RECLAMATION

Managing Water in the West

Design Standards No. 1

General Design Standards

Chapter 1: Preparing and Using Design Standards
Chapter 2: Design Standards Index

U.S. Department of Interior
Bureau of Reclamation

May 2012

Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Design Standards Signature Sheet

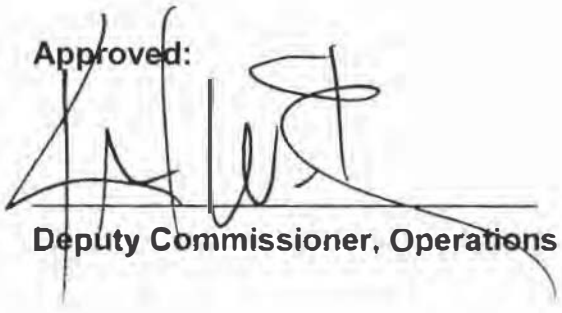
Design Standards No. 1

General Design Standards

Chapters

Chapter 1: Preparing and Using Design Standards
Chapter 2: Design Standards Index

Approved:



Deputy Commissioner, Operations

9/10/09

Date

Revision Number DS-1(1)-9.1

Summary of revisions:

Revisions have been made to the following sections describing the method for making intermediate and relatively minor revisions or updates to a design standard chapter or chapters. These intermediate updates would be subsequent to a major review and update and prior to the next scheduled or planned review and update:

Section 1.2.2, Notification of Draft and Updated Standards
Updated information was provided to access Web sites for Reclamation-wide and public reviews of draft design standard chapters.

Section 1.4.6, Inserting References
Instructions for references was clarified.

Section 1.2.3, Review and Posting Requirements
Table 1.2.3.1-1 were expanded.

Section 1.3, Design Standards Updates
The following sections were added to provide information on preparing and formatting intermediate revisions to design standards:

Section 1.3.1 - Planned Reviews and Updates
Section 1.3.2 - Intermediate Reviews and Updates
Section 1.3.2.1 - Minor Intermediate Revisions
Section 1.3.2.2 - Major Intermediate Revisions
Section 1.3.2.3 - Minor Intermediate Revision Numbering and Signature Sheet

Figure 1.3.2-1, Minor Intermediate Revision Signature Sheet (Example)
Added.

Section 1.4.1, Visual Identity Guidelines
Instructions were provided for using the Visual Identity compliant, Microsoft Word template.

Appendix B
Deleted.

A few minor grammatical and editorial changes were made.

Revision Number DS-1(1)-9.1

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Michael R. O'Shea, P.E. — Date
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P.E. — 5/18/2012
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Chief, Civil Engineering Services Division

Approved:

5/18/12
Lowell Pimley, P.E. — Date
Director, Technical Service Center

INE
SR

Chapter Signature Sheet
Bureau of Reclamation
Technical Service Center

Design Standards No. 1

General Design Standards

Chapter 1: Preparing and Using Design Standards

Summary of Changes:

Deletions

- Design standards transmittal form

Revisions

- Sections on Purpose, Available Standards, Engineering Judgment, Format, Metric Policy, Draft Standards, and Transmittal of Standards were all modified and updated.

- The section on Responsibility is now a section on Quality Control and Review Requirements.

- The Design Standards Index have been moved to chapter 2 and updated.

Additions

- Review and updating schedule for design standards

- Example forms for Design Standards Signature Sheet, Chapter Signature Sheet, and Security Review Signature Sheet

- Requirements for formatting

- Section on use of computer programs, codes, standards, manuals, and guidelines

- Sections on including standard drawings and example drawings

- Security review requirements
- Requirements for posting design standards
- Review and signature requirements
- Appendix A – Project Management Plan Template for Updating Design Standards
- Appendix B – Style Guide for Reclamation Design Standards

Prepared by:

Arthur Glickman, P.E. — 8/19/09 Date

Technical Approval

Not required

_____ — _____ Date

Peer Review:

Michael R. O'Shea, P.E. — 8-18-09 Date

Submitted:

Richard LaFond, P.E.
Chief, Civil Engineering Division — 8/26/09 Date

Security Review:

Larry Nuss
Division Security Reviewer — 8/18/09 Date

Approved:

Lowell Pimley
Director, Technical Service Center — 9/8/09 Date

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Chapter 1

Preparing and Using Design Standards

1.1 General Sections

1.1.1 Purpose

The design standards present clear and concise technical requirements and processes to enable design professionals to prepare design documents and reports necessary to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. Compliance with these design standards assists in the development and improvement of Bureau of Reclamation (Reclamation) facilities in a way that protects the public's health, safety, and welfare; recognizes all stakeholder needs; and achieves the lasting value and functionality necessary for Reclamation facilities. The responsible designer(s) accomplishes this through processes that enable compliance with these design standards and all other applicable technical codes, as well as incorporation of the stakeholder's vision and values, that are then reflected in the construction project.

1.1.2 Application of Design Standards

All Reclamation design work, whether performed by the Technical Service Center (TSC), the regional offices, or an architectural/engineering (A&E) firm, will conform to the design standards.

Reclamation's use of its design standards requires designers to also integrate sound engineering judgment with applicable national standards, site-specific technical considerations, and project-specific considerations to ensure suitable designs and protect public safety.

The design standards are not intended to provide cookbook solutions to complex engineering problems. Strict adherence to a handbook procedure is not a substitute for sound engineering judgment. The designer should be aware of and use state-of-the-art procedures. Designers are responsible for using the most current edition of referenced codes and standards and to be aware that Reclamation Design Standards may include exceptions to requirements of these codes and standards.

1.1.3 Deviations and Proposed Revisions

Design activities must be performed in accordance with established Reclamation design criteria, Reclamation engineering, architectural, or technical standards, and approved national design standards. Exceptions to this requirement will be pursued in accordance with provisions of *Reclamation Manual* Policy, Performing Designs and Construction Activities, FAC P03.

Reclamation designers should inform the TSC, via Reclamation's Design Standards Web site notification procedure, of any recommended updates or changes for the design standards to meet current design practices.

1.1.4 Available and Proposed Design Standards

A complete list of all current and planned Reclamation design standards is contained in Chapter 2, Design Standards Index.

Each design standard will contain several chapters and may be prepared and posted by two possible methods: (1) draft the entire design standard and post the entire design standard at once, or (2) draft the design standard one chapter at a time and post each chapter separately.

1.1.5 Policy for Units of Weights and Measurements

Reclamation design standards are to be prepared in the foot-pound-second (U.S. Customary Units) system of units for weights and measurements. Designers of record may select alternate units based on benefits and compatibility to project needs. These needs may include common industry practice of using another system, such as the International System (SI) units for weights and measurements, a requirement by congressional authorization, or a specific request by the client.

1.1.6 Use of Computer Programs, Codes, Standards, Manuals, and Guidelines

1.1.6.1 Computer Programs

Description of, or reference to, specific Reclamation, other government, or commercial computer programs within a design standard shall be approved by those responsible for the development and review of the design standard. Identifying specific software programs should be avoided, unless they are unique in terms of their application and functionality.

1.1.6.2 Codes, Standards, Manuals, and Guidelines

Nationally accepted design standards, manuals, guidelines, and building codes shall be used, as approved by Reclamation, when available and applicable. Examples include the American Association of State Highway and Transportation Officials (AASHTO) Bridge Design Specifications (current edition), the American Institute of Steel Construction (AISC) *Manual of Steel Construction* (current edition), and the American Concrete Institute (ACI) 318 *Building Code Requirements for Structural Concrete* (current edition).

Although nationally accepted design standards, manuals, guidelines, and building codes are preferred for use in Reclamation designs, recognition must be given to the need for specific or special requirements and minimum levels of design unique to Reclamation facilities and features. These specific requirements and minimum levels of design unique to Reclamation shall be clearly identified and defined in the appropriate design standards.

1.1.7 Drawings

1.1.7.1 Standard Drawings

Standard drawings shall be prepared in accordance with Reclamation's *Information Management Handbook*, volume 3 (Reclamation, 2008). Standard Reclamation drawings (40-D series), which can be used by Reclamation and non-Reclamation designers, should be shown and/or referenced in each applicable design standard. Use of standard drawings is recommended, as applicable, for consistency and efficiency.

1.1.7.2 Example Drawings

Example drawings are often included in a Reclamation design standard to illustrate the requirements of the design standard. Example drawings may be taken from previous specifications or may be new drawings prepared specifically for the design standard. For security purposes, the drawings should not show means of access into Reclamation facilities. Example drawings prepared specifically for a design standard shall also be prepared in accordance with Reclamation's *Information Management Handbook*, volume 3 (Reclamation, 2008).

1.1.7.3 Location of Drawings

If drawings are 8-1/2 by 11 inches in size, they should be placed either where they are mentioned in the text or at the end of the chapter. If they are larger than 8-1/2 by 11 inches, they should appear at the end of the chapter. For guidance on how to number standard drawings, see section 1.4.4, "Drawing Numbering."

1.1.8 General Sections for Insertion in All Design Standards

The following sections of Design Standards No. 1 shall be inserted into each design standard or separately published chapter:

Purpose
Application of Design Standards
Deviations and Proposed Revisions

These sections make up the Foreword, which is included in the Design Standards Word template. The Word template is located on the Design Standards SharePoint site, under "Templates."

1.2 Quality Control and Review Requirements

1.2.1 Roles and Responsibilities

The design standards project manager (Director of the TSC) has overall responsibility for preparing, updating, reviewing, and disseminating the design standards. The Client Support and Technical Presentations Office of the TSC is responsible for formatting and posting all design standards.

The current line of authority for preparing and updating a design standard is as follows.

1.2.1.1 Executive Leadership – Deputy Commissioner, Operations

The Deputy Commissioner, Operations, is responsible for authorizing the program to update the design standards.

1.2.1.2 Reclamation Design and Construction Coordination Team (RDCCT)

The RDCCT and its Executive Sponsor act as liaison to all Reclamation offices involved in design or construction activities. They will ensure that all Reclamation offices have an opportunity to comment on the draft standards.

1.2.1.3 Project Manager for M4E-16 (Managing for Excellence – Engineering Standards) – Director, TSC, or Delegated Authority

The project manager for M4E-16 – Director, TSC, or delegated authority is responsible for general planning, coordination, tracking, and project direction of all tasks associated with M4E-16.

1.2.1.4 Delegated Project Manager for M4E-16 Task 2 (Design Standards Update) – Chief, Civil Engineering Services Division, or Delegated Authority

The delegated project manager for M4E-16 task 2 (design standards update) – Chief, Civil Engineering Services Division, or delegated authority is responsible for planning, coordination, tracking, and direction of all tasks associated with M4E-16 Task 2.

1.2.1.5 Design Standards Team Leader

The design standards team leader is responsible for preparation, planning, coordination, tracking, checking, peer review, and security review for a specific design standard preparation or update.

1.2.1.6 Design Standards Development Team (DSDT)

The DSDT works under guidance of the design standard team leader to prepare, update, and review new or existing design standards.

1.2.2 Notification of Draft and Updated Standards

During the period that a design standard is being prepared or updated, draft versions will be posted on Reclamation's Design Standards SharePoint site(s) for review by Reclamation and non-Reclamation offices and organizations until the final standards are published. Reclamation's Design Standards SharePoint site: https://connect.doi.gov/bor/DO/TR/TSC/CESD/BORDS/SitePages/Home.aspx, will be used for Reclamation wide reviews and non-Reclamation reviews.

Notification for the Reclamation and non-Reclamation reviews will be provided by the M4E-16 Project Manager (or delegated authority) via e-mail. The draft preparation, review, and posting phases are described in section 1.2.3.

Individual chapters of a design standard, when completed, will be posted as described in section 1.2.3.2.4. The Executive Leadership (Deputy Commissioner, Operations) approves the final design standards with the following notification requirements:

(1) A memorandum via e-mail from the Deputy Commissioner, Operations, will notify Reclamation offices that the design standard is finalized and the Internet Web site location to access the design standard.

(2) A memorandum from the Deputy Commissioner, Operations, will be distributed to Reclamation offices announcing the elimination of an unneeded design standard.

(3) Notification to stakeholders of the completed design standards will be provided by the Deputy Commissioner, Operations.

1.2.3 Review and Posting Requirements

1.2.3.1 General

TSC peer review for scope of work, work breakdown, estimated staff-days, schedule of work, and progress tracking of the design standards will be performed in accordance with TSC Operating Guidelines.

After all chapters of a design standard are completed, the Design Standard Signature Sheet (figure 1.2.3.1-1) is signed "Approved" by the Deputy Commissioner, Operations.

The design standards review and publication process for the chapters shall be in four phases, which are summarized in table 1.2.3.1-1 and specified thereafter.

Table 1.2.3.1-1 Summary of Review and Publication Process

Phase No.	Phase description
Phase 1: Prepare draft design standards chapter	Author drafts design standard chapter. Chapter is uploaded to Reclamation's Design Standards SharePoint[1] site for peer review, formatting, and technical editing. Chapter Signature Sheet (figure 1.2.3.1-2) is signed by the preparer, technical approver, and peer reviewer.
Phase 2: Review by Reclamation offices	Chapter is posted on Reclamation's Design Standards SharePoint site under direction of M4E-16 Project Manager for review and comments. The 60-day Reclamation review period begins. During this time, comments can be made and addressed on the Design Standards SharePoint site discussion board. The chapter is revised in SharePoint based on Reclamation review comments and a final edit takes place. After Phase 2 review is completed, the Design Division Chief signs the Chapter Signature Sheet as "Submitted."
Phase 3: Public and stakeholder review	Chapter is posted on Reclamation's Design Standards SharePoint site under direction of M4E-16 Project Manager for public review and comments. A security review must be provided and signed prior to posting. Again, comments are made and addressed on the Design Standards SharePoint site discussion board. The chapter is revised in SharePoint based on public review comments, and a final edit takes place. After the Phase 3 review is completed, the Director, TSC, signs the Chapter Signature Sheet as "Approved."
Phase 4: Post final signed chapter	Completed chapter is posted on the Reclamation Design Standards Internet Web site.

[1] Information about the Design Standards SharePoint site and instructions for using it are provided on the Design Standard SharePoint home page: https://connect.doi.gov/bor/DO/TR/TSC/CESD/BORDS/SitePages/Home.aspx. You will need to enter "Domain/username" and your current password". For example, if your name is Joe Smith, and you work for Reclamation, you would enter "BOR/jsmith" and your password.

1.2.3.2 Process for Preparing and Posting a Design Standards Chapter

1.2.3.2.1 Phase 1 – Preparation and Review of Initial Draft

- Initial draft is prepared by the Design Standards Development Team as directed by the design standards team leader and the technical approver. The draft is reviewed by the peer reviewer.

- At the conclusion of Phase 1, the Chapter Signature Sheet (figure 1.2.3.2.1-1) is signed by the preparer, technical approver, and peer reviewer. The technical approver and peer reviewer shall be registered professional engineers.

- Draft design standards are to have the word "DRAFT" in the header.

1.2.3.2.2 Phase 2 – Reclamation-wide Review

- Post draft on Reclamation's Design Standard SharePoint site.

- A memorandum notifying recipients that the draft is posted and requesting Reclamation review is sent via e-mail by the M4E-16 Project Manager. The recipients will include the Regional Directors, Area Managers, the RDCCT, and TSC Division Chiefs.

- Reviewers send comments via Reclamation's Design Standard SharePoint site.

- The design standards team leader updates draft and posts responses on Reclamation's Design Standard SharePoint site based on concurrence from the technical approver and peer reviewer(s).

- Minimum review time of 60 calendar days.

- At the conclusion of Phase 2, the Chapter Signature Sheet (figure 1.2.3.1-2) is signed "Submitted" by the Design Division Chief.

1.2.3.2.3 Phase 3 – Review by the Public and Stakeholders

- A security review is required prior to posting on Reclamation's Design Standards SharePoint site for public review (Reclamation, 2003). The TSC security review is documented by signing the form, "TSC Security Review of Proposed Public Disclosure of Technical Information" (figure 1.2.3.2.3-1). The form is signed by the design standards team leader, the applicable design group manager, and the division security reviewer. The signature sheet is not included in the design standards but is filed separately.

- The draft chapter is posted on Reclamation's Design Standards SharePoint site under direction of M4E-16 Project Manager for public review and comments. The M4E-16 Project Manager sends notifications to stakeholders for review and comment. Stakeholders may include:

    - Private engineering organizations, Federal agencies, and State agencies that provide similar engineering services.

    - Water districts and utility companies.

- An email notifying stakeholders that the draft is posted and requesting their review is sent via email by the M4E-16 Project Manager.

- Reviewers send comments via Reclamation's Design Standard SharePoint site.

- The design standards team leader updates the draft based on concurrence of the technical approver and peer reviewer.

- Minimum review time of 60 calendar days.

- At the conclusion of Phase 3, the Chapter Signature Sheet (figure 1.2.3.1-2) is signed "Approved" by the Director, Technical Service Center.

1.2.3.2.4 Phase 4 - Post Final Document on Reclamation's Design Standards Internet Web Site.

- The design standards chapter is posted on the Reclamation Design Standards Internet Web site.

- If the chapter completes the update of a design standard, the Design Standards Signature Sheet (figure 1.2.3.1-1) is sent to the Deputy Commissioner, Operations, for approval. Approval is indicated by the Deputy Commissioner's signature.

- Notification is sent by Deputy Commissioner, Operations, by mail and e-mail to Reclamation and stakeholders.

1.2.4 Security Review Requirements

The material contained within a design standard is for use throughout Reclamation and outside of Reclamation by those performing analyses and preparing design documents for Reclamation facilities, and it will be posted on the Internet. The standards shall not contain information, figures, tables,

drawings, or other components that will require a "For Official Use Only" (FOUO) classification (Reclamation, 2007).

All draft design standards shall be reviewed for FOUO classification by the division security reviewer prior to posting on the Internet. If information contained within the draft design standards requires the FOUO classification, the FOUO information shall be removed from the draft.

1.3 Design Standards Updates

1.3.1 Planned Reviews and Updates

Reviews of design standards will be performed every 5 years by Subject Matter Experts (SMEs) within Reclamation. An assessment will be made after these reviews as to whether individual chapters or the entire design standard should be updated. If a determination is made that individual chapters or the entire design standard should be updated, a recommendation with estimated cost for the effort will be submitted to the executive sponsor (RDCCT) describing the update requirements and justification for updating. If approval of the design standard update proposal is received from the executive sponsor, a Project Management Plan (PMP) will be prepared that addresses the specific update needs and plan. The proposal for updating design standards or creating new design standards should include: scope of work, reason for work, budget, and schedule requirement. The proposal may be submitted using the PMP template shown in appendix A.

The PMP will be transmitted to the M4E-16 project manager (Director, TSC, or representative) by the agreed-upon date. After review and acceptance by the project manager, the PMP will be signed by the designated representatives responsible for workload and resource allocation within the DSDT member's group.

The updated design standard shall use the revision numbering format described in Section 1.4.2.

1.3.2 Intermediate Reviews and Updates

1.3.2.1 Minor Intermediate Revisions

Many of Reclamation design standards make direct reference to other design standards, policies, and procedures, both within and outside of Reclamation. Many of these referenced standards, policies, and procedures are updated more frequently and/or independently of planned reviews and updates for Reclamation design standards described in section 1.3.1. There may be circumstances that arise shortly after a final, signed, Phase 4 design standard is posted (or sometime

before the next planned review and update period takes place for that standard) that require immediate attention to resolve limited or minor discrepancies in terminology, methodology, or technical requirements. An alternate, simplified process for review and update of the design standard may be used to address these more limited or minor revisions.

These intermediate or exigent updates may be prepared by the subject matter expert for immediate review by a subject matter expert qualified to provide a peer review of the updates. Once these updates have been peer reviewed, the revised design standard shall be provided to the appropriate Design Division Chief for signature. No other posting and review requirements prescribed in sections 1.2.2 and 1.2.3 are required for these intermediate updates. Once the design standard update has been signed "Submitted" by the Design Division Chief, the revised standard shall be provided to the Director, TSC for signature.

1.3.2.2 Major Intermediate Revisions

Recognition is given here to the atypical case or situation where substantial or numerous revisions to a recently updated, Phase 4 design standard chapter or chapters are necessary due to unforeseen innovations or technological advancements that substantially affect or change standard practices or technical requirements. If the subject matter experts consider a design standard chapter or chapters rendered inadequate or deficient due to recent developments in technology, practices, or methods, then that design standard chapter or chapters should be updated in accordance with the procedures prescribed in sections 1.2 and 1.3.1 as soon as practicable and prior to the routinely performed review and update prescribed in section 1.3.1.

1.3.2.3 Minor Intermediate Revision Numbering and Signature Sheet

The following numbering scheme shall be used to identify minor intermediate revisions: The primary (scheduled) revision numbering format described in Section 1.4.2, shall be followed by a decimal point with the intermediate revision number. Using the example provided in Section 1.4.2, the first intermediate revision after the major revision 9 for Design Standard No. 1, Chapter 1, would be designated revision number DS-1(1)-9.1.

If the intermediate revision is considered a minor revision as described in section 1.3.2.1, the signature sheet shall contain the following signatures: "Prepared by," "Peer Review," "Submitted," and "Approved." An example of the required signature sheet for intermediate updates is shown in figure 1.3.2.3-1. The revisions made for this update shall be summarized on this signature sheet. A review by the division security reviewer may or may not be necessary. If the signatories determine that a security review should be made, a security review shall be provided and signed prior to posting the updated design standard on Reclamation's Design Standards Internet Web site for public use.

1.4 Format

1.4.1 Visual Identity Guidelines

The format for the design standards shall be in accordance with Reclamation's Visual Identity (VI) guidelines. The VI guidelines are used to provide a consistent look and tone, and to convey a professional image for Reclamation documents. The general format used for this chapter should be followed for subsequent portions of the design standards. The word processing software currently supported for Reclamation-wide use shall be used to prepare the text.

Authors should download the VI-approved, Microsoft Word file (template) to prepare their chapters. This Word file is located on the main page of Reclamation's Design Standards SharePoint site.

1.4.2 Chapter, Section, and Page Numbering

When numbering chapters and sections, the first number refers to the chapter, the second number refers to the section, the third number refers to the subsection, and so on. (For example, the number "1.3.2" refers to chapter 1, section 3, subsection 2.)

Page numbering for introductory pages and the table of contents should be in small roman numerals. Page numbering for the chapter itself should begin with page 1 and include the chapter number. (For example, the first page of chapter 1 would be listed as 1-1). Page numbers should be placed at the bottom outside margin and should alternate from left to right.

In addition to the page number, also list the design standard number, chapter number, and revision number, as well as the date. This should appear at the bottom inside margin and should alternate from left to right. For an example, see the bottom of this page. "DS-1(1)-9" refers to Design Standards No. 1, chapter 1, revision 9.

1.4.3 Figures, Tables, and Equation Numbering

Figures, tables, and equations should be numbered according to the section of text in which they are **first** mentioned. They should then be followed by a hyphen and the appropriate sequential number. For example, if two figures are mentioned for the first time in this section, they would be labeled "figure 1.4.3-1" and "figure 1.4.3-2."

1.4.4 Drawing Numbering

Drawings are considered figures. Therefore, they are numbered in the same way figures, tables, and equations are numbered; that is, according to the section in which they are first mentioned in the text. For example, a drawing mentioned in this section would be labeled “figure 1.4.4-1.”

1.4.5 Cover Pages for Chapters Prepared Separately

An example cover page for a chapter prepared separately is shown in appendix B.

1.4.6 Inserting References

References in the text can be listed by author and date, or by numbers in brackets. Full reference information should appear in the References section.

Design Standards Signature Sheet

Design Standards No. XX

Design Standards Title

DS-XX(XX)-X: Draft: Phase XX (Review Stage Title) Month 2011

Chapter XX: Title

Approved:

_____ _____

Deputy Commissioner, Operations **Date**

Figure 1.2.3.1-1 Example of a Design Standards Signature Sheet.

Chapter Signature Sheet
Bureau of Reclamation
Technical Service Center

Design Standards No. XX

Design Standards Title

Chapter XX: Title

DS-XX(X)-X:[1] Draft: Phase X (Review Stage Title)
Month 2011

Chapter X - Title is an existing chapter (or new chapter) within Design Standards No. XX and was revised to include:

-
-
-

[1] DS-XX(X)-X refers to Design Standards No. XX, chapter X, revision X.

Figure 1.2.3.1-2 Example of a Chapter Signature Sheet (page 1 of 2).

Prepared by:	
(Insert name and group)	Date
Technical Approval:	
(Insert name and group)	Date
Peer Review:	
(Insert name and group	Date
Security Review:	
(Insert name and group)	Date
Submitted:	
Richard LaFond Chief, Civil Engineering Services Division	Date
Approved:	
Lowell Pimley, P.E. Director, Technical Service Center	Date

Figure 1.2.3.1-2 Example of a Chapter Signature Sheet (page 2 of 2).

Note: The Geotechnical Services Division signatures are reordered slightly and include "Recommended for Technical Approval."

TSC Security Review of Proposed Public Disclosure of Technical Information

Type: Design Standard

Design Standard: Design Standards No. 1 – General Design Standards

Chapters: 1. Preparing and Using Design Standards
2. Design Standards Index

Brief Description of Information: Provides information for preparation and use of design standards plus an index of all design standards.

Requesting/Sponsoring Organization: Director, Technical Service Center

Program Office: Deputy Commissioner, Operations

Is Information Official Use Only / SENSITIVE? (Y/N) _____
(to be completed by reviewer)

Is Information Official Use Only / RESTRICTED? (Y/N) _____
(to be completed by reviewer)

(Sensitive or Restricted information shall not be included in a design standard.)

Design Standard Team Leader:

Name(s)/Mail Code(s):
Signature(s)/Date(s): _____

Group Manager(s) Approving Release:

Name(s)/Mail Code(s):
Signature(s)/Date(s): _____

Division Security Reviewer(s) Peer Reviewing Approval:

Name(s)/Mail Code(s):
Signature(s)/Date(s): _____

Figure 1.2.3.2.3-1 Example of a Security Review Signature Sheet for Design Standards. (Note: This signature sheet is not included in the design standard but is filed separately.)

Revision Number DS-14(1)-4.1

Summary of revisions:

Minor revisions to text and figures related to:

- Pg. 1-12, Section 1.7.1.4 Structural Analysis/Design and Pg. 1-22, Section 1.7.2.4 Structural Analysis/Design – Revised phrase from "…refers to Chapter 7, …" to "…refer to Chapter 6…."
- Pg. 1-15 & 1-16, Section 1.7.1.6 Risk Analysis (Only for Significant- and High-Hazard Dams/Dikes) and Pg. 1-25 & 1-26, Section 1.7.2.6 Risk Analysis (Only for Significant- and High-Hazard Dams/Dikes) – Revised terminology/methodology to reflect update 2011 Public Protection Guidelines.
- Pgs. 1-28 thru 1-38, Figures – Corrected labeling.
- Pg. 1-39, References – Replaced 2003 Public Protection Guidelines with the 2011 Interim Public Protection Guidelines.

Signatures:

Prepared by:

John LaBoon, P.E.
Design Standard Team Leader — 10/20/2011 Date

Peer Review:

Tom Hepler, P.E.
Technical Specialist — 10/24/11 Date

Submitted:

Richard LaFond, P.E.
Chief, Civil Engineering Division — 10/25/11 Date

Approved:

Lowell Pimley, P.E.
Director, Technical Service Center — 10/20/11 Date

Figure 1.3.2.3-1 Example of a Minor Intermediate Revision Signature Sheet

1.5 References

Technical Service Center

Bureau of Reclamation. 2008. *Reclamation Information Management Handbook*, Volume 3.

Bureau of Reclamation. 2003. *Security Review Guidelines for Disclosure of Technical Information*.

Bureau of Reclamation. 2007. "Identifying and Safeguarding For Official Use Only (FOUO) Information," SLE 02-01, *Reclamation Manual, Directives and Standards.*

Appendix A

Project Management Plan Template for Updating Design Standards

M4E-16 TASK 2 – DESIGN STANDARDS UPDATE **Project Management Plan for Updating** **Design Standards No. (Insert Design Standards No. and Title)**	
Job Name: Update Design Standards No.	Date Submitted:
JCN:	WOID:
Team Leader:	Client Group or Region: N/A
Supervisor:	Client Office: Deputy Commissioner, Operations
M4E-16 Project Manager or delegated authority:	Client Contact: Director, Technical Service Center

1. Purpose and Goals:

a. Team 16 concluded that Reclamation has a legitimate need for internal design standards. However, the Team also believes there are opportunities for Reclamation to adopt more national standards in lieu of maintaining Reclamation-specific standards.

b. Reclamation's use of its design standards needs to integrate sound engineering judgment with applicable national standards, site-specific technical considerations, and project-specific considerations to the extent that public safety is not compromised.

c. Reclamation needs to better manage and organize its design standards, make development of the standards more transparent to its stakeholders, and make the standards more readily accessible for all Reclamation offices, Reclamation stakeholders, and members of the American public.

d. The TSC review and development of each design standard will be conducted in a manner that allows input from all Reclamation offices, as well as Reclamation's water and power users.

e. Formally announce the selection of each current standard for use by Reclamation.

f. Formally announce the update of each out-of-date standard.

g. Formally announce each decision to eliminate unnecessary Reclamation standards to all Reclamation offices.

h. Post Reclamation design standards on Reclamation's Design Standards Internet Web site to ensure they are readily accessible.

2. Products:

CHAPTER NO.	EXISTING DS-(insert DS number) CHAPTERS	PROPOSED NEW OR REVISED DS- (insert DS number) CHAPTERS
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

3. Schedule:

Major Milestone	Dates	Notes

4. Financial Plan: Summary of Staff Days and Cost by FY

FY	SL1	SL2	SL3	SD Total	$ (Labor)	$ (Non
Totals						

Total DS No. (Insert design standard and chapter number) Budget =

5. Roles and Responsibilities: See Design Standards No. 1, Chapter 1, Subsection 1.2.1, "Roles and Responsibilities."

6. Quality Control: See Design Standards No. 1, Chapter 1, Section 2, "Quality Control and Review Requirements."

7. Change Management:

(a) If an adjustment in this PMP is required for either schedule or budget, the proposed modification will be prepared by the DSDT member requesting the change for a particular task and a written request (see attachment 1 for change order form) describing the modification will be sent to the project manager by the design standards team leader for approval prior to making any adjustments to the PMP.

(b) If approval is obtained (documented via e-mail) from the project manager, work will proceed on that particular task as agreed to in the modification.

(c) If approval cannot be obtained from the project manager, the design team leader, the design standards development team member involved in requesting the modification, and the project manager will discuss and resolve the need and amount of adjustment in schedule or budget for that particular task.

(d) If resolution of a request for modification cannot be obtained in steps (a) through (c) above, the issue will be raised to the project manager (Director, TSC) to seek resolution. All work that is not affected will continue as planned and scheduled.

8. Communication:

TSC DSDT meetings will be held as frequently as weekly, if required, during the first month of activity and no less frequently than monthly through completion of the work described in this PMP.

Status report meetings will be held no less frequently than quarterly between the DSDT members and leader, and the M4E-16 Task 2 Manager. These meetings will be conducted to assess progress; address resource, budget, and schedule issues; and to assist the DSDT with policy and procedure issues or concerns.

See also Chapter 1, Section 2, "Quality Control and Review Requirements," for the internal and external review coordination process.

Status reports:

Quarterly status reports will be issued to report overall design standard progress, evaluate expenditures versus accomplishments, present changes or problems and their resolutions, and present planned activity for the upcoming quarter.

9. Risk Management:

The following risks are identified as having a moderate to high probability of occurrence. These risk events will be monitored throughout the development of the design standards. Other risk events not discussed below that impact the development of the design standards will be managed by the change management process.

Risk No. 1: Available funding is reduced or eliminated, resulting in modification to scope of work, budget, and/or schedule. If this occurs, the PMP will require revision.

Risk No. 2: Lack of qualified Reclamation resources (either current or retired employees) to perform tasks identified for SMEs. If this occurs, the PMP will require revision.

Risk No. 3: Modifications in the currently anticipated scope of the work may be revealed as work progresses (e.g., additional chapters may be identified). If this occurs, the PMP will require revision.

Risk No. 4: The nature and extent of interaction with stakeholders (and/or their A&Es) are not well defined at the time this PMP is being developed. The timeframe and staff-day estimate reflect the assumptions and anticipated effort to complete this activity. This PMP may require revision to address this issue once tasks are underway should the original assumptions of this interaction prove inaccurate.

10. Project Closeout:

Perform recordkeeping in accordance with Federal records policies and procedures.

Contact the client liaison (86-68010) and ask to have the WOID closed.

Write a summary for the project manager concerning the scope of the design standard, significant items discussed during the development, and potential items for future inclusion.

11. Signatures: The following signatures indicate approval of this contract:

_____	_____
DSDT Leader (name)	Date
_____	_____
M4E-16 Project Manager (name)	Date
_____	_____
Group Manager, 86-68xxx (name)	Date
_____	_____
Group Manager, 86-68xxx (name)	Date
_____	_____
Group Manager, 86-68xxx (name)	Date
_____	_____
Group Manager, 86-68xxx (name)	Date

Attachment No. 1
Change Order Form

Design Standards No. (Insert Design Standards No. and Title)
Chapter No. (Insert Chapter No. and Title)

Change Order Form

Task or Subtask ID: _____
Task or Subtask Title: _____
Change No.: _____
WBS No.: _____
Task Name: _____
Added Cost: $_____ SL1 _____ SL2 _____ SL3 _____

Budget: ____ No Impact ____ Contingency Fund
Schedule: ____ No Impact ____ Slip (No. of scheduled days___)
Reason:
_____
_____

Major: (Change in Scope)

New Requirement (Attachment Yes/No)
_____
_____

Task: (New/Existing)
_____

Scheduled Days: _____ Staff Assigned: _____
Start Date: _____
Budget: ____ No Impact ____ Contingency Fund
Schedule: ____ No Impact ____ Slip

Submitted by:

_____
TSC Team Leader Date

____ Approved ____ Not Approved

_____
Project Manager Date

Revision Number DS-1(2)-1.1

Summary of revisions:

Design standard chapter titles and contacts have been updated in chapter 2.

Prepared by:

Michael R. O'Shea, P.E. — 5-17-12

Michael R. O'Shea, P.E. — Date
Design Standard Team Leader

Peer Review:

P.E. — 5/18/2012

John LaBoon, P.E. — Date
Civil Engineer, Waterways and Concrete Dams Group

Submitted:

P.E. — 5/18/12

Richard LaFond, P.E. — Date
Chief, Civil Engineering Services Division

Approved:

Acting For — 5/18/12

Lowell Pimley, P.E. — Date
Director, Technical Service Center

Chapter Signature Sheet
Bureau of Reclamation
Technical Service Center

Design Standards No. 1

General Design Standards

Chapter 2: Design Standards Index

Summary of Changes:

Revisions

The index tables were previously in chapter 1 and have now been relocated to chapter 2.

The index tables show the currently posted design standards and the design standards proposed to be updated by 2014.

Prepared by:

Arthur Glickman, P.E.

8/19/09
Date

Technical Approval:

Not required

Date

Peer Review:

Michael R. O'Shea — 8-18-09

Mike O'Shea, P.E. — Date

Submitted:

8/26/09

Richard LaFond, P.E.
Chief, Civil Engineering Division — Date

Security Review:

8/18/09

Division Security Reviewer — Date

Approved:

9/8/09

Lowell Pimley, Director
Technical Service Center — Date

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Design Standards No. 1: General Design Standards

Std. No.	Chapter No.	Standard/ Chapter Title	Contact
1		General Design Standards	Plant Structures Group 86-68120
	1	Preparing and Using Design Standards	
	2	Design Standards Index	

Design Standards No. 2: Concrete Dams

Std. No.	Chapter No.	Standard/ Chapter Title	Contact
2		Concrete Dams	Structural Analysis Group 86-68110
	1	Introduction	
	2	Design Considerations	

Design Standards No. 3: Water Conveyance Facilities, Fish Facilities, and Roads and Bridges

Std. No.	Chap-ter No.	Standard/ Chapter Title	Contact
3		Water Conveyance Facilities, Fish Facilities, and Roads and Bridges	Water Conveyance Group 86-68140
	1	Open Channels	
	2	Canal Structures and Canal Automation	
	3	Diversion Dams and Headworks	
	4	Tunnels, Shafts, and Caverns	
	5	Fish Facilities	
	6	Water Measurement	
	7	Cross Drainage	
	8	Pipelines and Pipe Distribution Systems	
	9	Bridges and Roads	
	10	None	
	11	General Hydraulic Considerations	
	12	General Structural Considerations	
	13	Safety Standards for Water Conveyance and Fish Facilities	

Design Standards No. 4: Electrical Apparatus and Systems

Std. No.	Chapter No.	Standard/Chapter Title	Contact
4		Electrical Apparatus and Systems	Electrical Plants Group 86-68430
	1	General Considerations for Power, Pumping, and Pumped-Storage Plants	
	2	Electrical Rotating Machinery	
	3	Associated Electrical Equipment	
	4	None	
	5	Switchyards and Substations	
	6	Powerplant Control and Station-Service Equipment	
	7	None	
	8	None	
	9	Grounding Methods	
	10	None	

Design Standards No. 5: Field Installation Procedures

Std. No.	Chapter No.	Standard/Chapter Title	Contact
5		Field Installation Procedures	Electrical Plants Group 86-68430
	1	None	
	2	Electrical Standards for Equipment Installation	
	3	None	

Design Standards No. 6: Turbines and Pumps

Std. No.	Chap-ter No.	Standard/Chapter Title	Contact
6		Turbine and Pumps	Hydraulic Equipment Group 86-68420
	1	Hydraulic Turbines	
	2	Hydraulic Appurtenances	
	3	Station Service Piping	
	4	Pumping Plants	
	5	Pumping Plant Auxiliaries	

Design Standards No. 7: Valves, Gates, and Steel Conduits

Std. No.	Chapter No.	Standard/Chapter Title	Contact
7		Valves, Gates, and Steel Conduits	Hydraulic Equipment Group 86-68420
	1	Hydraulic Valves and Gates	
	2	Closed Steel Conduits	

Design Standards No. 8: Miscellaneous Mechanical Equipment

Std. No.	Chapter No.	Standard/Chapter Title	Contact
8		Miscellaneous Mechanical Equipment	Mechanical Equipment Group 86-68410
	1	Handling Facilities and Shop Equipment	
	2	Tanks	
	3	De-Icing Systems	
	4	Heating, Ventilating, and Cooling	

Design Standards No. 9: Buildings

Std. No.	Chapter No.	Current Status	Contact
9		Buildings	Plant Structures Group 86-68120
	1	General Structural Design Procedures and Standards	
	2	Structural Design Data and Criteria	
	3	Concrete Design and Details	
	4	Steel Design and Details	
	5	Architectural Details	
	6	Timber Design Criteria	
	7	Masonry Design Criteria	
	8	Modification of Existing Structures	

Design Standards No. 9: Buildings (continued)

	9	Instrumentation and Monitoring	
	10	Plant Structure Type	
	11	Special Structural Materials	
	12	Site Design	
	13	Seismic Design	
	14	Accessibility Design	
	15	Design for Life Safety	
	16	Security Assessment and Design Criteria for Buildings	
	17	Special Structures	
	18	Sustainable Design	

Design Standards No. 10: Transmission Structures

Std. No.	Chapter No.	Standard/Chapter Title	Contact
10		Transmission Structures	Plant Structures Group 86-68120
	1	General	
	2	Structures	
	3	Foundations and Cable Trenches	
	4	Site Development	
	5	Oil Spill Containment	
	6	Drawings	

Design Standards No. 12: Plant Testing

Std. No.	Chapter No.	Standard/Chapter Title	Contact
12		Plant Testing	Hydraulic Research and Technical Services 86-68450
	1	ASME PTC-18, Performance Test Code for Hydraulic Turbines and Pump-Turbines	
	2	Field Generator, Motor, and Generator/Motor Tests	
	3	NFPA 12, Carbon Dioxide Fire Extinguishing Equipment	

Design Standards No. 13: Embankment Dams

Std. No.	Chapter No.	Standard/Chapter Title	Contact
13		Embankment Dams	Geotechnical Services Division 86-68300
	1	General Design Standards	
	2	Embankment Design	
	3	Foundation Surface Treatment	
	4	Static Stability Analysis	
	5	Protective Filters	
	6	Freeboard	
	7	Riprap Slope Protection	
	8	Seepage	
	9	Static Deformation Analysis	
	10	Embankment Construction	
	11	Instrumentation	
	12	Foundation and Earth Materials Investigations	
	13	Seismic Design and Analysis	
	14	Decision Analysis (sunset)	
	15	Foundation Grouting	
	16	Cutoff Walls	
	17	Soil-Cement Slope Protection	
	18	Drawing Standards (sunset)	
	19	Geotextiles	
	20	Geomembranes	
	21	Dewatering	
	22	Seismic Loading	

Design Standards No. 14: Appurtenant Structures for Dams

Std. No.	Chapter No.	Standard/Chapter Title	Contact
14		Appurtenant Structures (Spillways and Outlet Works)	Waterways and Concrete Dams Group 86-68130
	1	Introduction	
	2	Hydrologic Considerations	
	3	General Spillway Design Considerations	
	4	General Outlet Works and Diversion Design Considerations	
	5	Hydraulic Considerations for Spillways and Outlet Works	
	6	Structural Considerations for Spillways and Outlet Works	
	7	Mechanical/Electrical Considerations for Spillways and Outlet Works	