

RECLAMATION

Managing Water in the West

Design Standards No. 9

Buildings and Other Structures

Chapter 8: Modification of Existing Buildings

Phase 4 (Final)



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. 9

Buildings and Other Structures

DS-9(8)-2: Phase 4 (Final)

January 2012

Chapter 8: Modification of Existing Buildings

Foreword

Purpose

The Bureau of Reclamation (Reclamation) design standards present 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 Reclamation facilities in a way that protects the public's health, safety, and welfare; recognizes needs of all stakeholders; and achieves lasting value and functionality necessary for Reclamation facilities. Responsible designers accomplish this goal through compliance with these design standards and all other applicable technical codes, as well as incorporation of the stakeholders' vision and values, that are then reflected in the constructed facilities.

Application of Design Standards

Reclamation design activities, whether performed by Reclamation or by a non-Reclamation entity, must be performed in accordance with established Reclamation design criteria and standards, and approved national design standards, if applicable. Exceptions to this requirement shall be in accordance with provisions of *Reclamation Manual Policy*, Performing Design and Construction Activities, FAC P03.

In addition to these design standards, designers shall integrate sound engineering judgment, applicable national codes and design standards, site-specific technical considerations, and project-specific considerations to ensure that suitable designs are produced that protect the public's investment and safety. Designers shall use the most current edition of national codes and design standards consistent with Reclamation design standards. Reclamation design standards may include exceptions to requirements of national codes and design standards.

Proposed Revisions

Reclamation designers should inform the Technical Service Center (TSC), via Reclamation's Design Standards Website notification procedure, of any recommended updates or changes to Reclamation design standards to meet current and/or improved design practices.

**Chapter Signature Sheet
Bureau of Reclamation
Technical Service Center**

Design Standards No. 9

Buildings and Other Structures

Chapter 8: Modification of Existing Buildings

**DS-9(8)-2:¹ Phase 4 (Final)
January 2012**

Chapter 8 – Modification of Existing Buildings is a new chapter and covers:

- Extent of modifications
- Historic buildings
- Review of existing information
- Site investigations
- Evaluation of environmental hazards

¹ DS-9(8)-2 refers to Design Standards No. 9, chapter 8, revision 2.

Prepared by:

Paul M. Ruchti
Paul M. Ruchti, P.E.

1/19/2012
Date

Technical Approval

Tim P. Brown
Tim P. Brown, P.E.

1/19/2012
Date

Peer Review:

Michael R. O'Shea, P.E.
Michael R. O'Shea, P.E.

1-19-12
Date

Security Review:

Phoebe Percell
Phoebe Percell, Division Security Reviewer

1-20-12
Date

Submitted:

Richard LaFond
Richard LaFond, Chief, Civil Engineering Division

1-27-12
Date

Approved:

Lowell Pimley
Lowell Pimley, Director, Technical Service Center

2/27/13
Date

ACTING FOR

Contents

	<i>Page</i>
8.1 General Sections	
8.1.1 Purpose.....	8-1
8.1.2 Application of Design Standards	8-1
8.1.3 Deviations and Proposed Revisions.....	8-1
8.2 Extent of Modifications Based on Code Compliance.....	8-2
8.3 Historic Buildings	8-3
8.4 Review of Existing Information.....	8-3
8.5 Site Investigations.....	8-4
8.6 Evaluation of Environmental Hazards	8-5
8.7 References.....	8-6

Chapter 8

Modification of Existing Buildings

8.1 General Sections

8.1.1 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.

8.1.2 Application of Design Standards

All Reclamation design work, whether performed by the Technical Service Center (TSC), the regional offices, the area 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.

8.1.3 Deviations and Proposed Revisions

Whenever a design deviates from the standards, the designer should note the deviation and the rationale. The deviation and rationale for the deviation must be

Design Standards No. 9: Buildings and Other Structures

approved by the engineers technically responsible for the designs, and concurrence must be obtained from the peer reviewer(s). Deviations from Reclamation design standards made by an A&E firm must be approved by the Reclamation contracting officer. Any deviation from the design standard must be documented and made part of the design records.

The designer should inform the TSC, via the Web site notification procedure, of any recommended updates or changes for the design standards to meet current design practices.

8.2 Extent of Modifications Based on Code Compliance

The extent of modifications to existing buildings that may be required is governed by the International Existing Building Code. Depending on the scope of the modifications, compliance with this code may require substantial upgrades to bring the building up to code.

Compliance with the International Existing Building Code will require an assessment of impacts due to changes in building use, occupancy, existing life safety features, and accessibility, as well as major and minor structural components. Verification of compliance with local codes and standards may also be necessary and will typically involve assessment of visual impact, noise restrictions, space limitations (height, length, etc.), clearance criteria, and special loading conditions.

In addition to the International Existing Building Code, all existing federally owned and leased buildings that are modified must comply with the *Standards of Seismic Safety for Existing Federally Owned and Leased Buildings, ICSSC Recommended Practice 8 (RP 8)*, issued in 2011. Life-Safety is the minimum acceptable performance objective for Federal buildings. This document further provides for an extended level of performance, Immediate Occupancy, where required to meet agency missions.

If a building is owned or leased by the U.S. General Services Administration (GSA), then compliance with the latest edition of Public Building Service (PBS) P100, *Facilities Standards for the Public Buildings Service*, will be necessary. This document establishes design standards and criteria for new buildings, major and minor alterations, and work in historic structures for GSA's PBS. This document applies to all new buildings and alterations of existing buildings that are owned or leased by GSA.

8.3 Historic Buildings

A historic building is any building that is listed in the State or National Register of Historic Places. There are State and Federal laws that require documentation of the historical features of the building before any modifications may occur.

8.4 Review of Existing Information

The initial step in the design process associated with the modification of an existing building involves collecting and reviewing existing data that describe the design, construction, and operation and maintenance of the building. Data that are of value to the modification design process are summarized below:

- Design calculations
- Design specifications, reports, summaries, technical memorandums, communication records, etc.
- Design drawings (e.g., general plan, site plan, general arrangements, concrete outline and details, reinforcement design and details, mechanical and electrical equipment layouts, structural design data sheet, embedded and exposed piping and conduit, etc.)
- Contractor's submittals, including shop drawings and data sheets
- Manufacturer's unit and auxiliary equipment drawings
- As-built drawings
- Drawings and other information detailing modifications made to the facility after initial construction
- Interviews of long-term project personnel detailing operation and maintenance concerns
- Construction reports
- Material test reports (concrete, steel, timber, masonry, etc.)
- Construction photographs
- Concrete core samples
- Operation and maintenance reports and photographs

Design Standards No. 9: Buildings and Other Structures

- Designers' operating criteria or standing operating procedures
- Intake and tailwater water surface elevations hydrologic (flow) data
- Geologic reports and drill hole logs
- Foundation inspection report
- Existing topography, including location of all existing utilities (above ground and buried)
- Magazine or newspaper articles written during the construction or early years of the project
- Postconstruction reports
- Hazardous Material Inspection Report
- Seismic Risk Assessment Report (or Rapid Visual Screening Report)
- Life Safety Compliance Report
- Accessibility Compliance Report

Possible sources for this information are files maintained by the design office, project office, owners, operators, libraries, and museums. In general, the objective is to assemble all available information: any fact from any source that describes the design, construction, operation, and maintenance of the building(s). The age of the facility, changes in ownership, and size of installation will affect the availability of information and data.

Design calculations and drawings are vital for understanding design loads, structural capacities, sizes, shapes, and unseen details of building components. Safety inspection reports provide information on service capability and condition of existing building(s). Maintenance and operational records provide information which may indicate problems particular to the site. Interviews of operators, long-term employees, and local engineers should provide valuable insights.

8.5 Site Investigations

Once the existing project data have been collected and the engineer has become acquainted with this information, a site investigation should take place. The purpose of this investigation is to identify any deviations from the existing data and any structural deficiencies that may exist. It should be noted that throughout

the design process, the engineer may need to make additional trips to the site to gather additional information on the existing facility. Summarized below are types of information the engineer should obtain during these site visits:

- Photographs and/or videotapes with narrative of the entire facility from many angles, including aerial photographs
- Photographs and/or videotapes with narrative of all equipment (including piping; conduit; cable trays; heating, ventilating, and air-conditioning ducts; etc.) and its position within the building marked on prints of the existing drawings
- Dimensional information in critical areas as needed to confirm the correctness of the existing drawings and to locate existing equipment and structural members
- Identification of any materials that may be hazardous to the environment and humans
- Identification of any conditions which do not meet life safety standards and codes, which will have to be corrected
- Identification of any structural defects which will have an impact on the design or the integrity of the building
- Accessibility and life safety review and evaluation as part of the site investigation
- Inspection of the existing site geology to identify any site-specific problems that may impact the design

8.6 Evaluation of Environmental Hazards

Typically, older buildings used materials which, by today's standards, are considered hazardous to the environment and humans. Early in the design process, an inspection of the facility to assess the presence of these materials should be performed by a qualified hazardous material inspector. This is an important consideration because the engineer will be required to remove the material during the rehabilitation process at a considerable expense. The inspection may require sampling and testing of materials to determine the type of material present. Some common hazardous materials found at older buildings may include, but are not limited to, asbestos, coatings containing heavy metals, petroleum products, and polychlorinated biphenyls (PCBs).

8.7 References

- American Society of Civil Engineers. 2003. *ASCE Standard ASCE/SEI 31-03, Seismic Rehabilitation of Existing Structures*. American Society of Civil Engineers, Reston, Virginia.
- American Society of Civil Engineers. 2006. *ASCE Standard ASCE/SEI 41-06, Seismic Evaluation of Existing Structures*. American Society of Civil Engineers, Reston, Virginia, published 2007.
- International Conference of Building Officials. 2000. *Guidelines for the Rehabilitation of Existing Buildings*. International Conference of Building Officials, Whittier, California.
- International Code Council. 2003. *International Existing Building Code – 2003*. International Code Council, Country Club Hills, Illinois.
- Interagency Committee on Seismic Safety in Construction. 2011. *Standards of Seismic Safety for Existing Federally Owned and Leased Buildings, RP 8*, NIST GCR 11-917-12. National Institute of Standards and Technology, Gaithersburg, Maryland.
- United States Access Board. 2004. *Americans with Disabilities Act and Architectural Barriers Act – Accessibility Guidelines*. United States Access Board, Washington, DC.
- United States General Services Administration. 2005. *Facilities Standards for the Public Buildings Service*. U.S. General Services Administration, Public Buildings Service, Office of the Chief Architect, Washington, DC.

TSC Security Review of Proposed Public Disclosure of Technical Information

Type: Design Standards

Design Standards: Design Standards No. 9 – Buildings

Chapter: 8. Modifications of Existing Buildings

Brief Description of Information: This is a new chapter within Design Standards No. 9 and provides information on pertinent national and international codes and standards and their application with regard to making modifications to Federally owned or leased buildings. Information is also provided in regard to making modifications to historic buildings and dealing with environmental hazards.

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) N

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

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

Design Standards Team Leader:

Name(s)/Mail Code(s): Michael R. O'Shea 86-68120

Signature(s)/Date(s): Michael R. O'Shea 1-19-12

Group Manager(s) Approving Release:

Name(s)/Mail Code(s): Alfred I. Bernstein 86-68120

Signature(s)/Date(s): Alfred I. Bernstein 1-19-2012

Division Security Reviewer(s) Peer Reviewing Approval:

Name(s)/Mail Code(s): Phoebe Percell 86-68110

Signature(s)/Date(s): Phoebe Percell 1-20-12

