAINS		841.5
HOT MIX ASPHALT CONCRETE BASE		
also se	ee BASE Engineering Criteria	663
HOT MIXED ASPHALT		631.1
also	see FLEXIBLE PAVEMENT	
HYDRAULIC	Gradient, Definition	806.2

<u> Highway Design Manual</u>		Index
		July 1, 2020
	Jump, Definition Mean Depth, Definition Mean Depth Radius, Definition	806.2 806.2 864.3 806.2
HYDRAULIC DESIGN DISCHARGE	Empirical Methods Field Investigation Hydrograph Methods Rational Methods Regional Analysis Statistical Methods Summary of Methods	819.2 815.3 816.5 819.2 819.2 819.3 819.1
HYDROGRAPH	Definition SCS Triangular Synthetic Unit	806.2 816.5 819.4 819.4 819.4
HYDROGRAPHY	Definition	806.2
HYDROLOGIC DATA	Basin Characteristics	812
	Federal Agencies Field Investigations Precipitation Rainfall Sources Stream Flow Surface Runoff Transfer of Data	815.3 815.2 815.3 815.5 815.3 815.4 815.2 819.5
HYDROLOGICAL ANALYSIS	Gumbel Extreme Value Distribution Log Normal Distribution Log Pearson Type III Distribution Objectives Rational Methods Regional Analysis Methods SCS Triangular Hydrograph Synthetic Hydrograph Unit Hydrograph	819.3 819.3 819.3 811.2 819.2 819.4 819.4 819.4
HYDROLOGY	Definition	806.2
HYDROPLANING	Definition	811.1 831.4

INFILTRATION		602.1
	Definition	819.2 806.2
INITIAL CONSTRUCTION	and Stage	106.1
INLETS	Combination	837.2
	Curb Opening	837.2
	Grate	837.2
	Hydraulic Design	837.4
	Location and Spacing	837.3
	Pipe Drop	837.2
	Time, Definition	806.2
	Transition	826.4 837.2
	Types Use of	837.1
INSPECTION STATIONS, BORDER		107.3
INTERCHANGES	Access Control	504.8
INTERCHANGES	Access Control Aesthetic Factors	109.3
	Approval of Design	503.2
	Auxiliary Lanes	504.5
	Cloverleaf	502.2
	Concepts	501.1
	Data Required for Design	503.1
	Definition	62.4
	Design, Procedure	503 504
	Design, Standards Diamond	502.2
	Elements	62.4
	Freeway Entrances and Exits, Design	504.2
	Freeway-to-freeway	502.3
Freew	yay-to-freeway Connections, Definition	62.4
	ay-to-freeway Connections, Standards	504.4
	y-to-freeway, Minimum Design Speed	504.4
Freewa	ay-to-freeway Omission of Movements	502.3
	Grade Separations Grades Exits/Entrances	62.4 504.2
	Lane Reduction	504.2
	Local Streets	502.2
	Parallel Street Systems	502.2
	Ramps	504.3
	Reviews	503.2
	Sight Distance for Planting	902.2
	Single Point Interchange	502.2

Highway Design Manual		Index
		July 1, 2020
	Spacing	501.3
	Traffic	500
	Trumpet	502.2
	Two-quadrant Cloverleaf	502.2
	Types	502
	Warrants	501.2
	Weaving Sections	504.7
	also see RAMPS	
INTERMODAL SURFACE TRANSPOR	RTATION	
EFFICIENCY ACT (ISTEA)		40
INTERSECTION	Access Control	405.6
	Accidents	402.2
	Angle of Intersection	403.3
	Areas of Conflict	403.2
	Bicycle, Affecting Design of	401.6
	Capacity	402.1
	Capacity, Ramps	406
	Channelization	403
	Definition	62.4
	Design, Factors Affecting	401
Des	sign, Operational Features Affecting	402
	Design, Standards	405
	Design Vehicle	404
	Driver, Affecting Design of	401.2
	Environment, Affecting Design of	401.4
	General, Factors Affecting Design	401.1
	at Grade	400
	Grade Separations Left-turn Channelization	62.4
		405.2
	Major Movement, Preference to Median Openings	403.1 405.5
	Operational Features	402
	Pedestrian, Affecting Design of	401.5
	Points of Conflict	403.4
	Precautions	403.12
	Prohibited Turns	403.8
	Public Road	405.7
	Ramp	406
	Refuge Area	403.7
Re	eturns and Corner Radii, City Street	405.8
	Right-turn Channelization	405.3
	Right-turn Lanes at Off Ramp	405.3
	Roundabout, Definition	62.4
	Sight Distance	405.1
	Signal Control	403.9

July 1, 2020		
	Speed-change Areas Traffic Control Devices Traffic Islands Turning Traffic Types Undesirable Geometric Features Vehicle, Affecting Design of Widening at Signalized Intersections	403.5 403.10 405.4 403.6 401.5 402.2 401.3 405.9
INTERSTATE	Definition Funding Numbering	81.4 42.2 21.2
INUNDATE	Definition	806.2
INVERSE CONDEMNATION	Definition	62.6
INVERT	Definition Paving, Definition Paving Protection	806.2 806.2 852.1 852.4 853.6 852.4 852.5
INVERTED SIPHON	Definition	806.2 829.7
IRRIGATION SYSTEM ISLAND	Crossover Conduits	706.4 62.4
	Traffic	405.4
ISOHYETAL	Line, Definition	806.2
ISOVEI	Map, Definition Definition	806.2 806.2
ISOVEL	J	41.1 42.2
JACK	Definition	806.2
JACKING OPERATIONS	Definition	806.2
JETTY	Definition	806.2
IOINT	Types	873.4
JOINT	Longitudinal	62.7

Highway Design Manual		Index
		July 1, 2020
	Pavement Seals	622.4 62.7
JOINT BANK PROTECTION COMMITTEE		802.3
JOINT PLAIN CONCRETE PAVEMENT		621.2
	also see RIGID PAVEMENT	
JOINTS	Culverts	829.4
		854.1
JUNCTION STRUCTURES		838.5
	K	
KINEMATIC WAVE EQUATION		816.6
KIRPICH EQUATION		816.6
K-RAIL		204.8
	L	
L-TYPE WALL		210.2
LAG	Definition	806.2
LAMINAR FLOW	Definition	806.2
LANDSCAPE	Aesthetic Factors	109.3
	Architecture	62.5
	Highway	900 62.5
LANE	Addition	206.2
	Addition on Ramps	504.3
	Auxiliary	62.1
	Climbing	504.5 204.5
		206.2
	Deceleration	405.2 405.3
	Definitions	405.3 62.1
	Drops	206.3
Drops on F	reeway-to-freeway Connectors	504.4 504.3
	Drops on Ramps Express Toll Lanes	62.8
	High-Occupancy Vehicle	62.8

	High Occupancy Toll	62.8
	Left Turn Managed, Definition	405.2 62.8
	Median, Definition	62.1
	Multiple, Definition	62.1
	Numbering	62.1
	Passing	204.5
	Reductions Reduction at Interchanges	206.3 504.6
	Right Turn	405.3
	Separate Turning	403.6
	Speed Change	403.5
	Speed Change, Definition	62.1
	Traffic, Definition Two-way Left-turn Lanes	62.1 405.2
	Width	301.1
	Width on Curves	504.3
	Width of Opening for Falsework	204.8
	Width, Ramps	504.3
LATERAL	Definition	806.2
		838.4
	5405	838.5
LEAN CONCRETE BASE	see BASE	00.7
	Definition Engineering Criteria	62.7 662
	Design, Flexible (Asphalt) Pavement	635.2
	Design, Rigid (Concrete) Pavement	624.1
LEFT-TURN CHANNELIZATION		405.2
LEFT-TURN REFUGE		403.7
LEGISLATION		41
	ISTEA	41.1
LEVEE	Definition	806.2
LEVEL OF SERVICE	Definition	62.8
		102
LIFE-CYCLE COST ANALYSIS (LC	CA)	619
LIME	Treatment Definition	614.4
	Use of	633.1
LIME TREATED SUBBASE	see SUBBASE	
LOAD TRANSFER DEVICE	see DOWEL BAR	
LOADING FACILITIES	Transit	108.2

Highway Design Manual		Index
Ingriway Design Manaai		July 1, 2020
LOCAL STREETS/ROADS	Cross Section	308.1
	Definition	62.3
	Design Coard	81.4
	Design Speed Driveways	101.1 205.3
	Grade	204.1
	Horizontal Alignment	203.1
	Interchanges Returns and Corner Radii	502.2 405.8
	Superelevation	202.7
LOCKED GATES		701.2
LOG OF TEST BORINGS		210.8
	M	
MAINTAINADUITY	D	040.4
MAINTAINABILITY	Pavement	618.1
MAINTENANCE	Definitions	62.7
MAINTENANCE VEHICLE PULLOU		62.1
MAINTENANCE YARDS	On Freeways	107.2
MAJOR STREET/MAJOR HIGHWA	Y Definition	62.3
MANDATORY MATERIAL SITES	Federal-aid Projects	111.6
MANNING	Equation	866.3
	Roughness Coefficient	851.2
MARKERO		866.3
MARKERS	Contrast Treatment	702.1 704.1
MATERIALO		
MATERIALS	Availability, Pavement Color Selection for Steel Structures	617.1 705.2
	Conservation of	110.11
	Hauling, Overloaded Design	110.1
Informa	tion Furnished to Prospective Bidders Plants	111.3 112
	Recycling, Pavement	617.2
	Report (see MATERIALS REPORT)	
	Sites Sites, Acquisition	111 111.5
	Sites, Arrangements	111.3
	Sites, Environmental Requirements	111.1
	Sites, Investigation of Local Sources Sites, Mandatory	111.2 111.6
	•	111.0
	xxxiii	

Index	Highway Desi	gn Manual
July 1, 2020		
	Special Treatment	705.1
MATERIALS REPORT	Content	114.3
	Local Materials Sources Policy Preliminary Requesting Retention of Records Reviews	111.2 114.1 114.4 114.2 114.5 114.5
MAXIMUM COMFORTABLE SPEED	Chart	202.2 202.2
RA A V	Superelevation	
MAY	Definition and Usage	82.1
MEAN VELOCITY		864.3
MECHANISTIC-EMPIRICAL		606.3
MEDIAN	Definition	62.1
	Aesthetic Factors Barriers Cross Slope Curbs Decking on Bridge Fencing Grade Lane Left-turn Lane Openings Paved Position Separate Roadways Standards Width	109.3 305.3 305.2 305.4 208.3 701.2 834.2 62.1 405.2 405.5 305.5 305.6 305.6 305.1
MERGING	Definition	62.8
METEOROLOGY	Evapo-transpiration Rainfall Snow Tides and Waves Tsunami	814.4 814.2 814.3 814.5 814.5
METERING	Definition Freeway-to-Freeway Connections Lane Merges Ramp Lane Drops	504.3 62.8 504.4 206.3 504.3
MINIMIM TURNING RADIUS	Definition	62.4

Highway Design Manual		Index
- nga, 200.g. manaa.		July 1, 2020
MINOR ARTERIAL	Definition	81.4
MISCELLANEOUS STANDARDS		700
	Fences	701
	Guardrail Mailboxes	702 702
	Markers	702
MUD FLOW	Definition	806.2
MULTILANE CROSS SECTIONS	All Paved	307.5
	Divided	307.4
MULTIPLE LANES	Definition	62.1
MULTIPLE PIPES		824.2
	N	
NATIONAL HIGHWAY SYSTEM		42.1
NAVIGABLE WATERS	Definition	806.2
NEGATIVE PROJECTING CONDUIT	Definition	806.2
NOISE ABATEMENT		1100
	By Others	1101.2
	Objective Prioritizing	1101.2 1101.5
	Terminology	1101.3
NOISE BARRIERS	Aesthetics	1102.6
	Alternate Designs	1102.5
	Clearances Design Criteria	1102.2 1102
	Design Procedures	1102.5
	Drainage Openings	1102.9
	Emergency Access Heights	102.8 1102.3
	Lengths	1102.4
	Location Maintenance Considerations	1102.2 1102.7
	Pay Quantities	1102.7
	Planting Proliminary Site Data	1102.6
	Preliminary Site Data Sight Distance Requirements	1102.5 1102.2
NONFREEWAY FACILITIES	Conversion to Divided	108.1
NONMOTORIZED TRAFFIC	Provisions for	104.3

Index	Highway Desi	gn Manual
July 1, 2020		
NORMAL DEPTH	Definition	806.2 864.2
	0	
OFFICE OF	State Landscape Architecture Program	901.1
OFF-SET LEFT-TURN LANE	Definition	62.4
OFF-SITE DRAINAGE	Definition	806.2
OFFTRACKING	Definition	62.4
	Design Considerations	404.1
ON-SITE DRAINAGE	Definition	806.2
ON-STREET PARKING	Definition	62.1 402.3
OPEN CHANNEL	Definition	62.8
OUTER SEPARATION	Definition	62.1 310.2
OUTFALL	Definition	806.2
OUTWASH	Definition	806.2
OVERFLOW	Channel	861.5
OVERLAND FLOW		816.6
OVERLAYS	Asphalt On Structure Decks Definitions	607.6 62.7
OVERLOADS	Design for	110.1
	Р	
PAINTING	Concrete	705.1
PARALLEL STREET SYSTEMS	Steel	705.2
	Interchanges	502.2
PARK AND RIDE LOTS	Definition Pavement Structural Section Design	62.5 636.4
PARKWAY	Definition	62.3
PARTIAL ACQUISITION	Definition	62.6
PASSING LANE	25	204.5

Highway Design Manual	Index
	July 1, 2020
PASSING SIGHT DISTANCE	201.2
PAVEMENT/PAVEMENT STRUCTURE Capital Preventive Maintenance	603.3
Composite see COMPOSITE PAVEMENT	
Condition Survey	603.3
Cross Slopes	
Definition	
Design Life, Definition	
Design Life	
Detours	
Drainage, Impact of Flexible see FLEXIBLE PAVEMENT	
Joints	
Layers	
New	
Performance see PAVEMENT SERVICE LIFE Portland Cement Concrete	
Preservation	
Reconstruction	
Reductions	
Rehabilitation, Roadway	
Rehabilitation, Definition	
Rigid see RIGID PAVEMENT	
Tapered Edge	
Serviceability, Definition	
Service Life, Definition	
Structure	
Surface Course	
Temporary Transitions	
Transitions for Freeways, Temporary	
Type Selection	
Types of Projects	
Widening	
Width	301.1
PEAK FLOW Definition	806.2
. L. att Lott	811.3
PEDESTRIAN FACILITIES	105
Accessibility Requirements	105.3
Bridges	
Conventional Highways	
Crosswalk, Definition	
Curb Ramps, Guidelines	
Design Considerations	
Freeway Facilities	105.1

Frontage Roads Grade Separations Pedestrian, Definition Overcrossings Overcrossing/Undercrossing, Standards Railings Refuge, Definition Refuge Areas Replacement in Kind School Walkways Sidewalks Sidewalks, Definition Sidewalks, Structures Trails Undercrossings	105.2 62.10 105.2 208.6 208.10 62.4 403.7 105.1 105.1 105.1 62.1 208.4 1003.4
PERCHED WATER Definition	806.2 841.4
PERCOLATING WATERS Definition	806.2
PERMEABILITY Definition	806.2
	841.2
PHYSICALLY DISABLED PERSONS	
see ACCESSIBILITY REQUIREMENTS	
PIPE Alternative Pipe Culvert Selection Procedure Using AltPipe	857.2
Cast in Place Concrete Concrete Box and Arch, Strength Requirements Corrugated Aluminum Pipe and Arch, Strength Requirements Corrugated Steel Pipe and Arch, Strength Requirements Culverts Minimum Cover Minimum Diameter Multiple Plastic, Strength Requirements Protective Coatings Reinforced Concrete, Strength Requirements Standards for Drain Structural Metal Pipe and Arch, Strength Requirements Definition	852.3 852.5 852.4 828.2 828.3 856.5 838.4 824.2 852.7 852.4 852.1 838.4 852.6
PLACE TYPES Definition Rural Area	
, talai, a sa	J .

42 000 km

Definition

309.2

62.3

PRIORITY NETWORK

PRINCIPAL ARTIRIAL

Index	Highway Desig	ın Manual
July 1, 2020		
PRIVATE ROAD	Definition	62.3
PRIVATE ROAD CONNECTIONS		205.2
	Financial Responsibility Sight Distance	205.5 405.1
PROCEDURAL REQUIREMENTS		82.4
PROGRAMS, FEDERAL-AID		
Bridge Replaceme	nt and Rehabilitation Program	43.3
Congestion Mitigation and Air (40.0
	(CMAQ) Federal Lands Program	43.2 43.4
	Special Programs	43.5
Surface 7	Transportation Program (STP)	43.1
PROHIBITED TURNS		403.8
PROJECTING BARREL		826.3
PROJECTING ENDS		826.3
PROPRIETARY ITEMS		110.10
	Earth Retaining Systems	210.2
PROTECTION OF ACCESS RIGHTS		104.4
PROTECTION OF WETLANDS	see WETLANDS	
PROTECTIVE COATINGS		852.4
PUBLIC ROAD INTERSECTION		405.7
	Sight Distance	405.1
PULL OUTS	see TURNOUTS	
PUMPING	Definition	62.7
PUMPING PLANT		839.1
	_	
	R	
R-VALUE	see CALIFORNIA R-VALUE	
RADIAL HIGHWAY	Definition	62.3
RADIUS	Curb	405.8
	Horizontal Alignment	203.2
RAILINGS	Bicycle	208.10
	Bridge	208.10
	Bridge Approach	208.10

Highway Design Manual		Index
		July 1, 2020
	Cable Chain Link Earth Retaining Systems Guardrail	210.6 208.10
	Pedestrian Vehicular	702.1 208.10 208.10
RAIL	Clearances	309.2
	Structures Adjacent to Commuter, Definition Conventional, Definition Crossings Grade Line of Structures High Speed, Definition High Seed, Clearances Light, Definition	309.5 62.10 62.10 104.3 204.8 62.10 309.1 62.10
	Overheads Slope Treatment, Structures Underpasses	208.9 707 208.9
RAINFALL	Definition Sources of Data	806.2 815.3
RAIN GAGE		819.5
RAINWASH	Definition	806.2
RAMPS	Curbs on Curb Ramps Definition Dikes Distance Between Exits	504.3 105.4 62.4 504.3 504.3
	Distance Between On-Ramps	504.3
	Entrance and Exit Grade	504.2 504.2
	Grade Line Grade, Standards	204.2 204.3
	Hook	
	Intersection Capacity	406
	Intersections on Crossroad, Location of	504.3
	Lane Drops Loop Metering (see METERING)	504.3 504.3
	Pavement, Flexible	636.1
	Pavement, Rigid	626.1
	Pavement, Traffic Considerations Pavement Transitions	613.5 206

	Single Lane Structural Design	504.3 602.3 603.5 604.5
	Superelevation Tapers Termini, Flexible Pavement Termini, Rigid Pavement	504.3 206.3 636.1 626.1
	Transitions Two-lane Entrance Two-lane Exit Width Widening for Trucks	504.3 504.3 504.3 504.3 504.3
RATIONAL METHOD	maoning for maone	819.2
RAVELING	Definition	62.7
REACH	Definition	806.2
RECORD KEEPING	Documentation, Type of Pavement Revisions	605.1 605.2
RECOVERY AREA		309.1
RECYCLING, ASPHALT CONC	RETE General Hot, Definition	110.11 62.7
REFUGE AREAS		403.7
REGIME	Definition	806.2
REHABILITATION, CULVERTS	General	853.1
	Caltrans Host Pipe Structural Philosophy Problem Identification and Coordination Alternative Pipe Liner Materials Cementitious Pipe Lining Invert Paving with Concrete Structural Repairs with Steel Tunnel Liner	853.2 853.3 853.4 853.5 853.6
	Plate	853.7
REHABILITATION, PAVEMENT	Capital Preventive Maintenance, part of Definitions	603.3 62.7
	Design Life Composite Flexible Pavement Rigid Pavement	612.4 645 635 625
REHABILITATION, ROADWAY		603.4
	Definitions	62.7

Highway Design Manual		Index
		July 1, 2020
	Design Life Composite Pavement Flexible Pavement Rigid Pavement	612.4 645 635 625
REINFORCED EARTH SLOPES		210
RELICTION	Definition	806.2
RELINQUISHMENT	Definition	62.6
REPLACEMENT IN-KIND	Sidewalks	105.1
REPLACEMENT PLANTING	Aesthetic Factors Definition	109.3 62.5
RESEARCH/SPECIAL DESIGNS	Research, Experimentation Special Designs Mechanistic-Empirical Design	606.1 606.2 606.3
RESOURCES	Other, Pavement	604.3
RESTORATION PLANTING	Aesthetic Factors Definition	109.3 62.5
RESURFACING	Definition see PRESERVATION, PAVEMENT see REHABILITATION, PAVEMENT see REHABILITATION, ROADWAY	62.7
RETAINING WALLS Safety I	Aesthetic Considerations Construction Methods and Types Guidelines for Plan Preparation Railing, Fences, and Concrete Barriers	210 210.5 210.2 210.8 210.6
RETARD	Types	873.4
RETARDING BASIN	Definition	806.2
RETENTION BASIN	Definition	806.2
RETROGRESSION	Definition	806.2
RETURN WALLS		210.8
RETURNS, CITY STREET AND CO	RNER RADII	405.8 62.5
REVEGETATION	Aesthetic Factors	109.3
REVERSING CURVES		203.6
	Superelevation Transitions	202.5
REVETMENT	Definition	806.2

Index	Highway Des	sign Manual
July 1, 2020		
RIGHT OF ACCESS	Definition	62.6
RIGHT OF WAY	Definitions	62.6
	Through Public Domain Width	306.2 306.1
RIGHT-TURN CHANNELIZATION	N	405.3
RIGID PAVEMENT	Catalog	623.1
	Definition Design Procedure for Engineering Properties Joints New Construction Mechanistic-Empirical Procedures Pavement Preservation Performance Factors Reconstruction Rehabilitation Texturing Types also see CONCRETE	62.7 623 622.1 622.4 623 606.3 624 622.2 623 625 622.9 621
RIPARIAN	Definition	806.2
RIPRAP	Definition	806.2
		827.2 873.3
RISER	Culvert Entrance	822.2
	Definition	806.2
RISK ANALYSIS	Definition	806.2 818.2
ROADBED	Definition	62.1 62.7
ROADSIDE	Definition	62.1
ROADSIDE INSTALLATIONS		107
ROADSIDE RESTS, SAFETY	Border Inspection Stations, Location of Define Roadside Maintenance Yards and Police Facilities Roadway Connections Definition Design Standards Facilities and Features Fencing	107.3 62.1 107.2 107.1 62.5 913 913.3 913.3
	. 239	

Highway Design Manual		Index
		July 1, 2020
	Grading	912.1
	Minimum Standards	912.1
	Pavement Design	613.5
	Pavement, Flexible	636.4
	Pavement, Rigid	626.4
	Planting and Irrigation	912.2
	Site Feasibility	913.1
	Size and Capacity	913.1
	Water Supply	110.2
		706.6 913.5
	1	
ROADSIDE TREATMENT	Irrigation Crossover Conduits	707.2
	Roadside Management	706.1
	Topsoil	706.3 706.2
	Vegetation Control Water Supply	905.2
ROADWAY	Connections	107.1
ROADWAT		
	Definition Drainage	62.1 830
	Structural Elements	601.2
ROCKFALL RESTRAINING NETS		703.2
	A 0 1 1	
ROUNDABOUTS	Access Control	405.10
	Bicyclist Use	405.10
	Circulatory Boadway	62.4 62.4
	Circulatory Roadway Definition	62.4
	Design Guidance	405.10
	Design Vehicle	405.10
	Entry Speeds	405.10
	Exit Design	405.10
	Inscribed Circle Diameter	62.4
	D # 101:	405.10
	Landscape Buffer/Strip	62.4
	Lighting	405.10 405.10
	Lighting Number of Legs	405.10
	Path Alignment (Natural Path)	405.10
	Pedestrian Refuge	62.4
	Pedestrian Use	405.10
	Splitter Island	62.4
		405.10
	Stopping Sight Distance and Visibility	405.10
	Transit Use	405.10
	Truck Apron	62.4

Index	Highway Desig	gn Manual
July 1, 2020		
	Vertical Clearance	405.10
ROUNDED INLET	Definition	806.2
ROUNDED LIP		826.3
RRR CRITERIA	Design Period	103.2
	Left-Turn Lanes	405.2
	Multi lane Cross Section	307.6
	Pavement Design Life Two-lane Cross Section	612.5 307.3
RUNNING	Speed	62.8
KOMMING	Time	62.8
RUNOFF		816
	Drainage, Definition	806.2
	Factors Affecting	811.5
	Superelevation Transition	202.5
RURAL	Acceleration Lane at Intersection	405.1
	Access Control Area, Definition	504.8 81.3
	Design Speed	101.2
	Driveway Connection	205.4
	Interchange Spacing Median Standards	501.3 305.1
	Outer Separation	310.2
	Weaving Section	504.7
RURAL AND SINGLE INTERSTATE R	OUTING	309.2
RUTTING	Definition	62.7
	0	
	S	
SAFETY	Planting	904.5
	Planting and Irrigation	912.2
	Railings on Walls	210.5
	Reviews Roadside Rests	110.8 912
	Tunnel Safety Orders	110.12
	Worker	110.7
	Worker, Falsework Clearance	204.8
SAFETY ROADSIDE RESTS	Definition	62.5
	Design Standards Facilities and Features	913 913.5
	i dominos ana i catalos	0.10.0

		862.2 865.2
SEPARATE ROADWAY		305.6
SERVICEABILITY	Definition	62.7
SETTLEMENT	Definition	62.7
	Structure Approach	208.1
SEVERANCE DAMAGES	Definition	62.6
SHALL	Definition and Usage	82.1
SHEET FLOW	Definition	806.2
SHOALING	Definition	806.2
SHORE PROTECTION		880

1

Armor	883.3
Planning Site Considerations Definition and Usage Cross Slope Definition Design Considerations Pavement, Flexible Pavement, Rigid Standards, Geometric Standards, Pavement Superelevation Transitions Transitions (Widen, Reduction)	883.1 883.2 882.1 882.3 82.1 302.2 62.1 404.2 636.2 626.2 302 613.5 202.5 206
Width, Right Turn Channelization	302.1 405.3 307.2 834.3
Benches and Cut Widening Clearance to Right of Way Line Contour Grading and Slope Rounding Standards Stepped Structures Transition Slopes Widening	304 304.3 304.2 304.4 304.1 304.5 208.5 304.1 304.3
Clear Distance (m) Corner Decision Decision at Intersections Exit Nose General Headlight, at Grade Sags Intersection Passing Planting Ramp Intersections Standards Stopping	201.6 405.1 201.7 405.1 504.2 201.1 201.5 405.1 201.2 904.6 504.3 201.1 201.3 201.4
	High Water and Design Wave Height Planning Site Considerations Definition and Usage Cross Slope Definition Design Considerations Pavement, Flexible Pavement, Rigid Standards, Geometric Standards, Pavement Superelevation Transitions Transitions (Widen, Reduction) Width Width, Right Turn Channelization th, Two-lane Roads, New Construction Benches and Cut Widening Clearance to Right of Way Line Contour Grading and Slope Rounding Standards Stepped Structures Transition Slopes Widening see PEDESTRIAN FACILITIES Clear Distance (m) Corner Decision Decision at Intersections Exit Nose General Headlight, at Grade Sags Intersection Passing Planting Ramp Intersections Standards

,	

Definition

Definition

806.2

812.8 814.3

806.2

SLUG FLOW

SNOW PACK

SOFFIT

Highway Design Manual		Index
		July 1, 2020
STAGE	Definition	806.2
STAGE CONSTRUCTION		106.1
	Freeway Connections with Local Roads	106.2
STANDARDS		80
	Approval for Nonstandard Design Boldface Standard FHWA and AASHTO Other Approval Permissive Underlined Standard	82.2 82.1 82.3 82.1 82.1 82.1
STATE HIGHWAY, CROSS SEC	TIONS	307
	also see CROSS SECTIONS	
STEEL STRUCTURES	Colors	705.2
STEPPED SLOPES		304.5
STOPPING SIGHT DISTANCE	see SIGHT DISTANCE	
STORAGE		838.4
	Basin, Definition Definition Depression Detention Interception Left-turns Retention, Definition Right-turns	806.2 806.2 819.2 812.6 812.6 405.2 806.2 405.3
STORM	Definition	806.2
	Design, Establishing Design, Recommended Criteria Drain, Definition	818.2 821.2 806.2
STP see SUI	RFACE TRANSPORTATION PROGRAM	
STREAM WATERS	Definition	806.2
STREETS	Definitions	62.3
STRUCTURAL PLATE	Arches	852.6
OTDUOTUDAL OFOTION	Vehicular Underpasses	852.6
STRUCTURAL SECTION	see PAVEMENT STRUCTURE	224.2
STRUCTURE APPROACH	Design Responsibilities Pavement Systems Structure Approach Slabs Slab-Rehabilitation Projects	601.3 672 209 673

Index	Highway Des	gn Manual
July 1, 2020		
STRUCTURE CLEARANCE		309
	Elevated Structures Horizontal Railroad Tunnel Vertical	309.4 309.1 309.5 309.3 309.2
STRUCTURES, SLOPE TREATMENT	UNDER see SLOPE TREATMENT	
STRUTTING	Definition	806.2
SUBBASE	Definition	62.7
	Description Engineering Criteria Lime Treated Treated	602.1 663 662.2 662.2
SUBCRITICAL FLOW	Definition	806.2 864.3
SUBDRAIN	Definition	806.2 841.5
SUBGRADE	Definition Description Engineering Considerations Enhancement Fabrics	614 62.7 602.1 614.1 614.5
SUBSEAL	Ellilancement Fabrics	607.6
SUBSURFACE DRAINAGE		840
SUBURBAN		81.3
SUMP	Definition	806.2 831.3
SUPERCRITICAL FLOW	Definition	806.2 864.3
SUPERELEVATION	Axis of Rotation Basic Criteria Bridge Channels City Streets and County Roads Comfortable Speeds Compound Curves Ramps Relationship to Speed on Curves	202.4 202.1 203.9 866.2 202.7 202.2 202.6 504.3 203.2
	Reversing Curves	203.6

Highway Design Manual		<u>Index</u>
		July 1, 2020
	Runoff Standards Transition	202.5 202.2 202.5
SURFACE	Course, Definition Course, Description Runoff, Definition	62.7 602.1 806.2
	Water, Definition Water	806.2 831.1
SURFACE TRANSPORTATION	ON PROGRAM	43.1
SWALE	Definition	806.2
SWEPT WIDTH	Definition	62.4
	Design Considerations	404.1 404.2
	Т	
TAPERED INLET	Definition	806.2 826.4
TEXTURING	Rigid Pavement	622.9
THREE-CENTER CURVE	Intersections	405.7
THROUGHWAY	Definition	62.3
TIME OF CONCENTRATION	Channel Flow	816.6
	Combined Flow Culvert Flow Kinematic Wave Equation Kirpich Equation Overland Equation Soil Conservation Service (SCS) Equation Upland Method	816.6 816.6 816.6 816.6 816.6 816.6
TOLL ROAD, BRIDGE OR TU	JNNEL	62.3
TOPSOIL	Roadside Treatment	706.3
TRACKING WIDTH	Definition	62.4
	Design Considerations	404.1 404.2
TRAFFIC	Axle Load Spectra	613.4
	Considerations Considerations in Pavement Engineering Control Devices Control Devices	401.3 613 62.8 403.10
	liii	

	Control Plans, Special Problems	110.7
	Definitions	62.8
	Engineering	82.7
	Index, TI	613.3
	Interchanges	500
	Islands	405.4
	Lane	62.1
	Markings Noise Abatement	62.8 1100
	Pedestrian Refuge	405.4
	Ramp Intersection Flow	406
	Sign	62.8
	Signals	62.8
Specific	c Traffic Loading Considerations	613.5
	Volume Projections	613.2
	Volumes	102.1
TRAILS	Multipurpose	1003.5
TRANSIT	Bus Rapid Transit (BRT)	62.10
	Definition	62.10
	Design Vehicle	404.3
	Factors Affecting Design Loading Facilities	401.6 108.2
	Turning Templates	404.5
TRANSITIONS	General Standards, Pavement	206.1
	Lane Additions	206.2
	Lane Drops	206.3
	Pavement	206
	Spiral	203.8
	Superelevation	202.5
	Temporary Freeway	206.4
TRANSPIRATION		812.8
		819.2
TRANSPORTATION MANAGEMENT ARI	EA Definition	81.3
	Interchange Spacing	501.3
TRASH RACK	Definition	806.2
		822.2
TRAVELED WAY	Definition	62.1
	Design Considerations	404.2
	Standards	301
TREATED BASE AND SUBBASE		662.2
TREATED PERMEABLE BASE AND SUE	3BASE	662.3

Highway Design Manual		Index
		July 1, 2020
TREES	Conventional Highways	904.5
	Freeways and Expressways	904.5
TRUCK	Critical Lengths of Grade	204.5
	Design Vehicle Escape Ramps	404.3 702.1
	Turning Templates	404.5
	Turns	404.5
TRUMPET INTERQUANCE	Weighing Facilities	703.1
TRUMPET INTERCHANGE	- a	502.2
TRUNK LINE	Definition	806.2
TUNNEL	Classification	110.12
	Clearances Liner Plate	309.3 852.6
	Projects	110.12
Structural Repa	irs with Steel Tunnel Liner Plate	853.7 838.4
TURBULENCE	Definition	806.2
TURBULENT FLOW	Definition	806.2
TURNING LANES	Left-turn Channelization	405.2
TORRING LANES	Right-turn Channelization	405.2
	Separate	62.1
	Traffic Two-way Left-turn	403.6 405.2
TURNING RADIUS	Minimum	403.2 62.4
TURNING TEMPLATES	Millimum	404.3
TURNING TEMPLATES	Truck and Transit	404.3 407
TURNOUTS	Track and Transit	204.5
TURNS, PROHIBITED	Intersections	403.8
TWO-LANE CROSS SECTIONS	New Construction	307.2
TWO-LANE CROSS SECTIONS	RRR Projects	307.2
TWO-QUADRANT CLOVERLEAF INTER		502.2
TWO-QUADRANT CLOVERLEAF INTERCHANGE TWO-WAY LEFT-TURN LANES		405.2
WO-WAT ELIT-TORN LANES		700.2
U		
UNDERCUT	Definition	806.2
ONDEIGO	Deminion	865.2

Index	Highway Desig	gn Manual
July 1, 2020		
UNDERDRAINS	Design Criteria Installations Open Joint Perforated Pipe Pipe Selection of Type Service Life	842.4 842.2 842.5 842.5 842.5 842.7 842.6
UNDERFLOW	Definition	806.2
UNDERPASS	Railroad, Grade Line Railroad	204.8 208.9
UNDIVIDED HIGHWAYS	Axis of Rotation Grade Line	202.4 204.2
UNTREATED GRANULAR BASE	see BASE	
UTILITIES	Access Control Corner Radii Definition Design Speed Drive way Horizontal Clearance Interchange Spacing Median Standards Outer Separation Position of Curbs and Dikes Weaving Section at Walls	504.8 405.8 81.3 101.2 205.3 309.1 501.3 305.1 310.2 303.5 504.7 210.8
	V	
VACATION VALUE ANALYSIS VEGETATIVE EROSION CONTROL	Definition	110.9 110.9 706.2
VELOCITY HEAD	Definition	806.2 864.3
VERTICAL CLEARANCE VERTICAL CURVES	see CLEARANCES	204.4
TEITHORE GOILVEO	also see SIGHT DISTANCE	207.4
VISTA POINTS	Definition Aesthetic Factors	62.5 109.3

Highway Design Manual		Index
		July 1, 2020
	Design Standards Features and Facilities General Minimum Standards Site Selection Water Supply	904 904.3 904.1 904.1 904.2 905.2
VOLUME		62.8
	Design Hourly Volume Design Volume	103.1 62.8
	W	
WALKWAYS	see PEDESTRIAN FACILITIES	
WALLS	Head	826.3
WALLS, RETAINING	see EARTH RETAINING SYSTEMS	
WATER	Course, Definition	806.2
	Pollution, Control of Quality Control Boards Shed Table, Definition Way, Definition Wells, Abandonment	110.2 110.2 819.2 806.2 806.2 110.2
WATER LEVEL PROVINCE	Definition	820.5
	Annual Exceedance Probability Tide Gauge Stations Tailwater Elevation Co-tidal Lines Tidal Datums	820.3 820.4 820.5 820.8
WATER SUPPLY	Roadside Rests	913.5
	Roadside Rests and Landscaping Vista Points	912.1 914.3
WAVE	Height	873.2
VALE AVVINCE	Run-up	873.2
WEAVING	Sections	62.8 62.4
	Sections, Interchange	504.7
WEED CONTROL	Noxious, Control of	110.5
WEEPHOLES	Definition	806.2

Index	Highway Des	sign Manual
July 1, 2020		
WEIGHING FACILITIES	Truck	703.1
WEIR	Definition	806.2
WELLS		841.5
WELLO	Water, Abandonment	110.2
WETLANDS PROTECTION		110.4
WHEELBASE	Definition	62.4
		02.4
WHEELCHAIR RAMPS	see CURB RAMPS	0000
WIDENING	Pavement	206.2
	Ramps, for Trucks Pavement Design Life Pavement, Project Type Signalized Intersections Slope Benches and Cut Widening	504.3 612.3 603.2 405.9 304.3
WIDTH	Driveway, Access Openings on Expressways	205.1
	Driveway, Urban Lane Lane, on Curves Left Turn Lanes Median Opening for Falsework Pavement Right of Way Shoulder Structures Swept, Definition Swept, Design Considerations Tracking, Design Considerations Tracking, Design Considerations	205.3 301.1 504.3 405.2 305.1 204.8 301.1 306 302.1 208.1 62.4 404.2 62.4 404.2
	•	
YARDS	Maintenance	107.2
	Plant Sites, Contractors	112