



# Elevator AUDIT (Version 1.01)

**Denis Anson, MS, OTR**

Manual last updated February 9, 2009



©2009 R<sub>2</sub>D<sub>2</sub> Center, UW-Milwaukee  
OK to copy and distribute but use in its entirety and do not alter

## BACKGROUND

Universal design (UD) is a process that ensures that a newly created product is useful to the broadest possible array of people, particularly those with disabilities. UD of elevators allows all students, staff and visitors to have equal access and usability.

## DIRECTIONS

This AUDIT has been tested for compatibility with Excel 2004 in Mac OS X and Excel 2003 in Windows XP and Windows Vista.

**Note:** If you are a PC user turn the "Macro security" down in Excel to "Warn", or the spreadsheets won't work. The AUDITs will run on a Mac system without needing this adjustment.

To perform an AUDIT:

- Open the Excel file: click on "enable macros".
- The AUDIT will open in "Page Break Preview" view. You may change to another view mode if you wish.
- Save your file with a new name.
- Identify the elevator for audit and clearly label it (along with your name and date) at the top of the worksheet by double clicking on "AUDIT Target", "AUDIT Date", and "Auditor" to enter data in these cells.
- (The AUDIT Target, in this case, could be "Smith Hall main bank".)
- Print a copy of both the Accessibility and Usability worksheets,  
(or, you may enter scores into the AUDIT directly on your computer).
- You may use the print features of Excel, or you may click on the buttons at the bottom of the page to print individual sheets or the entire workbook.
- Carefully observe all features of the elevator, making measurements as needed to complete the AUDIT. Remember that the AUDIT is a screening tool, not a legal document. It is intended to identify possible accessibility issues, which will

then be formally evaluated for action. When in doubt, err on the side of accessibility.

- Score the AUDIT/enter data.
- You can move from sheet-to-sheet by using the buttons across the top or by clicking on the Excel worksheet tabs at the bottom.
- Examine and interpret the graphical data.
- Write comments about the elevator, or specific issues related to the Elevator AUDIT, in the comments section.

For most AUDITs (e.g. doing an AUDIT of an architectural feature) it is easiest to print a paper copy of both the accessibility and usability worksheets. Take the paper copy to the location, score the items, and then transfer your scores to the computerized spreadsheet. Some AUDITs may be scored directly on the spreadsheet. The method you use depends on the item you are auditing and the computer you use.

The AUDITs are formatted in an Excel workbook with 3 spreadsheets. You may use arrow keys to facilitate the entering of data. Double click on the boxes where you will enter text (e.g. “Comments”, “Auditor”). The spreadsheets for both the accessibility and usability sections will tally the scores and provide a numerical score based on the degree of demonstrated accessibility or usability. Graphical data are presented on the 3<sup>rd</sup> sheet.

Trichotomous scoring (e.g. “Yes”, “Partial”, “No”) is used to rate each item in the AUDIT. The spreadsheet converts these to numerical scores.

A **“Yes”** score indicates the item is present and effective

This should not be selected if there is any doubt if the item is present.

A **“Partial”** score indicates that the item is present to some extent. If the item is only present in some cases, or is present but not in an effective way, you mark “Partial”.

A “**No**” score indicates that the specified item is not present. If a feature is present, but not readily “discoverable,” the typical user will not benefit from it. If you are not sure that an item is present, it should be marked “No.”

“**NA**” will remove the item from scoring.

The Accessibility and Usability scores compute the “demonstrated” levels of accessibility and usability. Thus, items that are not scored are considered not to have been demonstrated. If you do not score all items the final score will be lower because the spreadsheet will interpret any unscored items as zero.

## CLARIFICATION ON INDIVIDUAL ITEM SCORING

### *Accessibility Items*

**Accessibility Section 1, item 2:** There are no ashtrays (free-standing or built-in), plants, or other decorative elements adjacent to the elevator call buttons.

- ✓ Although the building structure often meets the requirements for accessibility, residents may add decorative elements such as plants, sculptures or ashtrays to an elevator lobby. A person who is standing can generally reach around such obstacles, but a person in a wheelchair may find them a significant barrier.

**Accessibility Section 2, item 3:** The highest call button (the "Up" button) is located with its centerline no higher than 48 inches and no lower than 30 inches from the floor.

- ✓ Call buttons must be within reach of riders who are standing, who have short stature, or who use wheeled mobility. If the buttons are above 48 inches, a person in a wheelchair cannot reach them. If below 30 inches, they will be difficult to reach for a standing person.

**Accessibility Section 2, item 5:** If a call button registers a call by illuminating, the lit area is brighter than ambient light (so it can be seen) and is larger than 1/2 inch in the smallest dimension (the size of a fingertip).

- ✓ If a call is registered only by illuminating the center of the call button, the signal will not be evident while the user's finger remains on the button. Providing a signal that is immediately evident aids those with cognitive limitations.

**Accessibility Section 2, item 7:** The design and placement of the call buttons allows individual button activation by body parts other than fingers (e.g. elbow or palm).

- ✓ People who have their hands encumbered may prefer to use an elbow or other body part to activate the call buttons. Service animals may use paws or nose to call the elevator. The button design and placement should facilitate a broad range of activation strategies.

**Accessibility Section 2, item 13:** When an elevator car is approaching, a visible signal is provided. The visual signal for each car is visible from in front of each other car in the bank and from the call button location.

- ✓ In an elevator lobby, a person standing in front of any elevator should be alerted to the arrival of a different car. If the signals are not visible from the rider's current location, the only signal is the opening of the doors, which often does not provide adequate time to respond.

**Accessibility Section 2, item 14:** When an elevator car is approaching, an audible signal plays once for a car moving to a higher floor, and twice for a car moving to a lower floor. The sound is generated at the location of the arriving car so that the direction of the signal can be determined by hearing.

- ✓ Many people with low or no vision rely on their ability to localize sound to detect events in the environment. If the audible alert sounds inside the elevator shaft rather than in the lobby, the sound may be heard, but will be difficult to locate. The benefit of the audible signal (early warning of which car is arriving) is then lost.

**Accessibility Section 2, item 15:** The visual and audible alerting signals provide sufficient time to enter the car before the door closes. This time is the greater of 5 seconds, or the number of feet from the call button location to the elevator door multiplied by 2/3 seconds.

- ✓ If the distance from the call button to the arriving car is less than eight feet, the warning period must be at least 5 seconds. If the distance is 15 feet (measured on the floor from directly below the call button to the center of the elevator door), the delay between the warning and the door beginning to open should be  $15 \text{ feet} * 2/3 = 10 \text{ seconds}$ .

**Accessibility Section 3, item 6:** If an object is inserted into a closing door, the door stops and re-opens without damage to the inserted object.

- ✓ When a person is trying to catch an elevator that is about to depart, it is common practice to thrust an arm, briefcase, or other object into the closing door. While the elevator may detect the object, unless the doors stop closing very quickly, or close very gently, there is a risk of injury to the individual. For safety and accessibility, the doors should have a mechanism to reverse the doors without causing damage. The physical bumper of some older elevators served this function well in many cases.

**Accessibility Section 4, item 1:** The elevator is lit to a minimum 54 lux (5 candle power). (The approximate level of lighting of a family living room.)

- ✓ The federal standard for elevator illumination (54 lux) may be too dim for many individuals with low vision. We recommend that the higher level (80 lux – lighting levels of typical bath rooms) be used in its place.
- ✓ Low cost light meters (~\$20) are available from many garden supply businesses, which will provide measurements of candle-power light output.

**Accessibility Section 5, item 3:** Floor buttons are arranged in ascending order (higher numbers above lower numbers). When the buttons are arranged in two or more columns, they are read left to right, bottom to top.

- ✓ In no case should a floor button for a low-numbered floor be positioned higher in the control panel or to the right of the button for any higher-numbered floor. When more than once column of buttons is used, the pattern used should be the same for each elevator in a bank.

**Accessibility Section 5, item 4:** Buttons are flush with the surrounding surface or raised. For concave-top buttons, the lowest portion of the concave surface is no lower than the surrounding surface.

- ✓ Concave top buttons facilitate activation using head-sticks or mouth-sticks for those with disabilities. However, the overall button must be either raised or even with the surrounding surface to be pushable by larger body parts (e.g. palms, elbows, hips).

**Accessibility Section 5, item 8:** Call buttons can be activated without requiring direct skin contact (e.g. While wearing gloves or using a mouthstick).

- ✓ Thermal or touch sensitive buttons require no force to activate, but do often require direct skin contact. Such buttons cannot be used by a person who operates the elevator with a prosthetic tool.

**Accessibility Section 5, item 13:** The elevator is provided with a visual position indicator which shows which floor the car is approaching, and which is updated as the car passes each floor. This indicator is located at least 85 inches above the floor level either over the control panel or over the elevator door. The floor designator allows the floor indicator to be read at angles of at least 70 degrees.

- ✓ The visual position indicator must be located high enough to be seen over the heads of other elevator riders, even by a person seated in a wheelchair. Some types of display are easily viewed from directly in front of the display, but not by a person standing to one side. The visual position indicator should be readable at angles (laterally and vertically) of at least 70 degrees.

**Accessibility Section 5, item 14:** Illuminated indicators provide high visual contrast with the background and do not require color vision.

- ✓ The common red LED indicators are very difficult to see for a person who is color-blind in the red spectrum. Illuminated indicators should provide broad-spectrum light to accommodate all forms of color blindness.

## ***Usability Items***

**Usability Section 1, item 1:** Each elevator car in a bank of elevators is labeled with an accessible identifier (both inside the car and in the elevator lobby) that matches the identifiers on the lobby position indicator.

- ✓ In the event of an elevator failure, it is important that a person stuck in an elevator car be able to provide responders the identification of the car in which they are stuck.
- ✓ Riders attempting to use the lobby elevator position indicators to prepare for loading must be able to associate the displayed information with the physical elevators to benefit from the information provided.

**Usability Section 1, item 3:** The car identifier label is clearly distinct from the floor indicator on the elevator jamb.

- ✓ The elevator doorjamb must include a visual and tactile sign indicating the current floor. The elevator car indicator should be clearly associated with the elevator, but be presented in a way that will not be confused with the floor indicator.

**Usability Section 1, item 4:** Lobby lighting does not shine directly on the elevator direction indicators or position indicators.

- ✓ Elevator lobbies frequently employ indirect lighting directed at the walls to illuminate the lobby. If these lights shine directly on the illuminating indicators, a person with low vision may be unable to detect when the indicator illuminates.

**Usability Section 2, item 4:** The elevator car position indicators provide relative as well as absolute position information (e.g. "5th of 25 floors" rather than just "5th floor" or uses analog indicators).

- ✓ While knowing that an elevator is currently on the fifth floor (while you are on the second floor) is useful, it does not provide an indication of whether the elevator is near the top or bottom of the building. An elevator going up in a 6-story building is much nearer returning than one going up in a 60-story building. Relative information provides an indication of current position that is easier to interpret than just the floor number.

**Usability Section 5, item 1:** The elevator control panel provides visual and tactile cues to link control buttons with their function (e.g. spacing between columns).

- ✓ In a multi-column control panel, mentally associating a button to the label on the left versus the label on the right adds complexity. This can be avoided if the buttons are linked with visual or tactile cues (columns of texture, for example) or by adding additional space between the columns.

## AUDIT SCORE SHEET

The AUDIT summary graphs display the accessibility and usability scores for both parts of the AUDIT. The graphs help determine the perceived levels of accessibility and usability for the item under review based on the percentage of possible points. Behind the scenes a score of "Y" = 2 points, a score of "P" = 1 point and a score of "N" = 0 points. A score of "NA" removes the item from consideration, reducing the total number of possible points for the section of the AUDIT.

**Accessibility interpretation:** A one hundred percent score suggests full, basic access to people with disabilities. Any "no" or "partial" scores indicate that some people with disabilities will not be able to use the AUDIT target. They flag major problems.

**Usability interpretation:** The usability scores illustrate the "friendliness" of the AUDIT target. This usability affects all users, including people without disabilities, but difficulties are often amplified for people with disabilities. The higher the "yes" and "somewhat" scores, the more usable the AUDIT target is for everyone. "No" responses signify less access for everybody.

The score sheet "**comments**" section is provided for your notes and/or recommendations.

The ACCESS-ed Project considers all AUDITs to be live/working documents. Please share any comments, feedback or suggestions that you may have through the "Contact Us" feature of our website.

R<sub>2</sub>D<sub>2</sub> Center, Enderis 135  
University of Wisconsin-Milwaukee  
PO Box 413  
Milwaukee, WI 53201-0413  
voice (414) 229-6803  
fax (414) 229-6843  
TTY (414) 229-5628

Email: [access-ed@uwm.edu](mailto:access-ed@uwm.edu)  
[www.access-ed.r2d2.uwm.edu](http://www.access-ed.r2d2.uwm.edu)

The ACCESS-ed project is supported in part by the U.S. Department of Education's Office of Post-secondary Education, PR/Award #P333A050090. The opinions contained in this publication are those of the grantee and do not necessarily reflect those of the U.S. Department of Education