American Society of Civil Engineers

Automated People Mover Standards

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STANDARDS

In 2006, the Board of Direction approved the revision to the 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 Society's Codes and Standards Committee (CSC). The consensus process includes balloting by a balanced standards committee made up of Society members and nonmembers, balloting by the membership of the Society as a whole, and balloting by the public. All standards are updated or reaffirmed by the same process at intervals not exceeding five years.

The following standards have been issued:

ANSI/ASCE 1-82 N-725 Guideline for Design and Analysis of Nuclear Safety Related Earth Structures

ASCE/EWRI 2-06 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 and Specification for Masonry Structures: Containing Building Code Requirements for Masonry Structures (TMS 402-11/ACI 530-11/ASCE 5-11), Specification for Masonry Structures (TMS 402-11/ACI 530-11/ASCE 6-11), and Companion Commentaries

ASCE/SEI 7-10 Minimum Design Loads for Buildings and Other Structures

SEI/ASCE 8-02 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

ASCE/EWRI 12-13 Guideline for the Design of Urban Subsurface Drainage

ASCE/EWRI 13-13 Standard Guidelines for Installation of Urban Subsurface Drainage

ASCE/EWRI 14-13 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)

AF & PA/ASCE 16-95 Standard for Load 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 19-10 Structural Applications of Steel Cables for Buildings

ASCE 20-96 Standard Guidelines for the Design and Installation of Pile Foundations

ANSI/ASCE/T&DI 21-13 Automated People Mover Standards—Part 1

SEI/ASCE 23-97 Specification for Structural Steel Beams with Web Openings

ASCE/SEI 24-05 Flood Resistant Design and Construction

ASCE/SEI 25-06 Earthquake-Actuated Automatic Gas Shutoff 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

ASCE/SEI/SFPE 29-05 Standard Calculation Methods for Structural Fire Protection

SEI/ASCE 30-00 Guideline for Condition Assessment of the Building Envelope

SEI/ASCE 31-03 Seismic Evaluation of Existing Buildings

SEI/ASCE 32-01 Design and Construction of Frost-Protected Shallow Foundations

EWRI/ASCE 33-09 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
CI/ASCE 38-02 Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data
ASCE/EWRI 39-03 Standard Practice for the Design and Operation of Hail Suppression Projects
ASCE/EWRI 40-03 Regulated Riparian Model Water Code
ASCE/SEI 41-06 Seismic Rehabilitation of Existing Buildings
ASCE/EWRI 42-04 Standard Practice for the Design and Operation of Precipitation Enhancement Projects
ASCE/SEI 43-05 Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities
ASCE/EWRI 44-05 Standard Practice for the Design and Operation of Supercooled Fog Dispersal Projects
ASCE/EWRI 45-05 Standard Guidelines for the Design of Urban Stormwater Systems
ASCE/EWRI 46-05 Standard Guidelines for the Installation of Urban Stormwater Systems
ASCE/EWRI 47-05 Standard Guidelines for the Operation and Maintenance of Urban Stormwater Systems
ASCE/SEI 48-11 Design of Steel Transmission Pole Structures
ASCE/SEI 49-12 Wind Tunnel Testing for Buildings and Other Structures
ASCE/EWRI 50-08 Standard Guideline for Fitting Saturated Hydraulic Conductivity Using Probability Density Functions
ASCE/EWRI 51-08 Standard Guideline for Calculating the Effective Saturated Hydraulic Conductivity
ASCE/SEI 52-10 Design of Fiberglass-Reinforced Plastic (FRP) Stacks
ASCE/G-I 53-10 Compaction Grouting Consensus Guide
ASCE/EWRI 54-10 Standard Guideline for Geostatistical Estimation and Block-Averaging of Homogeneous and Isotropic Saturated Hydraulic Conductivity
ASCE/SEI 55-10 Tensile Membrane Structures
ANSI/ASCE/EWRI 56-10 Guidelines for the Physical Security of Water Utilities
ANSI/ASCE/EWRI 57-10 Guidelines for the Physical Security of Wastewater/Stormwater Utilities
ASCE/T&DI/ICPI 58-10 Structural Design of Interlocking Concrete Pavement for Municipal Streets and Roadways
ASCE/SEI 59-11 Blast Protection of Buildings
ASCE/EWRI 60-12 Guideline for Development of Effective Water Sharing Agreements

FOREWORD

The Board of Direction approved revisions to the ASCE Rules for Standards Committees to govern the writing and maintenance of standards developed by ASCE. All such standards are developed by a consensus standards process managed by the ASCE Codes and Standards Committee (CSC). The consensus process includes balloting by a balanced standards committee and reviewing during a public comment period. All standards are updated or reaffirmed by the same process at intervals of five years.

This standard is a consolidation of the previous four-part *Automated People Mover Standards*. An automated people mover (APM) is defined as a guided transit mode with fully automated operation, featuring vehicles that operate on guideways with exclusive right-of-way.

Chapters 1–11 cover requirements for design of an APM system, and Chapters 12–16 cover requirements for an APM in passenger operation, including chapters on security; emergency preparedness; system verification and demonstration; operations, maintenance, and training; and operational monitoring.

The standard also includes

- one mandatory annex on system safety program plan (SSPP) requirements;
- one nonmandatory reference bibliography of examples and guidance for other SSPPs;
- one nonmandatory informative annex on inspection and test guidelines; and
- two nonmandatory annexes: Recommended Practice for Acceptance of an APM System Application and Recommended Practice for Working Safely near APM Systems.

The provisions of the nonmandatory annexes and recommended practices are written in permissive language and, as such, offer the user a series of options or instructions, but do not prescribe a specific course of action. Significant judgment is left to the user of these annexes and recommended practices.

The development of these standards began in 1991 with a plan of producing partial standards in sequential segments. The first printing of Part 1, Chapters 1–6, was in 1996; followed by Part 2, Chapters 7 and 8, in 1998; Part 3, Chapters 9–11, in 2000; and the final Part 4, Chapters 1–6, in 2008.

During this early development period, Parts 1, 2, and 3 were reaffirmed on their five-year anniversary, as required by ASCE and ANSI rules and amended as needed.

The ultimate goal was to conduct a concurrent reaffirmation of all 16 chapters in one master volume to better serve the APM industry.

This publication now contains all 16 chapters of the completed standard and will be reaffirmed as needed, at least on a five-year cycle.

This standard establishes the minimum set of requirements necessary to achieve an acceptable level of safety and performance for an APM system. As such, it may be used in the safety certification process. The overall goal of this standard is to assist the industry and the public by establishing standards for APM systems.

This standard has no legal authority in its own right but may acquire legal standing in one or more of the following ways:

- Adoption by an authority having jurisdiction,
- Reference to compliance with the standard as a contract requirement, or
- Claim by a manufacturer or manufacturer's agent of compliance with the standard.

This standard will be beneficial to transportation engineers, civil engineers, safety engineers, and contractors of APM systems. Also, anyone who owns, operates, builds or maintains, designs, tests, insures, oversees, or certifies APMs or other innovative technology transit systems, such as magnetic levitation, air cushion, personal rapid transit, and monorail systems, will also benefit.

This standard has been prepared in accordance with recognized engineering principles and should not be used without the user's competent knowledge for a given application. The publication of this standard by ASCE is not intended to warrant that the information contained herein is suitable for any general or specific use, and ASCE takes no position respecting the validity of patent rights. The user is advised that the determination of patent rights or risk of infringement is entirely his or her own responsibility.

ACKNOWLEDGMENTS

The ASCE APM Standards Committee formed two decades ago as a volunteer group of individuals sharing a common belief that the fledgling APM industry would benefit by the development of a minimum set of requirements necessary to achieve an acceptable level of safety and performance for the public.

Many individuals and organizations from many backgrounds gave their time, resources and expertise in hosting meetings, providing web and email communications, drafting sections, and shepherding complicated technical specifications through the challenging consensus process and finally publication.

One individual stands out during these 22 years and is recognized by all committee members, past and present, as the driving force and catalyst behind the creation of this standard. This special acknowledgment is given to the founder and chairman of this committee for its first 17 years cumulating with the final production of the four volume APM standard.

Tom McGean, Chairman Emeritus, has tirelessly led all aspects of the creation of the standard—from securing the sponsorship of ASCE, assembling a balanced membership from diverse backgrounds, nurturing the collegial spirit necessary to create a consensus standard, producing the standard in four consecutive parts to meet the evolving industry needs, and astutely guiding its acceptance within the competitive APM industry.

The committee dedicates this first publication of the combined standard to Tom McGean and hereby proclaims that this standard would not exist or be as well accepted by the transit and APM industry, without his quiet, persistent persuasion and gentle leadership.

Lawrence Smith, P.E., *Chair;* Paul Didrikson, P.Eng, *Secretary;* Tedd Snyder, P.E., *Vice-Chair;* Thomas McGean, P.E., *Past-Chair*

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