



County of Riverside
Transportation Department

BRIDGE DESIGN MANUAL



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Table of Contents

Introduction	2
Application of Standards and Guidelines	2
Specifics for Developer Projects	5
Plan Format	6
Quality Control Plans	7
Deliverables	8
30% Submittal (Bridge Type Selection Study)	8
65% PS&E Submittal (Unchecked Plans)	8
Initial (95%) PS&E Submittal	9
Final (100%) PS&E Submittal	10
“As-Built” Plans	10
Appendix – A: Bridges and Other Structures	
Appendix – B: Bridge Title Blocks	
Appendix – C: Quality Control Plan Checklist	
Appendix – D: Resident Engineer Pending File Check List	

Introduction

The County of Riverside covers an area of approximately 7300 square miles, which is about the size of the state of New Jersey. The County owns and operates 116 bridges connecting approximately 2200 miles of County maintained public road system, which is about the distance between the County of Riverside and Washington D.C. The bridges are a vital component of the transportation system for the residents of the County.

This puts in context the challenges that the County of Riverside Transportation Department (RCTD) faces in providing service to over 2.2 million residents (and growing!) living in the County. The Department's primary focus is on maintaining the existing roads and bridges, and enhancing the capacity of the roadway system while continuously improving safety to keep up with the population growth.

The purpose of this Bridge Design Manual is to provide a countywide uniform design guidance applicable to all bridges and other miscellaneous transportation structures designed and constructed on locally owned and operated public and private roads regardless of ownership and funding sources. These guidelines and procedures should be adhered in the development and design of bridge projects and applied with engineering knowledge, experience, and judgement to provide a safe, sustainable, integrated, and efficient transportation system.

Application of Standards and Guidelines

The following definitions are key to understanding the application of the standards and guidelines contained and referenced in this manual.

Bridge – As defined in 23 Code of Federal Regulations (CFR) 650.305, a bridge is: *a structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening*

Public Road – The term “public road” is defined in 23 U.S.C. 101(a)(27) as “any road or street under the jurisdiction of and maintained by a public authority and open to public travel.” The Streets and Highways (S&H) Code confers upon the Board of Supervisors of the counties the authority, duties, and limitations that have to do with the establishment and maintenance of the county road system. All the roads and bridges on the County Maintained Road System in the County of Riverside are considered Public Roads and Bridges.

Public authorities must follow the National Bridge Inspection Standards (NBIS) for all highway bridges located on all public roads. Federal Highway Administration (FHWA) requires State Department of Transportation (Caltrans) to inspect or cause to be inspected of all **public** highway bridges (except Federal or Tribal) in California. Caltrans provides bridge inspection services for all bridges located on the County Maintained Road System in the County of Riverside. Inspections are performed based on a predetermined schedule (usually at two-year intervals for routine inspection) and Inspection Reports are provided with detailed condition state of bridge elements and work recommendations. Caltrans is also required to maintain and report bridge inventory to FHWA to be included in the National Bridge Inventory (NBI). When new bridges are constructed or modifications are performed on existing bridges affecting previous inspection data, the County of Riverside is required to provide the as-built plans of the improvements to Caltrans within 180 days after change in status (23 CFR 650.311) for recording in the NBI. This is particularly important for determining the federal funding eligibility of future projects to rehabilitate or replace an existing bridge.

Private Bridge – Private bridges are typically constructed where a private road or driveway crosses a river, stream, or other waterway. Some of these bridges were built decades ago. Some have never been inspected by a qualified engineer, and for some no documentation exists for how much weight they can handle. The current County Ordinance 460.152, Section 3.3 permits private streets when it is determined that there is adequate provision for their construction and continued maintenance, that the welfare of the occupants of the development will be adequately served and that it will not be detrimental to the public health, safety, and general welfare. ***As such, private bridges shall be designed to the same standards used for bridges built on County Maintained Road System without exception. Load reductions are not allowed.*** This is especially important for assuring unrestricted usage by emergency responders in case of fires. Fire engines are the workhorses of fire departments. They carry a variety of equipment to handle almost any emergency call. A fire engine, fully loaded with equipment, water, and personnel, weighs about 38,000 pounds. A water tender, which is often used in more remote areas where there are no fire hydrants, can weigh up to 60,000 pounds. These loads push the operational load limits which the bridges are designed for.

The inspection, maintenance, rehabilitation, and replacement of private bridges are not eligible for funding using public monies. The County does not inspect or

maintain private bridges. These responsibilities are assigned to the owner of the bridge. The County does not keep an inventory of the private bridges either, as they are not reported for registration in the NBI. The private bridge owners should have their bridges inspected and load rated by a qualified bridge engineer. It is the bridge owner's responsibility to post a sign indicating the rating.

The locally owned and operated bridges in the County of Riverside are designed and built as part of either a Capital Improvement Project or a developer designed and constructed project. In addition to the bridges, other miscellaneous transportation related structures are designed and built as part of these projects. These structures include, but are not limited to, the following structure types:

- Earth retaining systems (retaining walls)
- Soundwalls
- Bridge mounted signs
- Barrier mounted signs
- Overhead sign structures
- Culverts and drainage structures
- Pedestrian and/or bicycle structures

RCTD in general follows Caltrans standards and guidelines in preparation of Plans, Specifications and Estimate (PS&E) for bridge(s) and other transportation structures. Therefore, designers are required to follow the latest Caltrans manuals, guidelines, specifications, and other applicable publications for design and plan preparation.

All locally owned and operated bridge and structure projects in the County of Riverside must be designed in accordance with the current Caltrans adopted edition of the AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications with California Amendments in accordance with 23 CFR 625.4(b). A comprehensive summary of the [Caltrans Bridge Design Manuals, Policies, Standards, and Guidance](#) applicable to the design of bridges and other structures is provided in "**Appendix A - Standards and Guidance for Bridges and Other Structures**" of this manual. Appendix A is a County amended copy of the [Exhibit 11-B: Bridges and Structures](#) of Caltrans LAPM, Chapter 11 – Design Guidance.

Structural design of all bridge projects shall be supported by appropriate Geotechnical/Foundation Reports and Hydrology/Hydraulics Reports, which shall be based on the Caltrans guidelines. In addition to the above cited resources, the designers are also directed to the "Caltrans Office of Special Funded Projects (OSFP) Information and Procedures Guide available at:

<https://dot.ca.gov/-/media/dot-media/programs/engineering/documents/201906-osfp-informationandproceduresguide-a11y.pdf>

While prepared as a guidance for projects sponsored by local agencies and constructed on the State Highway System (SHS), it is an excellent resource applicable to the local agency bridges off the SHS providing detailed process descriptions for:

- Advance Planning Studies
- Structure Type Selection
- Bridge Foundation Report
- Bridge Hydraulics Report
- Resident Engineer's Pending File
- As-Built Plans

The County will implement a Structure Type Selection Process for every bridge proposed on County Maintained Roadway System. Bridge planning studies as well as all progress submittals for bridge Plans, Specifications, and Estimates (PS&E) prepared as part of various Development and Capital Improvement projects will be reviewed for compliance with guidelines, constructability, and Quality Assurance.

Specifics for Developer Projects

Developers are encouraged to retain the services of a competent bridge engineer with California/Caltrans bridge design experience as early as possible in the planning phase of the project. During the entitlement process and prior to the Structure Type Selection, it is recommended to perform Advance Planning Studies (APS) as outlined in Caltrans Memo to Designer (MTD) 1-8 to establish the true scale of the environmental impacts, and engineering challenges of the project. APS also provide a realistic order of magnitude of cost before investing in a detailed Type Selection process. Bridges are designed for an expected service life of 75 years. Over that time period, various maintenance and rehabilitation activities will be performed to prolong the bridge service life including widening in some cases. Unless otherwise approved for exception in advance of planning studies, it is the County's policy and in the best interest to avoid the use of proprietary bridge structure systems on County Maintained Roads. This is important to be able to secure federal funding as well as ease and flexibility in future bridge maintenance, rehabilitation, and widening projects.

The Structure Type Selection and the bid process for the construction of a development bridge depend on the final jurisdictional assignment (whether the bridge is going to be located on a private street or a County Maintained Road) and the funding source used for its design and construction (whether private developer funds or public funds used) respectively.

- ***Case – 1: The bridge is located on a private street, and will be owned, operated, and maintained by a private entity:*** The developer shall submit a Structure Type Selection Memo with all

pertinent attachments as outlined in MTD 1-29. At the sole discretion of the County Bridge Engineer, the Type Selection Meeting might be waived and the proposed structure type might be approved without a meeting for those bridges considered as simple with no complex site conditions. Proprietary bridge structure systems are allowed. There are no restrictions on developer's bid process.

- **Case – 2: Up on completion and approval of construction, the road and the bridge will be relinquished into the County Maintained Roadway System. Only private funds will be used for the design and construction of the project:** A full scale Type Selection process is required as outlined in MTD 1-29. Proprietary bridge structure systems are not allowed. There are no restrictions on developer's bid process.
- **Case – 3: Up on completion and approval of construction, the road and the bridge will be relinquished into the County Maintained Roadway System. Developer is seeking credits from public funding sources such as Transportation Uniform Mitigation Funds (TUMF) or Development Impact Fees (DIF), etc.:** A full scale Type Selection process is required as outlined in MTD 1-29. Proprietary bridge structure systems are not allowed. Developer is required to follow the public bidding process.

Plan Format

The contract plans shall be prepared in accordance with the most current edition of applicable Caltrans bridge design and drafting manuals and other applicable documents. U.S Customary Units (English) and MicroStation® software shall be used to develop contract plans. The latest Caltrans Standard Plans and Standard "XS" Detail Sheets shall be incorporated into the bridge plans where applicable to minimize time and effort in developing details.

Plans for the County bridge projects shall be prepared on 22" x 34" full-size sheets so that the reduced plans on 11" x 17" half-size sheets are exactly half the scale of the original plans. County standard title blocks, which are attached in Appendix B of this manual, shall be used in preparation of plans for the bridges and non-standard retaining walls.

Plans of standard and nonstandard retaining walls shall be included with the bridge plans in abutment details if they are monolithic with the wing walls. This will allow Caltrans Structures Maintenance and Investigations (SM&I) to inspect

and comment on the walls. Locally owned standalone retaining walls are not inspected by Caltrans.

All symbols, soil legend, and nomenclature used in geotechnical Log of Test Borings (LOTBs) Sheets shall follow the format shown in the Caltrans Standard Plans A10F, A10G, and A10H. In addition, the geotechnical engineer shall sign the structure foundation plans confirming that the design and the setting of structure foundations shown in the plans are in compliance with the geotechnical recommendations provided in the Bridge Foundation Report.

Consultant corporate logos are not allowed on the plans.

Quality Control Plan

RCTD considers quality control a key aspect of the project development. As a part of project start up tasks, consultants are required to prepare a Quality Assurance/Quality Control (QA/QC) plan to be approved by the County for implementation during the project development and the preparation of the construction documents. Plans, special provisions, estimates, calculations, and reports shall go through a thorough check and a QA/QC process prior to all major submittals. The evidence of QA/QC plan implementation shall be in the project files and shall be made available to the County up on request.

The following check lists shall be included with the Initial (95%) and Final (100%) Plans Specifications and Estimates (PS&E) submittals:

- Quality Control Plan Checklist. This checklist is provided in Attachment 1-6.1 of the Caltrans OSFP Information and Procedures Guide. It is also provided in Appendix C of this design manual.
- For all federally funded projects, the PS&E Checklist provided in Exhibit - 12D of Caltrans LAPM, Chapter 12 Plans Specifications and Estimate shall be attached.
- Resident Engineer (RE) Pending File Checklist. Attached in Appendix D of this Design Manual. The content of the RE Pending File is also discussed in detail in the Caltrans OSFP Information and Procedures Guide Section 4-9.

The Quality Control Plan Checklist shall be submitted with evidence of check prints initiated by the structural designer and independent checker or reviewer.

Deliverables

Deliverables required as part of various progress submittals for review and approval by the County are specified below. The contents and the number of review cycles for progress submittals depend primarily on the quality of the submittal as well as the nature and size of the project.

30% Submittal (Structure Type Selection Study)

No further final design work shall be performed until the approval of the Structure Type Selection Report by the County. The Structure Type Selection Report shall be prepared in accordance with Caltrans guidelines and shall contain a general plan, a draft foundation plan, general plan cost estimate, vicinity map, type selection study memorandum, concept falsework and prestressing plans for complex structures, permanent and temporary vertical and horizontal clearances, project-specific seismic design criteria and preliminary seismic performance design data, railroad coordination correspondences and clearance requirements as a minimum. Additional project-specific information such as utility coordination, bridge aesthetics, and regulatory restrictions shall be added and discussed as appropriate. The Structure Type selection Report shall be submitted with the Preliminary Foundation Report and Hydrology/Hydraulics Report where applicable. A Structure Type Selection Review Meeting shall be scheduled after the County has received an acceptable Structure Type Selection Report. Once all the issues raised during the type selection meeting are satisfactorily addressed, the County will provide written approval of the proposed structure type.

Pre Type Selection Meeting Deliverables:

- Structure Type Selection Report – 4 sets and a PDF copy
- Preliminary Foundation Report – 4 sets and a PDF copy
- Preliminary Hydrology/Hydraulics report – 4 sets and a PDF copy

Post Type Selection Meeting Deliverables:

- Type Selection Meeting minutes – 3 sets and a PDF copy
- Revised Structure Type Selection report – 3 sets and a PDF copy

65% PS&E Submittal (Unchecked Plans)

65% progress submittal is also known as the unchecked details submittal. Unchecked details are structure plans with unchecked construction details that are generally complete but have not been checked independently yet by another

licensed civil engineer who was not involved in the design. County performs the review on the unchecked details to identify any significant potential issues and to provide Consultants with valuable feedback in preparing subsequent submittals. A list of pay items and unedited Caltrans Standard Special Provisions (SSPs) shall be included in the submittal in order to provide sufficient preliminary information on the nature of the construction work being reviewed.

Deliverables:

- Unchecked plans (11" x 17" half-size plans) – 6 sets
- Unedited Caltrans standard special provisions (SSPs) – 3 sets
- Contract pay item list – 3 sets
- Draft Foundation Report – 3 sets
- Draft Hydrology/Hydraulics report – 3 sets
- In addition to the hard copies listed above, an electronic copy of the submittal is required. CADD files (plans) in both ".dgn" and ".pdf" format, and all other documents in ".pdf" format.

Initial (95%) PS&E Submittal

County performs the 95% PS&E Submittal review with the primary goal that the projects are in compliance with applicable County and Caltrans standards and guidelines. The final review comments are usually noted on a set of red-marked plans and in various review memos and letters. Consultants may be required to submit the 95% PS&E package multiple times before 100% submittal depending on the quality of the initial submittal as well as the accurate implementation and resolution of the comments. The reviews are performed to minimize the constructability issues and the potential contract change orders.

Deliverables:

- Checked plans (11" x 17" half-size plans) – 6 sets
- Design calculations – 2 sets
- Independent check design calculations – 2 sets
- Final foundation report – 2 sets
- Final hydrology/hydraulics report – 2 sets
- Edited Caltrans standard special provisions (SSPs) – 3 sets
- Marginal estimate – 6 sets
- Design quantity calculations – 3 sets
- Independent check quantity calculations – 3 sets
- Consultant Quality Control Plan Checklist – 2 sets
- PS&E Check List (for all federally funded projects) – 2 sets
- Resident Engineer Pending File Check List (Draft) – 2 sets

- In addition to the hard copies listed above, an electronic copy of the submittal is required. CADD files (plans) in both “.dgn” and “.pdf” format, and all other documents in “.pdf” format.

Final (100%) PS&E Submittal

After the 95% submittal and the pertinent reviews are completed satisfactorily, the Final (100%) PS&E package shall be submitted to the County. Consultants are required to submit the Resident Engineer Pending File together with all documents and the checklist along with the Final PS&E package.

Deliverables:

- 11” x 17” half-size plans – 6 sets
- 22” x 34” full-size plans on mylar – 1 set
- Final edited Caltrans Standard Special Provisions (SSPs) – 3 sets
- Final quantity calculations and marginal estimate – 3 sets
- Final Foundation Report – 2 sets
- Final Hydrology/Hydraulics report – 2 sets
- Resident Engineer Pending File and the Check List – 2 sets
- In addition to the hard copies listed above, an electronic copy of the submittal is required. CADD files (plans) in both “.dgn” and “.pdf” format, and all other documents in “.pdf” format.

“As-Built” Plans

On County administered contracts, the resident engineer shall provide the County Project Manager a set of original record drawings of all structure work with “As-Built” corrections, or a clear, readable, black-line copy of the original tracings with “As-Built” corrections. The “As-Built” corrections shall be made by the engineer responsible for structure work. Each sheet of the As-Built plans must be clearly identified with an “As-Built” stamp. All plan sheets, whether they contain changes or not, must have (at a minimum) the name of the Resident Engineer (R.E.), the Construction Contract Acceptance date, and the Contract Number. These shall be forwarded by the County Project Manager to the Caltrans District Local Assistance Engineer (DLAE) with a copy of Caltrans LAPM, Exhibit 17-J: Report of Completion of Structures on Local Streets and Roads.

Users of this Design Manual are also referred to the OSFP Information and Procedures Guide, Section 5-5: Structure As-Built Plans for further information.

Appendix – A

Standards and Guidance For

Bridges and Other Structures

Appendix A - Bridges and Other Structures

Appendix A is a copy of the “Exhibit 11-B Bridges and Other Structures” from Caltrans Local Assistance Procedures Manual (LAPM), Chapter 11 Design Guidance with County of Riverside amendments.

Definitions

Bridge – As defined in 23 Code of Federal Regulations (CFR) 650.305, a bridge is:

A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.

Bridge Length – The greater dimension of a structure measured along the center of the roadway between backs of abutment backwalls or between ends of bridge floors.

Bridge Roadway Width – The clear width of a structure measured at right angles to the center of the roadway between the bottom of curbs or, if curbs are not used, between the inner faces of parapet or railing.

Other Structures – Any structure, other than a “bridge,” as defined above, that is related to a local agency highway or transportation project, including but not limited to:

- Structures designed as a bridge, but not meeting the bridge definition noted above
- Earth retaining systems (retaining walls)
- Soundwalls
- Bridge mounted signs
- Barrier mounted signs
- Overhead sign structures
- Culverts and drainage structures
- Pedestrian and/or bicycle structures

Statewide Design Standards for Bridges and Structures

Local agency funded highway transportation projects with bridges and structures on the State Highway System (SHS) must be designed in accordance with current SHS standards in the Caltrans bridge design and geotechnical manuals.

All local bridge and structure projects off the SHS and either on or off the National Highway System (NHS) must be designed in accordance with the current Caltrans adopted edition of the [AASHTO Load and Resistance Factor Design \(LRFD\) Bridge Design Specifications with California Amendments](#).

Caltrans bridge design manuals, policies, standards, and guidance are available on the [Caltrans Division of Engineering Services \(DES\)](#) website under [Technical Publications](#). The [Caltrans Geotechnical Manual](#) is available on the Caltrans DES website under [Geotechnical Services](#).

The following bridge design policies, criteria, and standards address bridge design:

- The current Caltrans adopted edition of the [AASHTO LRFD Bridge Design Specifications with California Amendments](#)
- The current version of the Caltrans Seismic Design Criteria (SDC)
- The current releases to the Caltrans Bridge Memo to Designers (MTD)

The MTD serves as a supplement to the Caltrans adopted edition of the [AASHTO LRFD Bridge Design Specifications with California Amendments](#) and the Caltrans' Seismic Design Criteria. Caltrans MTDs are technical policies and procedures particular to California and assist the Structure Designer in the interpretation and application of structural and seismic design standards.

The following Caltrans bridge design manuals are considered Caltrans bridge design guidance, where guidance includes current Caltrans procedures and technical practices:

- [Bridge Design Practice Manual](#)
- [Bridge Design Details](#)
- [Bridge Design Aids](#)

Bridge Design Alternatives

Structural Capacity - Alternatives to the criteria contained herein for the structural capacity of bridges, bridge railings, and other structures are not allowed. Alternatives to bridge design detailing are permitted as long as they do not impact structural capacity.

Geometric Standards - Alternatives to accepted geometric standards are allowed. For alternatives to geometric criteria, refer to "Design Decisions" described in "Caltrans LAPM, Section 11.5." Design decisions that would result in construction of a new bridge with a Sufficiency Rating less than 80 are not allowed.

Railroad Bridges

The railroad grade separations carrying rail traffic, i.e., the underpasses, shall be designed using the standards of the American Railway Engineering and Maintenance-of-Way Association (AREMA) as well as the standards and guidelines of the particular railroad company.

Bridge Railing

Local agency funded highway transportation projects on the SHS must use a current Caltrans approved bridge railing. Current Caltrans approved bridge railings and associated details can be found within the current [Caltrans Standard Plans](#) and current [Caltrans Bridge Standard Detail Sheets](#), commonly referred to as XS sheets.

For local bridge projects off the NHS, bridge railing designs must either meet the crash testing requirements of [AASHTO Manual for Assessing Safety Hardware \(MASH\)](#), or can be geometrically and structurally evaluated as equal to a crash-tested system. For more information on bridge railing types tested under [AASHTO MASH](#), or for bridge railing that has been evaluated as equal to a crash-tested system, refer to both the AASHTO Task Force 13, [A Guide to Standardized Bridge Rail Hardware](#) and the [FHWA Bridge Railings webpage](#).

For local bridge projects on the NHS, bridge railing designs must meet the crash testing requirements of [AASHTO MASH](#). Any new proposed bridge railing design must meet [AASHTO MASH](#) testing requirements.

Foundation Investigation for Design

A foundation investigation and a Bridge Foundation Report must be completed for all local agency bridge projects with major rehabilitation or replacement.

The following reports are part of the foundation investigation:

- Structures Preliminary Geotechnical Report (SPGR)
- Preliminary Foundation Report (PFR) – Type Selection Process
- Foundation Report (FR) – Final PS&E Process

For further guidance refer to [Foundation Report Preparation for Bridge Foundations](#) and [Guidelines for Structures Foundation Reports](#).

Bridge and Culvert Hydraulic Design

Local agency funded highway transportation projects with bridges and structures on the SHS must be designed in accordance with current SHS standards in the Caltrans bridge design manuals, [Caltrans Geotechnical Manual](#) and [Caltrans Highway Design Manual](#).

All local bridge and structure projects off the SHS and either on or off the NHS must be designed in accordance with the current Caltrans adopted edition of the [AASHTO LRFD Bridge Design Specifications with California Amendments](#).

The goal of hydraulic design for bridges and structures is to convey surface and stream waters originating upstream of the drainage facility to the downstream side without significant upstream and downstream impacts in a manner that meets regulatory requirements.

The local agency must use sound engineering judgment in selecting and applying their project-specific hydraulic criteria in order to design the most cost-effective project considering the importance of the facility, safety, federal and state regulations, environmental requirements, legal obligations, and ease of maintenance.

The following resources are available to assist local agencies in hydraulics and hydrologic design:

- [Caltrans Highway Design Manual](#)
- [FHWA Hydraulic Engineering Circular \(HEC\) Publications](#)
- [Caltrans LAPM, Section 11.6 Highway Cross Drainage, Hydraulic, and Hydrologic Design](#)
- [Caltrans MTD Section 16 Structures Hydraulics](#)
- [FHWA Hydraulic Engineering Website](#)
- [Central Valley Flood Protection Board Website](#)
- [NOAA Fisheries Website](#)
- [California Department of Fish and Game Website](#)

The local agency must document their selected project-specific hydraulic and hydrologic design criteria within the following two bridge hydraulic reports:

- Preliminary Hydraulic Report (during the project planning phase)
- Final Hydraulic Report (during the project design phase)

The Scour Data Table must be shown on the plans for new projects and on the As-Built Plans.

References

AASHTO

- [Guide Specifications for Bridge Railings](https://bookstore.transportation.org/CATEGORY_ITEM.ASPX?ID=DS&GCLID=CLTK3EXEY8MCFUEEFGODU3UAPQ)
https://bookstore.transportation.org/CATEGORY_ITEM.ASPX?ID=DS&GCLID=CLTK3EXEY8MCFUEEFGODU3UAPQ
- [LRFD Bridge Design Specifications](https://bookstore.transportation.org/HOME.ASPX)
https://bookstore.transportation.org/HOME.ASPX
- [LRFD Guide Specification for the Design of Pedestrian Bridges](https://bookstore.transportation.org/home.aspx)
https://bookstore.transportation.org/home.aspx
- [Standard Specifications for Highway Bridges](https://bookstore.transportation.org/category_item.aspx?id=DS&gclid=CLTK3eXey8MCFUeEfgodu3UAPQ)
https://bookstore.transportation.org/category_item.aspx?id=DS&gclid=CLTK3eXey8MCFUeEfgodu3UAPQ
- [Task Force 13, A Guide to Standardized Bridge Rail Hardware](http://www.aashtotf13.org/)
http://www.aashtotf13.org/

Caltrans

- [Bridge Design Aids](http://www.dot.ca.gov/hq/esc/techpubs/index.html)
http://www.dot.ca.gov/hq/esc/techpubs/index.html
- [Bridge Design Details](http://www.dot.ca.gov/hq/esc/techpubs/index.html)
http://www.dot.ca.gov/hq/esc/techpubs/index.html
- [Bridge Design Practice Manual](http://www.dot.ca.gov/hq/esc/techpubs/index.html)
http://www.dot.ca.gov/hq/esc/techpubs/index.html
- [Bridge Memo to Designers](http://www.dot.ca.gov/hq/esc/techpubs/index.html)
http://www.dot.ca.gov/hq/esc/techpubs/index.html

- [Bridge Rails and Barriers, A Reference Guide for Transportation Projects in the Coastal Zone](http://www.dot.ca.gov/hq/LandArch/16_la_design/aesthetics/barriers/pdf/Caltrans_Bridge_Rails_and_Barriers.pdf)
http://www.dot.ca.gov/hq/LandArch/16_la_design/aesthetics/barriers/pdf/Caltrans_Bridge_Rails_and_Barriers.pdf
- [Bridge Standard Details Sheets](http://www.dot.ca.gov/hq/esc/techpubs/index.html) (XS Sheets)
<http://www.dot.ca.gov/hq/esc/techpubs/index.html>
- [California Amendments \(to the AASHTO LRFD Bridge Design Specification\) – current edition](http://www.dot.ca.gov/hq/esc/techpubs/manual/bridgemanuals/ca-to-aashto-lrfd-bds/caalbds_v4.html)
http://www.dot.ca.gov/hq/esc/techpubs/manual/bridgemanuals/ca-to-aashto-lrfd-bds/caalbds_v4.html
- [California Bank and Shore Rock Slope Protection Design](http://www.dot.ca.gov/hq/oppd/hydrology/hydroidx.htm),
<http://www.dot.ca.gov/hq/oppd/hydrology/hydroidx.htm>
- [Caltrans Division of Engineering Services \(DES\) Technical Publications](http://www.dot.ca.gov/hq/esc/)
<http://www.dot.ca.gov/hq/esc/>
- [Caltrans Geotechnical Manual](http://www.dot.ca.gov/hq/esc/geotech/geo_manual/manual.html)
http://www.dot.ca.gov/hq/esc/geotech/geo_manual/manual.html
- [Foundation Report Preparation for Bridge Foundations](http://www.dot.ca.gov/hq/esc/osfp/current-issues/new-foundation-manuals/new-foundations-manuals.htm)
<http://www.dot.ca.gov/hq/esc/osfp/current-issues/new-foundation-manuals/new-foundations-manuals.htm>
- [Guidelines for Structures Foundation Reports](http://www.dot.ca.gov/hq/esc/osfp/current-issues/new-foundation-manuals/new-foundations-manuals.htm)
<http://www.dot.ca.gov/hq/esc/osfp/current-issues/new-foundation-manuals/new-foundations-manuals.htm>
- [Standard Plans](http://www.dot.ca.gov/hq/esc/oe/project_plans/HTM/stdplns-US-customary-units-new18.htm)
http://www.dot.ca.gov/hq/esc/oe/project_plans/HTM/stdplns-US-customary-units-new18.htm
- [Soil and Rock Logging Manual](http://www.dot.ca.gov/hq/esc/geotech/sr_logging_manual/srl_manual.html)
http://www.dot.ca.gov/hq/esc/geotech/sr_logging_manual/srl_manual.html

FHWA

- [23 CFR Part 650 Bridges, Structures and Hydraulics](http://www.ecfr.gov/cgi-bin/text-idx?rgn=div5&node=23:1.0.1.7.28)
<http://www.ecfr.gov/cgi-bin/text-idx?rgn=div5&node=23:1.0.1.7.28>
- [FHWA Bridge Railing](http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/barriers/bridge_railings/)
http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/barriers/bridge_railings/
- [Hydraulic Engineering](http://www.fhwa.dot.gov/engineering/hydraulics/)
<http://www.fhwa.dot.gov/engineering/hydraulics/>

Other

- [California Department of Fish and Game](http://www.wildlife.ca.gov/)
<http://www.wildlife.ca.gov/>
- [Central Valley Flood Protection Board Home](http://www.cvfpb.ca.gov/)
<http://www.cvfpb.ca.gov/>
- [NOAA Fisheries](http://www.nmfs.noaa.gov/)
<http://www.nmfs.noaa.gov/>

Appendix - B

Title Blocks for Bridge/Structure Plans

GENERAL PLAN SHEET

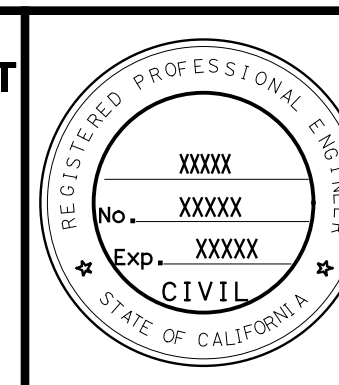
PLOT DRIVER => \$PLTDRVS\$
PEN TABLE => \$PENITBL\$

REVISIONS				
MARK	DATE	DESCRIPTION	BY	APP'D

DESIGN BY:	X	CHECKED BY:	X
DETAILS BY:	X	CHECKED BY:	X
QUANTITIES BY:	X	CHECKED BY:	X
<small>THE COUNTY OF RIVERSIDE OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC OR SCANNED COPIES OF THIS PLAN SHEET.</small>			

LOAD & RESISTANCE FACTOR DESIGN	LIVE LOADING: HL93 W/"LOW-BOY"; PERMIT DESIGN VEHICLE
LAYOUT BY: X	CHECKED BY: X
SPECIFICATIONS X	PLANS AND SPECS COMPARED BY: X
BRIDGE NO. X	
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS	0 1 2 3

**COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT**
Approved to conformance with County Standards and Practices.
XXX XXX COUNTY OVERSIGHT ENGINEER XX-XX-XX DATE



CONSULTANT NAME
XXX XXX PROJECT ENGINEER XX-XX-XX DATE
1234 ABC ST., Ste. X
ABC, CA XXXXX PH: (XXX) XXX-XXXX

**PROJECT TITLE 1
PROJECT TITLE 2
PROJECT TITLE 3**
SHEET TITLE
SCALE: 1"=XX'

SHEET NO. X	
SHEET X	OF X
PROJECT SHEET NO. X	TOTAL SHEETS X

FOUNDATION PLAN SHEET

APPROVAL DATE: XX-XX-XX

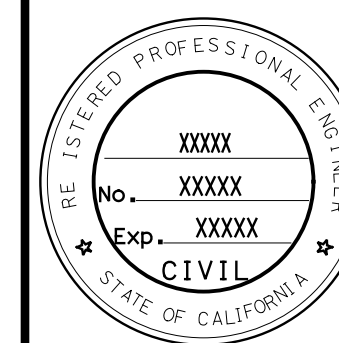
GEOTECHNICAL PROFESSIONAL: X

PLOT DRIVER => \$PLTDRVS\$
PEN TABLE => \$PENITBL\$

REVISIONS				
MARK	DATE	DESCRIPTION	BY	APP'D

VERT.DATUM	X
HORZ.DATUM	X
PHOTOGRAMMETRY AS OF:	X
SURVEYED BY:	X
FIELD CHECKED BY:	X
DESIGN BY:	X
CHECKED BY:	X
DETAILS BY:	X
CHECKED BY:	X
QUANTITIES BY:	X
CHECKED BY:	X
DRAFTED BY:	X
CHECKED BY:	X
BRIDGE NO.	X

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS	0	1	2	3
--	---	---	---	---



CONSULTANT NAME
 XXX XXX PROJECT ENGINEER
 DATE XX-XX-XX
 1234 ABC ST., Ste X
 ABC, CA XXXXX PH: (XXX) XXX-XXXX

PROJECT TITLE 1
PROJECT TITLE 2
PROJECT TITLE 3
SHEET TITLE
 SCALE: 1"=XX'

SHEET NO.	
X	
SHEET	OF
X	X
PROJECT SHEET NO.	TOTAL SHEETS
X	X

USERNAME => DGN FILE => \$REQUEST

WO 0000

COUNTY FILE No.

LAST REVISION: DATE PLOTTED => \$DATE\$
TIME PLOTTED => \$TIME\$
04-21-15

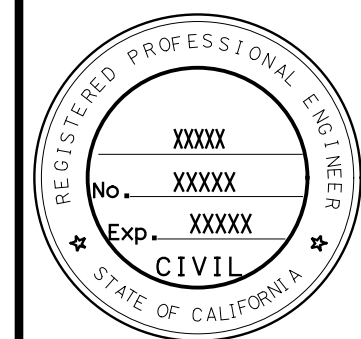
DETAIL SHEET

PLOT DRIVER => \$PLTDRV\$
PEN TABLE => \$PENITBL\$

REVISIONS				
MARK	DATE	DESCRIPTION	BY	APP'D

THE COUNTY OF RIVERSIDE OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC OR SCANNED COPIES OF THIS PLAN SHEET.

DESIGN BY: X	CHECKED BY: X
DETAILS BY: X	CHECKED BY: X
QUANTITIES BY: X	CHECKED BY: X
BRIDGE NO. X	
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS	0 1 2 3



CONSULTANT NAME
 XXX XXX PROJECT ENGINEER
 1234 ABC ST., Ste. X
 ABC, CA XXXXX PH: (XXX) XXX-XXXX

PROJECT TITLE 1
PROJECT TITLE 2
PROJECT TITLE 3
SHEET TITLE
 SCALE: 1"=XX'

SHEET NO. X	
SHEET X	OF X
PROJECT SHEET NO. X	TOTAL SHEETS X

USERNAME => DGN FILE => \$REQUEST

WO 0000 COUNTY FILE No.

LAST REVISION | DATE PLOTTED => \$DATE\$
TIME PLOTTED => \$TIME\$
04-21-15

LOG OF TEST BORINGS (GEOTECHNICAL) SHEET

PLOT DRIVER => \$PLTDRVS\$
PEN TABLE => \$PENITBL\$

REVISIONS				
MARK	DATE	DESCRIPTION	BY	APP'D

THE COUNTY OF RIVERSIDE OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC OR SCANNED COPIES OF THIS PLAN SHEET.

XXX XXX		XX-XX-XX
FIELD INVESTIGATION BY		DATE
DRAWN BY: X	CHECKED BY: X	
BRIDGE NO. X		
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		
0	1	2 3



CONSULTANT NAME

XXX XXX PROJECT ENGINEER XX-XX-XX DATE

1234 ABC ST., Ste. X
ABC, CA XXXXX PH: (XXX) XXX-XXXX

**PROJECT TITLE 1
PROJECT TITLE 2
PROJECT TITLE 3
LOG OF TEST BORINGS
NO. X**

SCALE: 1"=XX'

SHEET NO.	
X	
SHEET X	OF X
PROJECT SHEET NO.	TOTAL SHEETS
X	X

USERNAME => DGN FILE => \$REQUEST

WO 0000 COUNTY FILE No.

LAST REVISION | DATE PLOTTED => \$DATE\$
04-21-15 | TIME PLOTTED => \$TIME\$

Appendix - C

Quality Control Plan Checklist

Quality Control Plan Checklist—Page 1 of 6

PROJECT INFORMATION

EA:		Date:	
District:	County:	Route:	KP(PM):
Consultant:			
Consultant Project Manager:			

DESIGN

	Design calculations, independent check calculations, and supporting documentation are bound and properly identified.
	Appropriate registration seals and signatures are shown on design and check calculations.
	Designer and Checker have resolved and documented all design, details and layout differences.

PLANS

	Riverside County Title Blocks are used for the project plans.
	Plans conform to CALTRANS drafting standards.
	All plan sheets are complete with names, signatures and registration seal shown in appropriate locations.
	All sheets are readable when reduced in size.
	Applicable Standard Plans are listed, and appropriate references are included in the plans.
	Specifications, proprietary items or trade names are not shown on plans.
	Terminology on plans matches item descriptions in the estimate, the Special Provisions and the Standard Specifications.
	Standard abbreviations and symbols are used.
	Stage construction and traffic control are shown if applicable.
	Plans and details for structures are in accordance with applicable checklists shown in the Bridge Design Details Manual.

Quality Control Plan Checklist—Page 2 of 6

	Cross-references on plans are verified.
	Bridge plans and road plans are checked for consistency in details.
	Road plans reviewed for special designed retaining walls, sound walls, sign structures, and other special designed features, which require OSFP review.
	Spellings and abbreviations are checked.
	Standard Detail Sheets or modifications to Standard Detail Sheets are in agreement with the details on plans.
	Existing and proposed utilities are shown and owners are identified. Project conforms to CALTRANS policy on high and low risk utilities.
	Log of Test Borings are included in Plans.
	Properly formatted As-Built Log of Test Borings Sheets are included as appropriate.
	Foundation selection and design are consistent with the recommendations in the Foundation Report.
	Signature of the Geotechnical Professional is shown on Foundation Plan.

SPECIAL PROVISIONS

	The project Special Provisions conform to the CALTRANS PS&E Guide.
	Appropriate registration seals and signatures included in Special Provisions signature sheet.
	All information is clear and legible.
	Item list with item descriptions, item numbers, units of pay and item pay codes are included, and all items of work are covered in the Special Provisions.
	Current, edited Standard Special Provisions (SSPs) are used and hidden text is shown.
	Bridge and Road Special Provisions are checked for consistency.
	Measurement and payment clauses are included or referenced for all contact items.
	Standard style and format is used, especially for measurement and payment clauses.
	Use of trade names is in accordance with CALTRANS policy.
	Completed Memo to Specification Engineer/Estimator is included.

Quality Control Plan Checklist—Page 3 of 6**ESTIMATE**

	Quantity calculations and independent quantity check calculations are bound and properly identified.
	All information clear and legible.
	Completed CALTRANS Marginal Estimate Forms and Quantity Summary Forms are included for each structure.
	Quantity values summarized on forms are consistent with quantity calculations.
	Quantity calculations and independent check calculations are resolved within allowable tolerances.
	Estimate quantities are appropriately rounded.
	Standard Contract items are used from BEES Coded Contract Item Lists. Code numbers and descriptions shown.
	Standard units of measure used.
	All items of work covered by Contract Item, Supplemental Funds or State Expense.
	State-Furnished materials, specialty items and supplemental work listed in Special Provisions are included in the estimate.
	Price and quantity supporting information included for Lump Sum items. (i.e. calculations for cubic meters of concrete removal items or calculations for kilograms of prestressing steel for prestressed cast-in-place concrete items.)
	Reasonable unit prices included
	Working day schedule included.

LATE PLAN CHANGES

	Design calculations, independent check calculations, and supporting documentation prepared and submitted.
	Bridge plans and road plans are checked for consistency in details.
	Changes are consistent with the recommendations in the Foundation Report.
	Special Provisions modified as necessary.
	Quantities and estimates revised as necessary.

Quality Control Plan Checklist—Page 4 of 6

GENERAL

	Typical Cross-sections, layouts, profile grades, superelevations, contour grades, and structure plans are consistent with approved project geometrics and current road plans.
	On structure projects, with PS&E produced by two or more consultants the following has been verified: <input type="checkbox"/> Plans and details are coordinated and are consistent <input type="checkbox"/> Special Provisions are consistent with all plans <input type="checkbox"/> Contract Item List matches plans and Special Provisions <input type="checkbox"/> Unit prices are consistent in all submittals <input type="checkbox"/> All submittals bound and identified
	Railroad requirements are incorporated.
	Justification for non-standard items of work is provided.

Quality Control Plan Checklist—Page 6 of 6

SPECIFICATION ENGINEER REGISTRATION NUMBER		
List the name, registration number and registration expiration date of the specification engineer or the engineer under whose direction the Contract Special Provisions were prepared.		
Name:	No:	Date:
PROJECT MANAGER’S STATEMENT AND SIGNATURE		
[] PS&E Submittal is complete and ready for transmittal to OSFP		
Project Manager:	Date:	

Appendix – D
Resident Engineer
Pending File Checklist

RESIDENT ENGINEER FILE CHECKLIST

Required information to be included in the Resident Engineer File
Check either the box for **Included** or **N/A** for **Not Applicable**.

1) Critical Issue

- Included N/A **Internal and External Memos or letters pertinent to administer the Construction Contract**
- Included N/A **Engineer in Charge (Project Engineer) notes/Special instructions to RE**
- Included N/A **Potential issues**
- Included N/A **Unresolved issues requiring a contract change order**
- Included N/A **Special Requests/ Instructions from local agencies**
- Included N/A **Exceptions to Mandatory and Advisory Design Standards**

2) Project Documents

- Included N/A **Project Report**
- Included N/A **PSSR**
- Included N/A **Environmental Document**
- Included N/A **Freeway Agreements**
- Included N/A **MOU**
- Included N/A **Cooperative agreements**

3) Environmental

- Included N/A **Description of any critical Environmental Issues**
- Included N/A **Map of Environmental Footprints**
- Included N/A **Map of APE**

(see attached [Resident Engineer Environmental/Construction Checklist](#))

4) Right-of-Way

- Included N/A **Right-of-way certification.** (List type. Cert. 1, Cert. 2, Cert. 3)
(On Cert. Types 2&3 the Resident Engineer will schedule a meeting with the Right-of-Way Agent and Project Engineer)
- Included N/A **Copies of all right-of-way agreements**
- Included N/A **R/W maps if needed are obtained by the Resident Engineer**
- Included N/A **Railroad agreements**
- Included N/A **Pending Relinquishments**

5) Permits

- Included N/A **Copies of current permits**

6) Utilities

- Included N/A **List of relocated utilities and status** (see attached Utility Status spreadsheet)
- Included N/A **Certification of Utility Facilities**
- Included N/A **Copies of all approved Utility Relocation Maps**

7) Materials / Geotech

- Included N/A **Materials report**
- Included N/A **Copies of material test results** (R-value, SE, etc.)
- Included N/A **Preliminary investigations**
- Included N/A **Foundation study**
- Included N/A **Geotechnical design report**
- Included N/A **Deflection study**
- Included N/A **Material handout**
- Included N/A **Disposal/Borrow Sites**

RESIDENT ENGINEER FILE CHECKLIST

8) Traffic

- Included N/A Safety analysis
- Included N/A Final TMP's / TMP checklist
- Included N/A Traffic Recommendations

9) Landscape

- Included N/A Product information
- Included N/A Source of special plants
- Included N/A Pressure calculations, demand verification
- Included N/A Aesthetic considerations
- Included N/A Scenic Resource Evaluation (SRE)/Visual Impact Assessment (VIA)

10) Hydraulics

- Included N/A Drainage report or drainage recommendations
- Included N/A Strip map of "drainage concept" for complex projects

11) Storm Water Quality

(for jobs requiring a SWPPP, if not required include justification for using WPCP)

- Included N/A Topographic map of project
- Included N/A Map of disturbed soil area w/ calculations
- Included N/A Temporary-construction storm water pollution control measures
- Included N/A Permanent-construction storm water pollution control measures
- Included N/A Notice of construction (NOC)
- Included N/A Storm water quality information handout
- Included N/A Conceptual SWPPP
- Included N/A Drainage Reports; hydrology maps flow patterns, runoff concentrations
- Included N/A Technical Reports; i.e. geotechnical, soils, fill materials, hazardous waste
- Included N/A Critical temporary BMP's

12) Context Sensitive Solution Elements

- Included N/A

13) Engineering Related Calculations

- Included N/A Construction Working Days Plan
- Included N/A Cross sections
- Included N/A Earthwork Calculations
- Included N/A Detailed backup for items in the Engineer's Estimate
- Included N/A Project Schedule
- Included N/A Drainage Calculations
- Included N/A Falsework Clearance
- Included N/A Structure Calculations
- Included N/A Others

14) Survey Information

- Included N/A Computer Generated Files (such as Horizontal and Vertical Alignment)
- Included N/A R/W Maps
- Included N/A Slope Staking List

15) State Furnished Material

- Included N/A List of State Furnished Material

16) Call Box

- Included N/A Call Box Instructions and Forms

**Resident Engineer
Environmental/Construction
Checklist***

HISTORICAL and CULTURAL RESOURCES

CULTURAL SPECIALIST
PHONE

- | YES | N/A | |
|--------------------------|--------------------------|------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | Cultural/Historical Resource - ESA |
| <input type="checkbox"/> | <input type="checkbox"/> | Paleontology Monitor |
| <input type="checkbox"/> | <input type="checkbox"/> | Native American Monitor |
| <input type="checkbox"/> | <input type="checkbox"/> | Archaeological Monitor |

AIR/NOISE

A/N SPECIALIST
PHONE

- | YES | N/A | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Structure(s) Demolition Permit-Obtain from local Air Board |
| <input type="checkbox"/> | <input type="checkbox"/> | Local Noise Ordinance Compliance |
| <input type="checkbox"/> | <input type="checkbox"/> | Sound Walls (order of work) |

*** THIS CHECKLIST IS TO BE PROVIDED BY THE ENGINEER IN CHARGE TO THE GENERALIST WITH A COVER LETTER STATING THE DUE DATE. THE ENVIRONMENTAL DIVISION (GENERALIST) HAS THE RESPONSIBILITY TO COMPLETE AND RETURN THE INFORMATION TO THE ENGINEER IN CHARGE (PROJECT ENGINEER) BY THE STATED DUE DATE.**

UTILITY STATUS

List any and all Utility Agreements required for this project - to be completed by the Utility Coordinator***

Utility Owner Name	Contact Name	Contact Phone No.	Description of Work	Utility Agreement No.	Notice to Owner No. *	Relocation Deadline identified in Notice to Owner	Utility work Complete Y/N **

* Attach copies of all Notice to Owners listed

** A meeting attended by the RE, PE & Utility Coordinator shall be held to discuss each No answer

*** This list is to be provided by the Engineer in Charge to the Utility Coordinator with a cover letter stating the due date. The Utility Coordinator has the responsibility to complete and return the information to the Engineer in Charge (Project Engineer) by the stated due date.

List all known Utilities within the Project limits - to be completed by the Project Engineer

	Yes/No	Is relocation of this Utility required in order to perform work? Yes/No	If underground, will planned excavation or compaction operations affect this utility? Yes/No
Gas			
Underground Telephone			
Aerial Telephone			
Underground Electric			
Aerial Electric			
Water			
Sewer			

LIST OF KEY CONTACTS

Position	Name	Phone #	Comments
Project Manager			
Project Engineer/ Engineer in Charge			
Design Senior			
Construction Engineer			
Environmental Coordinator			
Right-of-Way Agent			
Utility Coordinator			
Cooperative Agreement Contact			
Traffic Design			
Landscape Contact			
Electrical Design			
Structures Contact			
Maintenance Area Supervisor			