

Technical Report: CABO/ANSI A117.1 Standard

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**Edward Steinfeld, Arch. D.
Danise R. Levine, M. Arch**



Preface

On July 11, 1997, a Special Interest Forum (SIF) was held in Washington DC, on the topic of the CABO/ANSI A117.1 Standard. Its purpose was to present and discuss changes to the Standard that would make sites, facilities, and buildings more accessible and usable by a diverse population, including people with disabilities. This report captures the main points raised by the presenters and elaborates on many of the issues.

The SIF was organized by the Association of Safe and Accessible Products (ASAP). Funding was provided by the Center for Inclusive Design and Environmental Access (IDEA Center), State University of New York at Buffalo, as part of a grant from the U.S. Department of Housing and Urban Development entitled “Fair Housing Means Universal Design”. The American Institute of Architects certified the program for continuing education credit.

Introduction

The CABO/ANSI A117.1 Standard is the consensus standard for the building industry that defines the minimum requirements for an accessible environment. It has a history dating back to 1961. Over the last few years, the Committee responsible for promulgating the standard has been engaged in a major revision and update of the document. The process is now complete. This report describes the changes that have been made. It will be useful to anyone who uses the CABO/ANSI A117.1 Standard in their work: code officials, consumer advocates, designers, product manufacturers and others.

At the Special Interest Forum, each presenter was responsible for a specific part of the program. Each is credited for their specific contribution to the report in the Appendix. We used their presentation as a basis for the report but since each presenter was limited by time constraints, we also completed some additional research and, in some cases, expanded their presentations.

The report focuses on only the technical changes to CABO/ANSI A117.1. We have not presented the exact text of the

Standard because that is available from CABO. Rather, we have provided an easy-to-use review of all the technical and the main organizational changes to the document. The final version will be published in the spring of 1998. Readers who need the exact wording of the text should obtain a copy when it is available and use this report as a companion guide to review the new material. To keep it concise and easy to reference, the report is written primarily in outline form.

We have included commentary to explain the rationale for changes and to identify what we consider to be issues that the Committee still has not resolved completely due to lack of research based knowledge or information from practical experience. This commentary is set off from the main text of the report in italics to indicate that it represents our own opinion and not necessarily the opinions of the CABO/ANSI A117 Committee as a whole nor the individual presenter at the Special Interest Forum. Dr. Edward Steinfeld, the primary author of this report is, however, a member of the CABO/ANSI A117 Committee and thus has detailed knowledge about the Committee's deliberations.

The report has 13 sections:

1. Overview
2. ANSI Process
3. Circulation
4. Reach Ranges
5. Plumbing
6. Residential Structures
7. Signs and Warnings
8. ATM's and Fare Machines
9. Alarms
10. Telephones
11. Elevators and Lifts
12. Harmonization with ADAAG
13. Conclusion

The first section provides an overview of all the changes made in the new version of the CABO/ANSI A117.1 Standard. The second section provides a description of the review and revision process. The twelfth section describes efforts to reconcile differences between the CABO/ANSI A117.1 and the ADA

Architectural Accessibility Guidelines. The report ends with a conclusion summarizing the major changes, trends and prospects for the future.

Overview

Reasons for Changes

Changes to the CABO/ANSI A117.1 Standard were extensive and have a significant impact on the document. It is useful to begin with an understanding of why the changes were made.

The most obvious change will be the major re-organization, editing and adjustments completed to make the document easier to use and understand. In particular, the re-organization of the sections is a very noticeable improvement. Over the years, there have been many questions regarding the intent of various sections. The revision process gave in-depth attention to those sections with the goal of clarifying the wording and intent. Another major effort was devoted to coordination of criteria. Due to excessive fragmentation in earlier versions, slight differences existed for similar applications, e.g knee and toe clearances at various plumbing fixtures. In the revisions, the “building block” concept was used to develop a consistent approach to criteria across all applications. This includes ground and floor surfaces, wheelchair turning spaces, knee and toe clearances, reach ranges, etc. Detailed review of the document uncovered and corrected inconsistencies. Some differences do remain in the application of these “building block” criteria, however, for various reasons. To facilitate recognizing the differences, they are usually called out as exceptions.

Another set of changes was based on the fact that many jurisdictions cannot adopt codes that rely on illustrations. In these jurisdictions, all illustrations have to be described in text form. Although illustrations will be included in an Appendix to the Standard, the body now includes language that converts all the illustrations to actual written criteria. This proved beneficial when reviewing the document and also improves accessibility of the document to those with visual impairments.

Another set of changes was based on developing consistency between the CABO/ANSI A117.1 Standard, the ADA Archi-

tectural Accessibility Guidelines (ADAAG) and the Fair Housing Accessibility Guidelines. Consistency with the ADAAG is evident throughout the document while the Fair Housing issue was addressed by the addition of a new section in the dwelling unit criteria.

While there were many detailed technical changes made for reasons in addition to those described above. They were primarily focused on a limited set of issues that had ramifications throughout the document or on a limited number of built elements. For example of the former, a series of technical changes throughout the Standard was based on a single change to the maximum reach height. And, as an example of the latter, the section on design of signs was extensively rewritten. The main reasons for these changes are increased awareness of the needs of two groups of people, people with visual impairments and people with extremes of stature. Of course, there were also many other miscellaneous changes made for specific reasons.

Thus, the reasons for the changes can be organized into the following major categories:

Improved use and understanding

- Reorganization for easier use
- Clarification of wording and intent
- Coordination of similar criteria
- Written description of all illustrations

Consistency with Federal accessibility regulations

- Harmonization of ADAAG
- Incorporation of Fair Housing Accessibility Guidelines

Targeted technical changes

- Improved access for people with sensory impairments
- Improved access for people with extremes of stature
- Miscellaneous issues

Outline of Changes

Regardless of the reasons for changes, it is useful to review their overall scope to fully comprehend their impact. The sec-

tions below provide an overview, in outline form, of the changes made.

Circulation

- Clarification of T-shaped wheelchair turning space
- Clarification of knee and toe clearances
- More detail on handrails
- A few additions to parking and loading area criteria
- Clarification of ramp criteria
- Clarification and major reorganization of door criteria

Reach Range

- Uniform upper reach limit of 48 in. for both side and forward reach
- Three specific exceptions from the new rule
- Coordination throughout standard

Plumbing

Clarifications:

- Clearances at toilet and toilet stalls
- Location of toilet paper

Technical changes to accommodate standard practices:

- Min. height of bathtub deleted
- Length of hand held shower spray unit changed
- Rectangular seats now allowed in shower stalls
- Mirror height adjusted
- Change in minimum distance from WC centerline to wall
- Alternate roll-in shower criteria added
- Thermal shock protection now required
- Relationship of grab bars to controls

Residential

- Three types of accessible dwelling units created
- Type A - Fully Accessible Units
- Section added on private residence elevator and wheelchair lifts
- Much more detail on operating controls with several exceptions
- Appliances addressed in more detail

- Work surface clearances coordinated with knee clearance requirements
- Type B - Less accessible units based on the Fair Housing Accessibility Guidelines (HUD)
- Section on Dwelling Units with accessible communications features added

Signs

- 3 categories of signs defined:
 1. Tactile and visual
 2. Tactile only
 3. Visual only
- More extensive requirements for proportions of each
- Spacing requirements added
- A range for mounting height is provided
- A floor clearance space for access now required
- Size of characters based on both height above floor and viewing distance
- More detail on Braille

Detectable Warnings

- Specific requirements for platform edges
 - Truncated domes
 - Color contrast
 - Equivalent detectability allowed

ATMs/Fare Machines

- Addition of fare machines
- Extensive additions of technical criteria for design of equipment
- Design of input devices, e.g. keypads
- Functions available
- Privacy
- Visibility of screen and text
- Standardized markings for function keys
- Types of output
- Exceptions for drive-up ATMs

Audible Alarms

- Exception for compliance with health care practices
- Peak level changed
- Cross reference to ANSI S3.41

Visual Alarms

- Reorganization
- Many new criteria
- Focus on room type rather than “mode”
- More charts on spacing and more detail in charts

Telephones

- Change in terminology: “TDD” has reverted to “TTY”
- Volume level on volume controlled telephones changed

Elevators

- Telephone style keypad control systems now called out
- Specific criteria for destination oriented elevator systems included
- Table added with minimum dimensions for different door locations and doorway widths
- Volume of audible signal reduced and top threshold added
- Section on limited Use/Limited Application elevators added
- Different door requirements
- Smaller size

Lifts

- Unassisted entry and exit required
- Automatic doors and gates required for single entry conditions

Summary

The impact of the revisions to the CABO/ANSI A117.1 Standard is significant. The new version of the standard will be much easier to use than the 1992 version. It will be easier to find the information one needs and it will be easier to understand what is required. Inconsistencies that previously existed have been eliminated. This will reduce the likelihood of errors in application and make it easier to check compliance.

On the technical side, the revisions have increased the attention given to heretofore under-represented groups. There are many new or revised technical criteria. Designers and officials will have to put in some effort to find these changes and become knowledgeable about them. We hope, in fact, that this report will help them in this effort.

Commentary: Although other members of the CABO/ANSI A117 Committee might disagree, many of the changes have increased the technical complexity of the Standard. As the reader will see below, the sections on alarms and signs, in particular, have many subtleties and new issues to consider for the designer. In addition, the addition of new types of accessible dwelling units might make the standard more difficult to administer because it will create confusion about which alternatives should apply to each project. Confusion could be avoided by clear guidance from administrative agencies on applications in each jurisdiction. On the other hand, the effort to harmonize the Standard with the ADAAG and the inclusion of the Fair Housing Accessibility Guidelines certainly will facilitate use by the designer. We can only hope that conclusion of the ADAAG revise and revision process will maintain the harmonization intact.

ANSI Process

In its deliberations, the CABO/ANSI A117 Committee relies on technical knowledge from many sources. These sources include research, opinions of experts in the design disciplines, experience of code officials and information on industrial practices. Anyone can submit a proposal for a change. Often, proposals for changes are controversial and often they are not. Sometimes, the proponents of a change carry the day simply because there is no opposition to it from other sources. The more participation obtained from all interested parties, the more likely it is that every implication of a change will be considered prior to a final decision by the Committee. To encourage

more participation in the future deliberations of the Committee, and to assist those who would like to participate to do so most effectively, we have included a section that describes the CABO/ANSI review process. To start, it is important to understand what the initials CABO and ANSI mean.

CABO is the Council of American Building Officials. It is an umbrella organization for the three model code organizations in the United States. CABO brings about a balance to the multitude of viewpoints regarding building codes at the national level. CABO acts as Secretariat for the ANSI Accredited Standards Committee A117, the Committee that promulgates the CABO/ANSI A117.1 Standard.

ANSI is the American National Standards Institute, a not for profit organization recognized by private sector standards developers as the central body responsible for the identification of a single consistent set of voluntary standards. ANSI accredits organizations that develop standards. It publishes procedures for standards development and it approves standards to verify openness and due process according to its procedures. There are three ANSI approved methods for developing standards:

- Accredited Committee
- Accredited Organization
- Accredited Canvass

The CABO/ANSI A117.1 standard has followed the Accredited Committee model.

According to the ANSI due process model, any person, organization, company or governmental agency with a “direct and material” interest in a standard has the right to participate. Participation includes

- Expressing a position and its basis
- Having position considered
- Appealing if adversely affected

Due process requirements insure:

- Openness
- Balance of interest categories
- Written procedures
- Appeals
- Notification
- Consideration of views and objection

Reflecting due process requirements, the ANSI Accredited Standards Committee A117

- 46 members
- 5 interest categories
- 9 consumer
- 10 professional
- 6 builder/owner/operator
- 9 Producer/distributor
- 12 regulatory

The following chronology describes the history of the CABO/ANSI A117.1 Standard. It is important to note that prior to CABO involvement, it was referred to simply as ANSI A117.1

Chronology

A117.1 (1961)

- Secretariat
 - National Easter Seals Society
 - President’s Committee on Employment of People with Disabilities
- Standard reaffirmed in 1971
- 1961 - first edition
- Minimal set of requirements
- Minimum scoping of applications (how many of each built element need to comply)
- Primarily concerned with wheelchair access
- Based primarily on practical experience with paraplegics

A117.1 (1980)

- US Department of HUD joins Secretariat and sponsors research starting in 1974
- 1980: New edition published that dramatically expands the scope of the original standard
- New format developed
- Housing covered for the first time
- Criteria based on systematic research wherever possible
- Adaptability concepts introduced
- New emphasis on accommodating disabilities beyond wheelchair use

- Extensive use of scoping criteria to insure full accessibility

A117.1 (1986)

- 1986 edition published with initial effort to remove scoping criteria
- minimal changes to technical criteria

CABO/ANSI A117.1 (1992)

- CABO assumes Secretariat in 1987 to develop standards more compatible with building code format and language
- Some additional technical changes made
- New edition published in 1992, referenced in all three model codes

CABO/ANSI A117.1 (Current Revision)

- First major revision of technical criteria and format since 1980
- 1994: A117 Committee initiates update with call for proposed changes
 - Harmonize with ADAAG
 - Incorporate FHAG
- 6/95 and 7/95: Committee meets to consider
 - More than 200 proposed changes
 - Task Force Recommendations
 - ATM's
 - Residential
 - Signage
 - Plumbing
- 8/95: Public Review Draft published, call for comments
- 2/96 and 3/96: Committee meets to resolve more than 500 public comments, Interim Draft published
- 5/96: A117 Committee and ADAAG review Advisory Committee begin harmonization
- 10/96: A117 Committee ballots Interim Draft with Harmonization recommendation, meets to resolve negative ballots
- 11/96: Second Public Review Draft published
 - Call for comments
 - Balloted by committee

- 5/97: Committee meets to resolve more than 200 items
- 6/97: Revised Second Draft published with nine substantive changes to Second Public Review Draft
 - 30-day ANSI public review through 7/20/97
 - Committee ballot through 8/1/97
- 6/97: Reformatting of standard begins
 - Consistent with final ADAAG report
- 10/97: Final committee meeting
 - Final attempt to resolve negative ballots
 - Resolved public comments on all but one substantive items
 - Reviewed reformatted document
- 10/97: One remaining substantive change sent out for public review and balloting

The CABO/ANSI A117.1 Standard is developed through a process that is consistent with procedures developed by ANSI for all voluntary standards. It is a democratic and open process. The Standard has a history of over 35 years. The latest revision is the most comprehensive since the 1980 version. Although anyone can propose a revision to the standard, the Committee ultimately votes on all proposals and only those that are approved are accepted. The process of updating and revising the standard during this cycle has been intensive and thorough. There were two formal Committee ballots and two limited ballots. Three complete public drafts were disseminated widely. There were actually four complete drafts written. In total, there were 21 days of formal Committee hearings at which more than 1000 proposed revisions were addressed.

Commentary: Although the ANSI process used in the formulation of the revisions is open and democratic, having one's voice heard requires commitment to make proposals in writing. Proposals must be supported with a good rationale, preferably research and, if not, a well reasoned argument with examples. Presence at a meeting to make the case for a change is very important to convince the Committee of the value of an argument. Since the time and money involved to be an effective participant is not insignificant, active representation on the Committee is very

useful for any interest group. The nature of many changes during this revision cycle can be directly attributed to the presence of some new members on the Committee and also to active in-person presentations by specific interest groups not on the Committee itself. Some viewpoints, while officially represented by organizations on the Committee, are not well promoted due to the fact that the individuals or their organizations are not as knowledgeable about the issues, as active and as aggressive as others. Some organizations have designated staff who is responsible for keeping abreast of all developments in the field of accessibility on a full time basis. These organizations tend to be the leaders in promoting changes and are very successful in getting their perspective incorporated in the document. Thus, participation and commitment is the name of the game, as it is in any democratic process.

Circulation

Many changes were made to familiar criteria in the Standard. In most cases, these changes were made to improve usability and to clarify the intent of the requirements. Because many of the circulation requirements were originally communicated by illustration, much of the revision focused on converting the information in the illustrations to text. The “T-Turn” requirements are one example. Another set of revisions was designed to overcome problems with accessibility found in the field. Good examples are the problem of parked vehicles obscuring signs for designated reserved spaces, inclusion of bus stop parking pads and the need for more specificity on the mounting of handrails. As indicated above, developing consistency using the “building block” approach also was an important goal in revising criteria. The toe and knee space revisions are an example of that. In response to the metal door manufacturing industry, adjustments were made in the requirements for door surfaces in order to provide a push surface for wheelchair users and not overly restrict use of different types of doors.

The outline below summarizes the changes in the Standard made that influence the design of site and building circulation systems:

“T” Turn

- Can include knee and toe clearance but only at the end of either the base or one arm.
- Each arm of the T must be clear of obstructions for 12” minimum
- The base must be clear of obstructions for 24” minimum

Toe Clearance

- Toe clearance separated from knee clearance
 - Allows knee clearance to be different depth than toe clearance
- Toe clearance
 - 30” wide (coordinated with knee clearance)
 - 9” high
 - Extends from edge of fixture to 17” min. - 25” max.
 - Space beyond 25” is allowed but not counted

Handrail Mounting

- Brackets or balusters or balusters attached to the bottom surface not considered obstructions if:
 - Not more than 20 percent of the handrail length is obstructed
 - 2 1/2” minimum clear space from bottom of handrail to horizontal projections
 - Edges have a 1/8” min. radius

Handrail - General

- Handrails not considered “protruding objects”
- Aisle stairs and aisle ramps can have only one handrail either at the side or in the middle
- Handrails in aisles serving seating don’t have to be continuous
- Handrail extensions are not required for handrails in aisles serving seating

Parking and Loading Zones

- Access aisles and loading zones must be marked to discourage parking in them
- Accessible parking signs shall be mounted with the lower edge of the sign 60" minimum above grade level

Bus Stop Pads

- Required when lifts will be used to load/unload
- 96" long
- 60" wide
- Connected to street, sidewalks or pedestrian paths by an accessible route

Ramp Landings

- Overlap of door clearance and landing area specifically allowed

Edge Protection

- Exceptions for edge protection:
 - Ramps where handrails are not required
 - Ramp landings serving an adjoining ramp run or stairway
 - Ramp landings having a vertical drop-off of
 - 1/2" maximum within 10" of the minimum landing area
- Below 4 in. guards, barriers and curbs cannot have openings that allow passage of a 4 in. diameter sphere

Doors - Swing

- Doors can swing into required turning space as long as maneuvering clearances are met

Doors - Maneuvering Clearances

- 4" projections into clear width permitted above 34"
- Table added to clarify figures and text deleted

Doorways without Doors

- Only applies to doorways with clear width less than 36" wide
- Front approach: 48" min. perpendicular to door/width of door
- Side approach: 42" min. perpendicular to door/width of door

Door Hardware

- Mounted between 34" and 48"
- Exception for locks used only for security purposes

Door Surface

- Smooth surface requirement reduced to 10"
- Clarification on joints - 1/16 offset max. allowed in adjoining planes
- Several exceptions:
 - Sliding doors
 - Tempered glass doors with beveled edge on top of bottom rail
 - Doors that don't extend to within 10 in. of floor

Automated Doors

- Separated out from manual doors
- Automated gates included
- Automated revolving doors now allowed
- Only power assisted doors required to comply with manual door clearances
- Specific cross references for:
 - Doors in series
 - Thresholds
 - Control switches
 - Labels and warnings

Dwelling Units

- Exceptions for closets and other small spaces
- Exception for attics and unfinished basements
- 3/4 in. high thresholds allowed at exterior sliding doors

Reach Requirements

One of the most significant changes in the new Standard is the elimination of the 54-in. maximum unobstructed side reach option. A new member of the committee, the National Association of Little People of America, spearheaded this change. Their rationale is presented below. Interestingly, their cause was supported by the National Institute of Tall People who also have an interest in making the Standard more responsive to the needs of people at the extremes of stature. Some exceptions were made to make the change more feasible, in particular, the exceptions for elevator control panels and freezer compartments. Perhaps the most important exception is the one for existing elements. This exception means that light switches and other controls do not have to be relocated when renovations to a space are made.

Commentary: The result of this change is more simplicity – one single unobstructed reach height – and a definite move toward universal design. There was surprisingly very little industry opposition to this change. The vending machine industry argued against it at first, but, when they learned that the ADA and building codes do not cover design of equipment, they did not keep up their opposition. The ATM industry, on the other hand, argued that the change would seriously affect the design of ATMs since they are permanently installed in buildings and the safes for holding money are located under the machines thereby restricting how low the total height of the machines can be. They were not successful in obtaining an exemption from the 48-in. requirement due to lack of research to demonstrate that this would be a hardship and the realization that use of ATMs is increasingly important in contemporary commerce. Many on the Committee expect problems with this change and the need for other exceptions will emerge when the Standard hits the streets. The uncertainty about the impact made this change controversial but, in the end, the Committee felt that the rationale was compelling and that those

industries that are affected have an obligation to make their case.

Unobstructed Side Reach

- Changed to 48 in. maximum

Rationale for Reach Requirement Change

- 30,000 people with dwarfism
- Mean vertical reach ability is 54 in.
- 48 in. accommodates 79% of adult population with dwarfism
- No economic impact in new construction
- Will benefit everyone
- Some exceptions clearly needed

Exceptions to the 48 in. Reach Range Rule

- Elevator controls in elevators serving >16 openings
- Freezer compartments in refrigerators
- Existing elements

Plumbing

The requirements related to plumbing were extensively revised. The changes primarily are focused on improving consistency with other requirements related to reach and clear floor space in the standard and conforming to general industry practices. Some additional changes were made to increase accessibility where there is no impact on cost or on other groups of building users. Many revisions were completed as part of the harmonization process and thus reflect concerns related to the ADA. Finally, some changes were added to increase flexibility in design and selection of fixtures and accessories, for example, the alternative shower stall requirements and the shape of the shower seat in a transfer style shower.

Water Closets and Compartments

- Term “stall” no longer used - changed to “compartment”
- Height of coat hooks made consistent with other reach requirements
- Self closing doors now required, not optional
- Toe clearances under partitions not required at front when stalls are >62 in. deep or at side when stalls are >66 in. wide
- Toilet paper dispensers shall be installed 7 in. minimum and 9 in. maximum in front of the water closet
- Change in distance from WC centerline to wall – 16 in. minimum allowed

Urinals

- “Extended” urinals not required to facilitate water conservation

Lavatories

- Exception for dip in overflow in calculating clearances

Tubs

- Lavatory allowed at foot of tub only
- Slight change in grab bars
- Exception included for reach distance to drain stoppers (new technology is available that can avoid the need to reach below flood level- cable operated systems)
- Minimum height of bathtub deleted since it was based on the transfer seat height but, if followed, makes tub heights less accessible.

Showers

- Alternate type of compartment now allowed - 36 in. x 60 in. with a 36 in. wide entry at one end
- Grab bars
 - Spacing in relationship to controls improved
 - Controls now clarified to be above grab bars
- Seats
 - Shape requirements more flexible - rectangle allowed
 - Space for cleaning water off seat required
- Length of hand held spray changed from 60 in. to 59 in. to be consistent with available equipment
- Thermal shock protection required
- Mirror height adjusted

Laundry Equipment

- New section
- Clear floor space for parallel approach required in front of machines
- Operable parts within reach limits
- Maximum height of doors set at 34 in. for top loading machines
- Maximum height of openings in front loading machines set at 15 in.

The industry has identified the following unresolved issues:

- Some local codes don't allow stall urinals even though they are the most accessible of all types of urinals.
- The 34-in. high requirement for lavatories is not compatible with conventional cabinetry.
- The 36" x 36" shower requirements are based on interior dimensions yet many manufacturers still use 36" x 36" rough-in dimensions; this creates problems when specifying fixtures and checking compliance
- Removal of the required rear mounted grab bar at toilets which many experts believe is not necessary, restrict use of tank type toilets and can be difficult to install where plumbing stacks are in the rear wall.

Although many improvements were made, there still are some outstanding issues that need to be addressed. In general, the focus of the changes was on accessibility for the wheelchair users and conformance to standard practices. They did not move the Standard in the direction of universal design or to support innovation in the plumbing industry.

Commentary: Some outstanding issues that are known to be problematical for access or for the industry that were not resolved:

- *Pivoting grab bars were not accepted as the sole bar at a toilet and no mention was made that it is considered acceptable if added in addition to the wall mounted bar*
- *Flexibility to provide fixtures that would benefit older people with disabilities or people who need attendant care but not necessarily those who use wheelchairs*

independently, e.g. side opening tubs.

Residential

Three major objectives drove the revision of the residential requirements:

- Provide consistency in technical criteria, wherever appropriate, with those for public buildings
- Introduce criteria for dwelling units designed for people with hearing impairments
- Introduce alternative criteria for design of housing to be in compliance with the Fair Housing Accessibility Guidelines

The most important change was the development of three types of ‘accessible’ dwelling units. The first (Type A) provides a dwelling unit similar to one based on the criteria in the 1992 version of CABO/ANSI A117.1. The second (Type B) provides units identical to those required by the Fair Housing Accessibility Guidelines (FHAG). Type B units have a lower level of accessibility than Type A units. The third (Dwelling Units with Accessible Communications Features) is designed to provide the features necessary for people with hearing impairments to use dwelling units effectively. The separate criteria allow administrative authorities to “scope” each type separately. For example, the Fair Housing law requires all multifamily housing in buildings with more than 3 units to meet the FHAG. Every unit in elevator equipped buildings and, in general, all ground floor units in walk-ups have to be designed to meet the requirements. But, states that have adopted CABO/ANSI A117.1 require a higher level of access in covered dwellings than FHAG. In some cases, the states “scope” CABO/ANSI A117.1 for only a small percentage of units, even in elevator equipped structures. Thus, depending on the jurisdiction, designers may have to comply with two different sets of requirements. FHAG does allow compliance with CABO/ANSI A117.1 as de facto compliance with the FHAG, but, if more FHAG units are required, owners may opt to have two types of accessible units in a project. The Accessible Communications package is not required at all by the FHAG but might be required by a specific jurisdiction. Keeping these requirements separate allows jurisdictions to “scope” the communications package separately. It also allows these units to be different than the wheelchair accessible units since people with hearing impairments generally do not need wheelchair access.

To summarize, the three different types of dwelling units are as follows:

Type A Dwelling Units

- “Fully” Accessible option
- Adaptable
- Basically the CABO/ANSI A117.1 (1992) requirements

Type B Dwelling Units

- Limited accessibility
- Consistent with Fair Housing Act Requirements

Dwelling Units with Accessible Communication Features

- Separated from Type A to allow separate scoping
- Provides built-in capability to adapt to tenant needs

The chart below provides an itemized comparison between the Type A and the Type B criteria

Element	Type A Unit	Type B Unit
Primary entrance	Consistent	Consistent
Accessible route within unit	Wheelchair turning spaces	Exempts one raised or sunken area
	"Tiny" balconies exempt	
Doors	32" clear width	Allows 2'-10" door
	Allows 1/4" threshold for sliding doors	No maneuvering clearance, hardware, or forces for interior doors
Ramps	Consistent	Consistent
Elevators	Consistent - New "private residence"	

	elevator	
Lifts	Consistent	Consistent
Operating controls	48" maximum height	No appliances
	Exceptions	No 5 lb. force "one handed" operation
Laundry Equipment	Clear floor space	Clear floor space
	Controls	
Toilet and Bath fixtures	3 options for clear floor space	WC Grab bar reinforcement
	Allowable "adaptable" features knee space under lavatory, grab bars, tub/shower seat	Option A: Each fixture provided
		Option B: Single "super" bath
Kitchens	Appliance controls	Clearances
	Knee/toe clearance	Clear floor space
Windows	Covered if operable	Not addressed

Dwelling with Accessible Communication Features includes the following design features.

- Alarms
 - Smoke detectors as per NFPA 72 - audible only required
 - Building fire alarm connection
 - Capability to add single set of visible appliances
 - Visible notification appliances (visual alarms) where

- provided, compliance with NFPA 72
- Activated upon smoke detection
- Interconnection with building alarm allowed
- Not used for other purposes
- Unit Entry Communications
- Building Entry Communications

Commentary: The changes to the residential section provide more flexibility for administrative authority and do bring all the technical criteria needed by a designer together but they also present some potential problems. Some members of the Committee were concerned that the inclusion of the Type B option might lower the level of accessibility mandated by administrative authorities. The theory being that, if given a choice, authorities would opt for the lower level of access under pressure from industry groups. They would find it hard to justify the Type A provisions if Type B was considered part of the consensus standard on accessibility. Many Committee members opposed the inclusion of Type B units entirely on these grounds. Another concern was that including two different sets of criteria for accessible dwelling units would create confusion as to which one should be used for any particular project or unit. One proposal floated during the deliberations was to develop a second standard that would be called “ANSI A117.2” that would specifically address the FHAG and keep compliance with the Fair Housing law separate to avoid confusion. However, that was perceived as too drastic an action and might not have solved the problem in any event. In the end, to address these concerns, the Committee opted for including a statement in the Standard under “Purpose” to clarify that Type B units are intended to be consistent with the intent of the technical requirements of the FHAG, and, they are intended to supplement, not replace the Type A dwelling units.

Signs

The changes to the technical criteria for signs and warnings were perhaps the most extensive of all the changes made to the Standard. In the last version of the Standard, the “signage” section was less than a page long. The final revised section, now called “signs”, is about three times longer. A major reason for the increased emphasis was more active involvement of advocates for people with visual impairments and the increased involvement of graphic design professionals on the CABO/ANSI A117 Committee. One of the main goals of the revision was to provide a clear distinction between the requirements for different purposes. In the previous version, there was a lot of ambiguity and confusion about how the criteria were to be applied because the applications for tactile, visual and combined uses were not clear. The requirements for pictograms and symbols were also not clear. More specificity regarding Braille was included to make sure that the Braille used in signs would be easy to read, located properly with respect to the features the signs describe and produced in accordance with conventions typically used in Braille text. Finally, improvements in the criteria were made to reduce the production cost of tactile signs by bringing the technical requirements into line with manufacturing constraints. The new section is organized into six subsections with parallel requirements in each so that it is clear what criteria apply to each type of sign. The six sections are:

- Combined visual and tactile characters
- Tactile characters (only)
- Visual characters (only)
- Braille
- Pictograms
- Symbols of Accessibility

The actual technical requirements are summarized below. All the requirements are included, not just the changes, due to the detailed nature of the criteria and the extensive revisions.

Combined Visual and Tactile Characters

- All characters required to be tactile must comply with

these criteria

- exception for signs where duplicate information is provided in both visual characters and tactile characters.
- Character Forms
 - All uppercase
 - San serif styles, not italic, oblique, script or highly decorative
 - Width 55%-110% of height (based on the letters O&I)
 - 5/8” - 2” high characters (based on I)
 - Stroke thickness (based on I)
 - 10% - 30% of height at base
 - 15% of height max at top
- Depth: 1/32” min
- Non-Glare Finish & High Contrast
- Spacing
 - 1/8 in. min. – 3/8 in. max. in general
 - more detailed spacing criteria based on shape of the character
- Mounting height
 - 48 in. and 60 in. above floor or ground surface
 - measured to base of character
- Mounting Location
 - at latch side of door
 - right side of double doors
 - nearest adjacent wall where there is no wall space
- Clear floor area of 18 x 18 inches in front of sign beyond arc of any door
 - an exception is made for the push side of doors with closers or hold open devices

Tactile Characters

- These criteria are for tactile characters on signs that duplicate visual and tactile characters
- Character Forms
 - All Uppercase
 - San serif styles, not italic, oblique, script or highly decorative
 - Width 55%-110% of height (based on O&I)
 - 1/2” - 3/4” High Characters (based on I)
 - Stroke Thickness 15% of height max. (based on I)

- Spacing
 - 1/8 in. min. – 1/4 in. max. in general
 - more detailed spacing criteria based on shape of the character
- Depth: 1/32” min
- Mounting height
 - - 48 in. and 60 in. above floor or ground surface
 - - measured to base of character
- Mounting Location
 - at latch side of door
 - right side of double doors
 - nearest adjacent wall where there is no wall space
- Clear floor area of 18 x 18 inches in front of sign beyond arc of any door
 - an exception is made for the push side of doors with closers or hold open devices

Visual Characters

- Character Forms
 - Upper & Lower Case allowed
 - Conventional Styles but not italic, oblique, script or highly decorative
 - Width 55%-110% of height (based on O&I)
 - Height of character based on mounting height and viewing distance (table provided)
 - 10% - 30% of height max. Stroke Thickness (based on I)
 - Non-Glare Finish & High Contrast
- Character Spacing 10% - 35 % of height
- Line Spacing 135% - 170% of height
- Mounting Height
 - 40” min.
 - Actual height based on character height and viewing distance (table provided)

Braille

- Located Below Text
- Spacing
 - 3/8” away from other tactile characters
 - Except Elevators 3/16”

- 40” - 60” above the floor
- Grade II, Literary Braille
- Domed or Rounded shape
- Detailed dimensional criteria provided for dot size and spacing
- Use of uppercase designation specified in detail

Pictograms

- 6” minimum field
- Non-glare finish and high contrast
- No characters or Braille in field
- Required text - visual & below or adjacent

Accessibility Symbols

- Non-glare finish and high contrast
- Defined types
 - Accessibility
 - Text telephone
 - Volume controlled telephone
 - Assistive listening systems

Commentary: The revised criteria on signs focus both on improving readability for the consumer and usability by the designer. At first, they may seem a bit overwhelming to designers because of their complicated wording and great detail. However, the separation of criteria into different types of signs provides much greater flexibility than the previous version. In fact, one unique application of tactile signage, at the Lighthouse in New York City, demonstrated that the optimal proportions of tactile signs are very different than those for visual signs. The result is that, in order to be easily readable with vision, combined tactile and visual signs must always be a poor compromise for tactile use. Tactile signs are more easily readable if they have thin stroke widths, and, the best mounting location for tactile signs, low and within easy reach, is not usually the best mounting location for visibility. Moreover, the best orientation of tactile signs is on an angle, like an inclined shelf, rather

than flat against the wall so that the user does not have to flex his or her wrist while reading the characters. It is hoped that the separation of criteria may spark the development of more tactile sign applications. The Standard gives some incentive for this by allowing more freedom in the design of signs that are visual only.

On the other hand, the high level of detail in the criteria requires intense scrutiny and evaluation of any sign that must comply with accessibility criteria. It is questionable whether such detail is actually enforceable in the field without some certification or labeling system like on fire rated building products. Moreover, the potential of unintended code infractions due to minute dimensional discrepancies such as the spacing of letters or lines of the height of a dot is very high. Although the Committee spent a great deal of time reviewing and revising these proposals, other than for the Braille requirements, they are not based on scientific research studies. In fact, even the visual sign criteria do not reflect the extensive existing research on readability of visual text.

Tactile Warnings

Throughout the history of accessibility standards, tactile warnings for people with visual impairments have been a controversial issue. The previous version of the Standard had only minimal criteria on this built element. Only a short paragraph requiring standardization within any building, facility or site was required. Sparked by the desire to harmonize with the ADAAG, the new version of the Standard includes additional criteria. Tactile warnings are now specifically required on platform edges.

The criteria include three optional solutions:

- Truncated domes
 - detailed dimensional requirements included
 - color contrast with adjacent materials

- at interior applications, differences in resiliency required
- An equivalent tactile surface that also has color contrast
- Another equivalent method that will reliably convey a warning about the platform edge to people with visual impairments

These options provide a great deal of flexibility and may result in the development of new technologies and solutions to this serious problem. Limiting the application to platform edges focuses on the location where there can be no doubt about the usefulness of the warning.

Commentary: Despite the welcome flexibility provided, the Standard does not provide any guidance on how to evaluate when equivalent conditions have been met. Perhaps the only way to prove equivalency is to compare use of any proposed solution to use of the tactile domes. This would be fine if it was possible to easily make a comparison. However, without the participation of a reasonable sample size of people with visual impairments and a valid testing methodology, any claims for equivalence would always be questionable. The expense of such research may deter the use of any other solutions. Simple physical performance criteria would be preferable but the current state of research does not provide the needed data to develop such criteria, particularly since alternative technologies may use entirely different sense modalities than tactile warnings.

Automated Teller Machines

Accessibility of automated teller machines has been a problem since these devices became a ubiquitous feature in the environment. The ATM is a rapidly evolving built element. Not only are they found in traditional bank settings but now they are also found in workplaces, transportation terminals and even convenience stores. They are maturing into multi-function transaction processing machines that can be used to do many

activities besides banking. Moreover, there are ‘sister’ machines like fare machines and fee card dispensers that essentially have the same functions. The ATM has become so common in banking that banks are now charging more for in-person transactions than ATM transactions. The availability of 24-hour access has made these machines extremely popular. Access for everyone is now a very important concern since barriers can be viewed as a form of discrimination that has a clear cost and convenience impact associated with it. Access by those with mobility and stature limitations is an important concern. But, in addition, people with impairments to sight need to have access to the controls and information.

These are the key accessibility issues were addressed in the revised standards:

- Privacy in use by those who need verbal instructions
- Size of data entry keys
- Key pad layouts
 - Functions available and identification of function keys
- Voice response – types of systems and performance
 - Types of information provided on transactions made
 - Visibility of screens
- Height and reach requirements

In the last version of the Standard, the ATM section was two paragraphs long. The revised section is much longer. It includes the following criteria:

- Clear floor space
 - as in the Building Block section
 - an exception is provided for drive-up units
- Operable parts
 - as in the Building Block section
 - an exception is provided for drive-up units
- Input
 - privacy required for all
 - size of key surface
 - separation between keys
 - arrangement of numeric keys
 - tactile marking of center key
 - organization of function keys

- tactile marking of function keys
- color coding of function keys
- Output
 - privacy required for all
 - visual and audible operating instructions
 - instructions required for initiation of a transaction, expedited processes, orientation - - and assistance, transaction prompts, input verification
 - options allowable for conveying audible instructions
 - video display screen visibility
 - video display character design
 - order of bill dispensing
 - acceptable options for receipts and verifications

Unresolved Issues

The industry that produces ATMs feels that the lowering of the maximum side reach height from 54 in. to 48 in. will result in some serious problems in implementation. Their main concern is that there will be technical problems meeting this requirement since the vault that holds the money in ATMs is located at the bottom of the unit. Others are concerned about the feasibility and safety of providing audible information. Although there are several possible options, including an audio mini jack for personal headsets, keeping information up to date and hearing the instructions in noisy places could be a problem.

Commentary: The new requirements for audible information, receipts and verification are being introduced with little or no previous practical experience and no research at all. This may prove to be a serious problem when introduced in all new ATMs. The Committee also did not address the future evolution of ATMs and sister machines. Touch screen technologies are now being introduced that provide some significant options for input and output modes. For example, the use of a “sonic landscape” on a touch screen can help individuals with sight impairments understand the functions of machines without standardizing input keys. By swiping a standard part of the screen with a finger, a non-

visual mode can be activated in which verbal descriptions of any touch areas can be obtained by touching the desired areas. The use of the entire screen for a touch surface increases the size of the input area and cascading screens can be used to provide highly complex functions. Each screen view can be tailored to the requirements of the information desired and even the individual user. It is likely that such machines will eventually provide WorldWide Web access so that the Web site itself will actually become the interaction ground. It is unlikely that the new requirements will be compatible with such technologies and they may hamper their development. In fact, there is some question about whether ATMs actually come under the definition of built elements or whether, like vending machines, they are classified as equipment under laws like the ADA. These devices are usually built in to the structure of a building like a drinking fountain or telephone, however, like a vending machine, they may not be owned by the owner of the building. In any event, the ADA and other disability rights legislation will certainly cover program access to these machines where applicable and there is probably a strong case for arguing that they are a “public accommodation.”

Alarms

Revisions in the Alarms section focused primarily on bringing the requirements in line with the ANSI S3.41 Standard for audible alarm systems and harmonization with the ADAAG. Extensive revisions were made to the section on visual alarms to reflect new ideas in this area. As with the sign section, many of the requirements are very detailed.

The changes for audible alarms include:

- A duration of 60 seconds exceeding maximum sound levels.
- A “three pulse” temporal pattern complying with ANSI S3.41
- Exception for compliance with health care practices

The changes for visual alarms include:

- Reorganization to focus on room type rather than “mode”
- Light Pulse characteristics
 - flash rate 1 Hz minimum to 2 Hz maximum
 - defining the pulse duration
 - maximum pulse duration - 0.2 sec. with a maximum duty cycle of 40 percent
 - wall mounted and ceiling mounted light dispersion
 - new tables added
- Ceiling mounted alarms must be suspended 30 ft. maximum above floor where ceiling height exceeds 30 ft.
- Extensive requirements for rooms that require multiple alarms to provide total coverage
 - synchronization of signals
 - adjustment of intensities
 - differences between ceiling and wall mounting
- Range for corridor spacing: 50 ft. minimum - 100 ft. maximum
- Existing tables for spacing extended and revised
- Sleeping rooms or suites:
 - monitored signaling line or channel required when connected to a building alarm system
 - combination smoke and fire alarm system activation allowed
 - maximum distance from head of bed location of 16 ft.
 - portable systems not allowed
 - higher intensity lights sources required where ceiling mounted or high wall mounted devices are used

The changes in the requirements are designed to insure that audible alarms are designed in accordance with consensus standards for fire safety. The visual alarm criteria likewise reflect current thinking in this field. The revisions also address details of connection with contemporary fire alarm systems. Finally, the option of portable systems was deleted based on field reports by people with hearing impairments that facility staff generally do not notify people of the availability of such systems and often do not know that they are available, where they are or how to use them.

Commentary: For visual alarms, the emphasis has been on developing criteria that insure full coverage in a room or space. To accomplish this, detailed requirements are necessary to account for all possible conditions. This implies that full coverage is equated to satisfactory performance and that the intensity specified is effective in attracting attention. The requirements may not be effective in practice, especially in waking an individual from a sound sleep, with any degree of reliability. There has been little research on actual performance of these systems in emergency or simulated emergency conditions. In fact, only one research study on effectiveness was presented to the Committee. That study demonstrated that visual alarms with even higher intensity than those required did not wake up individuals while in a sound sleep cycle. However, that study was flawed in that only hearing subjects were used. The assumption is also made that visual alarms are needed everywhere since a person with hearing impairments could be alone any place in a building but there is no research to demonstrate that this is true and that less than full coverage is not adequate. For example, even though a uniform level of light does not reach every space in a building, reflections off surfaces and bright spots in the visual field may be sufficient to attract attention.

Telephones

Some minor technical changes were made in the telephone section. The TDD term has been replaced with TTY. The range of volume enhancement for volume controlled telephones was changed from an upper limit of 18 dBA to 20 dBA. Auto reset for volume control is now required.

Elevators and Lifts

Many technical changes were made in the Elevator and Lift Section, some of which have significant implications. In general, the changes addressed new technology in the industry, elevators that are used infrequently and primarily for access purposes and improving accessibility in small elevators and lifts. The changes are summarized below:

- New Elevators
 - Call Buttons are to be located between 35” and 48”
 - Raised star required on both jambs of the main entry level entrance
 - Audible signals. -10 dba min. above ambient but not over 80 dba
 - – Inside dimensions of elevator cars now specified in a table based on door location
 - New table added for button designations
 - Heights for buttons with floor designations - 48” max.
 - A new section added on destination oriented elevators

- A new section on Limited Use Limited Access (LULA) Elevators
 - Must power both the car doors and the hoistway doors
 - Inside dimensions of Elevator cars - 42”x54” min.
 - Exception for existing buildings: 36”x54” minimum but at least 15 sq.ft in area
 - Door must be located on narrow end

- Existing Elevators
 - Car gates are prohibited
 - Power car doors are required

- Wheelchair (Platform) Lifts
 - Powered gates required unless there are two gates on opposite sides
 - 20 sec. hold open on gates
 - Side doors required to be 42 in. clear although end doors can be 32 in. clear
 - Unassisted entry and exit required

The destination oriented elevator is a new computerized system of elevator dispatching that changes the entire approach to hall and car controls and information about the status of the system. With such systems, the elevator lobby has a keypad on which the user designates the floor he or she wishes to reach. A display notifies the user which elevator will pick him or her up. The car has no controls; once on board, the user cannot do anything but wait until the car stops. Emergency controls are provided however. These systems are more efficient and can reduce the number of elevators required in a tall building.

The addition of the LULA requirements provides an option for a smaller elevator that will only be used for accessibility. These elevators only have to be as large as needed to carry a wheelchair and caregiver; turning around in the car is not required.

The changes to the existing elevator and lift requirements add provisions that in the field have come up as problems in independent use. The requirements for power doors and gates, however, will significantly increase the cost of these devices.

Harmonization With ADAAG

The CABO/ANSI A117.1 Standard is used as the basis for the technical criteria in the ADA Architectural Accessibility Guidelines (ADAAG). The U.S. Access Board, the agency responsible for promulgating the ADAAG and the U. S. Dept. of Justice, the lead agency responsible for enforcing the ADA, however, are not bound to accept any of the provisions of the Standard. The ADAAG is also currently under review and revi-

sion. It is expected that the process will take at least one more year. In the interests of uniformity, however, the U.S. Access Board and the CABO/ANSI A117.1 Committee convened a “Harmonization” Committee to resolve differences between the two documents as they were under development. Thus, we have included a section in this report describing that work. The outline below summarizes the state of that effort and what remains to be done in the ADAAG revision process.

U.S. Access Board Responsibilities

- Architectural Barriers Act (ABA)
- ADA Accessibility Guidelines (ADAAG)
- Accessibility to Telecommunications

Process of ADAAG Review - Advisory Committee

- This phase has been completed
- Public comment process during the past year of differed from rule making process
- Federal Advisory Committee created - had open meetings
- Board created a well balanced Committee
- Lots of participation encouraged, including people with disabilities
- Sub Committee examined coordination between CABO/ANSI and proposed changes to ADAAG

Rule Making Process

- This phase has not yet been completed
- A Notice of Proposed Rule Making (NPRM) on the ADAAG will be issued in Federal Register
- Copies of proposed rules will be distributed free with a 60-day turn around for comments
- To have an impact, comments must be well thought out and well written with concrete proposals for changes
- Final rule must be responsive to public comments
- Substance of Board review and deliberation not public

Unique Problems of Statutory Requirements

- Need to harmonize between Architectural Barriers Act (ABA) and the ADAAG - more than one responsibility
- 2 Federal agencies need to make ADAAG law - Department of Justice and Department of Transportation
- Civil rights intent of ADA

Result

- Harmonize with model codes and standards
- But the Access Board members have their own will
- Won't be complete harmonization
- Hope is that differences can be summarized on a single sheet of paper

Review of ADAAG Review Comments

- Staff reviews each comment & provides analysis for staff
- Preamble published in the Federal Register with comment/response format
- Comments have to have concrete recommendations, specify suggestions

At the SIF, Marcia Mazz, the representative of the Access Board gave a message to the attendees who were mostly architects. She pointed out that the profession of architecture has not participated in the review process to the degree that it deserves. Architects should learn more about the process and submit comments based upon their experience in practical applications. Suggestions will not be considered, however, unless they include a concrete proposal for a change backed up by a strong argument and rationale.

One participant in the SIF asked what could be done about items that are not in the proposed ADAAG, e.g. hard metric compatibility? Ms. Mazz responded that such comments couldn't be considered at this time because the scope of the review must be bounded by the original public notice. However, new issues like this can be considered in the next round of public review prior to rule making.

The ongoing process of review and revision of the ADAAG may result in differences between the ADAAG and the CABO/ANSI A117.1 Standard. However, everyone hopes that the differences will be minimal. Extensive review comments from the public reinforcing the desirability of consistency would, of course, be advantageous to advance the cause of harmonization.

Conclusion

The revision of CABO/ANSI A117.1 has involved a lengthy and arduous process of review and it is now coming to a close. At the last meeting of the Committee this fall, only one substantive change but minor change was made and that was sent out for simultaneous ballot and public review. The Committee has already voted approval. We can therefore expect the final document to hit the streets sometime in the spring. It is hoped

that as the ADAAG review process continues the technical criteria in the ADAAG will remain consistent with the CABO/ANSI A117.1 criteria.

The major changes made to the Standard can be summarized as follows:

- Reach Ranges
 - 48” maximum unobstructed high side reach
- Major rewrites
 - Alarms
 - ATM’s
 - Signs
 - Elevators and lifts
- Tactile warning signals
 - Truncated domes at loading platforms
 - Equivalent methods allowed
- Residential
 - Three optional sets of requirements
 - Original requirements called Type A units
 - Addition of Fair Housing requirements as Type B units
 - Addition of unit type equipped with accessible communications
 - Type B is intended to supplement, not replace, Type A units
- New organization
- Harmonization with ADAAG at the present time

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