



AMERICAN NATIONAL STANDARD

*ANSI/ASSE A10.47-2009
Work Zone Safety
for Highway Construction*

*American National Standard
for Construction and
Demolition Operations*

ANSI/ASSE A10.47-2009



AMERICAN SOCIETY OF
SAFETY ENGINEERS

The information and materials contained in this publication have been developed from sources believed to be reliable. However, the American Society of Safety Engineers (ASSE) as secretariat of the ANSI accredited A10 Committee or individual committee members accept no legal responsibility for the correctness or completeness of this material or its application to specific factual situations. By publication of this standard, ASSE or the A10 Committee does not ensure that adherence to these recommendations will protect the safety or health of any persons, or preserve property.

ANSI®
ANSI/ASSE A10.47 – 2009

**American National Standard
Construction and Demolition Operations**

**Work Zone Safety
for Highway Construction**

Secretariat

American Society of Safety Engineers
1800 East Oakton Street
Des Plaines, Illinois 60018-2187

Approved November 24, 2009

Effective February 24, 2010

American National Standards Institute, Inc.

American National Standard

Approval of an American National Standard requires verification by ANSI that the requirements for due process, consensus and other criteria for approval have been met by the standards developer. Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered and that a concerted effort be made toward their resolution. The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he/she has approved the standards or not, from manufacturing, marketing, purchasing or using products, processes or procedures not conforming to the standards. The American National Standards Institute does not develop standards and will in no circumstance give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretation should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

Caution Notice: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute requires that action be taken periodically to reaffirm, revise or withdraw this standard. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

Published January, 2010 by

American Society of Safety Engineers
1800 East Oakton Street
Des Plaines, Illinois 60018-2187
(847) 699-2929 • www.asse.org

Copyright © 2009 by American Society of Safety Engineers
All Rights Reserved.

No part of this publication may be reproduced
in any form, in an electronic retrieval system or
otherwise, without the prior written permission
of the publisher.

Printed in the United States of America

Foreword (This Foreword is not a part of American National Standard A10.47-2009.)

This standard is one of a series of safety standards that have been formulated by the Accredited Standards Committee on Safety in Construction and Demolition Operations, A10. It is expected that the standards in the A10 series will find a major application in industry, serving as a guide to contractors, labor, and equipment manufacturers. For the convenience of users, a list of existing and proposed standards in the A10 series for Safety Requirements in Construction and Demolition Operations follows.

- A10.1 Pre-Planning for Construction Safety and Health (under development)
- A10.2 Safety, Health, and Environmental Training (under development)
- A10.3 Powder-Actuated Fastening Systems
- A10.4 Personnel Hoists and Employee Elevators
- A10.5 Material Hoists
- A10.6 Demolition Operations
- A10.7 Transportation, Storage, Handling, and Use of Commercial Explosives and Blasting Agents
- A10.8 Scaffolding
- A10.9 Concrete and Masonry Construction
- A10.10 Temporary and Portable Space Heating Devices
- A10.11 Personnel and Debris Nets
- A10.12 Excavation
- A10.13 Steel Erection
- A10.15 Dredging
- A10.16 Tunnels, Shafts, and Caissons
- A10.17 Safe Operating Practices for Hot Mix Asphalt (HMA) Construction
- A10.18 Temporary Roof and Floor Holes, Wall Openings, Stairways, and Other Unprotected Edges
- A10.19 Pile Installation and Extraction Operations
- A10.20 Ceramic Tile, Terrazzo, and Marble Work
- A10.21 Safe Construction and Demolition of Wind Generation/Turbine Facilities (under development)
- A10.22 Rope-Guided and Non-Guided Workers' Hoists
- A10.24 Roofing – Safety Requirements for Low-Sloped Roofs
- A10.25 Sanitation in Construction
- A10.26 Emergency Procedures for Construction Sites (under development)
- A10.27 Hot Mix Asphalt Facilities
- A10.28 Work Platforms Suspended from Cranes or Derricks
- A10.29 Aerial Platforms in Construction (under development)
- A10.31 Digger-Derricks
- A10.32 Personal Fall Protection Used in Construction and Demolition Operations
- A10.33 Safety and Health Program Requirements for Multi-Employer Projects
- A10.34 Public Protection
- A10.36 Railroad Construction Safety (under development)
- A10.37 Debris Nets
- A10.38 Basic Elements of a Program to Provide a Safe and Healthful Work Environment
- A10.39 Construction Safety and Health Audit Program
- A10.40 Reduction of Musculoskeletal Problems in Construction
- A10.41 Equipment Operator and Supervisor Qualifications and Responsibilities (under development)
- A10.42 Rigging Qualifications and Responsibilities in the Construction Industry
- A10.43 Confined Spaces in Construction (under development)
- A10.44 Lockout/Tagout in Construction
- A10.46 Hearing Loss Prevention
- A10.47 Highway Construction Safety

A10.48 Communication Tower Erection (under development)

A10.49 Control of Health Hazards (under development)

One purpose of these standards is to serve as guides to governmental authorities having jurisdiction over subjects within the scope of the A10 Committee standards. If these standards are adopted for governmental use, the reference of other national codes or standards in individual volumes may be changed to refer to the corresponding regulations.

Revisions: The A10 Committee welcomes proposals for revisions to this standard. Revisions are made to the standard periodically (usually five years from the date of the standard) to incorporate changes that appear necessary or desirable, as demonstrated by experience gained from the application of the standard. Proposals should be as specific as possible, citing the relevant paragraph number(s), the proposed wording, and the reason for the proposal. Pertinent documentation would enable the A10 Committee to process the changes in a more timely manner.

Interpretations: Upon a request in writing to the Secretariat, the A10 Committee will render an interpretation of any requirement of the standard. The request for interpretation should be clear, citing the relevant paragraph number(s) and phrased as a request for a clarification of a specific requirement. Oral interpretations are not provided.

No one but the A10 Committee (through the A10 Secretariat) is authorized to provide any interpretation of this standard.

Approval: Neither the A10 Committee nor American National Standards Institute (ANSI) "approves," "certifies," "rates," or "endorses" any item, construction, proprietary device, or activity.

Appendices: Appendices are included in most standards to provide the user with additional information related to the subject of the standard. Appendices are not part of the approved standard.

Committee Meetings: The A10 Committee meets twice a year. Persons wishing to attend a meeting should contact the Secretariat for information.

Standard Approval: This standard was processed and approved for submittal to ANSI by the American National Standards Committee on Safety in Construction and Demolition Operations, A10. Approval of the standard does not necessarily imply (nor is it required) that all Committee members voted for its approval. At the time this standard was approved, the A10 Committee had the following members:

Richard King, CSP, Chairman
James Tomaseski, Vice Chairman
Timothy R. Fisher, CSP, CHMM, ARM, CPEA, Secretary
Jennie Dalesandro, Administrative Technical Support

Organization Represented	Name of Representative
Accident Prevention Corporation	Frank Burg, CSP Michael Serpe, ASP
Aegis Corporation	Matthew J. Burkart, P.E. Judith Burkart
Aerial Work Platform Training, Inc. Alstom Power	Dennis W. Eckstine Robert Renney Ted P. Sharp Edward Campbell
American Insurance Services Group	James G. Borchardt, CSP, CPE
ASCE - Construction Institute Committee	Harlan Fair, P.E. Laura Ciampa
American Society of Safety Engineers	Allen Macenski, CSP, J.D. A. David Brayton, CSP, CPC
Asbestos Workers International Union	Terry Lynch Jim E. Lapping, MS, P.E., CSP
Associated Builders and Contractors, Inc.	Michael W. Hayslip, Esq., P.E., CSP Chris Williams
Associated General Contractors of America, The	James Brown Kevin Cannon
Association of Union Constructors, The	William Treharne, P.E. Wayne Creasap, II
A-Z Safety Resources, Inc. Barton-Malow Company	Jane F. Williams, CPEA, CCA Mark Klimbal, CSP, ARM Clayton Shafer
Black & Veatch	Richard F. King, CSP John H. Borowski, CIH, CSP
Building & Construction Trades Department	Pete Stafford Jim Platner, Ph.D., CIH
Center for Construction Research & Training, The	Mike McCann, Ph.D., CIH Pete Stafford
Capital Safety Group	Scott C. Casebolt J. Thomas Wolner, P.E.
Clark Construction Group	Tim Sirofchuck, CSP Jack Duley
Cole-Preferred Safety Consulting, Inc. Philip L. Colleran DTE Energy Services	Barry Cole Philip L. Colleran, CSP Trent L. McClellan, CSP Tony Tarrance, CSP
ECI Safety Services Co.	Anthony Merisola Patrick Brennan, MA, CHSM, CSSM
Edison Electric Institute	R. Lee Reed, Jr. Charles Kelly
E. I. Dupont de Nemours & Company	Gary Birchall Ronald Probasco, CSP

Elevator Industry Preservation Fund	John Quackenbush Rod Gilles
Ellis Fall Safety Solutions	J. Nigel Ellis, P.E., CSP, CPE John Whitty, P.E.
Gilbane Building Co.	Anthony O'Dea, CSP, CHST Charles Praul, Jr.
Richard D. Hislop Institute of Makers of Explosives	Richard Hislop Lon D. Santis J. Christopher Ronay
International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers	Frank Migliaccio, Jr. Robert Migliaccio, Sr.
International Brotherhood of Boilermakers	Roger Erickson Bridget Connors
International Brotherhood of Electrical Workers	James Tomaseski
International Brotherhood of Teamsters	Michael W. Watson, CIH, CSP
International Safety Equipment Association	Cristine Fargo
International Union of Bricklayers & Allied Craftworkers	Michael Kassman, CHST Eileen Betit
International Union of Operating Engineers	Emmett Russell Steve Brown
Jack L. Mickle & Associates	Jack Mickle, Ph.D., P.E. Steve Stock, P.E., PLS
Laborers' International Union of North America	Scott Schneider, MS, CIH Walter A. Jones, MS
Marsh USA, Inc. Maryland Occupational Safety & Health	Timothy Bergeron, CSP Mischelle Vanreusel
Mechanical Contractors Association of America	Roger Campbell, MS, CSP Peter Chaney, MS, CSP
MYR Group, Inc.	Dennis Langley Steven T. Theis, CSP, CUSA
National Association of Home Builders	Joseph Branco
National Association of Railroad Safety Consultants & Investigators	Robert Matuga
National Electrical Contractors Association	Lewis Barbe, P.E., CSP, CRSP
National Institute for Occupational Safety & Health	Michael J. Johnston Jerry Rivera
National Railroad Contractors & Maintenance Association	Thomas G. Bobick, Ph.D., P.E., CSP, CPE
National Roofing Contractors Association	Matt Gillen, CIH
National Society of Professional Engineers	Jeffrey D. Meddin, CSP, CHCM Harry Dietz
Operative Plasterers and Cement Masons International Association	Tom Shanahan
Daniel M. Paine	E. Ross Curtis, P.E., DFE Paul Swanson, P.E.
Phoenix Fabricators and Erectors, Inc.	Gerald Ryan
Powder Actuated Tool Manufacturer's Institute	Daniel M. Paine Barbara Paine
Power Consultants, Incorporated	Robert E. Clouse, CSP, CHST Frank Massey
Professional Safety Consultants, Inc.	James A. Borchers David Jublonski David Goldsmith Camille Villanova Jim E. Lapping, MS, P.E., CSP

Property Casualty Insurers Association of America	Anthony Brown John Rabovsky, MS, CSP, ARM Peter Furst
Ryland Group, Inc., The Safety and Quality Plus	Bob Masterson, CSP Ron Lattanzio Frank Marino
Scaffolding, Shoring & Forming Institute	Chris Johnson Jerry Meadors
Shafer Safety Solutions, LLC Shawmut Design and Construction Sheet Metal & Air Conditioning Contractors' National Association	Carmen Shafer, CSP, CHTS, CRIS John Neil
Sheet Metal Workers International Association	Mike McCullion, CSP, ARM Tom Soles
SPA, Incorporated	Gary Batykefer Charles Austin, MS Stanley Pulz, CSP, P.E.
Turner Construction Company	Richard B. Loucks, Ph.D., P.E. Cindy L. DePrater, ALCM
United Association of Plumbers and Pipefitters	Laura Jargo Fowler Laurie Shadrick Michael Arndt
United Brotherhood of Carpenters and Joiners of America	William Irwin Thomas L. Kavicky
United Union of Roofers, Waterproofers and Allied Workers	
U.S. Department of the Army – Corps of Engineers	John Barnhard Brian Becker
U.S. Department of Energy	Ellen B. Stewart, CSP Patrick Finn, P.E.
West Virginia University Extension Service	Leslie Bermudez Mark Fullen
Winchester Homes Inc.	Brandon Takacs Thomas Trauger
ZBD Constructors (Zurn Industries)	Larry Freiert Greg Thompson Jeffrey D. Meddin, CSP, CHCM

Subgroup A10.47 had the following members:

Scott Schneider (Chairman)
Camille Villanova (Liaison)
David Ackerman
Timothy J. Bergeron, CSP
James G. Borchardt, CSP, CPE
Janice Comer Bradley, CSP
James E. Bryden, P.E.
Frank Burg, CSP
Julie Carter-Simon
Una Connolly
Tim Cox
Tapan K. Datta, Ph.D., P.E.
Donald Elisburg
Cristine Fargo
David E. Fosbroke
Mike Gostovich

Carl Heinlein, CSP, ARM, CPEA, CSHM, OHST
Ernest D.L. Huckaby
Eric Kechejian
Jim Kellenberger, P.E.
Rod Klashinsky
Jeffrey J. LaBarge
Tom Land, MS, CSP
Jim E. Lapping, MS, P.E., CSP
Jeff Lewis
Allen Macenski, CSP, J.D.
David McKee
John Neil
Kenneth Opiela
Daniel M. Paine
Travis Parsons
Douglas S. Prince
R. Lee Reed, Jr.
Emmett Russell
Craig Ruyle, P.E.
Bradley Sant
Ken Smith
Ronald Stemple, CSP
Gerald Ullman, Ph.D., P.E.
Mischelle Vanreusel
Michael W. Watson, CIH
William W. Wellman
Daniel D. Zarletti, Esq.
Wesley C. Zech, Ph.D.
Norm Zuckerman

Contents	SECTION.....	PAGE
	1. General.....	11
	1.1 Scope	11
	1.2 Purpose	11
	1.3 Exceptions	11
	2. Referenced Standards	11
	2.1 Related American National Standards	11
	2.2 Other Standards	12
	3. Definitions.....	12
	4. Traffic Control.....	15
	4.1 General Requirements	15
	4.2 Transportation Management Plan (TMP).....	15
	4.3 Communicating Plans.....	15
	4.4 Positive Protection Measures.....	15
	4.5 Set Up and Removal of Traffic Control Devices.....	15
	4.6 Inspections of Traffic Control Set Up.....	16
	4.7 Removal of Traffic Control Devices When Work is Inactive.....	16
	4.8 Speed Reductions/Management.....	16
	4.9 Construction Vehicles.....	17
	4.10 Aerial Lifts.....	17
	5. Flagger Safety.....	17
	5.1 Use of Flaggers.....	17
	5.2 Positioning.....	17
	5.3 Visibility.....	17
	5.4 Escape Path.....	17
	5.5 Requirements for Flaggers.....	17
	5.6 Advance Warning Signs.....	18
	5.7 Stop/Slow Paddles.....	18
	5.8 Flagger Training Requirements.....	18
	5.9 Training Records.....	18
	5.10 Communication Between Flaggers.....	18
	5.11 Use of Automated Flagger Assist Devices (AFADs).....	19
	5.12 Response to Frustrated Motorists.....	19
	5.13 Intrusion Warning Devices.....	19
	6. Runover/Backover Prevention.....	19
	6.1 Mirrors.....	19
	6.2 Backing Construction Vehicles and Equipment.....	19
	6.3 Internal Traffic Control Plans (ITCP).....	20
	6.4 Access and Egress to Work.....	20
	7. Equipment Operator Safety.....	20
	7.1 Inspection and Maintenance of Equipment.....	20
	7.2 Lockout/Tagout.....	20
	7.3 Roll-Over Protection Structures (ROPS) and Seatbelts.....	20
	7.4 Operator Qualifications.....	21
	7.5 Multiple Person Occupancy.....	21
	8. Excavation Safety.....	21
	9. Electrical Safety (Underground Utilities and Overhead Power Lines).....	21
	9.1 Underground Installations.....	21
	9.2 Overhead High Voltage Lines, Installations, and Equipment.....	22
	10. Power Tool Safety.....	23
	10.1 Guarding.....	23
	10.2 Vibration.....	23

11. Fall Prevention	23
11.1 Walking and Working Surfaces	23
11.2 Working at Heights	24
11.3 Floor Openings/Holes.....	24
11.4 Access/Egress to Equipment	24
11.5 Ladders.....	24
11.6 Scaffolds.....	24
11.7 Excavations	24
12. Reduction of Musculoskeletal Problems	24
12.1 General.....	24
13. Protection from Health Hazards	24
13.1 Health Hazards.....	24
13.2 Potential Major Health Hazards.....	24
13.3 Hierarchy of Controls.....	25
13.4 Administrative Controls.....	25
13.5 Personal Protective Equipment	25
13.6 Extreme Temperatures.....	25
13.7 Dermal Hazards.....	25
13.8 Concrete/Masonry Cutting.....	25
14. Illumination Requirements for Night Work	25
14.1 Illumination Plan	25
14.2 Illumination Levels	25
14.3 Vehicle Lights	26
14.4 Glare Control	26
15. Personal Protective Equipment.....	26
15.1 High-Visibility Safety Apparel	26
15.2 Head Protection.....	26
15.3 Eye and Face Protection	26
15.4 Hearing Protection.....	26
15.5 Other Personal Protective Equipment	27
16. Paving Operations.....	27
16.1 General.....	27

AMERICAN NATIONAL STANDARD A10.47 WORK ZONE SAFETY FOR HIGHWAY CONSTRUCTION

1. GENERAL

1.1 Scope. This standard covers workers engaged in construction, utility work, maintenance, or repair activities on any area of a highway.

1.2 Purpose. Establishes the minimum requirements for the construction and maintenance of public and private highways and roads to achieve the following objectives:

1. Prevent worker injuries and illnesses resulting from working in work zones.
2. Establish safe work practices in highway work zones.
3. Prevent vehicular crashes in highway work zones.

1.3 Exceptions. In cases of practical difficulties, unnecessary hardships or new developments, the enforcing authority may grant exceptions to literal requirements of this standard. These exceptions may permit the use of other devices or methods, but only when it is clearly indicated that equivalent safety and permanent installation are thereby secured.

2. REFERENCED STANDARDS

2.1 Related American National Standards. The following American National Standards are referred to, supplement or are related to this document. All provisions of the referenced standards that are applicable to demolition operations shall be observed. When the following American National Standards are superseded by a revision approved by the American National Standards Institute, the revision shall apply:

ANSI S3.40, *Anti-Vibration Gloves*

ANSI/ASSE A10.12, *Safety Requirements for Excavation*

ANSI/ASSE A10.17, *Safe Operating Practices for Hot Mix Asphalt (HMA) Construction*

ANSI/ASSE A10.32, *Fall Protection Systems for Construction and Demolitions*

ANSI/ASSE A10.40, *Reduction of Musculoskeletal Problems in Construction*

ANSI/ASSE A10.33, *Safety and Health Program Requirements for Multi-Employer Projects*

ANSI/ASSE A10.38, *Basic Elements of an Employer's Program to Provide a Safe and Healthful Work Environment*

ANSI/ASSE A10.44, *Control of Energy Sources (Lockout/Tagout) for Construction and Demolitions Operations*

ANSI/ASSE A10.46, *Hearing Loss Prevention in Construction and Demolition Workers*

ANSI/ISEA 107, *High Visibility Safety Apparel and Headwear*

ANSI/ISEA Z87.1, *Occupational and Educational Personal Eye and Face Protection Devices*

ANSI/AIHA Z88.6, *Respiratory Protection - Respirator Use - Physical Qualifications for Personnel*

ANSI/ISEA Z89.1, *Industrial Head Protection*