CHAPTER 80 – APPLICATION OF DESIGN STANDARDS

Topic 81 – Project Development Overview

Index 81.1 – Philosophy

The Project Development process seeks to provide a degree of mobility to users of the transportation system that is in balance with other values. In the development of transportation projects, social, economic, and environmental effects must be considered fully along with technical issues so that final decisions are made in the best overall public interest. Attention should be given to such considerations as:

(a) Need to provide transportation for all users (motorists, bicyclists, transit riders, and pedestrians) of the facility and transportation modes.

(b) Attainment of community goals and objectives.

(c) Needs of low mobility and disadvantaged groups.

(d) Costs and benefits of eliminating or minimizing adverse effects on natural resources, environmental values, public services, aesthetic values, and community and individual integrity.

(e) Planning based on realistic financial estimates.

(f) The cost, ease, and safety of maintaining whatever is built.

Proper consideration of these items requires that a facility be viewed from the perspectives of the user, the nearby community, and larger statewide interests. For the user, efficient travel, mode selection, and safety are paramount concerns. At the same time, the community often is more concerned about local aesthetic, social, and economic impacts. The general population, however, tends to be interested in how successfully a project functions as part of the overall transportation system and how large a share of available capital resources it consumes. Therefore, individual projects must be selected for construction on the basis of overall system benefits as well as community goals, plans, and values.

Decisions must also emphasize the connectivity between the different transportation modes so that they work together effectively.

The goal is to increase person and goods throughput, highway mobility and safety in a manner that is compatible with, or which enhances, adjacent community values and plans.

81.2 Highway Context

The context of a highway is a critical factor when developing the purpose and need statement for a project in addition to making fundamental design decisions such as its typical cross section and when selecting the design elements and aesthetic features such as street furniture and construction materials. Designing a highway that is sensitive to, and respectful of, the

surrounding context is critical for project success in the minds of the Department and our stakeholders.

A “one-size-fits-all” design philosophy is not Departmental policy. Designers need to be aware of and sensitive to land use, community context and the associated user needs of the facility. In some instances, the design criteria and standards in this manual are based on the land use contexts in which the State highway is located, for instance: large population areas and downtowns in urban areas, small rural towns and communities, suburban commercial/residential areas, and rural corridors. This approach ensures the standards are flexible, and the approach allows and encourages methods to minimize impacts on scenic, historic, archaeological, environmental, and other important resources.

Beyond their intended transportation benefits, State highways can significantly impact the civic, social and economic conditions of local communities. Designing transportation facilities that integrate the local transportation and land uses while making the design responsive to the other needs of the community support the livability of the community and are usually a complementary goal to meeting the transportation needs of the users of the State highway system.

To do this successfully, the designer needs to have an understanding of the area surrounding the highway and the users of the highway, its function within the regional and State transportation systems, (which includes all transportation modes), and the level of access control needed. To gain this understanding, the designer must consult the Transportation Concept Reports and work with the planning division and the local agencies.

In this manual, the following concepts are used to discuss the context of a highway:

- Place Type - the surrounding built and natural environment;
- Type of Highway - the role the highway plays in terms of providing regional or interregional connectivity and local access; and,
- Access Control - the degree of connection or separation between the highway and the surrounding land use.

81.3 Place Types

Place types describe geographic areas based on land use, development density, population, and transportation and mobility options. While state highways can influence the development of communities, the reverse can also be true. As development, land use, and population change, the transportation network must also evolve to serve both uses and users. The place types described below are intentionally broad, and there is likely to be more than one place type within the limits of a single project. Ultimately, the place types identified can be used to determine the appropriate application of design guidance. These place type definitions are independent of the Federal government definitions of urban and rural areas. See Title 23 United States Code, Section 101 for further information. Place types for the project including their segment limits may be initially determined and documented by Planning as part of the project initiation phase.

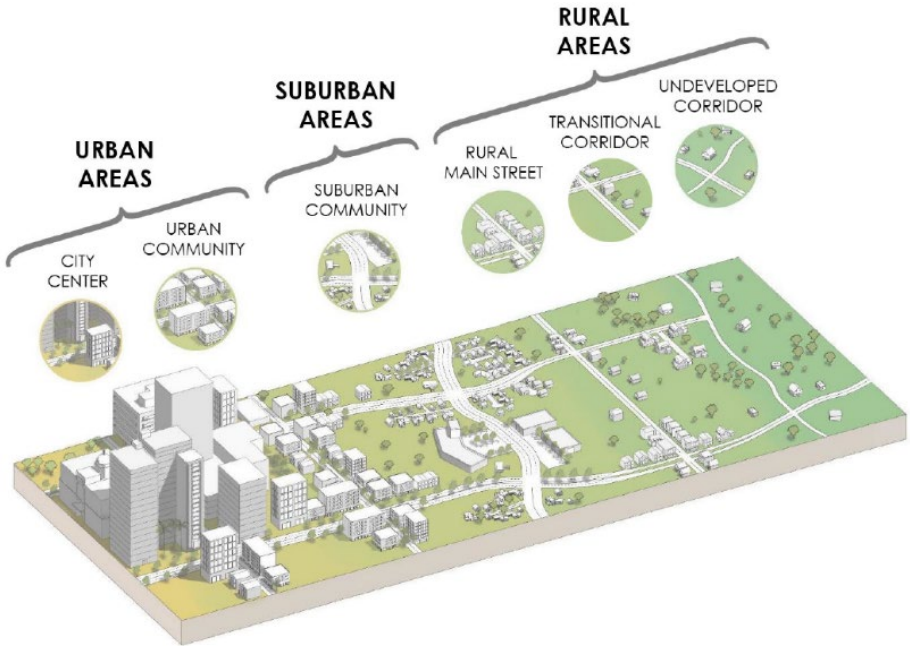
Additional Place Type guidance can also be found in the Smart Mobility Framework documents and the Main Street, California Guide. This place type guidance serves to identify common

needs and priorities but cannot be substituted for community input. Ongoing community engagement throughout the project planning, approval, design, and construction phases helps to formulate context sensitive project alternatives and transportation facilities that coordinate with the local needs. It is important to note that State Highway Main Streets (State highways that are functioning as community streets) can occur in all community place types.

Figure 81.3 depicts the typical place type development patterns used in this manual.

Figure 81.3

Place Types



(1) *Urban Areas.* Urban Area communities and City Centers are the major population centers in the State, although they cover only a small percentage of the land area. Large numbers of people live in these urbanized areas where growth is expected to continue. Active transportation (which can include walking, bicycling, rolling, and transit) is important in these areas, and as the facilities for pedestrians, bicyclists, and transit vehicles expand in Urban Areas, the percentage and number of travelers using active transportation modes is also likely to increase.

Urban Areas are high-density locations with a full range of land uses, and they can be further broken down into City Centers and Urban Communities. Urban Areas as described in this design manual may vary from the boundaries defined by the FHWA for federal funding purposes. For that definition, the HEPGIS tool on the FHWA website is available to determine if the project is in an urban area. Urban areas are found on the MPO & Air Quality tab of the tool, under FHWA Adjusted Urban Area.

(a) City Center (Central City, Center City). The City Center place type applies to the downtowns of our largest metropolitan areas. There are currently only a handful of

places like this in California and they include the central business districts of the state's major metropolitan areas: San Francisco, Oakland, San Jose, Sacramento, Los Angeles, and San Diego. The City Center place type is characterized by:

- High-density, compact urban form with buildings taller than four stories and minimal building setbacks; buildings front onto the street with easy pedestrian access.
- Dense street network with a walkable block pattern, often on a grid, typically with narrower lanes and parking located off-street in structures.
- Mixed-use development, typically with more office, civic, and hospitality uses than residential.
- High rates of bicycle, pedestrian, and transit mode share with lower vehicle speeds, increasing presence of micromobility, and lower rates of automobile ownership.
- Main Streets. Due to the intensity of development, nearly all streets in City Centers could be considered "Main Streets."

In City Centers, much of the transportation network has already been built out, but the existing right of way can be optimized to move people and goods most efficiently, while serving as a vital community space.

(b) Smart Mobility Vision for City Centers. City Centers' transportation needs can only be met through a concerted effort to maximize safety and convenience of all travel modes, along with a high degree of integration and ease of transition between the modes. City Centers include major transit hubs and transportation connections which are critical to the long-term success of the city, both to support the dense development and to support the local and regional economy. City Centers thrive when all modes of travel are accessible and well connected to Urban Communities. Urban Communities often exist adjacent to or near City Centers, such as the Mid-Wilshire district adjacent to Downtown Los Angeles, but they also include many mid-size cities with mixed-use centers, such as Santa Monica, Berkeley, or Santa Ana. This place type may occur within a larger metropolitan area or in more isolated locations in the State, such as the downtown areas of Santa Barbara or San Luis Obispo. Many Urban Communities were built prior to the widespread adoption of automobile use and their design supports walking, biking, and transit use through sidewalks, street trees, convenient destination density, and high-frequency bus and/or rail service. Urban Communities are typically characterized by:

- Centers or corridors of low-to mid-rise buildings with vertically and horizontally mixed land uses.
- Buildings are typically close to the street, although occasional strip commercial centers may exist.
- Moderately dense development, which may be primarily residential or include mixed-use centers.
- Fine-grained network of streets in a compact walkable block pattern, with good connectivity for non-motorized users.
- Parking options range from off-site nearby lots to on-site parking behind a building, or in a structure.
- Streets generally have narrow lanes, some on-street parking, variable bicycle facilities, and lower vehicle speeds.
- Main Streets. Depending on the mix of uses and density of development, many streets in Urban Communities would be considered "Main Streets."

In Urban Communities, the public right of way is often constrained and needs to balance different transportation modes. As Urban Communities intensify and expand with infill development, mobility needs and preferences for active transportation also evolve over time. Gaps in connectivity for bicycling are common, and the quality of the pedestrian environment varies significantly depending on the age of adjacent development.

Smart Mobility Vision for Urban Communities. The Smart Mobility vision for Urban Communities is similar to Center Cities: maximize safety and convenience for all travel modes. However, given the historical focus on vehicular circulation in this Place Type, the priority should shift to increasing walking, bicycling, and transit use. The greater the mode shift, the less space will be needed for parking, which frees up land for other, more valuable uses and activities.

(2) Suburban Areas. Suburban Areas are prevalent throughout California. While the original suburbs were developed as bedroom communities outside of cities or metropolitan areas, over time many independent communities in California have developed in this dispersed, low-density pattern that includes both residential and commercial zones. This place type often consists of extensive single-family neighborhoods, pockets of multi-family housing, parks, and schools, and strategically located single-story commercial centers. Relevant examples include Eastvale, Corona, Livermore, Roseville, and the master planned communities of south Orange County. Suburban Areas are characterized by:

- Low-rise residential and non-residential uses (mostly 1 to 2 stories in height), with clusters of office, civic, or other institutional buildings ranging from 2 stories or more in height.
- A hierarchy of street sizes that excludes through-traffic from certain areas and limits connectivity between different street types.
- Segregated land uses, including residential neighborhoods and town centers, that are difficult to travel between without a car.
- Large arterial roadways with wide lanes, shoulders and turn pockets, synchronized signal timing, and wide intersections designed to maximize free flow of vehicles.
- Expansive, often underused surface parking with buildings set back behind parking.
- Higher density suburban town centers, particularly those that include retail or civic uses, are often found along suburban “Main Streets.”

In Suburban Areas, the SHS typically provides a connection to nearby Urban Communities, as well as access between suburban town centers. Generally, State highways provide access to, but not through, suburban residential areas. Arterials in Suburban Areas have traditionally been designed to accommodate high volumes of vehicles, and generally include sidewalks, but not bicycle facilities. Passenger rail and transit facilities may also be present within the State highway.

Smart Mobility Vision for Suburban Communities. Decisions made by Caltrans in Suburban Communities have a direct impact on the potential evolution of the Place Type from a single use to a mixed-use environment. There is a symbiotic relationship between land use/urban form and the extent of smart mobility improvements. The Smart Mobility vision for Suburban Communities is to transform high-speed, car-dominated corridors into a multimodal environment that supports the densification and mixing of uses that is occurring over time. Potential developers along corridors are attracted by convenient and safe mobility options and an aesthetically pleasing streetscape – these features add value to the area which can then support the higher lease rates and rents needed to support new development.

(3) Rural Areas. The Rural Area Place Type applies to the low-density areas outside the built-up urban and suburban communities and can include agricultural areas, natural areas, and the small towns that support the inhabitants of these regions. Single occupancy vehicle use is high in Rural Areas, but zero- or low-vehicle ownership households may exist here as well. State highways through rural towns must consider local needs for vibrant community main streets, as well as the public's need for roadways that provide local, regional, and statewide connections. Highway design should respond to its context, thus for the purposes of applying design guidance, the Rural Area place type is broken up into Rural Main Streets (Rural Towns), Transitional Corridors, and Undeveloped Corridors. The great variability in traffic speeds, traffic volumes, roadway context, and roadway users necessitates the development of variable design solutions in each of these settings.

a) Rural Main Streets (Rural Towns). State highways in this scenario are usually a conventional highway main street through the center of town, where they may be the only main street, or one of several. A subset of Rural Towns is Gateway Communities, which are visitor-serving places situated near entries to national parks, recreational areas, and other scenic places. Examples of Gateway Communities include Three Rivers, near Sequoia National Park; Twentynine Palms, near Joshua Tree National Park; and Orick, near Redwood National Park. These communities, often situated along the highway, tend to rely heavily on the revenue provided by multimodal visitors seeking to access nearby parks and scenic resources. In many of these Gateway Communities, the State highway serves as a Rural Main Street. Rural Main Streets vary with the character of their communities, but they have many common characteristics:

- Rural Main Streets are often part of a small commercial grid around the main arterial or highway and have lower speeds. In some cases, frontage roads separate regional and local traffic.
- Land use is generally dominated by commercial and small office facilities, although this can vary with the community.
- Buildings lining Rural Main Streets, in contrast to Undeveloped or Transitional Corridors, can be up to three stories tall and very close together or abutting one another.
- Parking facilities are variable and may be located on-street or in small surface lots adjacent to or behind buildings.

Smart Mobility Vision for Rural and Rural Main Street Place Types. The vision for smart mobility in Rural Areas is to maintain walkable rural towns with streets that are operated and designed for speeds suitable for their context and safety for all users. Acknowledging that motorized vehicle travel will continuing to be the predominant mode in Rural areas outside of Rural Main Streets, efforts should be made to increase the number of vehicle trips with multiple passengers, to utilize transit as much as possible, and to improve bicycle safety on connecting roads including state highways. In Rural Main Street areas, focus on expanding use of pedestrian and bicycle modes and make them as safe and convenient to use as possible. Gateway Communities should be well connected by transit and multi-use trails to nearby scenic resources. As in other Place Types, Rural areas thrive when all modes of travel are accessible and well connected.

b) Transitional Corridors. State highways traveling through these lands tend to be increasingly clustered with industrial, commercial, and residential areas as they lead from an undeveloped rural area into a rural city or town center. The transition between high-speed rural highways and low-speed main streets and town centers occurs in these corridors and may employ traffic calming features to reinforce the lower posted speeds. In some cases, the nature of development in these areas is itself in transition as communities change over time, but in other instances this development pattern may remain stable for many years. Transitional corridors are characterized by:

- Low-rise one- to two-story buildings that are typically set back from the highway with parking areas placed in front.
- A moderately dense street network, with more frequent intersections and driveways than the outlying rural areas.

Truck traffic on these highways tends to serve the needs of industrial, commercial and retail buildings; however, there will be a component of the truck traffic that is transporting loads inter-regionally. At the same time, these corridors may be used by an increasing number of locals seeking to access the town center.

c) Undeveloped Corridors. Undeveloped Corridors feature very low building density and large tracts of agricultural or other undeveloped or natural land. This place type includes many of California's iconic landscapes, such as the National and State Forests in the Sierras, the vineyards of the coastal ranges and foothills, the Mojave Desert, the orchards and fields of the Central Valley, and the Pacific Coast, to name a few. See HDM Topic 109 for additional information on preserving the natural beauty of these corridors. Some of these Undeveloped Corridors are heavily used by recreational bicyclists and tourists, and experience high seasonal and weekend use. Undeveloped Corridors are often characterized by:

- Very low-density development with one- or two-story buildings.
- Low intersection density with a street pattern that is often non-rectilinear, reflecting underlying topography.
- Large parcels with buildings generally set far back from property lines.
- A diverse mix of land uses, where residences are often interspersed with agricultural, commercial, or other services.

State Highway projects in Undeveloped Corridors have traditionally focused on efficient movement of vehicles and freight over long distances, but often the state highway provides the only connection between destinations for non-motorized users, as well. The low user volumes, long distances, and variable terrain in these corridors may not lend themselves to a full range of complete streets features, but accommodations to support comfort and safety of non-motorized users should be incorporated wherever feasible.

(4) Special Use Areas and Protected Lands. These place types generally have a character separate from their surroundings and a specialized land use. Protected Lands are protected from development by virtue of ownership, long-term regulation, or resource constraints. Examples include national forests, state parks, nature preserves, and lands held in perpetuity by land trusts. Protected Lands are generally preservation-focused, and transportation projects should provide access while minimizing impacts. Providing access, including through extreme weather events, and maintaining goods movement are the primary focus of

infrastructure improvements. Improving bicycle/pedestrian and transit/shuttle infrastructure in this place type can help to minimize environmental impacts.

Special Use Areas are large tracts of single use lands that are outside of, or poorly integrated with, their surroundings, such as airports, industrial facilities, military installations, and some university campuses. The transportation needs of Special Use Areas are highly variable, ranging from the carefully limited access to military installations to highly accessible university campuses, and transportation projects should respond to their unique needs and users.

81.4 Type of Highway

Much of the following terminology is either already discussed in Chapter 20 or defined in Topic 62. The additional information in this portion of the manual is being provided to connect these terms with the guidance that is being provided.

(1) Functional Classification. One of the first steps in the highway design process is to define the function that the facility is to serve. The two major considerations in functionally classifying a highway are access and throughput. Access and mobility are inversely related; as access is increased, mobility decreases. In the AASHTO "A Policy on Geometric Design of Highways and Streets", highways are functionally classified first as either urban or rural. The hierarchy of the functional highway system within either an urban or rural area consists of the following:

- Principal arterial - main movement (high mobility, limited access) Typically 4 lanes or more;
- Minor arterial - interconnects principal arterials (moderate mobility, limited access) Typically 2 or 3 lanes with turn lanes to benefit through traffic;
- Collectors - connects local roads to arterials (moderate mobility, moderate access) with few businesses; and,
- Local roads and streets - permits access to abutting land (high access, limited mobility).

The California Road System (CRS) maps are the official functional classification maps approved by FHWA. These maps show functional classification of roads. See the link at https://caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=026e830c914c495797c969a3e5668538.

(2) Interstate Highways. The interstate highway system was originally designed to be high-speed interregional connectors and it is a portion of the National Highway System (NHS). In urban and suburban areas, a large percentage of vehicular traffic is carried on the interstate highway system, rather than on the local arterials and streets.

(3) State Routes. The State highway system is described in the California Streets and Highway Code, Division 1, Chapter 2 and they are further defined in this manual in Topic 62.3, Highway Types which provides definitions for freeways, expressways, and highways.

81.5 Access Control

Index 62.3 defines a controlled access highway and a conventional highway. The level of access control plays a part in determining the design standards that are to be utilized when designing a highway. See Index 405.6 for additional access control guidance.

81.6 Design Standards and Highway Context

The design standards were initially established to increase highway mobility and development, promoting a State transportation system that operated at selected levels of service consistent with projected traffic volumes and highway classification. Design standards revolved around FHWA's controlling criteria, evolving over time to more fully consider adjacent community values, local decisions making, and area context.

The design guidance and standards in this manual have been developed with the intent of ensuring that:

- Designers have the ability to design for all modes of travel (vehicular, bicycle, pedestrian, truck and transit); and,
- Designers have the flexibility to tailor a project to the unique circumstances that relate to it and its location, while meeting driver expectation to achieve established project goals.

Designers should balance the interregional transportation needs with the needs of the communities they pass through. The design of projects should, when possible, expand the options for biking, walking, and transit use. In planning and designing projects, the project development team should work with locals that have any livable policies as revitalizing urban centers, building local economies, and preserving historic sites and scenic country roads. The "Main Street, California" document published by the Department should be consulted for additional guidance as should the FHWA publication "Flexibility in Highway Design".

Early consultation and discussion with the Project Delivery Coordinator and the District Design Liaison during the Project Initiation Document (PID) phase is also necessary to avoid issues that may arise later in the project development process. Design Information Bulletin 78 "Design Checklist for the Development of Geometric Plans" is a tool that can be used to identify and discuss design features that may deviate from standard.

For projects to accomplish complete streets facilities on the State Highway System per Director's Policy 37, Design Information Bulletin 94 "Complete Streets: Contextual Design Guidance" can be used along with this manual as applicable.

Topic 82 – Application of Standards

82.1 Highway Design Manual Standards

(1) General. The highway design criteria and policies in this manual provide a guide for the engineer to exercise sound judgment in applying standards, consistent with the above Project Development philosophy, in the design of projects. This guidance allows for flexibility in applying design standards and documenting design decisions that take the context of the project location into consideration, which enables the designer to tailor the design, as appropriate, for the specific circumstances while maintaining safety.

The design standards used for any project should equal or exceed the minimum given in the Manual to the maximum extent feasible, taking into account costs (initial and life-cycle), traffic volumes, traffic and safety benefits, project goals, travel modes, facility type, right of way, socio-economic and environmental impacts, maintenance, etc. Because design standards have evolved over many years, many existing highways do not conform fully to current standards. It is not intended that current manual standards be applied retroactively to all existing State highways; such is neither warranted nor economically feasible. However, when warranted, upgrading of existing roadway features such as guardrail, lighting, superelevation, roadbed width, etc., should be considered, either as independent projects or as part of larger projects. A record of the decision not to upgrade existing non-standard design features are to be provided through the process described in Index 82.2.

This manual does not address temporary construction features. It is recognized that the construction conditions encountered are so diverse and variable that it is not practical to set geometric criteria. Guidance for use of traffic control devices for temporary construction zones can be found in Part 6 – Temporary Traffic Control of the California Manual on Uniform Traffic Control Devices (California MUTCD). Guidance for the engineering of pavements in temporary construction zones is available in Index 612.6. In this manual, design standards and guidance are described as follows (see Index 82.4 for other procedural requirements):

(2) Absolute Requirements. Design guidance related to requirements of law, policy, or statute that do not allow exception are phrased by the use of “must,” “is required,” “without exception,” “are to be,” “is to be,” “in no event,” or a combination of these terms.

(3) Controlling Criteria. The FHWA has designated the following ten controlling criteria for projects on the National Highway System (NHS) as comprehensive design standards which cover a multitude of design characteristics, allowing flexibility in application:

- Design Speed
- Lane Width
- Shoulder Width
- Horizontal Curve Radius
- Superelevation Rate
- Stopping Sight Distance

- Maximum Grade
- Cross Slope
- Vertical Clearance
- Design Loading Structural Capacity (non-geometric)

Design loading structural capacity criteria applies to all NHS facility types. See the Technical Publications – DES Manuals for further information.

The remaining geometric criteria listed above are applicable to the NHS as follows: (1) On high-speed roadways (Interstate highways, other freeways, and roadways with design speeds of greater than or equal to 50 mph), all the geometric criteria apply. The stopping sight distance criteria applies to horizontal alignments and vertical alignments except for sag vertical curves; and (2) On low-speed roadways (non-freeways with design speeds less than 50 mph), only the design speed criteria applies.

The two speed categories stated above that FHWA designates match the high- and low-speed definitions in Index 62.8(13) when considering that design speed and posted speed are set in 5 mph increments.

The design standards related to the geometric criteria are identified in Table 82.1A among other important geometric standards in this manual regardless of the design speed of the roadway and whether or not the roadway is part of the NHS.

(4) Boldface and Underlined Standards. Boldface and underlined design standards are those considered most essential to achievement of overall design objectives. Many pertain to requirements of law or regulations such as those embodied in the FHWA's ten controlling criteria (see Index 82.1(3)). In addition to the FHWA's ten controlling criteria are "Caltrans-only" standards that have been identified by Caltrans as most essential pertaining to requirements of State law, policy or objectives. The underlined standards allow greater flexibility in application to accommodate various design constraints. The design standards are shown in this manual as either **Boldface** type with the word "shall" (listed in Table 82.1A) or <u>Underlined</u> type with the word "should" (listed in Table 82.1B).

(5) Decision Requiring Other Approvals. There are design criteria decisions that are not bold or underlined text which require specific approvals from individuals to whom such decisions have been delegated. These individuals include, but are not limited to, District Directors, Project Delivery Coordinators or their combination as specified in this manual. These decisions should be documented as the individual approving desires.

(6) Permissive Standards. All guidance other than absolute requirements, standards, or decisions requiring other approvals, whether indicated by the use of "should", "may", or "can" are permissive.

(7) Other Caltrans Publications. In addition to the design standards in this manual, see Index 82.7 for general information on the Department's traffic engineering policy, standards, practices and study warrants.

Caution must be exercised when using other Caltrans publications which provide guidelines for the design of highway facilities, such as HOV lanes. These publications do not contain design standards; moreover, the designs suggested in these publications do not always meet Highway Design Manual Standards. Therefore, all other Caltrans publications must be used in conjunction with this manual.

(8) Transportation Facilities Under the Jurisdiction of Others. Generally, if the local road or street is a Federal-aid route it should conform to AASHTO standards; see Topic 308 – Cross Sections for Roads Under Other Jurisdictions. Occasionally though, projects on the State highway system involve work on adjacent transportation facilities that are under the

jurisdiction of cities and counties. Some of these local jurisdictions may have published standards for facilities that they own and operate. The guidance in this manual may be applicable, but it was prepared for use on the State highway system. Thus, when project work impacts adjacent transportation facilities that are under the jurisdiction of cities and counties, local standards and AASHTO guidance must be used in conjunction with this manual to encourage designs that are sensitive to the local context and community values. Agreeing on which standards will be used needs to be decided early in the project delivery process and on a project by project basis.

82.2 Approvals for Nonstandard Design

(1) Boldface Standards. Design features or elements which deviate from standards indicated in boldface type require the approval of the Chief, Division of Design. This approval authority has been delegated to the District Directors for projects on conventional highways and expressways, and for certain other facilities in accordance with the current District Design Delegation Agreement. Approval authority for design standards indicated in boldface type on all other facilities has been delegated to the Project Delivery Coordinators except as noted in Table 82.1A where: (a) the standard has been delegated to the District Director, (b) the standards in Chapters 600 through 680 requires the approval of the State Pavement Engineer, and (c) specifically delegated to the District Director per the current District Design Delegation Agreements and may involve coordination with the Project Delivery Coordinator. See the HQ Division of Design website for the most current District Design Delegation Agreements.

The current procedures and documentation requirements pertaining to the approval process for deviation from design standards indicated in boldface type as well as the dispute resolution process are contained in Chapter 21 of the Project Development Procedures Manual (PDPM).

Design exception approval must be obtained pursuant to the instructions in PDPM Chapter 9.

The Moving Ahead for Progress in the 21st Century Act (MAP-21) of 2012 allowed significant delegation to the states by FHWA to approve and administer portions of the Federal-Aid Transportation Program. MAP-21 further allowed delegation to the State DOT's and in response to this a Stewardship and Oversight Agreement (SOA) document between FHWA and Caltrans was signed. The SOA outlines the process to determine specific project related delegation to Caltrans. In general, the SOA delegates approval of deviations from design standards related to the ten controlling criteria on all Interstate projects whether FHWA has oversight responsibilities or not to Caltrans. Exceptions to this delegation would be for projects of FHWA Division Interest, which are determined on a project by project basis. See Index 43.2 for additional information. Consultation with FHWA should be sought as early in the project development process as possible. However, formal FHWA approval, if applicable, shall not be requested until the appropriate Caltrans representative has approved the design decision document.

FHWA approval is not required for deviations from "Caltrans-only" standards. Table 82.1A identifies these "Caltrans-only" standards. Where FHWA approval of a deviation from a design standard is required, only cite the standards that are identified by the FHWA as ten controlling criteria, see Index 82.1(3).

For local facilities crossing the State right of way see Index 308.1.

(2) Underlined Standards. The authority to approve deviations from standards indicated in underlined type has been delegated to the District Directors. A list of these standards is provided in Table 82.1B. Proposals for deviations from these standards can be discussed

with the District Design Liaison during development of the approval documentation. The responsibility for the establishment of procedures for review, documentation, and long term retention of approved design decisions from these standards has also been delegated to the District Directors.

(3) Decisions Requiring Other Approvals. The authority to approve specific decisions identified in the text are also listed in Table 82.1C. The form of documentation or other instructions are provided as directed by the approval authority.

(4) Permissive Standards. A record of deviation from permissive standards and the disclosure of the engineering decisions in support of the deviation should be documented and placed in the project file. This principle of documentation also applies when following other Division of Design guidance, e.g., Design Information Bulletins and Design Memos. The form of documentation and other instructions on long term retention of these engineering decisions are to be provided as directed by the District approval authority.

(5) Local Agencies. Cities and counties are responsible for the design decisions they make on transportation facilities they own and operate. The responsible local entity is delegated authority to exercise their engineering judgment when utilizing the applicable design guidance and standards, including those for bicycle facilities established by Caltrans pursuant to the Streets and Highways Code Sections 890.6 and 890.8 and published in this manual. For further information on this delegation and the delegation process, see the Caltrans Local Assistance Procedures Manual, Chapter 11.

82.3 FHWA and AASHTO Standards and Policies

The standards in this manual generally conform to the standards and policies set forth in the AASHTO publications, "A Policy on Geometric Design of Highways and Streets" (2018) and "A Policy on Design Standards-Interstate System" (2016). A third AASHTO publication, the latest edition of the "Roadside Design Guide", focuses on creating safer roadsides. These three documents, along with other AASHTO and FHWA publications cited in 23 CFR Ch 1, Part 625, Appendix A, contain most of the current AASHTO policies and standards, and are approved references to be used in conjunction with this manual.

AASHTO policies and standards, which are established as nationwide standards, do not always satisfy California conditions. When standards differ, the instructions in this manual govern, except when necessary for FHWA project approval (Index 108.7, Coordination with the FHWA).

The use of publications and manuals that are developed by organizations other than the FHWA and AASHTO can also provide additional guidance not covered in this manual. The use of such guidance coupled with sound engineering judgment is to be exercised in collaboration with the guidance in this manual.

82.4 Mandatory Procedural Requirements

Required procedures and policies for which Caltrans is responsible, relating to project clearances, permits, licenses, required tests, documentation, value engineering, etc., are indicated by use of the word "must". Procedures and actions to be performed by others (subject to notification by Caltrans), or statements of fact are indicated by the word "will".

82.5 Effective Date for Implementing Revisions to Design Standards

Revisions to design standards will be issued with a stated effective date. It is understood that all projects will be designed to current standards unless a design decision has been approved in accordance with Index 82.2 or otherwise noted by separate Design Memorandum.

On projects where the project development process has started, the following conditions on the effective date of the new or revised standards will be applied: For all projects where the PS&E has not been finalized, the new or revised design standards shall be incorporated unless this would impose a significant delay in the project schedule or a significant increase in the project engineering or construction costs. The Project Delivery Coordinator or individual delegated authority must make the final determination on whether to apply the new or previous design standards on a project-by-project basis for roadway features.

- For all projects where the PS&E has been submitted to Headquarters Office Engineer for advertising or the project is under construction, the new or revised standards will be incorporated only if they are identified in the Change Transmittal as requiring special implementation.

For locally-sponsored projects, the Oversight Engineer must inform the funding sponsor within 15 working days of the effective date of any changes in design standards as defined in Index 82.2.

82.6 Design Information Bulletins and Other Caltrans Publications

In addition to the design standards in this manual, Design Information Bulletins (DIBs) establish policies and procedures for the various design specialties of the Department that are in the Division of Design. Some DIBs may eventually become part of this manual, while others are written with the intention to remain as design guidance in the DIB format. References to DIBs are made in this manual by the “base” DIB number only and considered to be the latest version available on the Department Design website. See the Department Design website for further information concerning DIB numbering protocol and postings.

Caution must be exercised when using other Caltrans publications, which provide guidelines for the design of highway facilities, such as HOV lanes. These publications do not contain design standards; moreover, the designs suggested in these publications do not always meet Highway Design Manual Standards. Therefore, all other Caltrans publications must be used in conjunction with this manual.

82.7 Traffic Engineering

The Division of Traffic Operations maintains engineering policy, standards, practices and study warrants to direct and guide decision-making on a broad range of design and traffic engineering features and systems, which are provided to meet the site-specific safety and mobility needs of all highway users.

The infrastructure within a highway or freeway corridor, segment, intersection or interchange is not “complete” for drivers, bicyclists and pedestrians unless it includes the appropriate traffic control devices; traffic safety systems; operational features or strategies; and traffic management elements and or systems. The presence or absence of these traffic elements and systems can have a profound effect on safety and operational performance. As such, they are commonly employed to remediate performance deficiencies and to optimize the overall performance of the “built” highway system. For additional information visit the Division of Traffic Operations website at http://www.dot.ca.gov/trafficops/.

Table 82.1A

Boldface Standards

CHAPTER 100	BASIC DESIGN POLICIES
Topic 101	Design Speed
Index 101.1	Technical Reductions of Design Speed
101.1	Selection of Design Speed - Local Facilities
101.1	Selection of Design Speed - Local Facilities - with Connections to State Facilities
101.2	Design Speed Standards
Topic 104	Control of Access
Index 104.4	Protection of Access Rights(1)
CHAPTER 200	GEOMETRIC DESIGN AND STRUCTURE STANDARDS
Topic 201	Sight Distance
Index 201.1	Stopping Sight Distance Standards
Topic 202	Superelevation
Index 202.2	Standards for Superelevation
202.7	Superelevation on City Streets and County Roads
Topic 203	Horizontal Alignment
Index 203.1	Horizontal Alignment - Local Facilities
203.1	Horizontal Alignment and Stopping Sight Distance
203.2	Standards for Curvature – Minimum Radius
203.2	Standards for Curvature – Lateral Clearance
Topic 204	Grade
Index 204.1	Standards for Grade - Local Facilities
204.3	Standards for Grade

Design exception approval of Boldface Standards for nonfreeway facilities, including local streets and roads at interchanges, has been delegated to the Districts. In addition, some District delegations included Boldface Standards applicable to freeways. See your District Design Delegation Agreement for specific delegation.

(1) Caltrans-only Boldface Standard.

(2) Authority to approve deviations from this Boldface Standard is delegated to the State Pavement Engineer.

Table 82.1A

Boldface Standards (Cont.)

204.8	Vertical Falsework Clearances(1)
Topic 205	Road Connections and Driveways
Index 205.1	Sight Distance Requirements for Access Openings on Expressways
Topic 208	Bridges, Grade Separation Structures, and Structure Approach Embankment
Index 208.1	Bridge Width(1)
208.4	Bridge Sidewalk (Width)(1)
208.10	Barriers on Structures with Sidewalks(1)
208.10	Bridge Approach Railings(1)
CHAPTER 300	GEOMETRIC CROSS SECTION
Topic 301	Traveled Way Standards
Index 301.1	Lane Width
301.2	Class II Bikeway Lane Width(1)
301.3	Cross Slopes – New Construction
301.3	Cross Slopes – Resurfacing or widening
301.3	Cross Slopes – Unpaved Roadway
301.3	Algebraic Differences in Cross Slopes
Topic 302	Shoulder Standards
Index 302.1	Shoulder Width
302.2	Shoulder Cross Slopes -Bridge
302.2	Shoulder Cross Slopes – Left
302.2	Shoulder Cross Slopes – Paved Median
302.2	Shoulder Cross Slopes - Right
Topic 305	Median Standards

Design exception approval of Boldface Standards for nonfreeway facilities, including local streets and roads at interchanges, has been delegated to the Districts. In addition, some District delegations included Boldface Standards applicable to freeways. See your District Design Delegation Agreement for specific delegation.

(1) Caltrans-only Boldface Standard.

(2) Authority to approve deviations from this Boldface Standard is delegated to the State Pavement Engineer.

Table 82.1A

Boldface Standards (Cont.)

Index 305.1	Median Width – Conventional Highways(1)
305.1	Median Width – Freeways and Expressways(1)
Topic 307	Cross Sections for State Highways
Index 307.2	Shoulder Standards for Two-lane Cross Sections for New Construction
Topic 308	Cross Sections for Roads Under Other Jurisdictions
Index 308.1	Cross Section Standards for City Streets and County Roads without Connection to State Facilities
308.1	Minimum Width of 2-lane Over-crossing Structures for City Streets and County Roads without Connection to State Facilities(1)
308.1	Cross Section Standards for City Streets and County Roads with Connection to State Facilities
308.1	Two-Lane Local Road Lane Width for City Streets and County Roads within Interchange
308.1	Multi-Lane Local Road Lane Width for City Streets and County Roads within Interchange
308.1	Shoulder Width Standards for City Streets and County Roads Lateral Obstructions
308.1	Shoulder Width Standards for City Streets and County Roads with Curbs and Gutter
308.1	Minimum Width for 2-lane Overcrossing at Interchanges(1)
Topic 309	Clearances
Index 309.1	Horizontal Clearances and Stopping Sight Distance
309.1	Horizontal Clearances(1)
309.1	High Speed Rail Clearances – Minimum Shoulder Width
309.2	Vertical Clearances - Minor Structures
309.2	Vertical Clearances - Rural and Single Interstate Routing System

Design exception approval of Boldface Standards for nonfreeway facilities, including local streets and roads at interchanges, has been delegated to the Districts. In addition, some District delegations included Boldface Standards applicable to freeways. See your District Design Delegation Agreement for specific delegation.

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(2) Authority to approve deviations from this Boldface Standard is delegated to the State Pavement Engineer.

Table 82.1A

Boldface Standards (Cont.)

309.3	Horizontal Tunnel Clearances(1)
309.3	Vertical Tunnel Clearances
309.4	Lateral Clearance for Elevated Structures(1)
309.5	Structures Across or Adjacent to Railroads - Vertical Clearance
Topic 310	Frontage Roads
Index 310.1	Frontage Road Width Cross Section
CHAPTER 400	INTERSECTIONS AT GRADE
Topic 404	Design Vehicles
Index 404.2	Design Vehicle–Traveled Way(1)
Topic 405	Intersection Design Standards
Index 405.2	Left-turn Channelization - Lane Width
405.2	Left-turn Channelization - Lane Width – Restricted Urban
405.2	Two-way Left-turn Lane Width
405.3	Right-turn Channelization – Lane and Shoulder Width
CHAPTER 500	TRAFFIC INTERCHANGES
Topic 501	General
Index 501.3	Interchange Spacing(1)
Topic 502	Interchange Types
Index 502.2	Isolated Off-Ramps and Partial Interchanges(1)
502.3	Route Continuity(1)
Topic 504	Interchange Design Standards
Index 504.2	Location of Freeway Entrances & Exits(1)
504.2	Ramp Deceleration Lane and “DL” Distance(1)
504.3	Ramp Lane Width

Design exception approval of Boldface Standards for nonfreeway facilities, including local streets and roads at interchanges, has been delegated to the Districts. In addition, some District delegations included Boldface Standards applicable to freeways. See your District Design Delegation Agreement for specific delegation.

(1) Caltrans-only Boldface Standard.

(2) Authority to approve deviations from this Boldface Standard is delegated to the State Pavement Engineer.

Table 82.1A

Boldface Standards (Cont.)

504.3	Ramp Shoulder Width
504.3	Ramp Lane Drop Taper Past the Limit Line(1)
504.3	Metered Multi-Lane Ramp Lane Drop Taper Past the Limit Line(1)
504.3	Ramp Meters on Connector Ramps(1)
504.3	Metered Connector Lane Drop(1)
504.3	Distance Between Ramp Intersection and Local Road Intersection(1)
504.4	Freeway-to-freeway Connections – Shoulder Width – 1 and 2-Lane
504.4	Freeway-to-freeway Connections – Shoulder Width – 3-Lane
504.7	Minimum Entrance Ramp-to-Exit Ramp Spacing(1)
504.8	Access Control along Ramps(1)
504.8	Access Control at Ramp Terminal(1)
504.8	Access Rights Opposite Ramp Terminals(1)
CHAPTER 610	PAVEMENT ENGINEERING CONSIDERATIONS
Topic 612	Pavement Design Life
Index 612.2	New Construction and Reconstruction(1), (2)
612.3	Widening(1), (2)
612.5	Roadway Rehabilitation(1), (2)
Topic 613	Traffic Considerations
Index 613.4	Specific Traffic Loading Considerations(1), (2)
CHAPTER 620	RIGID PAVEMENT
Topic 622	Engineering Requirements

Design exception approval of Boldface Standards for nonfreeway facilities, including local streets and roads at interchanges, has been delegated to the Districts. In addition, some District delegations included Boldface Standards applicable to freeways. See your District Design Delegation Agreement for specific delegation.

(1) Caltrans-only Boldface Standard.

(2) Authority to approve deviations from this Boldface Standard is delegated to the State Pavement Engineer.

Table 82.1A

Boldface Standards (Cont.)

Index 622.5	Transition Panels, Terminal Joints and End Anchors(1), (2)
Index 622.7	Dowel Bars and Tie Bars(1) (2)
Topic 625	Engineering Procedures for Pavement Rehabilitation
Index 625.2	Rigid Pavement Rehabilitation Strategies(1), (2)
Topic 626	Other Considerations
Index 626.2	Shoulder(1), (2)
626.2	Tied Rigid Shoulders or Widened Slab Standards(1), (2)
626.2	Tied Rigid Shoulders or Widened Slab at Ramps and Gore Standard(1), (2)
CHAPTER 630	FLEXIBLE PAVEMENT
Topic 635	Engineering Procedures for Flexible Pavement Rehabilitation
Index 635.2	Mechanistic-Empirical (ME) Design Method for Rehabilitation(1), (2)
CHAPTER 700	MISCELLANEOUS STANDARDS
Topic 701	Fences
Index 701.2	Fences on Freeways and Expressways(1)
CHAPTER 900	LANDSCAPE ARCHITECTURE
Topic 904	Planting Design
Index 904.9	Plant Establishment
Topic 905	Irrigation Design
Index 905.2	Water Supply

Design exception approval of Boldface Standards for nonfreeway facilities, including local streets and roads at interchanges, has been delegated to the Districts. In addition, some District delegations included Boldface Standards applicable to freeways. See your District Design Delegation Agreement for specific delegation.

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(2) Authority to approve deviations from this Boldface Standard is delegated to the State Pavement Engineer.

Table 82.1A

Boldface Standards (Cont.)

Topic 912	Roadside Site Design
Index 912.1	Freeway Ramp Design
Topic 913	Safety Roadside Rest Areas
Index 913.5	Public Pay Telephone
CHAPTER 1000	BICYCLE TRANSPORTATION DESIGN
Topic 1003	Design Criteria
Index 1003.1	Class I Bikeway Widths(1)
1003.1	Class I Bikeway Shoulder Width(1)
1003.1	Class I Bikeway Horizontal Clearance(1)
1003.1	Class I Bikeway Structure Width(1)
1003.1	Class I Bikeway Vertical Clearance(1)
1003.1	Class I Bikeway Minimum Separation From Edge of Traveled Way(1)
1003.1	Physical Barriers Adjacent to Class I Bikeways(1)
1003.1	Class I Bikeway in Freeway Medians(1)
1003.1	Class I Bikeway Design Speeds(1)
1003.1	Stopping Sight Distance
1003.1	Bikeway Shoulder Slope(1)
1003.1	Obstacle Posts or Bollards in Bicycle Paths(1)
CHAPTER 1100	HIGHWAY TRAFFIC NOISE ABATEMENT
Topic 1102	Design Criteria
Index 1102.2	Horizontal Clearance to Noise Barrier(1)
1102.2	Noise Barrier on Safety Shape Concrete Barrier(1)

Design exception approval of Boldface Standards for nonfreeway facilities, including local streets and roads at interchanges, has been delegated to the Districts. In addition, some District delegations included Boldface Standards applicable to freeways. See your District Design Delegation Agreement for specific delegation.

(1) Caltrans-only Boldface Standard.

(2) Authority to approve deviations from this Boldface Standard is delegated to the State Pavement Engineer.

Table 82.1B

Underlined Standards

CHAPTER 100	BASIC DESIGN POLICIES
Topic 101	Design Speed
Index 101.1	Selection of Design Speed – Local Facilities
101.1	Selection of Design Speed – Local Facilities – with Connections to State Facilities
101.2	Design Speed Standards
Topic 104	Control of Access
Index 104.5	Relation of Access Opening to Median Opening
Topic 105	Pedestrian Facilities
Index 105.2	Minimum Sidewalk Width – Next to a Building
105.2	Minimum Sidewalk Width – Not Next to a Building
105.5	Curb Ramp for each Crossing
Topic 107	Roadside Installations
Index 107.1	Standards for Roadway Connections
107.1	Number of Exits and Entrances Allowed at Roadway Connections
CHAPTER 200	GEOMETRIC DESIGN AND STRUCTURE STANDARDS
Topic 201	Sight Distance
Index 201.3	Stopping Sight Distance on Sustained Grades
201.7	Decision Sight Distance
Topic 202	Superelevation
Index 202.2	Superelevation on Same Plane for Rural Two-lane Roads
202.5	Superelevation Transition
202.5	Superelevation Runoff
202.5	Superelevation in Restrictive Situations
202.6	Superelevation of Compound Curves
202.7	Superelevation on City Streets and County Roads
Topic 203	Horizontal Alignment
Index 203.1	Horizontal Alignment – Local Facilities
203.3	Alignment Consistency and Design Speed

Table 82.1B

Underlined Standards (Cont.)

203.5	Compound Curves
203.5	Compound Curves on One-Way Roads
203.6	Reversing Curves – Transition Length
203.6	Reversing Curves – Transition Rate
Topic 204	Grade
Index 204.1	Standards for Grade – Local Facilities
204.3	Standards for Grade
204.3	Ramp Grades
204.4	Vertical Curves – 2 Percent and Greater
204.4	Vertical Curves – Less Than 2 Percent
204.5	Decision Sight Distance at Climbing Lane Drops
204.6	Horizontal and Vertical Curves Consistency in Mountainous or Rolling Terrain
Topic 205	Road Connections and Driveways
Index 205.1	Access Opening Spacing on Expressways
205.1	Access Opening Spacing on Expressways – Location
Topic 206	Pavement Transitions
Index 206.3	Lane Drop Transitions
206.3	Lane Width Reductions
Topic 208	Bridges, Grade Separation Structures, and Structure Approach Embankment
Index 208.3	Decking of Bridge Medians
208.6	Minimum width of Walkway of Pedestrian Overcrossings
208.6	Minimum Vertical Clearance of Pedestrian Undercrossings
208.6	Class I Bikeways Exclusive Use
208.10	Protective Screening on Overcrossings
208.10	Bicycle Railing Locations
Topic 210	Earth Retaining Systems

Table 82.1B

Underlined Standards (Cont.)

Index 210.6	Cable Railing
CHAPTER 300	GEOMETRIC CROSS SECTION
Topic 301	Traveled Way Standards
Index 301.2	Class II Bikeway Lane Width Adjacent to On-Street Parking,
301.2	Class II Bikeway with Posted Speeds Greater Than 40 Miles Per Hour
301.3	Algebraic Differences of Cross Slopes at Various Locations
Topic 303	Curbs, Dikes, and Side Gutters
303.1	Use of Curb with Posted Speeds of 40 mph and Greater
303.3	Dike Selection
303.4	Bulbout Design
Topic 304	Side Slopes
Index 304.1	Side Slopes 4:1 or Flatter
Topic 305	Median Standards
Index 305.1	Median Width Freeways and Expressways – Urban
305.1	Median Width Freeways and Expressways – Rural
305.1	Median Width Conventional Highways – Urban and Rural Main Streets
305.1	Median Width Conventional Highways – Climbing or Passing Lanes
305.2	Median Cross Slopes
Topic 309	Clearances
Index 309.1	Clear Recovery Zone – 4:1 or Flatter Apply on All Highways
309.1	Clear Recovery Zone – Necessary Highway Features
309.1	Existing Above-Ground Utilities and Existing Large Trees
309.1	Clear Recovery Zone – Discretionary Fixed Objects
309.1	Conventional Highways with Curbs Typically in Urban Areas
309.1	Areas without Curbs to Barriers at Retaining, Pier, or Abutment Walls
309.1	High Speed Rail Clearance
309.5	Structures Across or Adjacent to Railroads – Vertical Clearance

Table 82.1B

Underlined Standards (Cont.)

Topic 310	Frontage Roads
Index 310.2	Outer Separation – Urban and Mountainous Areas
310.2	Outer Separation – Rural Areas
CHAPTER 400	INTERSECTIONS AT GRADE
Topic 403	Principles of Channelization
Index 403.3	Angle of Intersection
403.6	Optional Right-Turn Lanes
403.6	Right-Turn-Only Lane and Bike Use
Topic 404	Design Vehicles and Related Definitions
Index 404.4	STAA Design Vehicles on the National Network, Terminal Access, California Legal, and Advisory routes
404.4	California Legal Design Vehicle Accommodation
404.4	45-Foot Bus and Motorhome Design Vehicle
Topic 405	Intersection Design Standards
Index 405.1	Corner Sight Distance – No Sight Obstruction in Clear Sight Triangle
405.1	Corner Sight Distance – Driver Set Back
405.1	Corner Sight Distance –Minimum Corner Sight Distance and Table
405.1	Corner Sight Distance at Signalized Public Road Intersections
405.1	Corner Sight Distance at Private Road Intersections
405.1	Decision Sight Distance at Intersections
405.3	Curve Radius for Free Right-Turn with Pedestrian Crossing
405.4	Pedestrian Refuge by Area Place Type
405.5	Emergency Openings and Sight Distance
405.5	Median Opening Locations
405.10	Entry Speeds – Single and Multilane Roundabouts
405.10	Pedestrian Crossing Width
405.10	Landscape Buffer/Strip Width
405.10	Sidewalk and Sidewalk Width
405.10	Horizontal Clearance Width

Table 82.1B

Underlined Standards (Cont.)

CHAPTER 500	TRAFFIC INTERCHANGES
Topic 504	Interchange Design Standards
Index 504.2	Ramp Entrance and Exit Standards
504.2	Collector-Distributor Deceleration Lane and “DL” Distance
504.2	Paved Width at Gore
504.2	Contrasting Surface Treatment
504.2	Auxiliary Lanes
504.2	Freeway Exit Nose Design Speed
504.2	Decision Sight Distance at Exits and Branch Connections
504.2	Design Speed and Alignment Consistency at Inlet Nose
504.2	Freeway Ramp Profile Grades
504.2	Differences in Pavement Cross Slopes at Freeway Entrances and Exits
504.2	Vertical Curves Beyond Freeway Exit Nose
504.2	Crest Vertical Curves at Freeway Exit Terminal
504.2	Sag Vertical Curves at Freeway Exit Terminal
504.2	Ascending Entrance Ramps with Sustained Upgrades
504.3	Ramp Terminus Design Speed
504.3	Ramp Lane Drop Taper At 6-foot Separation Point
504.3	Ramp Lane Drop Location
504.3	Metered Entrance Ramps (1 GP + 1 HOV Preferential Lane) Auxiliary Lane
504.3	Metered Entrance Ramps (1 GP + 1 HOV Preferential Lane) Auxiliary Lane on Sustained Grades and Certain Truck Volumes
504.3	HOV Preferential Lane Restrictive Condition Auxiliary Lane
504.3	Metered Multi-Lane Entrance Ramps Lane Drop
504.3	Metered Multi-Lane Entrance Ramps Auxiliary Lane
504.3	Metered Multi-Lane Entrance Ramps Auxiliary Lane on Sustained Grades and Certain Truck Volumes

Table 82.1B

Underlined Standards (Cont.)

504.3	Metered Freeway-to-Freeway Connector Lane Drops
504.3	Ramp Terminals and Grade
504.3	Ramp Terminals and Sight Distance
504.3	Distance between Ramp Intersection and Local Road Intersection
504.3	Entrance Ramp Lane Drop
504.3	Single-Lane Ramp Widening for Passing
504.3	Two-lane Exit Ramps
504.3	Two-lane Exit Ramps and Auxiliary Lanes
504.3	Distance Between Successive On-ramps
504.3	Distance Between Successive Exits
504.4	Freeway-to-freeway Connections Design Speed
504.4	Profile Grades on Freeway-to-freeway Connectors
504.4	Single-lane Freeway-to-freeway Connector Design
504.4	Single-lane Connector Widening for Passing
504.4	Volumes Requiring Branch Connectors
504.4	Merging Branch Connector Design
504.4	Diverging Branch Connector Design
504.4	Merging Branch Connector Auxiliary Lanes
504.4	Diverging Branch Connector Auxiliary Lanes
504.4	Freeway-to-freeway Connector Lane Drop Taper
504.6	Mainline Lane Reduction at Interchanges
504.8	Access Control at Ramp Terminal
CHAPTER 610	PAVEMENT ENGINEERING CONSIDERATIONS
Topic 612	Pavement Design Life
Index 612.6	Temporary Pavements and Detours

Table 82.1B

Underlined Standards (Cont.)

CHAPTER 620	RIGID PAVEMENT
Topic 625	Engineering Procedures for Pavement Rehabilitation
Index 625.2	Rigid Pavement Rehabilitation Strategies
CHAPTER 640	COMPOSITE PAVEMENTS
Topic 645	Engineering Procedures for Pavement Rehabilitation
Index 645.1	General Considerations
CHAPTER 700	MISCELLANEOUS STANDARDS
Topic 701	Fences
Index 701.2	Fences on Freeways and Expressways
CHAPTER 900	LANDSCAPE ARCHITECTURE
Topic 904	Locating Plants
Index 904.4	Median Planting on freeways
904.5	Minimum Tree Setback
904.5	Large trees on freeway and expressway medians
Table 904.5	Large Tree Setback Requirements on Conventional Highways
904.9	Plant Establishment Period
Topic 905	Irrigation Design
Index 905.4	Irrigation Controller
CHAPTER 1000	BICYCLE TRANSPORTATION DESIGN
Topic 1003	Bikeway Design Criteria
Index 1003.1	Class I Bikeway Horizontal Clearance
1003.1	Class I Bikeway in State Highway or Local Road Medians

Table 82.1C

Decision Requiring Other Approvals

CHAPTER 100	BASIC DESIGN POLICIES
Topic 103	Design Designation
Index 103.2	Design Period
Topic 108	Coordination With Other Agencies
Index 108.2	Transit Loading Facilities – Location
108.2	Transit Loading Facilities - ADA
108.3	Rail Crossings*
108.3	Parallel Rail Facilities*
108.5	Bus Rapid Transit – Location and ADA
108.7	Coordination With the FHWA - Approvals
Topic 110	Special Considerations
Index 110.1	Overload Category
110.8	Safety Review Items and Employee Exposure
110.10	Proprietary Items
110.10	Proprietary Items – On Structure
110.10	Proprietary Items – National Highway System
Topic 111	Material Sites and Disposal Sites
Index 111.1	Mandatory Material Sites on Federal-aid Projects
111.6	Mandatory Material Sites and Disposal Sites on Federal-aid Projects
Topic 116	Bicyclists and Pedestrians on Freeway
Index 116	Bicycles and Pedestrians on Freeways
CHAPTER 200	GEOMETRIC DESIGN AND STRUCTURE STANDARDS
Topic 204	Grade

* Authority to approve deviations from this “Decision Requirement” is delegated to the District Director.

Table 82.1C

Decision Requiring Other Approvals (Cont.)

Index 204.8	Grade Line of Structures – Temporary Vertical Clearances
Topic 205	Road Connections and Driveways
Index 205.1	Conversion of a Private Opening
Topic 208	Bridges, Grade Separation Structures, and Structure Approach Embankment
Index 208.11	Deviations from Foundation and Embankment Recommendations
210.4	Cost Reduction Incentive Proposals
CHAPTER 300	GEOMETRIC CROSS SECTION
Topic 303	Curbs, Dikes, and Side Gutters
Index 303.4	Busbulbs
Topic 304	Side Slopes
Index 304.1	Side Slopes – Erosion Control
304.1	Side Slopes – Structural Integrity
309.2	Vertical Clearance on National Highway System
309.2	Vertical Clearance Above Railroad Facilities
309.5	Horizontal and Vertical Clearances at Railroad Structures
CHAPTER 500	TRAFFIC INTERCHANGES
Topic 502	Interchange Types
Index 502.2	Other Types of Interchanges
Topic 503	Interchange Procedure
Index 503.2	Interchange Geometrics

*Authority to approve deviations from this “Decision Requirement” is delegated to the District Director.

Table 82.1C

Decision Requiring Other Approvals (Cont.)

Topic 504	Interchange Design Standards
Index 504.3	HOV Preferential Lane
504.3	Modification to Existing HOV Preferential Lanes
504.3	Enforcement Areas and Maintenance Pullouts – Required Enforcement Area
504.3	Enforcement Areas and Maintenance Pullouts – Removal
504.3	Enforcement Areas and Maintenance Pullouts - Length
504.6	Mainline Lane Reduction
CHAPTER 600	PAVEMENT ENGINEERING
Topic 604	Roles, Resources, and Proprietary Items
Index 604.3	Pavement Recommendations
604.4	Other Resources
Topic 606	Research and Special Designs
Index 606.1	Research and Experimentation
CHAPTER 610	PAVEMENT ENGINEERING CONSIDERATIONS
Topic 614	Soil Characteristics
Index 614.6	Other Considerations
CHAPTER 620	RIGID PAVEMENT
Topic 626	Other Considerations
Index 626.2	Shoulder – Widened Slab
CHAPTER 700	MISCELLANEOUS STANDARDS
Topic 701	Fences
Index 701.2	Locked Gates - Maintenance Force Use*
701.2	Locked Gates – Utility Companies, Non-Utility Entities, or Public Agencies*

*Authority to approve deviations from this “Decision Requirement” is delegated to the District Director

Table 82.1C

Decision Requiring Other Approvals (Cont.)

Topic 706	Roadside Management and Vegetation Control
Index 706.2	Vegetation Control
CHAPTER 800	HIGHWAY DRAINAGE DESIGN
Topic 805	Preliminary Plans
Index 805.1	Requires FHWA Approval
805.2	Bridge Preliminary Report
805.4	Unusual Hydraulic Structures
805.5	Levees and Dams Formed by Highway Fills
805.6	Geotechnical
Topic 808	Selected Computer Programs
Index 808.1	Table 808.1
CHAPTER 820	CROSS DRAINAGE
Topic 829	Other Considerations
Index 829.9	Dams
CHAPTER 830	TRANSPORTATION FACILITY DRAINAGE
Topic 837	Inlet Design
Index 837.2	Inlet Types
CHAPTER 850	PHYSICAL STANDARDS
Topic 853	Pipe Liners and Linings for Culvert Rehabilitation
Index 853.4	Alternative Pipe Liner Materials
CHAPTER 870	CHANNEL AND SHORE PROTECTION – EROSION CONTROL
Topic 872	Planning and Location Studies
Index 872.3	Site Consideration
Topic 873	Design Concepts
Index 873.1	Introduction
873.3	Armor Protection

*Authority to approve deviations from this “Decision Requirement” is delegated to the District Director.

Table 82.1C

Decision Requiring Other Approvals (Cont.)

CHAPTER 900	LANDSCAPE ARCHITECTURE - ROADSIDES
Topic 904	Planting Design
Index 904.1	Planting Design General
Index 904.3	Plant Selection
Topic 905	Irrigation Design
Index 905.1	Irrigation Design General
Index 905.4	Irrigation System Equipment
CHAPTER 910	LANDSCAPE ARCHITECTURE – ROADSIDE SITES
Topic 912	Roadside Sites Design
Index 912.1	Roadside Sites Layout
Index 912.3	Site Furnishings
Topic 913	Safety Roadside Rest Areas
Index 913.4	Safety Roadside Rest Area Buildings and Structures
Index 913.5	Safety Roadside Rest Area Utilities and Facilities
Topic 914	Vista Points
Index 914.3	Vista Point Amenities
Topic 915	Park & Ride Facilities
Index 915.1	Park & Ride Facilities General
CHAPTER 1000	BICYCLE TRANSPORTATION DESIGN
Topic 1003	Miscellaneous Criteria
Index 1003.5	Bicycle Path at Railroad Crossings
CHAPTER 1100	HIGHWAY TRAFFIC NOISE ABATEMENT
Topic 1101	General Requirements
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*Authority to approve deviations from this “Decision Requirement” is delegated to the District Director.