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Design Loads on Structures During Construction

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ABSTRACT

The purpose of this standard is to provide minimum design load requirements during construction for buildings and other structures. This standard addresses partially completed structures, and temporary structures used during construction. The loads specified herein are suitable for use either with strength design (such as USD and LRFD) or with allowable stress design (ASD) criteria. The loads are equally applicable to all conventional construction materials.

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STANDARDS

In April 1980, the Board of Direction approved ASCE Rules for Standards Committees to govern the writing and maintenance of standards developed by the Society. All such standards are developed by a consensus standards process managed by the Management Group F (MGF), Codes and Standards. The consensus process includes balloting by the balanced standards committee made up of Society members and nonmembers, balloting by the membership of ASCE as a whole, and balloting by the public. All standards are updated or reaffirmed by the same process at intervals not exceeding 5 years.

The following Standards have been issued:

- ANSI/ASCE 1-82 N-725 Guideline for Design and Analysis of Nuclear Safety Related Earth Structures
- ANSI/ASCE 2-91 Measurement of Oxygen Transfer in Clean Water
- ANSI/ASCE 3-91 Standard for the Structural Design of Composite Slabs and ANSI/ASCE 9-91 Standard Practice for the Construction and Inspection of Composite Slabs
- ASCE 4-98 Seismic Analysis of Safety-Related Nuclear Structures
- Building Code Requirements for Masonry Structures (ACI 530-99/ASCE 5-99/TMS 402-99) and Specifications for Masonry Structures (ACI 530.1-99/ASCE 6-99/TMS 602-99)
- ASCE 7-98 Minimum Design Loads for Buildings and Other Structures
- ANSI/ASCE 8-90 Standard Specification for the Design of Cold-Formed Stainless Steel Structural Members
- ANSI/ASCE 9-91 listed with ASCE 3-91
- ASCE 10-97 Design of Latticed Steel Transmission Structures
- SEI/ASCE 11-99 Guideline for Structural Condition Assessment of Existing Buildings
- ANSI/ASCE 12-91 Guideline for the Design of Urban Subsurface Drainage
- ASCE 13-93 Standard Guidelines for Installation of Urban Subsurface Drainage
- ASCE 14-93 Standard Guidelines for Operation and Maintenance of Urban Subsurface Drainage
- ASCE 15-98 Standard Practice for Direct Design of Buried Precast Concrete Pipe Using Standard Installations (SIDD)
- ASCE 16-95 Standard for Load and Resistance Factor Design (LRFD) of Engineered Wood Construction
- ASCE 17-96 Air-Supported Structures
- ASCE 18-96 Standard Guidelines for In-Process Oxygen Transfer Testing
- ASCE 19-96 Structural Applications of Steel Cables for Buildings
- ASCE 20-96 Standard Guidelines for the Design and Installation of Pile Foundations
- ASCE 21-96 Automated People Mover Standards—Part 1
- ASCE 21-98 Automated People Mover Standards—Part 2
- ASCE 21-00 Automated People Mover Standards—Part 3
- SEI/ASCE 23-97 Specification for Structural Steel Beams with Web Openings
- SEI/ASCE 24-98 Flood Resistant Design and Construction
- ASCE 25-97 Earthquake-Actuated Automatic Gas Shut-Off Devices
- ASCE 26-97 Standard Practice for Design of Buried Precast Concrete Box Sections
- ASCE 27-00 Standard Practice for Direct Design of Precast Concrete Pipe for Jacking in Trenchless Construction
- ASCE 28-00 Standard Practice for Direct Design of Precast Concrete Box Sections for Jacking in Trenchless Construction
- EWRI/ASCE 33-01 Comprehensive Transboundary International Water Quality Management Agreement
- EWRI/ASCE 34-01 Standard Guidelines for Artificial Recharge of Ground Water
- EWRI/ASCE 35-01 Guidelines for Quality Assurance of Installed Fine-Pore Aeration Equipment
- CI/ASCE 36-01 Standard Construction Guidelines for Microtunneling
- SEI/ASCE 37-02 Design Loads on Structures During Construction

FOREWORD

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 the proposed standard 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 proposed to ASCE by Robert T. Ratay in early 1987. Work on the proposed Standard was approved by ASCE's Board of Directors in October 1987. A meeting of twenty-five construction industry officials was convened in May 1988 to outline the general direction of the proposed Standard. Seven key ASCE participants met in September 1988 to begin the organization of the Standards Committee, and issue a Call for Members. The response by members and non-members of ASCE was overwhelming. The Committee, through its subcommittees, has been working on the development of this proposed Standard since the fall of 1988. Prior to this volume, drafts of the proposed standard had been issued for committee balloting in 1996, 1997, 1998, early 1999, late 1999; for public comments in October 2000; and for a final committee balloting in 2001.

ACKNOWLEDGMENTS

This Standard 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 final draft 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 six subcommittee chairs, is acknowledged: Charles G. Culver, David Rosowsky, James R. Harris, Alan Fisher, Gilliam S. Harris, Daniel M. McGee, and Cris Subrizi.

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

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Design Loads on Structures During Construction

STANDARD

COMMENTARY

1.0 GENERAL

C1.0 GENERAL

1.1 Purpose

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

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 may not be present at certain times during construction.

The requirements in this standard complement those in ASCE 7-95.

This standard does not specify who the responsible party is for the design of temporary structures or temporary supports or for the temporary use of incomplete structures.

1.2 Scope

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

C1.2 Scope

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

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

1.3 Basic Requirements

1.3.1 Safety

The design loads shall provide for a level of safety of partially completed structures, as well as temporary structures used in construction, that is comparable to the level of safety of completed structures.

C1.3.1 Safety

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

1.3.2 Structural Integrity

Partially completed structures and temporary structures shall have sufficient structural integrity, in 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.

C1.3.2 Structural Integrity

Structural integrity shall be provided by sequencing the construction in order to avoid creating vulnerable partially completed portions of the structure; by completing the system to support lateral loads as the dependent portion of the structure is erected or by providing suitable temporary lateral bracing; by avoiding conditions that result in loads that exceed the capacity of structural elements; and by promptly completing connections for all installed elements.

During erection of a structure, the structural system that will provide stability and structural integrity for the finished structure generally is not complete. In this interim state, elements of the structural system that are essential to the overall performance of the structure may not be in place or may be only partially secured.