ASCE STANDARD

ASCE/SEI 37–14

Design Loads on Structures during Construction

This document uses both the International System of Units (SI) and customary units

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A complete list of currently available standards is available in the ASCE Library (http://ascelibrary.org/page/books/s-standards).

CONTENTS

ASCE STANDARDS . . . iii

PREFACE . . . vii

ACKNOWLEDGMENTS . . . ix

1.0 GENERAL . . . 1
- 1.1 Purpose . . . 1
- 1.2 Scope . . . 1
- 1.3 Basic Requirements . . . 1
- 1.4 Alternate Criteria for Design Loads during Construction . . . 2

2.0 LOADS AND LOAD COMBINATIONS . . . 5
- 2.1 Loads Specified . . . 5
- 2.2 Load Combinations and Load Factors for Strength Design . . . 5
- 2.3 Allowable Stress Design . . . 8
- 2.4 Bridges . . . 9

3.0 DEAD AND LIVE LOADS . . . 11
- 3.1 Dead Loads . . . 11
- 3.2 Live Loads . . . 11

4.0 CONSTRUCTION LOADS . . . 13
- 4.1 General Requirements . . . 13
- 4.2 Material Loads . . . 14
- 4.3 Personnel and Equipment Load, C_p . . . 15
- 4.4 Horizontal Construction Load, C_H . . . 16
- 4.5 Erection and Fitting Forces, C_F . . . 17
- 4.6 Equipment Reactions, C_R . . . 17
- 4.7 Form Pressure . . . 18
- 4.8 Application of Loads . . . 20

5.0 LATERAL EARTH PRESSURE . . . 25
- 5.1 Definition . . . 25
- 5.2 Determination of Lateral Earth Pressure . . . 25

6.0 ENVIRONMENTAL LOADS . . . 27
- 6.1 Risk Category . . . 28
- 6.2 Wind . . . 28
- 6.3 Thermal Loads . . . 31
- 6.4 Snow Loads . . . 32
- 6.5 Earthquake . . . 33
- 6.6 Rain . . . 34
- 6.7 Ice . . . 35

INDEX . . . 37

PREFACE

The material presented in this publication has been prepared in accordance with recognized engineering principles. This Standard and Commentary should not be used without first securing competent advice with respect to their suitability for any given application. The publication of the material contained herein is not intended as a representation or warranty on the part of the American Society of Civil Engineers, or of any person named herein, that this information is suitable for any general or particular use or promises freedom from infringement of any patent or patents. Anyone making use of this information assumes all liability from such use.

Earlier drafts of this Standard and Commentary were reviewed and balloted several times by the full Standards Committee. The votes and comments returned by the members were reviewed and their proposed resolutions developed by the appropriate subcommittees. The resulting approved changes in the text are included in this volume.

Some of the provisions were adopted from other codes, standards, regulations, and specifications; some reflect prevailing industry design and construction practices; some grew out of the experiences, practices, and opinions of members of the Committee; and some others were developed through research conducted specifically for this Standard by members of the Committee.

Preparation of a standard for *Design Loads on Structures during Construction* and its outline were originally proposed to ASCE by Robert T. Ratay in 1987, resulting in the first edition of the Standard published in 2002 as *ASCE/SEI 37-02, Design Loads on Structures during Construction*. The Committee, through its subcommittees, has been working on the development of a revision to the Standard to embrace comments, recommendations, and experiences since the original 2002 edition, and to supplement the loading requirements of *ASCE/SEI 7-10*, *Minimum Design Loads for Buildings and Other Structures*, since the latter does not include requirements for loads during construction. The environmental loads provisions of this ASCE/SEI 37-14 have been aligned with those of ASCE/SEI 7-10 and adjusted for the duration of the construction period.

Final committee balloting was completed, and public comments solicited and resolved in mid-2014.

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Design Loads on Structures during Construction, Standard ASCE/SEI 37-14, was developed over a period of several years by the Design Loads on Structures during Construction Standard Committee of the Codes and Standards Activities Division (CSAD) of the Structural Engineering Institute (SEI), and of the Codes and Standards Activities Committee (CSAC) of the American Society of Civil Engineers (ASCE). This 2014 edition was prepared by six subcommittees of the Design Loads on Structures during Construction Standard Committee under the leadership of the following individuals:

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The particularly active long-term participation and valuable contribution of the following members, in addition to the chair, the five subcommittee chairs, and two co-chairs, is acknowledged: James R. Harris, Gilliam S. Harris, Donald Dusenberry, and David W. Johnston.

ASCE acknowledges the work of the Design Loads on Structures during Construction Standard Committee of the CSAD of SEI and of the CSAC of ASCE. The Standard Committee comprises individuals from many backgrounds including design, analysis, research, consulting engineering, construction, education, government, and private practice.

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CHAPTER 1
GENERAL

STANDARD

1.1 PURPOSE

The purpose of this standard is to provide minimum design load requirements during construction of buildings and other structures.

1.2 SCOPE

This standard addresses partially completed structures, temporary structures, and temporary supports used during construction. The loads specified herein are suitable for use either with strength design [such as ultimate strength design (USD) or load and resistance factor design (LRFD)] or with allowable stress design (ASD). The loads are equally applicable to all conventional construction materials.

This standard does not specify the party responsible for the design of temporary structures or temporary supports, or for the temporary use of incomplete structures. This standard also does not specify the party responsible for on-site supervision of the construction of temporary structures or temporary supports, or for the use of incomplete structures.

1.3 BASIC REQUIREMENTS

1.3.1 Structural Integrity Partially completed structures and temporary structures shall possess sufficient structural integrity, under all stages of construction, to remain stable and resist the loads specified herein.

Stability of the incomplete structure and the possibility of progressive collapse shall be considered.

COMMENTARY

C1.1 PURPOSE

The construction loads, load combinations, and load factors contained herein account for the often short duration of loading, and for the variability of temporary loads. Many elements of the completed structure that are relied upon implicitly to provide strength, stiffness, stability, or continuity are sometimes not present during construction.

The requirements in this standard complement those in ASCE/SEI 7-10 (ASCE/SEI 2010).

C1.2 SCOPE

In this standard, loads and load factors are based on probability where sufficient probabilistic information is available. Where there is insufficient probabilistic information, loads and load factors are established by experience and engineering judgment.

Safety factors for ASD and capacity reduction factors for strength design are not given in this standard. They are given or implied in the structural design standards for the various structural materials.

This standard is not intended to account for loads caused by gross negligence or error.

This standard is intended for use by engineers knowledgeable in the performance of structures.

Responsibilities for the design of temporary structures and temporary supports, for the design for temporary use of partially completed structures, and for supervision of site activities to control loads on structures are contractual matters that should be resolved among the parties involved in the construction of a structure. This standard is not intended to establish the responsible parties for any of those activities.

The requirements contained herein are not intended to adversely affect the selection of a particular construction material or type of construction.

C1.3 BASIC REQUIREMENTS

C1.3.1 Structural Integrity Structural integrity should be provided by sequencing the construction so as to avoid creating vulnerable partially completed portions of the structure; by completing the permanent system that supports lateral loads as the dependent portions of the structure are erected; by avoiding conditions that result in loads that exceed the capacity of structural elements and their connections; or otherwise by providing temporary supports.

In many cases, stronger members and connections than originally designed for the permanent structure will have to be provided to support construction loads.

Many structures experience higher wind loading on the open structure than on the completed, enclosed structure,

STANDARD

COMMENTARY

which may require temporary bracing in addition to the permanent lateral load-resisting system.

During erection of a structure, the permanent lateral load-resisting system is generally not complete. Also, other elements of the structural system that are essential to the overall performance of the structure may not be in place or may only be partially secured. As such, the structure may be vulnerable to severe and widespread damage should a single, local failure or mishap occur.

1.3.2 Serviceability The effects of construction loads or conditions shall not adversely affect the serviceability or performance of the completed structure.

C1.3.2 Serviceability An example of adverse effect on serviceability is excessive permanent deformation.

1.3.3 Types of Loads All loads in this standard—dead, live, construction, environmental, and lateral earth pressure—shall be considered. In addition, forces resulting from the interaction between the partially completed structure and temporary supporting or bracing structures shall be considered.

C1.3.3 Types of Loads The loads in this standard may be different from those used in the design of the completed structures.

Although this standard is limited to the determination of the types of loads listed in this section, the consideration of other loads and effects may also be appropriate for specific conditions or when specified by the authority having jurisdiction.

1.3.4 Construction The effects on the loads created by the methods and sequencing (scheduling) of the construction during the progressive stages of the work shall be considered.

1.3.4.1 Construction Methods Limiting Loads Construction methods that limit loads by allowing controlled damage or controlled failure of temporary construction (including parts of the structure being built) when subject to extreme environmental loads are permitted subject to a mitigation plan approved by the authority having jurisdiction.

C1.3.4.1 Construction Methods Limiting Loads An example of limiting loads is the design of a cofferdam to a specified tidal height, allowing it to flood under higher water levels.

The mitigation plan should provide for monitoring of the environmental effects that could cause the extreme loads; an evacuation plan; protection of personnel on the construction site; protection of the public; and protection of the structures being built and adjacent structures.

1.3.5 Analysis Load effects on incomplete structures, on temporary structures, and on their respective individual components shall be determined by accepted methods of structural and geotechnical analysis, taking into account second-order effects.

1.4 ALTERNATE CRITERIA FOR DESIGN LOADS DURING CONSTRUCTION

The use of other authoritative documents shall be permitted for design loads during construction, for a specific material or method of construction, when acceptable to the authority having jurisdiction.

C1.4 ALTERNATE CRITERIA FOR DESIGN LOADS DURING CONSTRUCTION

Authoritative documents such as specifications and reports of research or studies applicable to specific materials or methods of construction have been developed and are recognized and used extensively. Examples include AASHTO *Standard Specifications for Highway Bridges* (AASHTO 2002), AASHTO *LRFD Bridge Design Specifications* (AASHTO 2007), AASHTO *Guide Design Specifications for Bridge Temporary Works* (AASHTO 1995), CALTRANS *Memo to Designers 20-2* (CALTRANS 2011), CALTRANS *Memo to Designers 15-14* (CALTRANS 2010), the Mason Contractors Association of America's

STANDARD

COMMENTARY

Standard Practice for Bracing Masonry Walls Under Construction (MCAA 2012), and the National Concrete Masonry Association's TEK 3-4B, *Bracing Concrete Masonry Walls During Construction* (NCMA 2005).

The user is cautioned that the bases of loads and the corresponding load factors in authoritative documents permitted under Section 1.4 may be different from those in this standard. For example, wind velocity in this standard (based on ASCE 7-10) is the average of the 3-s gust given for a return period that yields loads at the strength level; the corresponding load factor is 1.0. The wind velocities in other standards are determined for shorter return periods or for the fastest mile of wind, yielding loads at the allowable stress level; the corresponding load factors for those loads are 1.3 or 1.6. Also, gust factors for wind velocities measured by the 3-s gust are different from gust factors for wind velocities measured by the fastest mile of wind. The user should not mix the load from another document, the basis of which is different from the load in this standard, with a load factor from this standard without making an appropriate adjustment to the magnitude of the load.

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