CALTRANS DESIGN STANDARDS & DESIGN STANDARD DECISION DOCUMENT

DISTRICT 7 DESIGN LIAISONS:
ZEBUNNESA TAREQUE
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CALTRANS DISTRICT 7/
ACEC LA CHAPTER LIAISON MEETING
21ST SEPTEMBER 2020

CT DESIGN DELEGATION AND DISTRICT DESIGN LIAISON (DDL)

- DDL position was created to replace HQ Geometric Reviewer in each CT district as a result of the Design Delegation, which transfers approval authority to the District Director for application of certain standards and policies previously held by the HQ DOD
- In 2015, all District Directors entered into Design Delegation Agreement (DDA)
- D 7 has 1st DDA on February 13th 2015 and the updated DDA on March 19th 2020.

DELEGATED DESIGN DECISIONS

Design Decision Delegation Authority Granted to District 7

Highway Design Manual (HDM)

Manual/Topic	Description	Conventional Highway	Expressway	Freeway	Interstate Freeway	Sub-Delegation [3]
Underlined Design Standards	Authority to approve deviations from Underlined Standards is delegated to the District Director as noted in the HDM Chapter 80.	Yes	Yes	Yes	Yes	DDD of Design
Boldface Design Standards (Except for Chapter 600) [1]	**Boldface** standards use the word "shall".	Yes	Yes	Yes	No	DDD of Design
Design Information Bulletins (DIB)						
DIB 79	2R Project certification Design guidance and Standards for Roadway Rehabilitation Projects and Certain Other Projects	Yes				
DIB 82	Pedestrian Accessibility Guidelines for Highway Projects and ADA	Yes[2]				
DIB 83	Caltrans Supplement to FHWA Culvert Repair Practices Manual	Yes				
Project Development Procedures Manual (PDPM)						
PDPM 12-Section 4	Traffic signal projects that introduce or perpetuate nonstandard conditions - Exceptions to **Boldface** Design Standards	Yes				

Project Development Procedures Manual (PDPM) Continued

Manual/Topic	Description	Conventional Highway	Expressway	Freeway	Interstate Freeway	Sub-Delegation [3]
HDM 82.2(1); PDPM 15-7	Contract Design Changes (CCOs) - Exceptions to **Boldface** design standards.	Yes	Yes	Yes	No	DDD of Design
PDPM 17	All Encroachment and Utility Policy Exceptions	Yes[3]	Yes[3]	Yes[3]	No	DDD of Design
PDPM 23	Approval Authority for Denominations, or Withdrawal of Denominations.	N/A	N/A	Yes	N/A	DDD of Design; No Further Sub-Delegation
PDPM 23	Reopen Route Studies – requires written approval.	Yes	Yes	No	No	DDD of Design; No Further Sub-Delegation
PDPM 2.24	Conformance to Adopted Route - All deviations from the adopted route must be approved.	Yes	Yes	No	No	DDD of Design; No Further Sub-Delegation
PDPM 2	Route adoption maps – Approval authority	Yes	Yes	Yes	Yes	DDD of Design; No Further Sub-Delegation
PDPM 2, 24	Freeway Agreements and Controlled Access Highway– Execution authority.	N/A	Yes	Yes	Yes	DDD of Design; No Further Sub-Delegation
PDPM 29, Section 2, Article 1	Separate contract requirement landscape & roadway contracts	N/A	N/A	Yes[4]	Yes[4]	DDD of Design
PDPM 29, Section 2, Article 1	Maximum costs per acre for planting	N/A	N/A	Yes[4]	Yes[4]	DDD of Design
PDPM 29, Section 2, Article 1	Plant establishment periods	N/A	N/A	Yes[4]	Yes[4]	DDD of Design
PDPM 29, Section 2, Article 3	Landscape maintenance of highway planting that exceeds the maximum costs per acre	N/A	N/A	Yes[4]	Yes[4]	DDD of Design

ROLES AND RESPONSIBILITIES OF THE DDL

- Solving problems those need SME involvement.
- Guidance on application of new policies
- Review new policies and provide input.
- For PoDI and Processing Access Modification requests on Interstate routes

- Provides guidance and recommendations for solution of design problems and accurate application of CT standards
- Reviews all types of design products towards approval
- Provides training on CT design policies and procedures

- Guidance for resolving any conflicting design issues.
- Conceptual approval of project alternatives
- Approval of design products
- Update about latest CT design policies

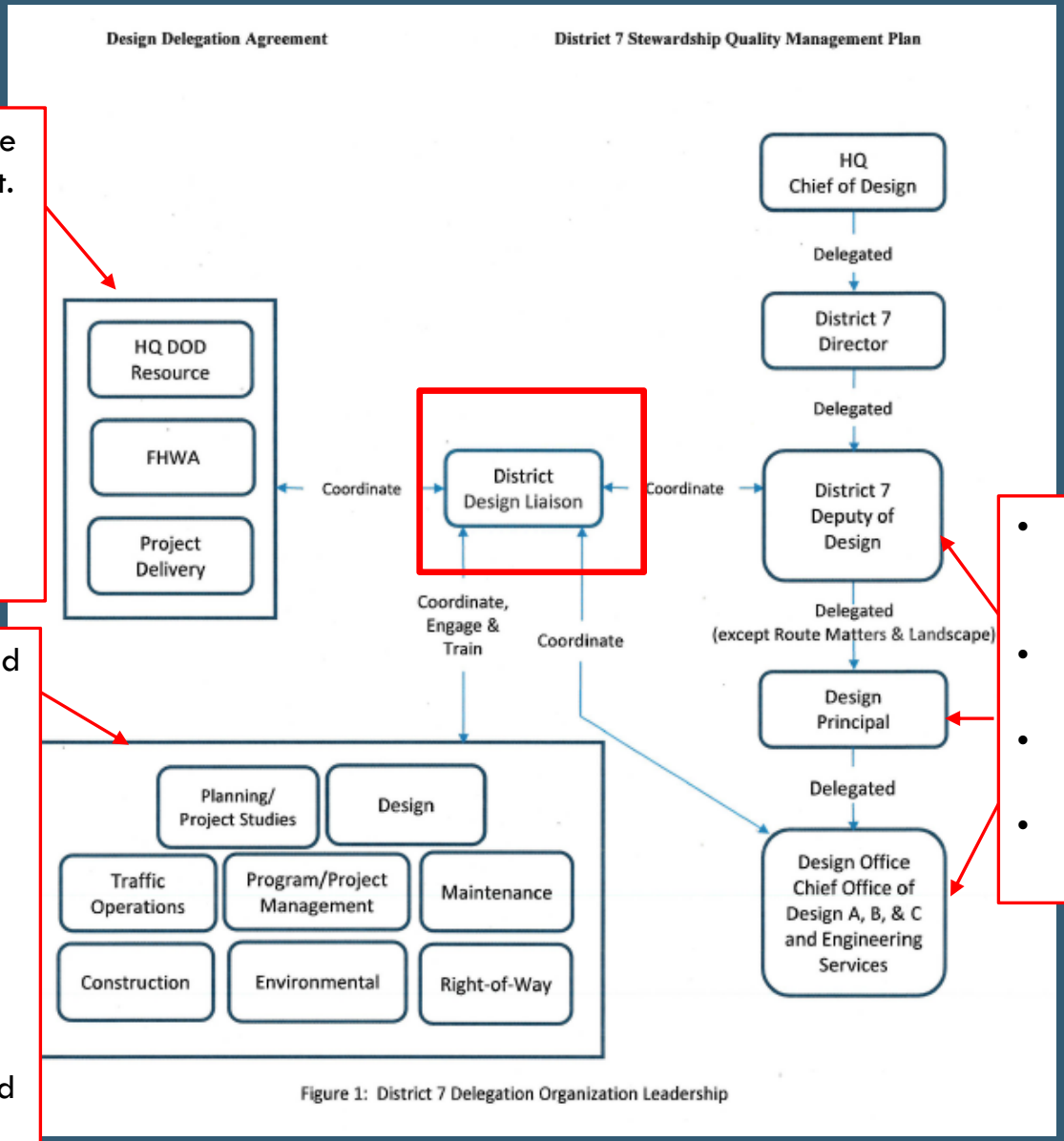


Figure 1: District 7 Delegation Organization Leadership

DESIGN STANDARDS (Ref: HDM)

CT Project Development Philosophy (HDM 81.1)

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.

Highway 101/Old Redwood Highway in Windsor.

Attention should be given to:

- All users – motorists, bicyclist, transit riders, and pedestrians
- Community goals and objectives
- Needs of low mobility and disadvantaged
- Eliminating or minimizing adverse effects on natural resources, environmental values, public services, aesthetic values…
- Realistic financial estimates
- Cost, ease and safety of maintaining whatever is built

DESIGN STANDARDS (Ref: HDM)

Application of Design Standards (HDM 82)

HDM Guidelines:

- Sound Judgement in applying standards
- Flexibility in applying standards
- Documenting design decisions considering the context of project location
- Specific circumstances while maintaining safety
- Equal or exceed the minimum value in the manual to the maximum extent possible
- Cost, traffic volume, operational and safety benefits, project goals, right of way, environmental and socio-economic impacts to be considered

DESIGN STANDARDS (Ref: HDM)

Application of Design Standards (HDM 82)

Types of HDM Standards

- **Boldface** type (Table 82.1A)
- Underlined type (Table 82.1B)
- Decisions requiring other approvals (Table 82.1C)
- Permissive standards (“should”, “may”, “can”)
- Absolute requirements

DESIGN STANDARDS (Ref: HDM)

Application of Design Standards (HDM 82)

Absolute Requirements in HDM

104.1 General Policy

Control of access is achieved by acquiring rights of access to the highway from abutting property owners and by permitting ingress and egress only at locations determined by the State.

On freeways, direct access from private property to the highway is prohibited without exception. Abutting ownerships are served by frontage roads or streets connected to interchanges.

203.4 Curve Length and Central Angle

The minimum curve length for central angles less than 10 degrees should be 800 feet to avoid the appearance of a kink. For central angles larger than 30 minutes, a curve is required without exception. Above a 20,000-foot radius, a parabolic curve may be used. Sight

404.2

(6) *Sidewalks.* Tracking width and swept width lines must not encroach onto sidewalks or pedestrian refuge areas, without exception.

(7) *Obstacles.* Swept width lines may not encroach upon ob

405.4

(3) *Pedestrian Refuge.* Pedestrian refuge islands allow pedestrians to cross fewer lanes at a time while judging conflicts separately. They also provide a refuge so slower pedestrians can wait for a gap in traffic while reducing total crossing distance.

At unsignalized intersections in rural city/town centers (rural main streets), suburban, or urban areas, a pedestrian refuge should be provided between opposing traffic where pedestrians are allowed to cross 2 or more through traffic lanes in one direction of travel, at marked or unmarked crosswalks. Pedestrian islands at signalized crosswalks should be ng into account crossing distance and pedestrian activity. Note that strian crossings must be timed to allow for pedestrians to cross. See the D, Chapter 4E, for further guidance.

sed as pedestrian refuge are to be large enough to provide a minimum of 6 on of pedestrian travel, without exception.

placed in the path of a pedestrian crossing must be accessible, refer to DIB dard Plans for further guidance. An example of a traffic island that serves refuge is shown on Figure 405.4.

904.4

In areas subject to frost and snow, plantings should not be located where they will cast shade and create patches of ice on vehicle and pedestrian thoroughfares.

Without exception, locate plants to maintain visibility to legal off-premise and on-premise outdoor advertising displays. Typical visibility viewsheds are as shown in the Encroachment Permits Manual 509.4.

(1) *Maintenance Considerations.* Consider the safety of maintenance workers and the traveling public when locating plants. Evaluate the mature size, form, and characteristics of the species, and long-term maintenance requirements.

Locate plants so that pruning will not be required

DOCUMENTATION AND APPROVAL OF NONSTANDARD DESIGN FEATURES (Ref: HDM and PDPM)

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.

Headquarters Division of Design (DOD) establishes and supports the consistent application of highway design standards (in accordance with the *Highway Design Manual*) to ensure optimal safety for the traveling public and those who work to construct, operate, and maintain the State Highway System.

The design standard decision document (previously known as a design exception fact sheet or fact sheet) is used to document engineering decisions made regarding a proposed design that deviates from the design standards in the *Highway Design Manual*. Additional documentation on what standards are used for a particular project is accomplished with the project approval document or with a memorandum to file placed in the project history file. Documentation of the engineering decisions

...s necessary for Caltrans to maintain

...epared and preserved to document

Design Immunity

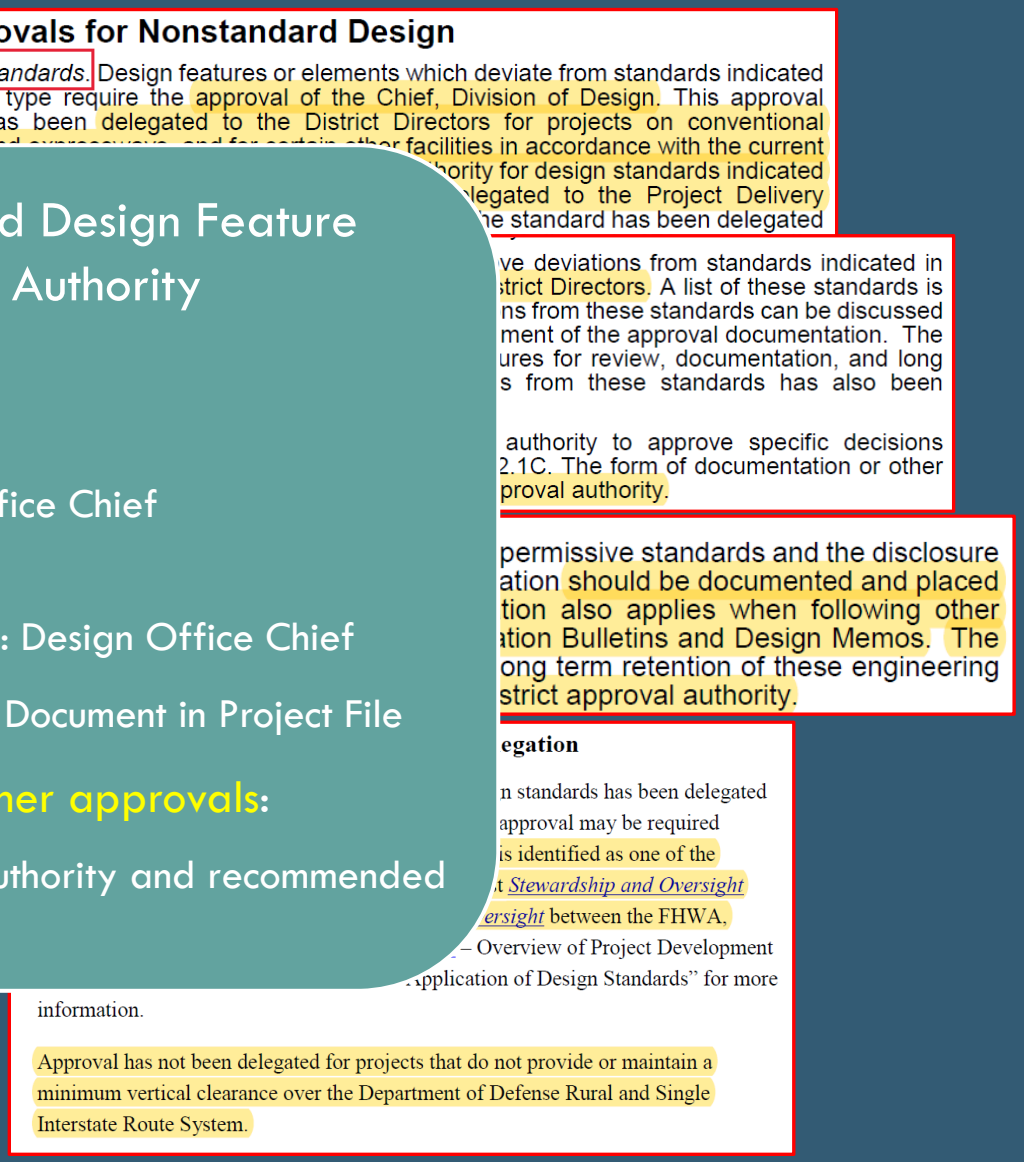
The rationale for design immunity is:
"to prevent a jury from second-guessing the decision of a public entity by reviewing the identical questions of risk that had previously been considered by the government officers who adopted or approved the plan or design."

The design immunity defense requires three essential elements:
(1) a causal connection between the design of the public property and plaintiffs' injuries;
(2) discretionary approval of the design before construction by a person authorized to give the approval; and
(3) substantial evidence of the reasonableness of the design

DOCUMENTATION AND APPROVAL OF NONSTANDARD DESIGN FEATURES (Ref: HDM and PDPM)

D 7 Nonstandard Design Feature Approval Authority

- On Interstate Routes:
  - Boldface: PDC
  - Underlined: Design Office Chief
- On State Routes:
  - Boldface & Underlined: Design Office Chief
- Permissive standards: Document in Project File
- Decisions requiring other approvals:
  - Respective approval authority and recommended document type



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 ...ority for design standards indicated ...legated to the Project Delivery ...e standard has been delegated

...ve deviations from standards indicated in ...trict Directors. A list of these standards is ...ns from these standards can be discussed ...ment of the approval documentation. The ...ures for review, documentation, and long ...s from these standards has also been ...

... authority to approve specific decisions ...2.1C. The form of documentation or other ...proval authority.

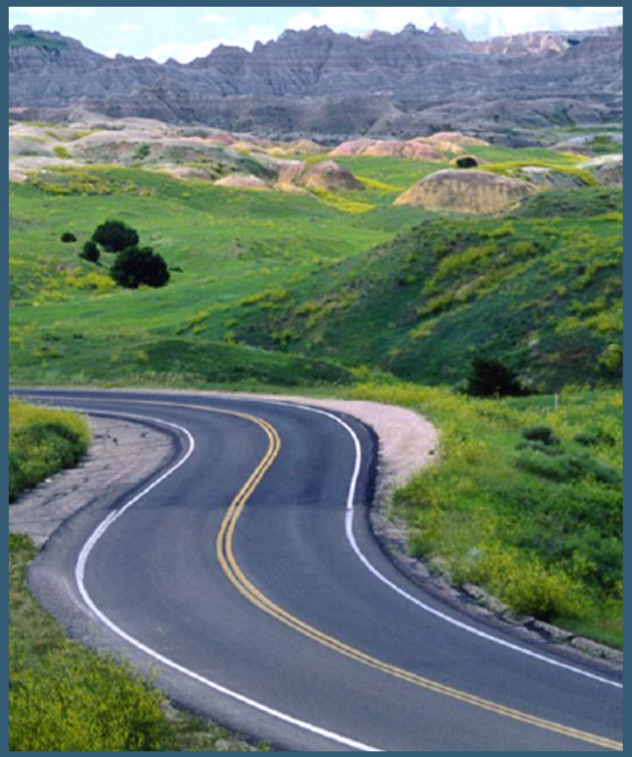
...permissive standards and the disclosure ...ation should be documented and placed ...tion also applies when following other ...ation Bulletins and Design Memos. The ...ong term retention of these engineering ...strict approval authority.

...egation

...n standards has been delegated ...approval may be required ...is identified as one of the ...t *Stewardship and Oversight* ...*ersight* between the FHWA, ... – Overview of Project Development ...Application of Design Standards" for more information.

Approval has not been delegated for projects that do not provide or maintain a minimum vertical clearance over the Department of Defense Rural and Single Interstate Route System.

DESIGN STANDARD DECISION DOCUMENT (DSDD)



DSDD is the recommended form by HQ DOD to document engineering decisions made regarding a proposed design that deviates from the design standards in the HDM.

Guidance and template is available in PDPM Appendix BB.

WHAT PHASE DO WE NEED A DSDD?

Design Standard Risk Assessment (DSRA)
Design Standard Decision Document (DSDD)

PID	Project Initiation Document
PAED	Project Approval/Environmental Document
PS&E	Plans, Specification, & Estimate
Cons	Construction (Before Feature is Constructed)

Identify nonstandard features early & discuss w/oversight engineer & DDL

DSDD TIPS AND COMMON MISTAKES
SECTION 1 – PROPOSED PROJECT

Project Description

- Brief but focused description of the proposed project improvement
- For supplemental DSDD, discuss original approved DSDD and why a supplemental is needed.
- Refer to Project Location Map

Existing Highway

- Route Classification
- Complete Geometric Description
- Posted Speed
- Design Designation (HDM 103.1)

DSDD TIPS AND COMMON MISTAKES
SECTION 1 – PROPOSED PROJECT

Safety Improvements

- How will safety be improved by the project over the existing condition?
- Reference safety upgrades that the project will incorporate as a result of a safety study.

Total Project Cost

- Cost Breakdown:
  - Roadway
  - Structure
  - Right-of-Way
- Detail Cost Estimate Not Needed

Roadway Items	$ XXX,000
Structure Items	$ XXX,000
Right-of-Way Items	$ XXX,000
Total Project Cost	$ XXX,000

DSDD TIPS AND COMMON MISTAKES
SECTION 2 – FEATURES REQUIRING DESIGN DECISION DOCUMENTATION

- Section A - Design Features with HQ Approval Authority
- Section B - Design Features with District Delegated Approval Authority

Design Feature (Section A & B)

- Include Table with Standard, Proposed and Existing value of the design feature with location (station) and related exhibits

Design Feature	Location			Decision Sight Distance (Corresponding Design Speed)			Attachment B Sheet No.
	Line	Station					
		From	To	Existing	Proposed	Standard	
B1.1	"A"	982+35	999+57	492' (32 MPH)	852' (54 MPH)	1105' (70 MPH)	DE-9 to 10

DSDD TIPS AND COMMON MISTAKES
SECTION 2 – FEATURES REQUIRING DESIGN DECISION DOCUMENTATION

Design Feature (Section A & B)

- Combined discussion where multiple standards apply for a design feature (list all standards)
- Only include the Boldface or Underlined standard statements from HDM for which exception is requested

Design Standard for Which Documentation Is Required:
HDM Index 302.1 Width – Shoulder
The shoulder widths given in Table 302.1 shall be the minimum continuous usable width of paved shoulders on highways. Per Table 302.1 for a 2-lane new construction on conventional highway to see Index 307.2.

HDM Index 307.2 Two-lane Cross Sections for New Construction
Shoulder widths based on design year traffic volumes shall conform to the standards given in Table 307.2. Since the geometrics are being changed on the existing highway, this standard is considered applicable. Based on Table 307.2 with SR-33 having a two-way AADT of 8,980 ((meeting the "Over 400 Two-way ADT" category of Table 307.2) for the design year, the standard shoulder width is 8' and per the referenced Index 405.3(2)(a) the minimum shoulder width shall be 4' when adjacent to right turn lanes. Non-standard right turn only lanes are addressed in Design Feature 3 below.

HDM Index 309.1 (2)(b) Horizontal Clearances for Highways, Clear Recovery Zone, Discretionary Fixed Objects
When discretionary fixed objects are constructed on freeways, expressways or conventional highways, they should be located beyond the clear recovery zone at a

DSDD TIPS AND COMMON MISTAKES
SECTION 2 – FEATURES REQUIRING DESIGN DECISION DOCUMENTATION

Reason For Not Using Design Standard

- Use sensible & clear statements for justification
- Include engineering and technical explanation
- Describe how performance is acceptable
- State specific resources used to justify nonstandard condition
- Indicate facts (i.e. actual lengths/widths) instead of using subjective adjectives
- If environmental impacts are a reason, elaborate & be consistent w/ED

DSDD TIPS AND COMMON MISTAKES
SECTION 2 – FEATURES REQUIRING DESIGN DECISION DOCUMENTATION – CONT'D

Reason For Not Using Design Standard – Cont'd

- If R/W impacts are a reason, elaborate partial/full take & type of property (4f or not)
- Include discussion about the relation between the design feature and predominant type of collisions observed (from latest 3 years TASAS data)
- Include mitigations proposed where applicable
- Consult appropriate functional units and include their input where required
- Ensure consistency between DSDD text and exhibit

DSDD TIPS AND COMMON MISTAKES
SECTION 4 – COLLISION ANALYSIS

Collision Analysis

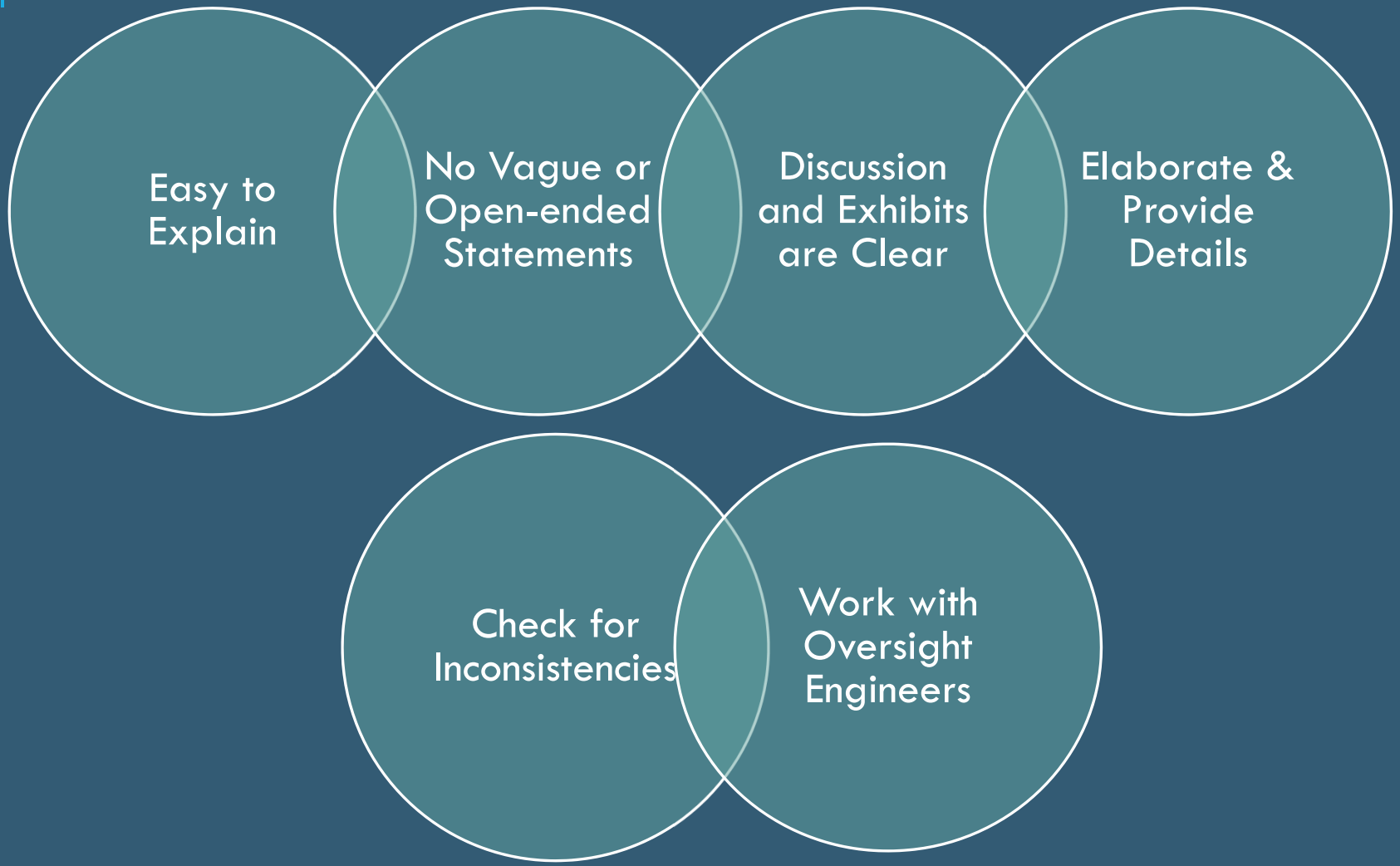
- Use the latest 3-year period
- Don't just state the collision data, highlight the relation between collision types and nonstandard features
- Discuss improvements proposed that mitigate & its impact on safety
- Discuss HSM analysis outcomes where applicable.

DSDD TIPS AND COMMON MISTAKES
SECTION 8 – ATTACHMENTS

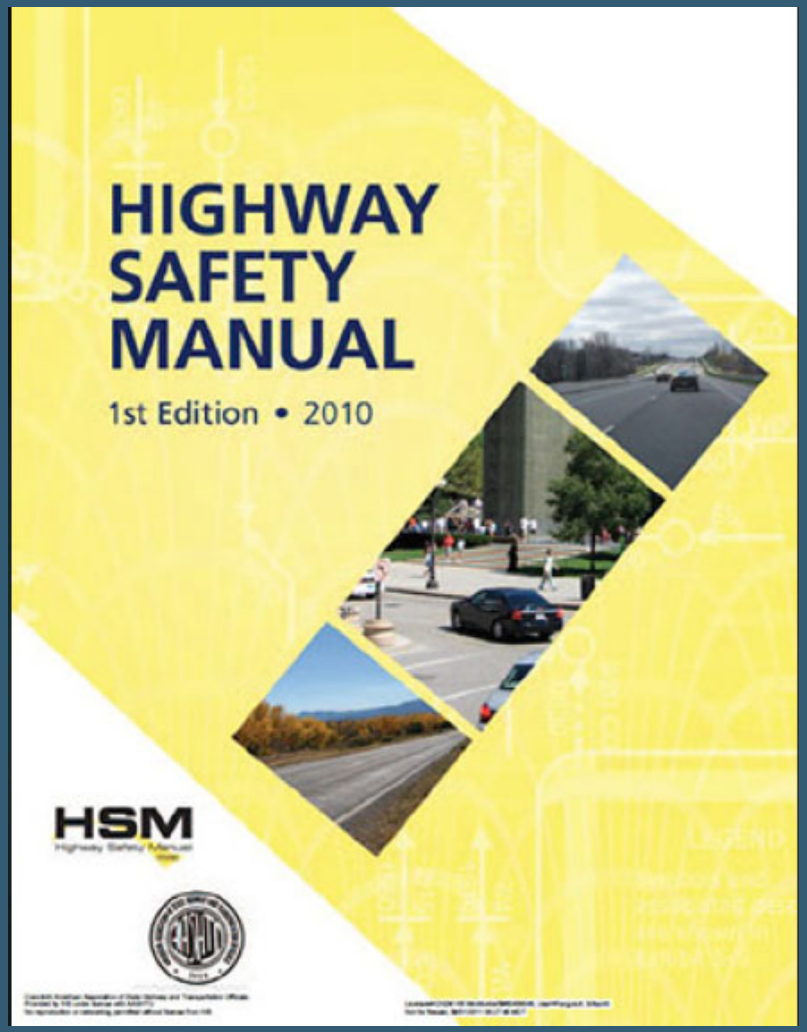
Attachments

- Black and White, no color copies or color photos
- Standard Paper Sizes 8.5”x11”, 8.5”x14”, 11”x17”
- Don’t attach TASAS/Collision report
- Exhibits provide a clear picture of exception (typical sections, layouts, labels/callouts/dimensions, relevant info only, not project plans, etc)

DSDD TIPS AND COMMON MISTAKES
GENERAL



HIGHWAY SAFETY MANUAL (HSM)



State of California
DEPARTMENT OF TRANSPORTATION

California State Transportation Agency

Memorandum

Making Conservation a California Way of Life

To: DEPUTY DISTRICT DIRECTORS, Traffic Operations
DEPUTY DISTRICT DIRECTORS, Design

Date: August 12, 2019

From: JASVINDERJIT S. BHULLAR
Chief
Division of Traffic Operations

JANICE BENTON
Chief
Division of Design

Subject: **PROJECT GUIDANCE FOR PERFORMANCE-BASED DECISION-MAKING USING HIGHWAY SAFETY MANUAL**

This memorandum provides project guidance on implementing performance-based decision-making processes for highway design using the American Association of State Highways and Transportation Officials Highway Safety Manual (HSM). The HSM is a nationally recognized reference that can be used to make informed performance-based decision-making on design solutions. The purpose of the HSM is to provide fact-based statistical information and proven data-driven analysis tools for collision frequency prediction. The HSM can facilitate the integration of quantitative collision frequency and severity performance measures into roadway planning, design, operations, and maintenance decisions. The primary focus of the HSM for the California Department of Transportation is to increase the use of analytical tools to assess the safety impacts of transportation projects and program decisions.

The HSM shall be used based on the project application guidelines in the Performance-Based Decision-Making Using Highway Safety Manual Project Application Guidelines document (attached). The HSM implementation shall apply to projects that meet the minimum criteria specified in the guidelines and have a Project Approval and Environmental Document date after June 30, 2020.

This guidance shall be effective until superseded by a subsequent memo or the appropriate updated project development guidance manuals.

"Provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability"

PHASED IMPLEMENTATION

1. Rural 2-lane highways and intersections:
   Implementation Date: August 2020
2. Rural multilane highways and intersections:
   Implementation Date: October 2020
3. Urban & Suburban Arterials:
   Implementation Date: December 2020
4. Freeways:
   Implementation Date: January 2021

WHAT IS HSM?

- Guidance Document for Incorporating Quantitative Safety Analyses
- Scientific Methodologies for Estimating Safety Performance
- Published in 2010, Supplement in 2014
- 2nd Edition expected to be published in 2022

WHY USE HSM?

Performance Based Decision

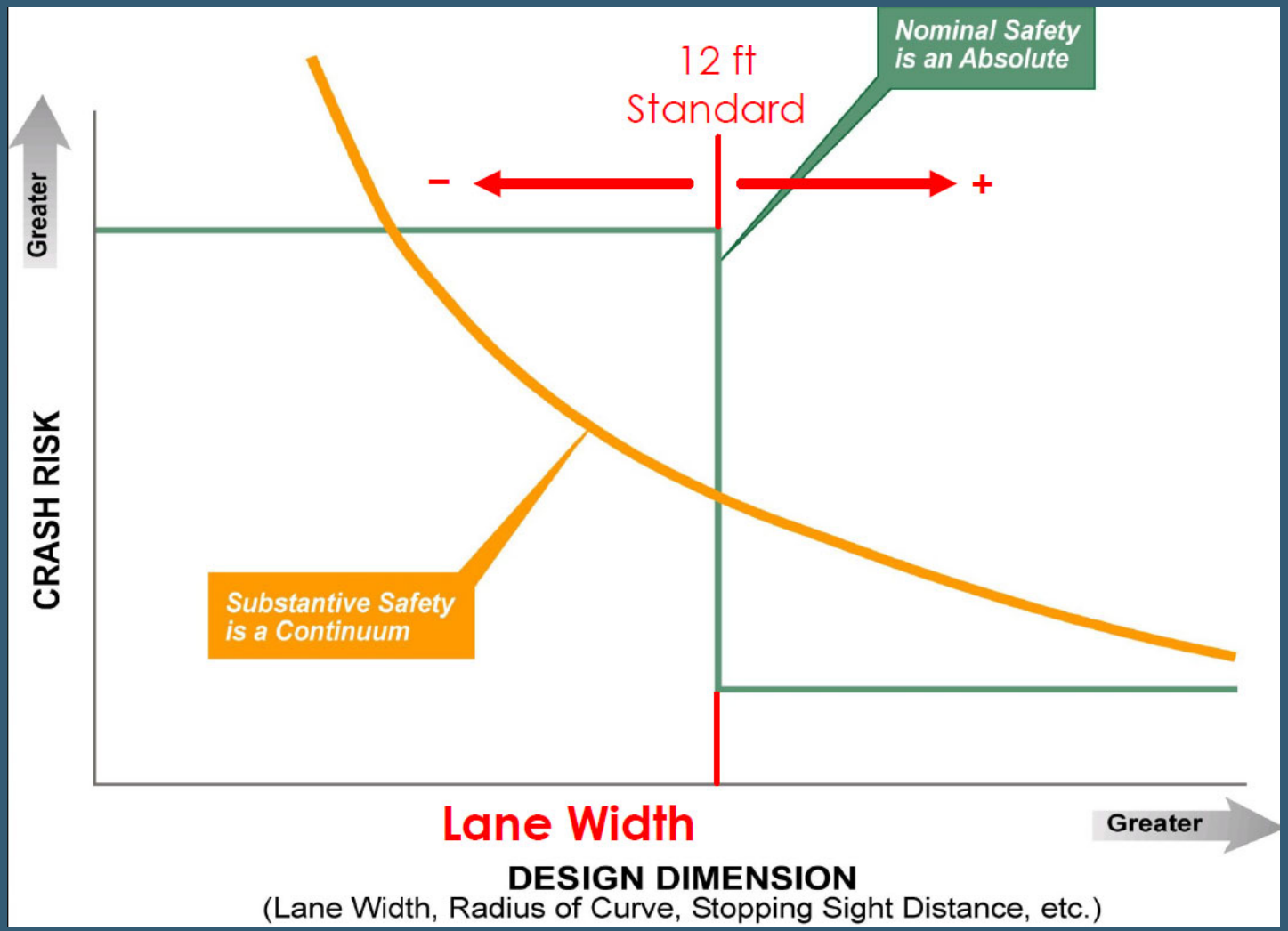
Improve Safety Analyses

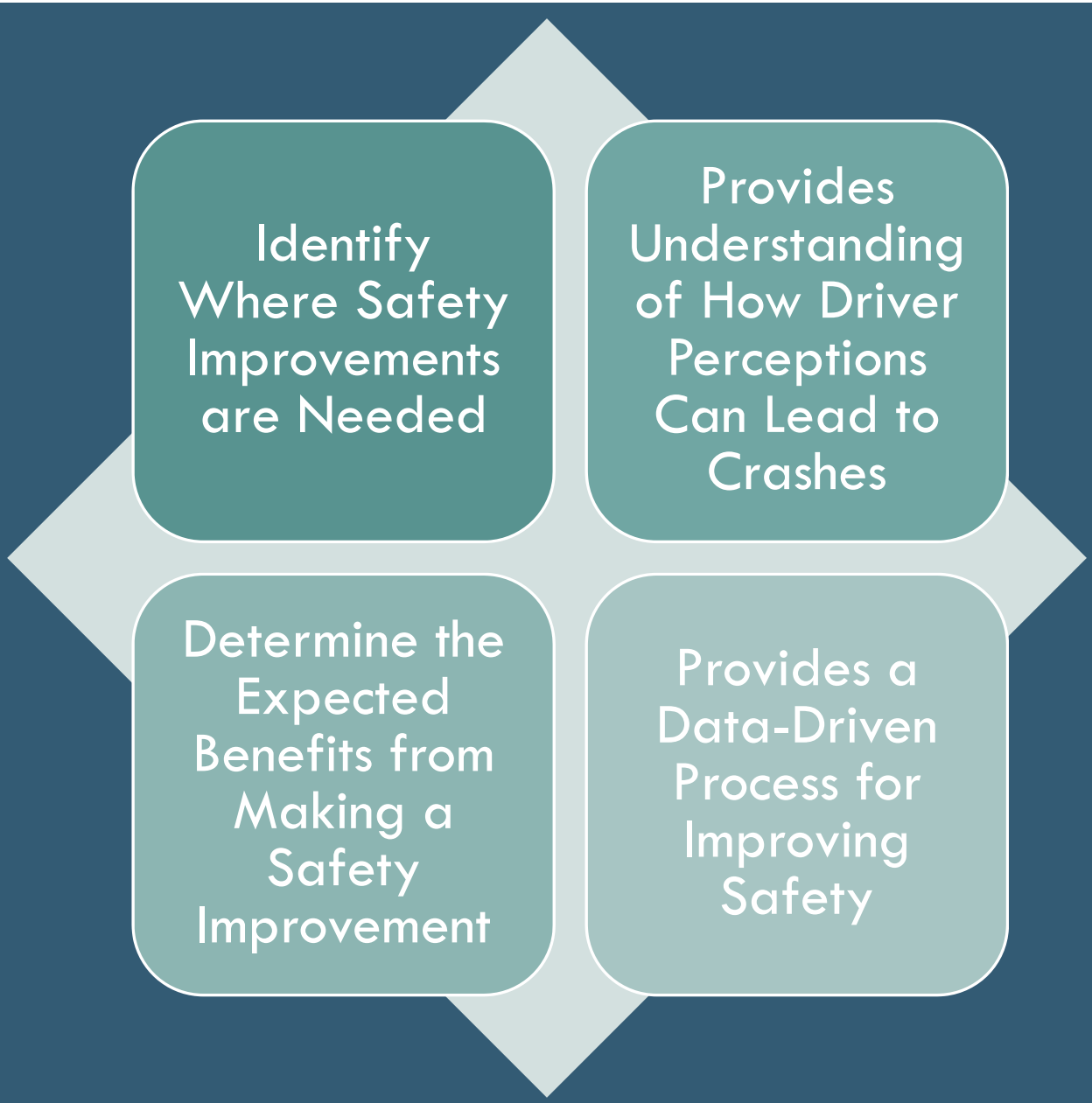
Encourages a "science-based" technical approach to safety analysis

Minimizes biased results

Nominal vs Substantive Safety

NOMINAL VS SUBSTANTIVE





Discuss Findings in DSDD or PR for Collision Analysis and/or Justification

RESOURCES

DSDD

- Project Development Procedure Manual
  - Chapter 21
  - Appendix BB & DSDD Template
- Caltrans Highway Design Manual
- Design Info Bulletin 78 - Design Checklist

HSM

- Performance Based Decision Making Memo using HSM
- AASHTO - HSM

QUESTIONS?