

CHAPTER 3 – Involvement of Caltrans Functional Units

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CHAPTER 3 – Involvement of Caltrans Functional Units

SECTION 1 Transportation Planning

Reference Information

Some of the references found in this chapter have hyperlinks that connect to Caltrans intranet pages which are not displayable to the general public. Until such time that the specific reference becomes available on the internet, the user will have to contact their district liaison, Caltrans project manager, or the appropriate Headquarters division to inquire about the availability of the reference.

General

The districts' transportation planning unit is responsible for the implementation of Caltrans policies, programs, and procedures for regional and systems planning, and for travel forecasting and analysis. Transportation planning is known by various names in different districts, including, but not limited to, transportation planning, regional planning, systems planning, transportation studies and transportation analysis.

The transportation planning unit is the liaison to Headquarters Division of Transportation Planning for regional and system planning issues, as well as matters pertaining to travel forecasting and analysis.

Reference

Refer to the Headquarters Division of Transportation Planning website for current information and services.

System Planning Products

System planning is Caltrans long-range planning process that identifies deficiencies on the state highway system, prioritizes improvements for programming funds for implementation, and manages each district's overall state highway network. Each stage of the process corresponds to a system planning document. The deficiency and improvement identification stage is through the route concept report (RCR); prioritization of funding (20 years) and implementation strategies occur through the Transportation System Development Program; communication of Caltrans priorities and strategies for route and system development to local agencies, and within Caltrans occur through the district system management plan.

The purpose-and-need for a project will often result from the system planning process. The design unit or advance planning unit uses information contained in system planning products as a starting point in initiating the project development process.

Regional Planning Coordination

Coordination with the regional transportation planning agencies (RTPAs) and the metropolitan planning organizations (MPOs) is done by the transportation planning unit. This includes monitoring their compliance with federal and State legal requirements and input into their planning and programming process with system planning data. This unit should provide project development with all necessary data concerning the regional transportation plans (RTPs), Regional Transportation Improvement Program (RTIP), air quality conformity, major investment studies, and other regional planning information.

Transportation Studies Services

Traffic forecasting is usually performed in the districts by the transportation studies unit. The forecasts are essential for all project studies that propose to increase the capacity or improve the operations of a facility to carry traffic. The following information is included in traffic forecasting:

Traffic Volumes

- Current Traffic
 - average annual daily traffic
 - peak hour and directional split for each alternative
 - level of service for existing conditions

Traffic Forecasts

- Forecasted Traffic (20 years beyond last stage of construction)
 - average annual daily traffic for each alternative
 - peak hour and directional split for each alternative
 - turning movements at proposed interchanges or intersections
 - level of service for each alternative

SECTION 2 Environmental

General

Since all transportation projects in California must comply with the *California Environment Quality Act of 1970* (CEQA), *National Environmental Policy Act of 1969* (NEPA), and other environmental laws, regulations, and executive orders, the project development process requires close coordination between the project engineer (PE), the project manager (PM), and the environmental unit representative to determine project schedules and to identify project issues, criteria, constraints, and impact mitigation.

The district's environmental unit is responsible for the implementation of Caltrans policies, programs and procedures concerning environmental considerations, analysis and compliance with environmental laws and regulations. This function is known by various names in different districts, including, but not limited to, environmental, environmental planning, environmental analysis, environmental testing, environmental technical studies, environmental engineering, environmental oversight, and environmental reports.

The Headquarters Division of Environmental Analysis develops environmental policy and procedure, recommends training to implement an enhanced environmental awareness in all employees, and provides direct project assistance in the areas of biology and cultural studies.

Reference

Refer to [Chapter 2](#) – Roles and Responsibilities and [Chapter 10](#) – Formal Project Studies for more information.

Refer to the [Standard Environmental Reference](#), for a full description of environmental involvement in the project development process.

Project Development Team Member

A representative of the environmental unit is a required member of the project development team (PDT).

Preliminary Environmental Analysis Report

The preliminary environmental analysis report (PEAR) prepared by the environmental unit when requested by the design unit as input to a project initiation document. It identifies environmental issues that could impact the project cost and schedule.

Environmental Studies, Reports, and Documents

The environmental unit is very deeply involved during the project planning phase of project development in those projects that require an environmental document, and is involved to some degree on projects that are categorically exempt under CEQA or categorically excluded under NEPA. Upon request of the design unit, the environmental unit publishes notices, conducts a number of environmental studies, and prepares reports on them, prepares a draft environmental document, and following public input prepares the final environmental document.

For those projects not categorically exempt under CEQA or categorically excluded under NEPA (where applicable) an initial level of environmental study was completed at the Project Initiation Document (PID) phase which resulted in the preparation of a preliminary environmental analysis report. The results of this evaluation dictate the next level of documentation necessary. Under CEQA, for those projects with no potential for significant impact, or which exhibit potential for modification such that the project as proposed will reduce any potential significant impacts to a level of insignificance, an initial study (IS) is prepared. The results of this effort provide the administrative record to substantiate issuance of a negative declaration (ND). Projects which clearly exhibit potential for residual or unmitigable significant impacts will require an environmental impact report (EIR). Under NEPA, projects with significant impacts, as concluded under the concept of context and intensity (see the [Standard Environmental Reference](#)), require the preparation of an environmental impact statement (EIS). All other projects can be determined to be categorically excluded. Depending upon the nature and degree of a project's potential impacts, a finding of no significant impact (FONSI) may be prepared (the CEQA negative declaration equivalent).

If a project is determined to be categorically exempt under CEQA, it will usually be categorically excluded under NEPA. However, these projects may still be subject to other State and federal environmental laws, and may still require permits from regulatory agencies.

Note that the definition of “emergency” has a specific meaning in regard to environmental compliance (see the [Standard Environmental Reference](#)).

Public Participation

The environmental unit participates in most public participation activities conducted during the project planning phase of project development, including any public hearing that is held. The environmental review processes are an outgrowth of the demand that environmental concerns be fully considered in project decisions and that the public have an opportunity to be involved.

Permits

The environmental unit may obtain permits, licenses, agreements, certifications (PLAC), and approvals that are required by environment laws, regulations, and executive orders. See [Chapter 13](#) – Project Related Permits, Licenses, Agreements, Certifications, and Approvals for a listing.

Environmental Reevaluation

The environmental unit conducts an environmental reevaluation when needed prior to advertising for construction.

Continuous Involvement

The environmental unit is involved throughout the project development process, even through construction, and beyond during maintenance and operation, whenever environmental issues arise. They must review any changes that might affect the environment and they must ensure that all environmental commitments are met.

SECTION 3 Surveys

General

The project planning and the design phases of project development both require appropriate mapping and field surveys. These services provide for all project land controls and base maps for development of contract plans and the acquisition of right-of-way.

The district's surveys unit is responsible for the implementation of Caltrans policies, and procedures concerning surveys and for conducting the surveys. This function is known by various names in different districts, including, but not limited to, surveys, right-of-way engineering and surveys, and engineering services.

The surveys unit is a liaison between the Headquarters Division of Right of Way and Land Surveys-Office of Land Surveys (which is the Headquarters functional unit with responsibility for the development of Caltrans policies, programs, and procedures in this areas), and the design unit.

Reference

Refer to [Appendix L](#) – Preparation Guidelines for Project Study Report for a discussion of mapping requirements for project initiation; to [Chapter 10](#) – Formal Project Studies, Section 2 “Engineering Studies,” for a discussion of mapping during formal engineering studies during project planning; and to [Chapter 14](#) – Preparation of Project Plans, Section 2 “Preliminary Plans,” for a discussion of the development of geometric base maps during the design phase. Refer to the [Surveys Manual](#) for more detailed information on the surveys function.

Project Development Team Member

A representative of the surveys unit serves on the project development team to provide input on mapping and surveying issues.

Photogrammetry and Mapping

Caltrans photogrammetry includes the Headquarters Division of Engineering Services-Structure Design Office of Photogrammetry and Preliminary Investigations and the district photogrammetry coordinator, with assistance from private photogrammetry contractors. Caltrans photogrammetry provides a wide range of photogrammetric services to units within Caltrans. The primary focus of Caltrans photogrammetry is to provide engineers with mapping services for project development, but they also provide reproduction products and services using Caltrans' extensive film library. The responsibilities of these units are as follows:

District Surveys Unit

- Field control surveys
- Field digital terrain model surveys

District Photogrammetry Coordinator

- Liaison with project engineers
- Photogrammetric project planning (with assistance from the Office of Photogrammetry and Preliminary Investigations)
- Orders and checks photography
- Assists the Office of Photogrammetry and Preliminary Investigations in map checking (visual)
- Performs map digitizing checking (visual, computer-aided design and drafting)
- Assists the Office of Photogrammetry and Preliminary Investigations in contract administration of photogrammetry contracts

Headquarters Photogrammetry Section

- Photogrammetry expertise and assistance
- Project management
- Photogrammetry contract execution and administration
- Densifies control through aerotriangulation
- Performs map checking (accuracy and visual at district request)
- Performs all photogrammetric cross-sectioning
- Performs all photogrammetric digital terrain model data capture
- Compiles in-house mapping when required for complex, difficult to contract projects
- Computer-aided design and drafting digitizing on a limited basis

- Computer-aided design and drafting digital terrain model preparation on a limited basis

Private Photogrammetry Contractors

- Perform all aerial photography
- Perform most laboratory and reproduction work
- Performs most of the map compilation
- Performs computer-aided design and drafting digitizing

Refer to the [A Guide to Photogrammetric Mapping Services & Resource Estimating](#) for further information.

Survey Requests

Survey needs should be evaluated and identified early in the project initiation phase and throughout the entire project development process when needed. After the first evaluation of survey needs, the project engineer should submit the initial survey request accompanied by a strip map. The extent of the survey will depend on the type of project, existing information available, sensitivity of the area of potential effect, and the number of viable project alternatives.

The right-of-way unit and the environmental unit require accurate mapping in order to properly carry out their functions, so their needs need to be carefully considered when evaluating survey needs.

Survey File

During the design phase the project engineer should assemble the survey data and compile a survey file and transmit it to the surveys unit for use in construction surveys. The project engineer should contact the construction and surveys units and discuss what information should be included. See the survey file checklist in [Appendix QQ](#) – Preparation Guidelines for Survey File.

SECTION 4 Right-of-Way

General

Since most transportation projects in California require right-of-way, utility easements, rights of entry, or some other right-of-way activity, the project development process requires close coordination between the project engineer, the project manager, and representatives of the right-of-way engineering unit and the right-of-way unit to determine project schedules and cost estimates, and to assure the acquisition of all necessary property rights.

The district’s right-of-way unit is responsible for the implementation of Caltrans policies, programs and procedures concerning right-of-way and utility considerations and compliance with State and federal laws and regulations. This function consists of various units in the districts under a district division chief for right-of-way, except for the right-of-way engineering unit which is generally located under another Deputy District Director. (Refer to Section 13 “Utilities,” and Section 5 “Real Property Asset Management.”)

The right-of-way unit is a liaison between the Headquarters Division Right of Way, (which is the Headquarters functional unit with responsibility for the development of Caltrans policies, programs and procedures in this area), and the design unit.

Right-of-way lead times frequently control the project design schedule. Generally, the preparation of project plans, calculation of quantities, and development of the plans, specifications, and estimate (PS&E) require less time than obtaining the right-of-way certification.

Reference

Refer to the [Right of Way Manual](#) for a full description of right-of-way involvement in the project development process. Also refer to [Chapter 13](#) – Project Related Permits, Licenses, Agreements, Certifications, and Approvals; [Chapter 25](#) – Relinquishments; [Chapter 26](#) – Disposal of Rights-of-Way for Public or Private Road Connections; and [Chapter 28](#) – Resolutions of Necessity for more information.

Project Development Team Member

A representative of the right-of-way unit is a required member of the project development team.

Project Planning

The right-of-way unit provides valuable information at the initiation of studies. Once the project limits have been tentatively determined, property ownership maps can be developed by the right-of-way engineering unit. Preliminary right-of-way estimates are required to properly develop and analyze project alternatives. Adequate mapping is required, as well as a realistic project scope.

The right-of-way data sheet should be requested as soon possible after project alternatives have been developed. The right-of-way data sheet is prepared during the project initiation phase and also during the formal project studies phase, and is a required attachment to the project study report (PSR), the project report (PR), and most other project initiation and project approval documents. The information in the right-of-way data sheet is vital to the process since it details all types of parcel information and the right-of-way estimate.

The right-of-way unit participates in most public participation activities conducted during the project planning phase of project development if right-of-way acquisition is involved.

Design

The project engineer and the right-of-way engineering unit work closely together in establishing the right-of-way lines. Once the geometric base maps are completed, the project engineer sets the lines (including permanent and temporary easements) and delineates access lines if appropriate. The completed right-of-way appraisal maps are sent to the PE for review to verify that the designated right-of-way lines are required to construct the project. A Certificate of Sufficiency ([Right of Way Manual](#) Chapter 6, Exhibit 6-EX-6) with a Hazardous Materials Disclosure Document – Acquisition form (ENV-0001-A) for the parcels contained in the appraisal report is signed by the project engineer and design senior. See [Chapter 18](#) – Environmental Contamination for further discussion of the Hazardous Materials Disclosure Document – Acquisition form.

Acquiring the Needed Property

Identifying the right-of-way needs and completion of the right-of-way parcel map allows the right-of-way unit to appraise the property, negotiate with the property owner for acquisition, conclude the acquisition by purchase or by starting the condemnation process, and to provide for relocation assistance for the occupants and clearance of the property for construction. During this process there should be active coordination between the project engineer and the right-of-way agent for each parcel required for the project. The acquisition agent will need to explain the project to the property owner and the need for that particular parcel. If the parcel is a partial acquisition of the property or an easement over the property, the right-of-way agent will need to explain how the property owner's remaining property will be affected by the project. The right-of-way agent may call upon the project engineer to join in meeting with the property owner to assist in explaining the project.

If the acquisition is not successfully accomplished by purchase, a resolution of necessity will have to be submitted to the California Transportation Commission (CTC) requesting authority to initiate condemnation action in court. If the property owner chooses to challenge the resolution of necessity by appearing before the CTC to protest the need for the project or the parcel, then both the project engineer and the right-of-way agent will be involved in providing information for the appearance information sheet and participating in the review procedures required by Caltrans policy (see [Chapter 28](#) – Resolutions of Necessity and [Appendix JJ](#) – Preparation Guidelines for Resolution of Necessity).

The acquisition may also require work to be accomplished to make adjustments to the property. These obligations should be placed in the right-of-way contract by the right-of-way agent and a method of accomplishing them must be agreed upon between the right-of-way agent and the project engineer. If they are to be included in the construction contract, the project engineer must assure that the work is included in the contract and documented in the resident engineer file. If they are to be done by service contract, the project engineer will need to assure that they are accomplished in a timely manner and will not interfere with the construction contract. If they are included by payment to the property owner, then this must also be documented in the resident engineer file.

Other Right-of-Way Involvement

The project engineer and the right-of-way unit work closely together in many other project development tasks. In addition to the project development team, there is team participation for hazardous waste cleanup, value analysis studies and asset management. Materials agreements involve the right-of-way unit. Fence review, excess land review, identifying water wells to be abandoned, disposal of operating right-of-way, and use of airspace are other areas of involvement.

Right-of-Way Certification

Right-of-way acquisition and the relocation of displaced people lead to a right-of-way certification, which must be provided by right-of-way before a project can be advertised. These activities involve legally mandated lead times. Changes in right-of-way requirements for a project can delay the date by which a certification can be provided if they occur late in the project development process.

SECTION 5 Real Property Asset Management

General

The Headquarters Division of Right of Way and Land Surveys-Real Property Services-Asset Management is responsible for ensuring optimum use of current real property assets and for obtaining informed investment decisions for transportation support facilities. The goal is to improve support operations and generate revenue from joint development, shared facilities, exchanges, privatization, or other innovative approaches utilizing Caltrans' real property assets. Right-of-way is also the liaison with other State agencies in coordinating joint asset management activity to meet legal requirements and to comply with the Governor's Executive Order to improve the State's management of its real estate portfolio.

Input During Planning and Design

During the planning and design stages it is important that the project engineer contact the district asset manager for input on support facility needs such as park-and-ride lots, traffic operations centers, offices, maintenance stations, etcetera.

The district asset manager would normally not be a member of the project development team, but should be invited to team meetings to assess potential real estate uses and address any facility needs based on master plans.

SECTION 6 Materials

General

Materials and geotechnical information is needed for every project. The project engineer uses this data to develop and analyze alternatives and estimate costs for use in project initiation and approval documents, and to prepare detail design and specifications for both new construction and rehabilitation projects. The district materials unit is involved throughout the project development process.

Reference

Refer to the Headquarters Division of Engineering Services-Materials Engineering and Testing Services (METS) website for current information and services.

Project Planning

During the Project Initiation Document (PID) phase, materials and geotechnical information is needed to adequately develop and assess project alternatives. This early information can usually be acquired from reports or data prepared for previous similar projects at the same location or for nearby projects currently under study. If there are critical unanswered concerns such as stability of slopes, foundation problems, seismic, percolation, availability of materials, etcetera, preliminary studies should be performed by the district materials unit. Deflection tests are required for all flexible pavement rehabilitation work.

After the project has been initiated, requests are made of the district materials unit to update materials information and provide other useful information, such as side slope recommendations, wetland locations, slide locations, etcetera. Some services from the Headquarters Division of Engineering Services-Materials Engineering and Testing Services (METS) may also be needed. Refer to their website for a listing of services available. As studies progress, additional materials investigations may be needed to expand previously identified alternatives or to develop new alternatives. It is essential that enough materials information is available so that all viable project alternatives are evaluated equally in draft project reports and project reports.

A final report on materials and geotechnical issues is not required at this stage, but a draft report would be appropriate.

Design

Following selection of the preferred alternative and approval of the project, a geotechnical design or materials report, as appropriate, is requested from the materials unit. It should cover pavement structural section recommendations and all other geotechnical and materials information required to construct the project, such as: geology, soils, seismic, slope stability, foundation, percolation, drains, type and availability of materials, solid waste disposal, borrow sites, disposal sites, etcetera. For more information, see [Highway Design Manual](#) Topic 111 “Material Sites and Disposal Sites,” Topic 113 “Geotechnical Design Report,” Topic 114 “Materials Report,” and Chapters 600 – 670 “Pavement Engineering.”

Surface Mining and Reclamation Act

Design of a cost-effective project usually requires balanced earthwork quantities. In some cases commercial material must be used or an offsite borrow source acquired for imported borrow. Materials for the structural section must also be investigated to determine source locations and availability. Coordination with the environmental unit and the Surface Mining and Reclamation Act (SMARA) coordinator is needed to ensure that sites are environmentally approved and that the Surface Mining and Reclamation Act requirements are met. The California Department of Conservation maintains a list of the Surface Mining and Reclamation Act compliant operations known as the [AB 3098 List](#), which is updated and published quarterly. In many areas, only commercial material or contractor-cleared materials sites are available.

SECTION 7 Traffic

General

The traffic unit's major role in the project development process is providing expertise and guidance so a project will adequately and efficiently move traffic both during and after construction. This is primarily accomplished by incorporating safety features and upgrades, developing traffic handling plans delineating signing, striping and other traffic control measures and developing a transportation management plan (TMP).

The traffic unit's input should begin at the conceptual phase of the project to determine what their role will be.

The traffic units are known by various names in different districts including, but not limited to traffic, traffic safety, traffic operations, traffic engineering, traffic design, traffic management, electrical design, and freeway operations.

Reference

Refer to the [Traffic Manual](#), the [High-Occupancy Vehicle Guidelines](#), the Highway Capacity Manual, the [Ramp Metering Design Manual](#), and the [Transportation Management Plan Guidelines](#).

Project Development Team Member

A representative of the traffic unit serves on the project development team to provide input on traffic-related issues.

Project Planning

The traffic unit provides capacity studies and operational analyses and develops safety and delay indices. It is imperative that they determine whether the project alternatives will function adequately if constructed. Questions to be answered by the traffic unit include the following:

- Can the project be signed?
- Is there sufficient room for sign structures, electrical facilities, and other?
- Should traffic signals, storage, and striping be considered?
- Have results of field safety review been incorporated when appropriate?

For projects that propose high-occupancy vehicle (HOV) lanes, *California Streets and Highways Code*, Section 149 and the *California Vehicle Code*, Section 21655.5 requires Caltrans to conduct competent engineering estimates of the effect of high-occupancy vehicle lanes on safety, congestion, and highway capacity, prior to construction. This is reported in the project report. The high-occupancy vehicle information is normally prepared by the traffic unit and is provided for inclusion in the project report. See the [High-Occupancy Vehicle Guidelines](#).

Design

The traffic unit is requested to review the geometric layout so signing requirements, stage construction, intersection operation, end of freeway plan, temporary connection plans, etcetera are adequate for consideration of the motorists and the construction and maintenance workers.

The traffic unit is provided with skeleton layouts and requested to prepare the traffic-related portions of the PS&E and related project items. This normally consists of the following elements:

- Traffic signing and striping plans
- Lane closures and lane requirement charts
- Traffic electrical plans including stage construction
- Traffic contract items and quantities
- Signing and striping for traffic handling plans
- Transportation management plans
- Special considerations such as railroad signing

Input During Construction

The traffic unit's involvement in project development does not end with the award of a construction project. At various times throughout the construction project, the unit is expected to review closure schedule change requests, proposed traffic control measures, and signing and safety elements so public safety and convenience are considered. Stage construction, detours, and temporary connections may require modification to the transportation management plan in cooperation with the district transportation management plan coordinator. Traffic should be consulted prior to making changes to the transportation management plan.

SECTION 8 Structure Design

General

The Headquarters Division of Engineering Services-Structure Design is a partner in the project development process. Their responsibilities include the following:

Bridges:

- New overcrossing, undercrossing, separation and connector structures
- Bridges over waterways
- Railroad underpasses and overheads and mass transportation structures
- Pedestrian and bikeway bridges
- Widening or lengthening of existing structures
- Seismic retrofitting of existing structures

Special Structural Design:

- Retaining walls exceeding standard heights
- Noise barriers exceeding standard heights
- Box culverts and other underground structures not covered by the [*Standard Plans*](#)
- Pumping plants
- Earth retaining structures
- Signs and overhead structures
- Maintenance stations and equipment shops
- Structures at roadside rest areas, transit stations and truck inspection and weigh stations
- Other highway and transit related structures

Special Functions:

- Special studies, such as calculating capacity of major waterways
- Railroad approvals
- California Public Utilities Commission approvals
- Structure Replacement And Improvement Needs (STRAIN) Report

The Headquarters Division of Engineering Services-Structure Design has assigned a project functional manager to each district who should be contacted prior to any direct dealings with Structure Design.

Reference

Refer to the Headquarters Division of Engineering Services- Structure Design website for current information and services.

Representative on Project Development Team

A representative from the Headquarters Division of Engineering Services-Structure Design should be on the project development team for projects with extensive structure involvement. In this capacity, the representative will assist in the development and analysis of project alternatives. This includes developing architectural treatments and providing cost estimates for each viable alternative.

Project Planning

The Headquarters Division of Engineering Services-Structure Design is responsible for preparing advanced planning studies as part of the PID phase. These studies should encompass all aspects of structure work, such as new structures, widening or lengthening of existing structures, raising existing structures, rehabilitating and/or retrofitting existing structures, removing existing structures, etcetera. These studies can be extensive, as they have to be performed for all viable project alternatives. Efforts should be made to submit accurate data as much as possible to help achieve a reasonable assessment of cost and constructability.

The district submits profiles, typical cross sections, and span and clearance controls for all project alternatives. The Headquarters Division of Engineering Services-Structure Design responds with alternative structural solutions and cost estimates.

The Headquarters Division of Engineering Services-Structure Design continues to be involved during the remaining phases of obtaining project approval. This involvement consists of continuing membership in the project development team, the preparation of advanced studies to address additional project alternatives developed during the environmental studies stage, and the updating of structures data for the preferred alternative during the project approval process.

Design

The design process for structures involves continuous communication between the districts and the Headquarters Division of Engineering Services-Structure Design. The district starts the process by submitting a bridge site data submittal. This submittal occurs after geometrics are finalized. Other site submittals may also be required for retaining walls and noise barriers.

Instructions for completing the bridge site data submittal is located at the Headquarters [*Division of Engineering Services-Preliminary Investigations \(PI\)*](#) website.

The Headquarters Division of Engineering Services-Structure Design will develop a bridge preliminary report when bridge work is required. This report translates the bridge site data submittal into a technical report that is used by the structure design engineer, and into a map showing the proposed site, contours, and structure control data. The project engineer should review this report very carefully to ensure that it accurately depicts project requirements.

After the Headquarters Division of Engineering Services-Structure Design finalizes the bridge preliminary report, the bridge general plan is prepared for the proposed structure. The general plan should be reviewed by the project engineer, including for traffic, right-of-way, and utility requirements. The district right-of-way unit should be contacted, as appropriate. Foundation studies and a foundation report are also a part of the process at this time. After district concurrence with the bridge general plan, Structure Design may proceed with the detail design.

During PS&E development, the Headquarters Division of Engineering Services-Structure Design will submit bridge unchecked details to the district. These have been prepared by one structures designer but have not been checked by a second designer; this gives the district a chance to review, check, or revise the details.

Just prior to completion of structure PS&E, the Headquarters Division of Engineering Services-Structure Design will submit bridge checked details to the district. This is the final chance to review and revise the details.

The last step in the process is for the Headquarters Division of Engineering Services-Structure Design to transmit their PS&E package to the district. The district combines the structure PS&E with the district PS&E, which is then submitted to the

Headquarters Division of Engineering Services-Office Engineer to develop into a bid package.

Other Services

The Headquarters Division of Engineering Services-Structure Design performs many additional services, including the following:

Liaison with Railroad Companies

The Headquarters Division of Engineering Services-Structure Design performs the direct liaison work with the various railroad companies. The district railroad liaison helps coordinate this work, but the majority of the work and ultimate approval comes from Structure Design.

Negotiations with railroad companies are usually long and involved. Therefore, it is necessary to determine the extent of involvement as soon as practical. The district railroad liaison normally sends a strip map to the Headquarters Division of Engineering Services-Structure Design for projects in the vicinity of railroads to determine potential involvement. This is then followed by a submittal showing preliminary alignment plans at crossing locations. Structure Design identifies the railroad involvement and obtains verification from the railroad. It is also appropriate to obtain railroad approval of the geometrics at this stage.

California Public Utilities Commission Approvals

The Headquarters Division of Engineering Services-Structure Design serves as a liaison for obtaining approvals from the California Public Utilities Commission. There are usually two types of approvals: (1) changes in at-grade crossings with railroads (district prepares the exhibit maps); and (2) underpasses/overheads (Structure Design prepares the exhibit maps). Structure Design submits the proposals to the California Public Utilities Commission and notifies the district when approvals have been received. After approval, estimates are prepared showing the breakdown in costs between the railroad and the State.

SECTION 9 Hydraulics

General

The responsibility for hydraulic design policies and procedures rests with the Headquarters Division of Design; the unit that performs the project drainage design is responsible for their implementation. District organizations differ, but for the purpose of this manual, it is assumed that the project engineer, under the direction of the project manager, is responsible for assuring that proper project drainage design is performed. This will typically require the active participation in, or the review of, the design by the district hydraulics unit.

Reference

For information on highway drainage design, see the [Highway Design Manual](#) Chapters 800 – 890 “Drainage Design.” Refer to the [Storm Water Quality Handbooks: Project Planning and Design Guide](#) for information on incorporating stormwater quality controls into a project.

Project Planning

Detailed drainage design, such as accurate sizing and location of culverts, storm drains and roadway drainage, does not begin until after selection of the preferred alternative and approval of the project. However, the hydraulics unit should be involved during the project planning phase. Their input in the PID phase is invaluable, particularly in recommending facility types and estimating costs of large facilities.

The hydraulics unit also should be involved in the environmental studies. Early coordination between the two functional groups is important. Many projects, by necessity, will include water quality enhancement features or encroach on wetlands, floodplains, etcetera. When flood plain encroachment is involved the hydraulics unit should be involved in preparing the location hydraulic studies. Historical drainage maps often depict the extent of the encroachment and help determine which project alternatives should be considered. Documentation of these features must be included in the draft project report.

Design

Preparation of the drainage report by the hydraulics unit following project approval usually signifies the start of detailed drainage design. This report covers rainfall, runoff, existing flood records, gauging stations, debris and any other pertinent drainage information. The report is transmitted to the project engineer so that pertinent drainage design can be started. See [Chapter 14](#) – Preparation of Project Plans.

Inclusion of necessary drainage information in the PS&E is the responsibility of the project engineer. To effectively carry out this responsibility, the project engineer should maintain communication with, and involvement by, the hydraulics unit in the various elements of the drainage design. Although it may not be feasible for the hydraulics unit to perform the drainage design, the more complex types of analyses should, at a minimum, be thoroughly reviewed by the hydraulics unit. Some of the items that necessitate hydraulics unit involvement are:

- storm drain design and calculations
- drainage basins exceeding 320 acres
- hydrograph development or routing
- open channel modification or realignment
- retention or detention basins
- backwater analysis
- situations with high potential for flood damage litigation
- scour analysis or sediment transport
- culvert designs greater than 36 inches in diameter
- encroachments onto Federal Emergency Management Agency (FEMA) floodplains
- modifications to inlet or outlet capacities on existing culverts or drainage inlets (for example: placement of safety end grates, modification of side opening inlets to grated inlets, etcetera.)
- unique hydraulic design features (for example: energy dissipater design, pumping stations, siphons, etcetera.)

Hydraulics unit involvement in the design process will ensure that proper drainage design methodology and material are utilized, that the design conforms to policy, and that other specialty units such as Headquarters Division of Engineering Services-Structure Design-Structure Hydraulics are involved as necessary.

To facilitate this involvement, the hydraulics unit should comment on proposed geometrics, typical sections, contour grading, erosion control, bridge or drainage general plans, etcetera, as they are developed. The drainage report, when finalized by the hydraulics unit, should be included by the project engineer in the resident engineer file.

Structures Hydraulics

The Headquarters Division of Engineering Services-Structure Design-Structure Hydraulics unit evaluates hydraulic issues (scour potential, waterway adequacy, etcetera.) as they relate to bridges. They typically should become involved on a project at the time of the advance planning study (APS) for the bridge. Lead time is crucial for completion of their studies. Not every advance planning study requires a complete hydraulic analysis. Contact the Headquarters Division of Engineering Services-Structure Design project functional manager as early as possible for assistance when a hydraulic evaluation is required to determine the scope of the hydraulic evaluation.

SECTION 10 Construction

General

The construction unit is responsible for administering a construction contract for the construction of the project by a contractor to ensure that the final product is in accordance with the plans and specifications, and to deal with any problems that arise in the process.

Reference

Refer to the [Construction Manual](#) for information on the construction phase.

Project Development Team Member

The construction unit is included as a member of the project development team to ensure that construction issues and safety design are considered from project initiation through project design.

Project Planning

The construction unit should review the alternatives during the project initiation phase to determine if they are buildable.

During environmental and project studies the construction unit should be involved in the determination of measures to reduce or mitigate construction impacts.

Design

During the design stage the construction unit should review the project plans and specifications for such things as construction safety, logical staging, the analysis of the number of working days, and special provision usability. If there is a transportation management plan, the construction unit will be heavily involved in its implementation.

It is prudent to review traffic handling design plans with an experienced resident engineer (RE) for projects in areas subject to extreme weather.

Prior to the start of construction the project engineer finalizes the resident engineer file. See [Chapter 15](#) – Final Project Development Procedures and [Appendix GG](#) – Project Data Checklists.

Preconstruction Consultation

Prior to start of construction, the project engineer, along with other involved district units, will go over the project with the resident engineer. The review at this stage will aid in clearing up reasons for design decisions and commitments such as: right-of-way obligations, signing and traffic handling, materials sites, selected material, foundation treatment, potential slides, environmental commitments, drainage, potential maintenance problems, erosion control, public notification, proprietary materials, special considerations in contract provisions, and other appropriate items.

Contract Design Changes

On almost all construction projects, developments in the field will necessitate some design changes. For early resolution of these changes, it is essential that there be timely and effective coordination between the resident engineer, the project manager, the project engineer, and other district units that have a direct interest in the project. It is Caltrans' policy to allow only those changes that are required to complete the work as contemplated at the time the plans and specifications were approved. Proposed deviations from design standards must be approved following the procedures in [Chapter 21](#) – Design Standard Decisions.

Project History File

After completion of the construction contract the project manager is responsible for gathering the construction contract records from the resident engineer and the project planning and design data from the project engineer to put in the project history file.

SECTION 11 Maintenance

General

The maintenance unit will be responsible for maintaining the highway facility once the project is complete. It is essential that the maintenance unit be involved in the project development process from conception through construction.

Headquarters Division of Maintenance is the lead program and “first responder” for disaster response and emergency projects. Emergency projects are initiated in maintenance and if restoration design is needed, the projects are transferred to design.

Reference

Refer to the [Maintenance Manual](#) for details on maintenance of the facility.

Project Development Team Member

A maintenance representative must be assigned to all project development teams to ensure that maintenance issues and safety design are considered. Preferably, the representative should be the field person most familiar with the project site.

Project Planning

Typical maintenance involvement would be to comment on features such as the following:

- drainage patterns—particularly known areas of flooding and debris
- stability of slopes and roadbed—can the project be built and maintained economically?
- possible material sites
- concerns of the local residents
- potential erosion problems
- facilities within the right-of-way that would affect alternative designs
- special problems such as deer crossings, endangered species
- traffic operational problems such as unreported accidents
- facility that is safe to maintain

In addition to participation on the project development team, the maintenance unit should review all project initiation and project approval documents before their approval. They should address the previously listed concerns, plus known environmentally sensitive areas.

Maintenance generates the Damage Assessment Form (DAF) for emergency work. See [Chapter 9](#) – Project Initiation for more information.

Design

The maintenance unit should also review the proposed geometric layouts, typical sections, and final plans. Maintenance units may have input on shoulder backing materials, drainage, erosion problems, access to buildings, access for landscape facilities, access to encroachments for utility facilities, access for maintenance of noise barriers, fence and excess land review, etcetera. Maintenance units should also participate in the preparation of maintenance agreements (setting maintenance control limits).

The maintenance unit field representatives have a unique insight to local problems and maintenance and safety concerns. This insight must be utilized in the project development process. As the last link in the process, give the maintenance unit a chance to minimize future maintenance problems and potential lawsuits.

SECTION 12 Landscape Architecture

General

The district landscape architecture unit is responsible for the implementation of Caltrans' policies, procedures, and programs for highway planting and restoration, safety roadside rest areas, roadside enhancements (for example: vista points, historical markers), erosion control, revegetation, wetlands/habitat restoration, and may in some cases be responsible for implementing policies, procedures, and programs for environmental enhancement and mitigation, transportation art, scenic highways, and blue star memorial highways.

In addition, the district landscape architecture unit providing functional support to the project development team for a wide variety of projects that include, but are not limited to, highway construction, multi-modal transportation facilities, park-and-ride lots, noise barriers, maintenance stations, toll plazas, and other projects requiring expertise in scenic resource evaluation, visual impact assessment, aesthetics, natural resource protection and mitigation, roadside vegetation management, water conservation, stormwater quality requirements, and community involvement.

Reference

Refer to the Headquarters Division of Design-Landscape Architecture Program website for current information and services.

Project Development Team Member

A representative of the district landscape architecture unit is offered the opportunity to serve as a member of the project development team on all projects and is a required member for planting, roadside rest and noise barrier projects.

Project Planning

Early and continuous involvement by the district landscape architect (LA) is essential for identifying and resolving project issues that can affect project schedules and estimates, construction, and maintenance considerations.

It is essential that the project manager and the project engineer be aware of potential involvement by the district landscape architect on all projects, except for routine maintenance and repair projects. During the project study phase, at a minimum, the district landscape architect is given an opportunity to review the aesthetics of a project design and potential changes to the visual environment. Major involvement includes consideration for new highway planting, replacement planting and irrigation modification, and erosion control required as a result of highway construction, and environmental mitigation involving native planting revegetation and wetlands/habitat restoration.

The district landscape architect should provide consultation on access and safe working conditions for vegetation management, site planning, and pedestrian accommodation. The district landscape architect will be responsible for coordinating initial highway planting and aesthetic reviews, assessing visual impact, and for providing input to the project study process.

The scope of aesthetic reviews and visual impact assessments should include, but is not limited to, consideration of the following:

- preservation of the natural environment
- scenic resource determination
- location, alignment, and profile of the highway or interchange
- structures such as bridges, buildings, and noise barriers
- utility hardware
- contour grading, drainage, slope treatment, and planting

During preparation of environmental documents, the landscape architecture unit participates in the development of environmental mitigation, focusing on suitability, constructability, cost effectiveness, and maintainability. This is particularly important when Caltrans' mitigation proposals have been developed to satisfy permit requirements established by federal, State, or local agencies.

The landscape architecture unit takes part in public participation activities for the purpose of receiving public input and communicating Caltrans' policies regarding programs and issues identified previously under the Sub-article "General."

Design

During the design phase of highway projects the landscape architecture unit reviews the proposed geometrics and provides information on prevention of stormwater pollution, replacement planting, irrigation system modifications, and erosion control. The landscape architecture unit also conducts an aesthetics review of the project when requested and a summary of recommendations and actions.

The landscape architecture unit prepares the final plans, specifications, and estimate to be submitted with the engineering package or as a separate project for contract advertisement.

SECTION 13 Utilities

General

Most transportation projects affect existing utilities or are constructed close to them. These utilities must be identified and located, and may need to be relocated prior to construction or protected during construction. The utilities relocation unit in the district right-of-way unit, through the assigned utilities coordinator, is responsible for coordination and negotiation with the utility companies involved to determine the location of facilities and to determine responsibility for relocation costs, to decide who does the relocation, to identify design requirements for any work that must be included in the project's contract plans, and to negotiate utility agreements with the companies.

Reference

Refer to [Chapter 17](#) – Encroachments and Utilities and [Appendix LL](#) – Utility Policy Certification and Utility Matrix for the treatment of utilities within the right-of-way. See the [Right of Way Manual](#) Chapter 13 “Utility Relocations” for details on utility relocation.

Project Development Team Member

If significant utility investigation and relocation are involved, a representative of the right-of-way utilities unit may be added to the project development team.

Project Planning

The utilities unit provides utilities information and estimates for the right-of-way data sheet. If extensive utility relocation may be required by any of the viable alternatives under consideration, a thorough investigation of the relocation requirements must be done during the project initiation phase to obtain realistic costs and schedules.

Design

The right-of-way utilities unit should assist the project engineer in verifying the location of all existing utilities. Under normal procedures, the project engineer plots all known utilities that can be identified from field inspection, as-built plans, encroachment permits, files, etcetera. The utility unit then transmits the maps to the

various utility companies for checking and for the addition of any facilities not shown on the maps.

The location of all utilities must be shown on the contract plans. If any of the utility facilities are to be relocated after award of the highway contract, both existing and proposed locations must be shown. This is necessary to protect the State in accordance with *California Government Code*, Section 4215.

Any necessary coordination with utilities companies is done through the utilities unit and the utilities coordinator. Each district has appointed utilities coordinators to implement Caltrans policies on the relocation and removal of utility facilities to clear transportation projects.

When utilities are located within the limits of a project, a determination must be made whether relocation is required either outside of the right-of-way or within the right-of-way to avoid conflict with planned construction. Policy concerning utility encroachments within the right-of-way is discussed in [Chapter 17](#) – Encroachments and Utilities.

The project engineer and utility coordinator must provide for a clear and safe right-of-way through proper placement, protection, relocation, abandonment or removal of underground utility facilities that may pose a safety risk to the highway worker or user.

The project engineer must be sure that copies of utility relocation plans and notices to relocate are included in the resident engineer file. See [Chapter 15](#) – Final Project Development Procedures and [Appendix GG](#) – Project Data Checklists.

SECTION 14 District Office Engineer

General

The district office engineer unit is responsible for insuring that the project design is complete, biddable and buildable. The district office engineer unit is expected to ensure the completeness, quality and consistency of all the plans, specifications, and estimate packages submitted to the Headquarters Division of Engineering Services-Office Engineer for processing, regardless of their origin (for example: district, structure, consultant, or local agency). The district office engineer unit is also responsible for ensuring that PS&E submittals are prepared and processed in conformance with Caltrans policies, procedures and standards and with the [Ready to List and Construction Contract Award Guide \(RTL Guide\)](#) issued by Headquarters Division of Engineering Services-Office Engineer.

References

Refer to [Ready to List and Construction Contract Award Guide \(RTL Guide\)](#) for further information.

Project Planning

During the project planning phase, the district office engineer unit advises the project engineer and project manager on the buildability and biddability of the various alternatives, and provides unit prices for estimates.

Design

The district office engineer unit advises the project engineer and project manager during the design phase concerning the preparation of the special provisions, identification of contract items, estimating of costs, and the establishment of schedules for completion of PS&E and advertising the project.

PS&E prepared for remediation of hazardous waste in accordance with a remedial action design is processed by the district office engineer unit so that the work can be done in a preliminary contract prior to advertising the prime project.

Preparing Contract Documents

The district office engineer unit is responsible for combining the structure PS&E package with the district PS&E package so as to have one combined PS&E package. The district office engineer unit is responsible for notifying the Headquarters Division of Engineering Services-Structure Design two weeks prior to submitting a combined PS&E to Headquarters Division of Engineering Services-Office Engineer.

The district office engineer unit is responsible for the completeness, quality and consistency of PS&E submittals to Headquarters Division of Engineering Services-Office Engineer and for verifying that the design is complete and the project is biddable, and buildable. Submitting all projects to Headquarters Division of Engineering Services-Office Engineer as “qualified” projects is a goal of Caltrans for each district. “Qualified” projects are projects with PS&E that are sufficiently complete and accurate that they can be used as final contract documents with minimal processing by Headquarters Division of Engineering Services-Office Engineer.

The district office engineer unit is responsible for submitting a current right-of-way certification, justification and approvals for deviations from adopted standards and policies; copies of permits and agreements with other entities, materials information, and other documents affecting the contractor’s performance of the contract, all with the PS&E submittal, or at the earliest possible date following the PS&E submittal to Headquarters Division of Engineering Services-Office Engineer.

The Headquarters Division of Engineering Services-Office Engineer draft contract comments, and issues needing resolution, are sent to the district office engineer unit for district review and response.

Preparing to Advertise

For all Caltrans projects except for Minor B projects, Headquarters Division of Engineering Services-Office Engineer there is a Ready to List (RTL) for advertisement date after determination that the contract documents have been prepared complete and accurate as to all engineering requirements (PS&E ready) and legal requirements (constraints cleared). If funding has been obtained, Headquarters Division of Engineering Services-Office Engineer schedules the project advertisement.

After the contract documents are reproduced, Headquarters Division of Engineering Services-Office Engineer returns a set of plans marked in red (“redline” plans) to the district office engineer unit indicating any changes that have been made to the plans.

Addenda

Addenda are used to effect any changes to the contract requirements of advertised projects. They are used and distributed to all concerned parties prior to bid opening and should only correct significant errors, omissions, and conflicts. If the project engineer determines the need for an addendum, a request for approval to issue an addendum is prepared (see the [*Ready to List and Construction Contract Award Guide \(RTL Guide\)*](#)). Concurrence is obtained from the district office engineer unit, the project manager, and if appropriate from the Headquarters Project Delivery Coordinator and the Federal Highway Administration (FHWA), and other appropriate organizations. Approval is by the Deputy District Director for design. Headquarters Division of Engineering Services-Office Engineer issues the addendum after approval. The request for addendum must be received by Headquarters Division of Engineering Services-Office Engineer a minimum of three weeks prior to bid opening, if there are plan sheet changes, and two weeks prior to bid opening for other changes, in order to avoid postponing bid opening and delaying the project.

After bid opening, changes can only be accomplished by re-advertising as a new project or by contract change order during construction.