

TECHNICAL DOCUMENT PREPARATION

Quality Control Plan

June 2006





Title VI

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Americans with Disabilities Act (ADA) Information

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1. Introduction

All documents (including drawings, reports, memoranda, etc.) that will be used in meetings outside of the Columbia River Crossing project should include a disclaimer regarding the preliminary nature of many of the documents produced during this phase of the work. The disclaimer shall read:

“This product is for informational purposes and may not have been prepared for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information source to ascertain the usability of this information.”

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2. Technical Document Preparation

2.1 Reports and Memoranda

Reports and memoranda should be reviewed throughout their development, ultimately receiving two levels of review.

2.1.1 Document Checks

During its development, each document should be internally checked by the Task Manager and/or other qualified staff as designated by the Task Manager, for general compliance with the project scope. These checks may include multiple staff so that a wide range of experience is represented in the checking of the data and conclusions drawn within the document, particularly when the complexity of the documents spans multiple disciplines.

2.1.2 Non-technical Reviews

Prior to final review, the Task Manager may request a non-technical review of the document for general readability, grammar, and appropriate use of technical language. This type of review is particularly important for documents intended for non-technical staff or public distribution.

2.1.3 QA/QC Review

An independent (peer) QA/QC review of the document should take place prior to submittal of a deliverable. This review is to be completed by a person with appropriate experience to verify that the information presented in the document conforms to the requirements established for the project, the presentation is effective and orderly, and the material included has been checked for accuracy. The reviewer shall also assess the reasonableness of conclusions drawn or recommendations made within the report. The reviewer should not have been directly associated with the preparation of the document, and independence from the project in general is recommended.

Records of the completed review may be kept in one of two ways:

1. The reviewer may use the review comments form (see Attachment A) to prepare the review comments. The document author will respond to the comments on this form, making corrections to the document as appropriate. The completed form with comments and responses will be kept in project records.
2. The reviewer may use the Prologue document database system used by the Columbia River Crossing project to electronically review the document and store the review comments. The document author would then respond to comments within Prologue.

Note: While Microsoft Office products such as Word have reviewing capabilities through Track Changes, use of this method is not recommended for final reviews, particularly when there are multiple reviewers, since merging comments into a single document and exporting the comments for the project files can be challenging for all but expert Microsoft Office users.

Required Quality Records

- A record copy of the final review draft with evidence of review.

2.2 Data Collection and Field Investigation

The task of data collection and field investigation includes collecting and reviewing historical and background information; reviewing previous studies, reports, and designs; site visits; surveying; traffic counts; and geotechnical investigations, inspections, and condition assessments. These tasks may result in providing background information and base data for the development of the project.

2.2.1 Data Collection

Data collection is performed by obtaining appropriate source material, contacting identified sources and soliciting input, and reviewing and assessing the data when received for its suitability to the project and its completeness for project needs. All data received must clearly identify the source and the date received. Recommendations made and whether or not to use specific material will be reviewed by the Task Manager prior to distribution to other project staff. In the event that the Task Manager is making such recommendations, at least one other qualified person should also review the recommendations for technical accuracy.

2.2.2 Field Investigations

When field investigations are required, a field investigation plan is to be prepared and distributed to staff going into the field. The plan should be simple in nature and cover the objectives of the field visit, site safety procedures (including required safety devices), and any other items of interest to the investigation team that may include schedule of activities in the field, necessary equipment, personnel roles and responsibilities, data collection requirements, and other special instructions. A meeting agenda would be sufficient where a team briefing was held in lieu of a distributed plan.

Following the field investigation, a brief trip summary memorandum should be prepared that summarizes the information obtained during the visit and attaches field notes prepared during the trip.

Required Quality Records

- Final review draft of the data collection summaries with evidence of review (see 2.1, Reports and Memoranda).
- Final review draft of the field investigation summary memo with evidence of review (see 2.1, Reports and Memoranda).

2.3 Calculations

Calculations are an important part of the engineering of the project and are often used as the basis for recommendations or conclusions drawn by the technical staff. Therefore, the accuracy of the calculations is an important consideration in project development.

The originator of the calculations is responsible for preparing them in accordance with applicable project guidelines, codes, criteria, and standards. The checker is responsible for verifying the correctness of the assumptions upon which the calculations are based and for compliance with the project guidelines, codes, criteria, and standards.

2.3.1 Preparing Calculations

Manual Calculations

Manual calculations should be prepared on a computation sheet. Each sheet must show the project title, the subject of the calculations, a consecutive page number, the initials of the originator, the date of preparation, and the initials of the checker with date checked.

As necessary, all calculations should include:

- Criteria and source references for the design requirements
- Purpose
- Design assumptions
- Dimensional units
- Back-up materials, appropriately labeled and referenced

Computer-generated Calculations

Much engineering work is completed using computer applications and models designed specifically to simplify complex engineering tasks. Examples include civil engineering software such as Inroads; modeling software for structures, traffic engineering, or hydraulics; and spreadsheets. Proper use of such computer applications must be checked to validate the engineering work completed on the project. Therefore, for work performed using computer applications, the following must be completed:

- Following the above procedures, manual calculations necessary to develop the input to the computer program.
- Input that is clear and easily understood, either printed from the computer application itself or prepared following the manual calculations procedures.
- Output that is reviewed by the originator to verify that results are reasonable. The originator initials and dates the front page of the output document. The checker also initials and dates the front page of the document when the check is completed.

Checking Calculations

For manual calculations, the checker reviews the calculations for clarity, legibility, proper documentation, technical concept, and numerical accuracy. The checker gives the originator any significant comments and corrections on a copy of the original computation sheets. The originator and the checker then discuss the checker's comments and corrections until all differences are resolved. If the corrections are significant, the original calculations are

regenerated and checked as new; otherwise the original calculation sheets are corrected by the originator and then initialed and dated by the checker.

For computer-generated calculations, the checker verifies that all input data are correct and that the output results are reasonable and correct. If required, the originator revises the input based on comments from the checker and resubmits the results to the checker. When the checker is satisfied that the output meets project requirements, the checker initials and dates the front page of the finished output document.

Note: For computer-assisted calculations, such as those prepared using spreadsheets, the checker spot-checks the output for formula correctness and initials and dates each page of the calculations.

Required Quality Records

- Signed original calculations, initialed and dated by both the originator and checker

2.4 Drawing Preparation

Phase 1 of the Columbia River Crossing project does not include the preparation of drawings in the traditional sense of engineering contract plans. It will, however, include the preparation of concept plans and a significant number of exhibits to supplement reports and to explain concepts to stakeholders and to the public at project open houses. It is also used by project staff in evaluating alternative feasibility and making other design-related recommendations.

Similar to the preparation of reports, prepared drawings receive two levels of quality review prior to submittal, described herein as a drawing check and final check print review.

2.4.1 Preparing Drawings

Drawings are prepared under the supervision of the Task Manager, but it is the responsibility of the preparer and drafter, if assigned, to develop the drawings in conformance with the project requirements and standards. The role of the preparer is to develop the concepts and details either manually or by use of CADD. The drafter is responsible for producing the drawings in accordance with the project drafting standards. The preparer reviews and back-checks the drawings during the various stages of preparation.

When the preparer is also acting as the drafter, the preparer is also responsible for adherence to project drafting standards. Additionally, since only one person is involved in the development of the drawing, the preparer shall work closely with the checker to ensure that adequate time is provided to perform multiple reviews and make any corrections.

2.4.2 Checking Drawings

The checker, who should be a project team member independent of the preparer, checks the drawing for conformance with the project design requirements, the suitability for the intended use of the drawing, and the requirements of the project drafting standards. This process may include performing alternative calculations, fatal flaw constructability analysis, comparing designs against similar proven designs from other projects, and discussions with other Task Managers to verify that the drawing meets the intended purpose.

Corrections

The checker clearly marks the drawing with any alternations or corrections.

The drafter (or preparer) incorporates any alterations or corrections on the drawing and indicates that each correction has been completed.

2.4.3 Final Check Print

Prior to each deliverable submittal, a final check print is prepared for each drawing. The drawing should be reviewed by both the checker and the Task Manager or designated reviewer prior to submittal.

Note: A deliverable submittal includes all deliverables listed in the project scope, but may also include drawings prepared for distribution or exhibit (in electronic format or hardcopy) outside of the project staff, such as exhibits for public open houses, stakeholder meetings, information to elected officials, and posting on the project Web site.

The drawing designated as the final check print contains the following information:

- Final check print designation
- Indication of “checked by” with initials of the checker and date of check
- Indication of “reviewed by” with the initials of the Task Manager or designated reviewer and date of review
- Indication of “corrected by” with initials of the drafter/preparer and date of correction
- The drafter may include as part of the CADD drawing a Microstation cell similar to the following to identify the print as a final check print and provide a location to initial and date the print.

FINAL CHECK PRINT		
	Initial	Date
Checked By:		
Reviewed By:		
Corrected By:		

Required Quality Records

- Final check prints, initialed and dated.

Note: The hard copy final check print may be discarded when a revised submittal, generating a new final check print, of the same drawing is made.

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ATTACHMENT A — REVIEW Comments Form

Project Title:				
Job Charge:	Reviewed By	Office & Mail Stop:	Phone:	Date:
				Sheet ___ of ___
#	Sht/Pg	Reviewer's Comment	Designer's Response	Init.
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