Figure 1

Trends and Issues in Platform Lifts

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Introduction

In this paper, the guidelines presented indicated that we should review the currently available short-range vertical transportation and elevation change technology for manual and powered wheelchairs, electric "scooters" and hybrids; we shall generically refer to them as "wheeled devices". The guidelines also suggested that the paper should extrapolate the potential evolution of the available equipment as well as discuss changes in anthropometry, codes and standards. Although not stated, we have assumed that the discussion will concern itself with the commercial or public building environment. Private homes are not considered. With that said however, it should be noted that the A18 national Standard does reference requirements for private residences**.[001**] If legislated, then these sections are applicable and codified for the jurisdictions involved. Many of the requirements in the public building sector are applicable to private residences, but not all. We will spend much time reviewing the codes and standards for platform lifts because they are a highly regulated industry. Innovation and creativity and evolution of design are more dependent on the legislated code environment than on the availability of creative solutions to accessibility problems.

A note on terminology

The terms "lift" and "elevator" although synonymous in definition in normal English usage have evolved into specific references in North America. **[002]** Within the vertical transportation industry, the term "elevator" has maintained its typical usage indicating a device in a built environment which has unrestricted access, use, size, speed, capacity and rise. The term "lift" has come to be defined as a device which has limited use, size, speed, capacity and rise. Until the publication of the second edition of the A18 National Standard "Safety Standard for Platform Lifts and Stairway Chairlifts", access to the device was also limited. The 2001 published edition removed the requirement for restricted access to these devices in the form of "keys".

ELEVATOR

By far the most usable technology would be a full passenger elevator as one would see and use in any multi-floor public building. Of course an ATV may have some problem gaining entry to the building….but it could be used! For other wheeled devices such as wheelchairs and scooters, an elevator

is excellent transportation. Their safety record is unsurpassed in comparison to almost any other form of transportation, considering the number of people moved daily. Its biggest drawback for accessibility is cost and available space, especially for very short range vertical elevation changes. The use of elevators is well documented and regulated in National and State codes and regulations. It is a mature industry which has addressed in depth the use of the equipment by wheeled devices. An elevator should be the catalyst to which we compare other technologies in order to obtain similar or superior access and usability at more reasonable costs and less use of the available real estate. However, even an elevator cannot address the needs of all persons with disabilities. Elevators are regulated in most jurisdictions by adoption of the ASME A17.1 National Standard**. [003**]

LIFTS

Lifts have become the "device of choice" for short range elevation changes in the built environment (existing buildings). The requirements of ADAAG limit the use of platform lifts in new construction to very specific locations, such as wheelchair line-of-sight, projection booths, etc. The scope of the A18 National Standard for platform lifts is as follows :

> ***1.1.1 Equipment Covered by This Standard.*** *This safety Standard covers the design, construction, installation, operation, inspection, testing, maintenance, and repair of inclined stairway chairlifts and inclined and vertical platform lifts intended for transportation of a mobility impaired person only. The device shall have a limited vertical travel, operating speed, and platform area. Operation shall be under continuous control of the user/attendant. The device shall not penetrate more than one floor. A full passenger enclosure on the platform shall be prohibited.*

Within the range of lifts available, there are the following sub-categories:

Vertical Platform Lifts ***[004]*** *(see figure 1)*

A Vertical Platform Lift, or more commonly a "VPL", is a short range vertical transportation elevating device specifically designed to vertically transport mobility impaired persons between floor levels. The

users may be in a wheeled device or ambulatory. As detailed in the scope of the A18 as shown above, the parameters in Table 1 reflect the limitations placed on a Vertical Platform Lift. VPLs are ADA compliant.

Inclined Platform Lifts ***[005]*** *(see figure 2)*

Figure 2

An Inclined Platform Lift, or more commonly an "IPL", is a short range vertical transportation elevating device specifically designed to transport mobility impaired persons between floor levels while traveling on an incline such as a stairway. The users may be in a wheeled device or ambulatory. As detailed in the scope of the A18 as shown above, the parameters in Table 1 reflect the limitations placed on an Inclined Platform Lift. IPLs are ADA compliant

Stairway Chairlifts ***[006]*** *(see figure3)*

Figure 3

A Stairway Chairlift, or more commonly a "Chairlift", is a short range vertical transportation elevating device specifically designed to transport a seated mobility impaired person between floor levels while traveling on an incline such as a stairway.. The users must be ambulatory and must be in a seated position while traveling on the device. As detailed in the scope of the A18 as shown above, the parameters in Table 1 reflect the limitations placed on a Stairway Chairlift as well as Vertical Platform Lifts. Stairway Chairlifts are typically not ADA compliant as they cannot provide access for a wheeled device.

	Max Speed	***Max Rise***	***Max Capacity***	***Max Size***	***Access***
Vertical Platform Lift	0,15m/s (30 ft.min)	3,65m (12'-0")	340 kg. (750 lbs.)	1,67 m^2 (18 ft^2)	Unrestricted in A18
Inclined Platform Lift	0,15m/s (30 ft.min)	No Limitation	340 kg. (750 lbs.)	1,1 m^2 (12 ft^2)	Unrestricted in A18
Inclined Stairway Chairlift	0,15m/s (30 ft.min)	No Limitation	340 kg. (750 lbs.)	1,1m^2 (12 ft^2)	Unrestricted in A18

A18 Short History

With NAFTA as a catalyst, the National Standard for platform lifts and stairway chairlifts (generically "lifts") is the ASME A18.1. For many years, the safety standards for lifts were contained within the

A17.1 National Elevator Standard as Parts XX and XXI. Part XX referenced lifts in public buildings and Part XXI referenced lifts in private homes. Harmonization of the A17 Standard with the Canadian equivalent standard, the CSA B44**,[007]** required that Parts XX and XXI be removed from A17.1. The reason….there already was a standalone standard in Canada referencing lifts and that is the CSA B355. A17 could not leave in parts XX and XXI and harmonize with the B44……that would create a second standard which would conflict with the CSA B355. Both CSA and ASME do not allow two standards to reference the same or similar equipment creating conflicts. Thus a new standard was developed under the sponsorship of the Accessibility Equipment Manufacturer's Association (AEMA**),[008]** as required by the ASME Board of Safety Codes and Standards (BSCS) policies. From an initial meeting in June 1994, the A18 standard was finally published in January 2000, simultaneously with the publication of the first North American harmonized edition of the A17.

Effect on the equipment

The effect of the recent changes to the A18 is a paradigm shift in the development of codes and standard for this type of equipment. Under the old requirements, many decisions were seemingly made on a basis sometimes inconsistent with the needs of the users of the equipment and the requirements of ADAAG. I am happy to report to the Federal Access Board **[009]** that their involvement in the code making process has resulted in the steady "evolution" of the A18: it more succinctly references the needs of the disabled. Their assistance has been exemplary. The rule making process prior to involvement by the access board was relegated mainly to manufacturers of accessibility equipment and enforcing authorities. Although the concern about safety was evident from these committee members, there was a certain lack of knowledge concerning usability and other general concerns of the disabled. The original A17 sub-committee did not have one disabled individual on the committee.! This was not due to lack of invitation….many disabled persons were approached but were unable to obtain funding to attend the committee meetings. The code writing process in the US and Canada is performed by a voluntary consensus seeking group of dedicated individuals, who volunteer their time and funds to this process. The access board was able to bring that expertise on board and a number of new rules show the effect of their involvement. Perhaps the Access

Board may consider some funding to allow the attendance of more persons with disabilities into the code making process? Some advances:

Restricted access

The standard had always required the use of keys for a disabled person to gain access and use a lift.**[010]** When a disabled person needed the use of a lift, the problem of locating the person who had possession of the key in the building was the single greatest complaint of the disabled community. Over the years many attempts were made for an alternative means of restricting access, but they were only partially successful. The Accessibility Equipment Manufacturer's Association (AEMA) instituted a program in the early nineties where the manufacturer members would all provide a "universal" key**[011]** on their equipment. This helped considerably and many thousands of disabled persons who required the use of a lift would carry a "universal key" on their person. The universal key was not "universally" acceptable. At one time, there was talk of legal proceedings by other interests to stop the use of the "universal" key.

When the A18 was finally established as a main committee, a number of Technical Revisions (TR's) were requested by the members in order to start the update of the standard. Not the least of which was the elimination of the requirement for a key to restrict access. It was stated clearly by a member of the access board that a national standard cannot restrict accessibility. It goes against the very concept of the ADA. It was stated that an owner can legally add a key to restrict access for "reasons of security", but a national standard could not "require" it. The current version of the A18 has eliminated the requirement for keys. Sadly, not all jurisdictions have adopted the A18 and the use of keys, due to the continued requirement in the old versions of the A17, continues. Happily, the future will see the use of keys slowly eliminated to allow unrestricted access to lifts. A big step forward.

Inclined Platform Lifts

ADAAG was incepted in 1990 when President Bush I signed into law the Americans with Disabilities Act. Although more than one change has been incorporated into the document, such as the 1998 revision, areas concerning lifts for wheeled mobility were left untouched. ADAAG references the A17.1 elevator Code for conformance. Since 2000 there has been no section of the A17 that references lifts for the disabled. Therefore ADAAG references a non-existent standard!**[012]** The A18 is referenced in the draft

version of the new ADAAG but it has not yet been legislated. Inclined Platform Lifts within A17 were limited in their application and the rules stated that only a device with 1070mm high sides and a gate could be used as a "non-attendant " operated lift. **[013]** ADAAG requires the use of lifts to offer "unassisted entry and exit". A lift such as that mentioned, which is arguably no longer manufactured and/or available also created a bar to accessibility. [**014]**Accessibility was denied in many instances because of economic considerations of the alternative to an IPL. Owners could not place such a large piece of equipment upon their stairways without creating a dual problem: Firstly, the use of the stairway would in many cases be severely compromised by the size of the lift and secondly the building codes did not allow a device on a stairway. The result (in many cases) no accessibility! Even today, where with the new matrix of the A18 committee they have been able to address changes to the standard (see figure 4) that permit creative alternatives to the "box on the stairs"**[15]** while still maintaining the high degree of safety inherent in lifts (supported by their enviable safety record), there is consternation about installing an incline platform lift. The new designs permitted by the A18 now keep the stairway clear for other traffic when the lift is not in use (see figure 5). This problem cannot be resolved until such times as the new ADAAG is finally accepted and legislated. Literal interpretation of ADAAG currently is restricting accessibility in a number of areas. Industry is still working with a 13 year old document! Look at the changes since that time in technology! ADAAG must be updated to remove one of the last barriers to innovation and creativity concerning vertical transportation for the physically disabled!

Figure 4

Unenclosed Vertical Lifts

The old Part XX rules required lifts to be enclosed (either fully or partially) with a shaft around them or some other enclosure, even for very short range lifts.**[016]** There are thousands of applications where accessibility to an area or building will be anywhere from 150mm on

Figure 5

up. How to address this problem and still provide usable, safe and economical equipment? There are several developments in this area that could not go forward until inception of the new A18 Standard. For example:

1. lifts for occasional access to a stage area that did not block the audience's view.
2. Lifts for courtrooms with very low travel for use on witness stands and judges benches.
3. Specialized new technology and innovations such as a dual use lift that is a stairway during normal use but can double as a vertical lift when needed.
4. "Hide-away" type lifts that disappear into the floor until needed again
5. other non-enclosed lifts that have been purpose designed to serve specific areas for short range accessibility needs.

Figure 6 (stair)

Figure 7 (retracts)

Figure 8 (raises)

Figure 9 (at top)

The combination stairway and vertical platform lift

Figure 10

Figure 11

Figure 12

Figure 13

The accessible witness stand lift

All of the above examples are specifically “short travel” lifts, typically less than 1,5m but serve an extremely important sector. A18, through the TR (Technical Revision) process with ASME is addressing all of this type of equipment, and more besides! Innovation and creativity can now blossom in this new environment. Accessibility equipment can now evolve as the needs are identified. The winners are the disabled community…..there will be no place where accessibility will be denied.

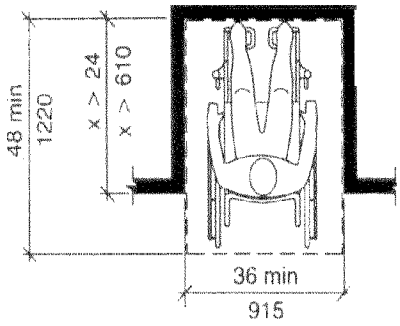
Platform Sizes

The code making bodies of ASME and other organizations addressed the sizes of available lifting equipment by some very primitive but effective means. In the early days of development of the standards, they did not have available the wealth of anthropometric data upon which to base standards. As a result, sizes were determined empirically. In many cases they were borrowed from other standards and from other countries. As time passed this data has a become almost engraved in stone. The result is that this “stalled’ area of development has affected design of other equipment. No different than the current dilemma faced by the designers of the new 1000 passenger airbus aircraft. It is technically possible and feasible but there are hardly any airports in the world that can handle this large aircraft. The same problem appears when we consider that wheelchairs and scooters cannot grow too large as they will not fit on existing lifting equipment…a fact most designers of this equipment typically don’t consider. The trend is to longer, wider more sophisticated equipment. As battery technology evolves there are already models of scooters and power wheelchairs that will not be able to use existing equipment. The guidelines presented by ADAAG are very vague to say the least and conflicting.. For example, In order to ensure ADA compliance, the industry researched the ADA and found nothing that made a reference to the sizes of lift platforms. Section 4.11 basically just referenced the whole matter over to the A17 where sizes were determined for other reasons than usability and accessibility. For example, the entire section referencing platform lifts in 4.11 states:

> ***4.11 Platform Lifts (Wheelchair Lifts).***
>
> *4.11.1* ***Location****. Platform lifts (wheelchair lifts) permitted by 4.1 shall comply with the requirements of 4.11.*

4.11.2 **Other Requirements**. If platform lifts (wheelchair lifts) are used, they shall comply with 4.2.4, 4.5, 4.27, and ASME A17.1 Safety Code for Elevators and Escalators, Section XX, 1990.*

*4.11.3 **Entrance**. If platform lifts are used then they shall facilitate unassisted entry, operation, and exit from the lift in compliance with 4.11.2.*



(a) Forward Approach

The additional rules mentioned in 4.11.2 can and are covered in the A18 and so should be adjusted or removed. They just add confusion because of other requirements within the referenced clauses. Interpretation confusion can and does occur. For example, there is a section concerning the minimum floor size to accommodate a wheelchair and that is set at 760 by 1220. (Section 4.2.4 above).In short order that became the defacto minimum size of a platform. Some recent interpretations at the local level have used a section of ADAAG and the A117 to insist that the minimum sizes of a lift platform must be in conformance with 305.7. It is intended to allow space where a wheelchair user must enter an alcove. (Figure 14) The Figure attached as forward approach from the A117 doesn't help as the drawing itself seems to indicate a lift and user parked in a wheelchair platform and not the alcove it is intended to portray. This requires a minimum width of 9145.. Other interpretations are now coming forward to confuse the issue even further. It is recommended that ADAAG review these conflicts in the new edition.

An attempt has been made in the draft new ADAAG edition and the adoptable standard A117 to address some of the problems likely to be encountered by ninety degree entry and exit platforms. These create another usability problem: how to ensure that a disabled person in a wheelchair can maneuver the chair on the platform. The draft edition has done an admirable job of attempting to resolve the issue for most applications. However, if ADAAG is to reference the A18 then the A18 should contain the requirements for this application. A larger platform size such as recommended in the next paragraph, would go towards alleviating the problem with 90 degree entrances. **[017]**

Generally it can be stated that platform sizes for A18 equipment have evolved to a point where they can currently solve most access problems for this type of equipment but new types of equipment likely to come on the market in the next decade may require a review of the minimum sizes. The current maximum size of an A18 VPL is set at 1,67 m^2 (18 ft^2). It is recommended that this size be increased to 2 m^2 (21.5 ft^2). This will accept the new equipment plus it aligns the standard with other international standards, eg: CSA B355 in Canada.

Another realignment of the standard would be to change the capacity from a maximum to a minimum. This would allow the equipment to reflect the actual needs of a particular application. The safety factors required by the A18 will look after the additional loads that might be imposed. New scooters and power chairs can easily start to climb in weight and couple that with a heavy user it becomes evident that the current capacities may not be able to handle the new technologies. Until technology can develop powerful and lightweight power sources for powered equipment we are "stuck" with batteries and their resultant heavy weights. It will be quite a while before the new hydrogen and other hybrid technologies filter into the powered wheeled mobility sector. Chairs and scooters are typically designed to accept a person up to 160kg (350 lbs) in weight with add-ons to allow for heavier users. Add the weight of batteries and the equipment and it can be seen that the current capacities may start to be insufficient. We should also keep in mind that the original standards were written at a time when only manual wheelchairs were considered; powered chairs were only for a small segment of the disabled community and power scooters were just in the R&D stage of development.

Expansion of the A18

During the process of rewriting and updating the "new" ADAAG, AEMA as a representative of the industry, suggested that the restriction placed on the use of lifts in new construction be eliminated. Currently, the use of lifts is basically unrestricted in existing buildings but extremely limited for use in new construction. Section 4.1.3 details the requirements for passenger elevators and details the restrictions on platform lifts in new construction. In order to provide the best accessibility possible for persons with mobility impairments, this section should be reviewed. It is old concepts that are out of place in our modern society. These concepts were instituted back in the eighties when the ADA was being

prepared. Platform lifts should be allowed in new as well as existing construction. A review of section 4.1.3 obviates one of the needs for change: the exemption for new construction that is less than three floors or less than3000 square feet per floor. This will and has created situations where access is not provided in smaller buildings or renovations (add-ons) to buildings. If the floor space is less than 3000 square feet per floor or it is less than three stories in height, we have a situation where accessibility is not provided. If the builder decides to voluntarily add vertical transportation, even though it is not required he must install an expensive passenger elevator as per section 4.10 with all of the ancillary building costs in addition to the elevator cost itself. He cannot install a lift! The use of platform lifts is restricted sufficiently by capacity, speed, rise and size within the national safety standard. ADAAG should not be additionally restricting their use in new construction. The "new" A18 has made sufficient changes to allow unrestricted entry and exit, not the least of which is the elimination of the requirement to restrict access by means of a key or other device. For restrictions on platform lifts Rule 4.1.3(5) (exception 4) states:

> *EXCEPTION 4: Platform lifts (wheelchair lifts) complying with 4.11 of this guideline and applicable State or local codes may be used in lieu of an elevator only under the following conditions:*
>
> *(a) To provide an accessible route to a performing area in an assembly occupancy.*
>
> *(b) To comply with the wheelchair viewing position line-of- sight and dispersion requirements of 4.33.3.*
>
> *(c) To provide access to incidental occupiable spaces and rooms which are not open to the general public and which house no more than five persons, including but not limited to equipment control rooms and projection booths.*

(d) To provide access where existing site constraints or other constraints make use of a ramp or an elevator infeasible.

(e) To provide access to raised judges' benches, clerks' stations, speakers' platforms, jury boxes and witness stands or to depressed areas such as the well of a court.

There are some recommended changes in the draft new ADAAG, but as it is a draft I will not reiterate them here. Suffice to say, there is additional restrictions recommended.

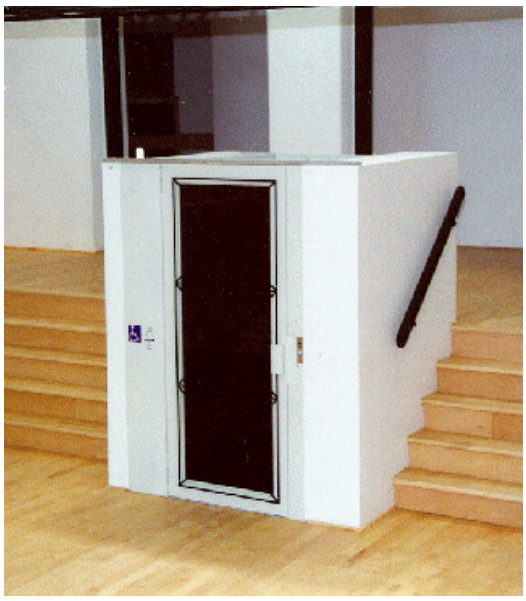


Figure 15
Solving an access problem in a school gym.

Platform Lift Emerging Technologies

VPL lifts have only been around since the seventies. When designed originally, they were intended mainly for use in private homes. Simple, light-duty devices that could easily be assimilated into the home. The original drive systems were winding drums and recirculating ball screws. The recirculating ball screw gave way to an even more simple drive: the Acme Screw thread; simple, with several inherent safety features such as its self-locking feature. The Acme thread thus has “built-in” overspeed protection which the recirculating ball screw did not possess. As the seventies turned into the eighties, the needs of the disabled started to become center stage. Disability groups and veterans groups were lobbying for action because such simple acts as climbing a curb (typically 150mm) was next to impossible for a disabled person in a wheelchair. The commercialization of the lifting devices from the residential sector occurred in the early eighties when Part XX and XXI of the A17 Wwere added to the standard. Lifts were now a codified lifting device! **[018]**With the passage of the ADA in 1990 more impetus was created for viable and code compliant equipment. Entrepreneurs were quick to see the

potentials of this newly created market and American Ingenuity again came to the fore. The creative forces of ingenuity and competition continues to drive the new technologies emerging worldwide. Today, within the A18 are listed a number of new drive systems which are increasing the choices of the users. Drive systems are an area where creativity has been most rampant! In addition to the old standbys with which most engineers are cognizant such as :

- Cable drive
- Rack and pinion
- Hydraulic
- Traction
- Screw
- Chain sprocket

There has been added a number of new drives such as :

- Friction
- Lever
- Rope Sprocket

Figure 16

A new German solution to an access problem.

International

Internationally and specifically the European Union, innovation is far more prevalent due to a change in the concept of codification to a performance standard method, new designs and drive systems are continually being implemented. It is difficult for this innovation to cross “the pond” because of the long process of code change in North America. In defense of ASME, they have embarked on a process of simplifying the rules and methodologies in order to speed up the process. **[019]** Performance standards are also being investigated. At various trade shows, some new innovations in drive systems are:

- Slotted tube
- Dimpled tube
- Flat cable
- Pneumatic
- Variable pitch screw
- Vertical worm
- Incline worm

Each new show presents the latest in innovation. Some new systems take their place in the pantheon of drives that will be used and some fall by the wayside as being too expensive or difficult to install or for other reasons.

An unconfirmed report states that a recent change that is coming in the EU is the concept of unlimited travel for a lift for the mobility impaired. It has been reported that this change will be reflected in the new standards soon to be published by the International Standards Organization. (ISO). For many years, the concept of limiting the size, capacity, speed and rise of lifts has been codified. Limitation of speed makes some sense as speed is horsepower and thus reducing the speed reduces the power consumption. Lower speeds also add to the inherent safety of the device due to its rather “open” architecture. Limited capacity and size also have a rationale for the same reasons. However, limitation of rise or travel of the device has always been a subjective matter. At least in North America and I’m sure the EU as well, other forces were at work to keep lifts in “low rise applications”. In the USA, travel of a commercial “wheelchair lift”, now termed a platform lift, has always been limited to 12’-0” (3,6m) and they were not permitted to penetrate a floor. In Canada, when the B355 National Code was published, travel of the lift was limited to 7m and they could penetrate floors. It is a requirement of the B355 that a lift that penetrates a floor must be in conformance with the building code, especially concerning fire separations. That code section was adopted in Canada in 1980….it only became effective in the USA A18 code in 2001! An A18 lift can still only travel 12’-0, but it may now penetrate one floor. There is a TR ongoing that may change the travel to 14’-0”. The catalyst for this change is the State of Florida where building codes and Federal regulations require that buildings in many areas must be built at least 12’-0” above the ground because of potential

flooding. A limitation of 12’-0” of travel will not serve these areas, thus the suggested increase to 14’-0”. However, the EU rationale for unlimited travel does make sense from a usability view and from an engineering and safety view. Typically, the addition of travel distance does not reduce the level of safety; (the required safety factors within the code would keep the platform structure safe) nor does it typically increase the power consumption, nor will it increase the use of lifts in areas where a full passenger elevator should be used! This last item is probably the most contentious. Enforcing authorities and code writers should keep in mind that lifts are in actuality self limiting in application. If the speed is maintained at 30 ft. min (0,15m/s) which by the way is international, then no building owner or architect is going to be convinced that a lift is the proper solution for access for his building if the travel is extra high. Internationally, all accessibility lifts are limited to 30 ft. min and continuous pressure controls. The user must press and hold the control button or lever at all times in order to keep the lift in motion. Continuous pressure operation is one of the most important inherent safety features of a lift. A lift traveling a distance of 30 feet using the maximum permitted speed of 30 ft.min would require one minute to travel the distance and the controls must be held pressed at all times the lift is in motion. The typical lift, using a screw drive attains a speed in the 8 ft. min to 10 ft. min range. Therefore by design, high travel lifts are self-limiting. Existing buildings don’t always lend themselves to the limitations placed on lifts when accessibility is required. If a building has a distance of 12’-6” of travel for an accessibility lift then it is very likely that no access would be provided because the alternative is extremely costly! Unless the local jurisdiction having authority is permitted to grant variances then the building will most likely go without accessibility. Travel is a subjective matter that has nothing to do with safety and should be addressed as the Europeans have done in order to remove this bar to accessibility in many jurisdictions.

Summary on code

Unfortunately in our litigious society, the code standards have become rigidly applied in many jurisdictions. Section 1.2 states as follows:

1.2 Purpose and Exceptions

The purpose of this Standard is to provide for the safety of life and limb, and to promote the public welfare.

The provisions of this Standard are not intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety to those prescribed by this Standard provided that there is technical documentation to demonstrate the equivalency of the system, method, or device.

The specific requirements of this Standard shall be permitted to be modified by the authority having jurisdiction based upon technical documentation or physical performance verification to allow alternative arrangements that will assure safety equivalent to that which would be provided by conformance to the corresponding requirements of this Standard.

There are very few jurisdictions that will follow the tenets of this code section. The result is that once a code is published, it literally works to cease innovation and new technology. Too many jurisdictions will not permit anything new to be installed. Their rationale is that they don't have the resources to review the documents of a new device to ensure that they meet the last paragraph of section 1.2. Usually this just really means that they don't want to make a decision and thus open themselves and their department to litigation if anything should go wrong. This single example is one reason why our codes are so far behind as compared to the international standards.

The following section on new technology will be able to be well addressed by the ability of the new National Standard, the A18. Even three years ago some of the new technologies could not have made it through the restrictions of the previous code writing process. The struggle ahead for mobility restricted persons is the adoption in more and more jurisdictions of the A18. The publication of a new edition of ADAAG that recognizes and references the A18 will ensure that State and local adoption of the A18 happens sooner than later. Accessibility must be a universal goal!

Figure 17

New Technologies

At various trade shows where new products are being introduced that will provide accessibility for mobility restricted persons, it is obvious that considerable funds have been made available to inventors. Recently, there was the introduction of a powered wheelchair that would not only provide horizontal transportation for persons with mobility restrictions, it was also designed to climb stairs! This powerful device has been demonstrated at several venues and still draws gasps of wonder at its capabilities. In the same vein is the "Segway" that I am sure has been seen by quite a number of persons. This is a two wheeled personal transport device that maintains its stability and control by means of several Pentium microprocessors. The same type of control is evident in this new wheeled device. What does this do to platform lifts…is this type of device likely to replace platform lifts because it can climb stairs? To answer the second query first, it is not likely that this device will replace platform lifts. The main reason is cost. The above unit will have a retail price in the US$20,000.00 range. This is the second time this writer has seen a device similar to this shown at trade shows and demonstrated extensively. It was about ten years ago and the Company as I recall was California based. The unit sold in the US$$25,000.00 range. To my knowledge, the company did not survive and only a few units were manufactured and many of them were sold to dealers for their showroom where they still sit. The technology is marvelous and the innovation breathtaking but it is not for everyone and not likely to be a volume marketable product. The designers spent in excess of US150,000.00 developing this unit so obviously they feel it will be a success. For the first question, if the units were marketable, then the same

Figure 18

problem would occur as with the new Airbus aircraft previously mentioned….it would not likely fit the available equipment (where and when the device user decided to use it). In another view, users of wheeled devices such as a wheelchair are extremely wary of stairways: only the youngest and most physically able with good upper body strength would attempt a stairway even with this device! The platform lift or an elevator would be used. The device underscores the new technologies and innovations though, and as previously stated, some changes will be necessary.

The Segway two-wheeled balancing human transporter has been successful with many thousands in operation. These units too would have to access a lift or other vertical transporting device to be able to get up a few stairs. I don't believe this is intended to be a device to transport disabled persons. However, it appears to be a simple device that would assist ambulatory persons with hip or other walking problems. It is FDA certified.

Ramps

Within the A18 ramps are frequently used in order to bridge the short vertical distances created by the thickness of a platform when resting on the lower floor. The alternative to a ramp for a platform lift is to construct the runway of the lift with a "pit" or depression at its lower level. Usually with an enclosed device but not necessarily. Ramps in some applications serve a dual purpose. When used with an unenclosed lift such as an Inclined Platform Lift, the ramp when in the raised position serves as protection against wheelchair roll-of during movement of the platform. When the platform reaches a landing, the ramp will be lowered to act as a bridge horizontally between the landing and the platform or to bridge the vertical obstruction created by the thickness of the platform as described earlier. New rules in the A18 standard have incorporated strength requirements into the design of the ramps. In previous editions, ramps were acceptable and the elevation ratios were codified but there was no requirement for the strength and maximum deflection of a platform ramp. This has now been changed as of the most current edition of the A18.1.

Figure 19

Figure 20

The ramps used with straight on and off platform lifts do the job as intended; they bridge the gap at landings; offer an inclined access to the platform area at the bottom landing (see figure 8) and while in travel, some manufacturers have added two way sensitivity to the ramps; in other words if the chair rolls forward and touches the ramp a device will trip a switch and stop the lift. Additionally, ramps operate as external obstruction sensing devices that will stop the movement of the platform if it touches an obstruction, such as a person, while traveling on the stairway. Areas of improvement in the use of ramps with inclined platform lifts would include a redesign or code revisions concerning their use with 90 degree lifts. In order to provide access into difficult areas due to building layout and obstructions, it is sometimes necessary to utilize a 90 degree platform on an incline platform lift. This model is used when most other means to provide accessibility have been eliminated. If not utilized, then in most instances no accessibility would be provided. Some accessibility is better than no accessibility! 90 degree platforms can be difficult to enter and exit unless certain design parameters are considered. In order to ensure that the lift can be used "unassisted" as required by ADAAG, the ramp designs for the side entry should be codified. Some manufacturers provide the wider design and rounded edges necessary to allow the wheelchair to maneuver more easily onto the platform and some manufacturers do not. It is suggested that the A18 committee in conjunction with wheelchair restricted users, take a hard look at 90 degree ramp entry Inclined Platform lifts to ensure compliance with the intent of ADAAG.

Internationally, there are designs of ramps and lifts that work concurrently to provide access to tight areas, such as a short radius spiral set of stairs where the top 3 or 4 steps spiral towards the top landing. It is impossible to rotate the platform so that the ramp bridge is parallel to the top landing in such a short distance. As well, the stairway widths do not always permit the space to make this turn. An innovative solution is to rotate the entire lift up and past the edge of the landing. Of course this stops the platform above the top floor by about 30cm or more. The solution: include a device in the design which allows the platform to lower itself to the landing floor hydraulically. The normal platform ramps can then deploy to allow the user to exit. An interesting solution to very tight access problems.

Ramps with platform lifts are used on every model of inclined platform lift but are not used on every model of vertical platform lift. The ramps typically utilized are of very short length and are designed to the requirements of the A18. It should be noted that the intent of the ramps in A18 and the intent of the ramps in ADAAG is different. An ADAAG ramp assumes that the wheelchair user will climb a ramp where both wheels of his chair will be on the ramp and his center of gravity has changed. In other words, if the wheels are released the chair will react to the center of gravity change and roll back down the ramp. On nearly all types of lifts, the ramps are simply a short bridge to solve a vertical access problem of typically 40mm to 65mm. As well, both front and rear wheels of the chair are never on the ramp at the same time! (Some isolated ramp accesses to a lift platform may be different). This results in a far different center of gravity change. The force required by the user to ride up the ramp is reduced due to the two-stages of wheel access. The load is shared between the front and rear wheels. Thus the ramp inclines can be higher for platform lift use. In the most current version of the A18, ramp ratios and lengths are now detailed and codified. In previous editions, the construction and ratios for ramps were referenced back to the A117.1. As part of the redesign process for A18, it should be noted that it is the intent of the main committee to minimize the references to other standards and actually write the rules into the A18 standard. Another step forward!!

APPENDIX "A"

[001] ASME A18.1 National Standard Sections 5, 6 and 7. This standard is available from ASME (American Society of Mechanical Engineers) Three Park Ave., NY, NY 10016. www.asme.org

[002] Excerpts from Merriam Webster's Collegiate Dictionary :

Elevator

1 : one that raises or lifts something up: as **a :** an endless belt or chain conveyor with cleats, scoops, or buckets for raising material **b :** a cage or platform and its hoisting machinery for conveying people or things to different levels

Lift

10 : an apparatus or machine used for hoisting:

[003] ASME A17.1 National Standard "Safety Code for Elevators and Escalators".

[004] The requirements for vertical platform lifts are contained within section 2 (public buildings) and section 5 (private residences).

[005] The requirements for Inclined Platform Lifts are contained within section 3 (public buildings) and section 6 (private residences).

[006] The requirements for Stairway Chair lifts are contained within section 3 (public buildings) and section 6 (private residences).

[007] The Canadian National Safety Code for Elevators is the CSA (Canadian Standards Association) B44-2000. Available from CSA International, 178 Rexdale Blvd.. Toronto, Ontario, Canada M9W1R3. www.csa-international.ca

[008] Accessibility Equipment Manufacturer's Associuation (AEMA). www.aema.com. Po Box 380, Metamora Illinois.

[009] The Federal Access Board. www.access-board.gov.

[010] A17.1-1997a . Rule 2000.10a; 2001.10a and 2002.10a.

[011] The universal key was a Chicago Lock #2252. Now made by OSLO our of Connecticut. Same Key number. Available from any AEMA mfr. Member.

[012] Addendum "C" of the A17.1-1996 removed Parts XX and XXI from the A17 in order to permit the A18 to become an American National Standard.

[013] A17.1-1997a Rules 2001.1a and b. A17.1 -1997a Rule 2001.6(c)1

[014] To my knowledge**, t**he last inclined wheelchair platform lift that was manufactured in conformance with the "box on the stairs" rule was the Liberty Wheelchair Lift III. It was manufactured by The Cheney Company out of New Berlin, Wi. They were acquired by Access Industries in 1990 and the Wheelchair lift III has not been manufactured since. No photographs could be located.

[015] A17.1 -1997a Rule 2001.6(c)1 (modified from this Rule to A18.1 Para.3.6.8.2.4)

[016] A17.1-1997a Rules 2000.1a and b.

[017} A117-1998 Section 408

[018] The codification of Platform Lifts in both public buildings and private residences occurred when Parts XX and XXI were added to the ASME A17.1 National Standard in 1983.

[019] Visit www.asme.org/codes. There are several articles worth reading on the path of ASME into the future. One such document can be read at www.asme.org/codes/pdfs/article6.pdf.

APPENDIX "B"

Figure1-	Courtesy National Wheelovator Company. Roanoke, Illinois
Figures 2,3,4,19,20	Courtesy Garaventa Canada, Surrey, British Columbia.
Figure 5	Courtesy Savaria Inc. Quebec, Canada.
Figures 6,7,8,9,10,11,12,13-	Courtesy Vertical Mobility, Dayton, Ohio
Figure 14-	Excerpt from A117.1-1998
Figure 15	Courtesy Concord Elevator, Brampton, Ontario, Canada
Figure 16-	Courtesy HiroLift, Bielefeld, Germany.
Figure 17	Ibot from Independence technology LLC
Figure 18-	Courtesy Segway, Manchester, New Hampshire