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National Workshop on Bus-Wheelchair Accessibility

Guideline Specifications for Wheelchair Ramps

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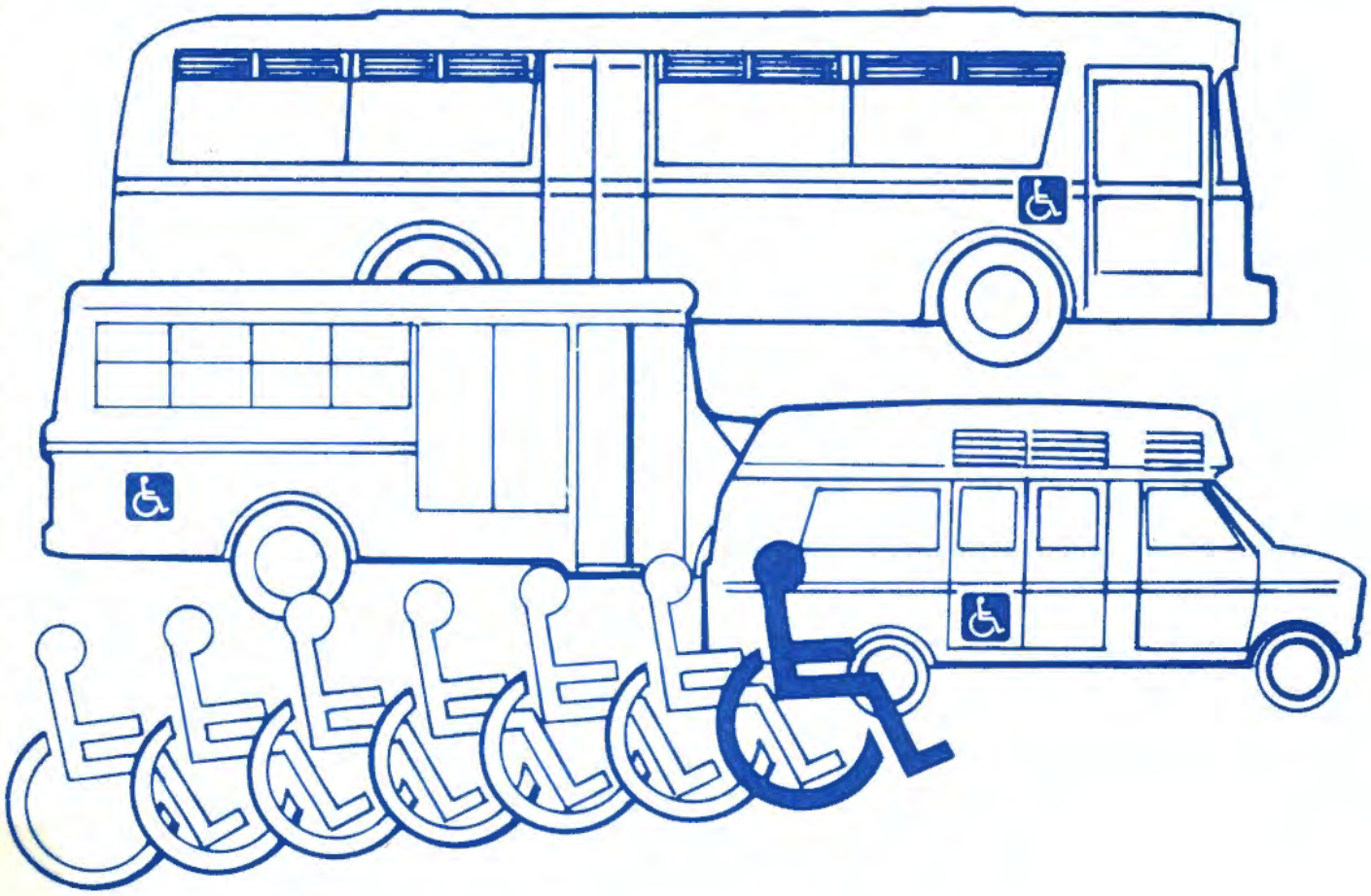

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National Workshop on Bus-Wheelchair Accessibility

Guideline Specifications for Wheelchair Ramps

May 7-9, 1986
Seattle, Washington

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Prepared for
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Urban Mass Transportation Administration
Washington, D.C. 20590

ACKNOWLEDGMENTS

These guideline specifications are the culmination of many hours of hard work by persons representing all facets of the accessible transit and paratransit industry. The Urban Mass Transportation Administration (UMTA) recognized that the technology associated with accessible transportation could be improved and sponsored an Advisory Panel in order to develop industry guideline specifications. Representing different viewpoints and different interests, the members of the Advisory Panel met, discussed issues, and developed these guideline specifications. It is a credit to the Advisory Panel and the dedication of its members that a formal vote never had to be taken and that the guideline specifications were developed on the basis of consensus.

Several people need to be acknowledged for the assistance they provided to the Advisory Panel in the development of these guidelines. George I. Izumi, the UMTA Project Manager, was responsible for planning and organizing the Advisory Panel, planning for the Workshop, and contributed greatly to the development of the guidelines. Vincent R. DeMarco, the UMTA Program Manager, was responsible for guiding the efforts of the Advisory Panel and for planning and conducting the Workshop. Two other persons from the U.S. Department of Transportation also provided assistance. Christina Chang of the Transportation Systems Center helped to organize and run the Workshop and prepare Workshop Proceedings. Scott York of the National Highway Traffic Safety Administration participated in the Advisory Panel meetings and assisted in clarifying certain safety issues. The Battelle project team of Gerald A. Francis (consultant), Martin Gombert (ATE Management and Service Company, Inc.), Rolland D. King, and David M. Norstrom was responsible for developing the draft guideline specifications and serving as a technical resource to the Advisory Panel. Special recognition is given to Mr. Norstrom who skillfully managed the guideline development process and led the discussions of the Advisory Panel meetings that obtained a general consensus of the Advisory Panel on each guideline subject. Finally, appreciation goes to each member of the Advisory Panel who gave of their time and contributed their expertise to the development of these industry guidelines.

PREFACE

On September 17, 1985, the Administrator, Ralph L. Stanley, of the Urban Mass Transportation Administration called together a meeting with representatives of transit agencies, handicapped organizations, rehabilitation specialists and manufacturers of buses and wheelchair lifts to hear first hand the problems and issues regarding transit bus wheelchair accessibility. As a result of this meeting, the Administrator requested that an UMTA Advisory Panel be formed to plan a National Bus Wheelchair Accessibility Workshop and to guide the development of a set of guideline specifications for the equipment required for transit bus and paratransit vehicle wheelchair accessibility. A contract was issued to Battelle to assist UMTA in this effort.

As a result of surveying the transit industry for input and meeting with the Advisory Panel, Battelle prepared a draft set of guideline specifications for wheelchair lifts, securement devices and ramps for presentation and discussion at the National Bus Wheelchair Accessibility Workshop held in Seattle, Washington, on May 7 through 9, 1986. Using the inputs developed during the Workshop and the written comments submitted following the Workshop, the Advisory Panel prepared these final guideline specifications.

These guideline specifications are advisory in nature. The intention of the guideline specifications is to provide transit agencies with a model that they could use, as appropriate, in the development of their specifications for wheelchair accessibility. In the guideline specifications, where the word "should" is used, the recommendation of the Advisory Panel is that the suggested item or value be included in a general specification. Where the word "may" is used, the Advisory Panel recommends that the item or choice of values be considered for inclusion based upon local operating conditions. The Advisory Panel has developed these guidelines for use throughout the United States. It recognizes that unique local conditions could make an item suggested for inclusion inappropriate and a local public transportation provider would be required to make the appropriate changes (e.g. to accommodate extreme environmental conditions).

This guideline specification is one of four specifications developed by the Advisory Panel, which developed separate guideline specifications for passive wheelchair lifts (those used primarily on transit buses), active wheelchair lifts (those used primarily on paratransit vehicles), ramps and securement devices. Members of the Advisory Panel participated actively in the development of each individual guideline specification based upon their experience and interest. Although the Advisory Panel discussed many related accessibility issues, these guideline specifications focus only on the technical requirements of a specific piece of equipment. They have been prepared to assist in the purchase of such equipment either separately or as part of an overall vehicle procurement.

ADVISORY PANEL

The following individuals participated in the Advisory Panel for the development of the draft guideline specifications of passive wheelchair lifts, active wheelchair lifts, ramps, and wheelchair securement devices.

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1.0 GENERAL

1.1 Scope

These guideline specifications relate to powered and manual ramps that are used by mobility limited persons to assist in boarding public transportation vehicles. The safety of passengers using the ramp and reliability of operations are of primary concern in these guideline specifications.

1.2 Definitions

The following definitions apply for this document.

Accessible Vehicle - A vehicle that has been equipped to allow boarding by passengers who by reason of handicap are physically unable to board a vehicle that has not been so equipped.

dBA - This term denotes decibels with reference to 0.0002 microbar as measured on the "A" scale.

Deploy - The term used to denote the operation of a ramp from a stowed position to a position for use.

Design Load - The maximum weight capacity a ramp is designed to support.

Elevator Lift - This term denotes the type of lift that has a vertical up and down movement as differentiated from an arc lift.

Factor of Safety (Design Safety Factor) - The factor of safety is the ultimate strength of a material divided by the working stress. A structure fails or breaks when loaded to its ultimate strength. A structure deforms or takes set when loaded to its yield strength.

Fail-safe - A characteristic of a system and its elements whereby any malfunctions affecting safety will cause the system to revert to a known safe state.

Interlock - The arrangement in which the operation or position of one mechanism automatically allows or prevents the operation of another.

Maintenance Personnel Skill Levels - Maintenance personnel skills used in this document are defined in accordance with the White Book specifications as follows:

5M: Specialist Mechanic or Class A Mechanical Leader
4M: Journeyman or Class A Mechanic
3M: Service Mechanic or Class B Serviceman
2M: Mechanic Helper or Coach Serviceman
1M: Cleaner, Fueler, Oiler, Hostler, or Shifter

May - This term is to be construed as permissive.

Paratransit Operation - Paratransit operation refers to a public transportation operation (service, vehicles, facilities, etc.) that is not a transit operation.

Should - The term is to be construed as recommended or strongly recommended by the Advisory Panel.

Slip Resistant - A characteristic of a surface of a material that reduces unintended relative motion with respect to another surface with which it has contact.

Stow - This term denotes the movement of a ramp from a position of use to a position where the ramp is stored and does not interfere with passenger movement.

Structural Components - The structural elements of the ramp include those that support working loads and attach the lift to the vehicle. They do not include mechanical and hydraulic components associated with operation and control of the ramp.

Transit Operation - Transit operations refers to a public transportation operation (service, vehicles, facilities, etc.) that operates with fixed routes and schedules.

White Book - This term is the common name for the "Baseline Advanced Design Transit Coach Specifications;" originally published by UMTA on April 4, 1977, it is now available from the American Public Transit Association.

Wheelchair - A seating arrangement that is positioned on wheels, may be powered or unpowered, and can be used to assist mobility limited individuals.

1.3 Abbreviations

The following abbreviations may be found in this document.

ANSI --- American National Standards Institute

ASME --- American Society of Mechanical Engineers

ASTM --- American Society of Testing and Materials

CSA --- Canadian Standards Association

FMVSS --- Federal Motor Vehicle Safety Standards

NHTSA --- National Highway Traffic Safety Administration

SAE --- Society of Automotive Engineers

UMTA --- Urban Mass Transportation Administration

VA --- Veterans Administration

1.4 Reference Documents

(1) American Public Transit Association. "Baseline Advanced Design Transit Coach Specifications," includes Addendums 1 through 20 that were made to the April 1977 issue of "Baseline Advanced Design Transit Coach Specifications," published by Urban Mass Transportation Administration. (Commonly known as The White Book). American Pubic Transit Association. April 1983.

(2) Booz, Allen and Hamilton Inc. Boarding Ramps for Transit Buses. Prepared for Urban Mass Transportation Administration. Washington, D.C. May 1977.

(3) California Administrative Code, Title 13, Chapter 2, Subchapter 4, Article 15. Wheelchair Lifts.

(4) Canadian Standards Association. "Motor Vehicles for the Transportation of Physically Disabled Persons," CAN3-D409-M84. Ontario, Canada: Rexdale. April 1984.

(5) Henderson, William H., Dabney, Raymond L., and Thomas, David D. Passenger Assistance Techniques: A Training Manual For Vehicle Operators of Systems Transporting the Elderly and Handicapped, Third Edition. Fort Worth, Texas: Transportation Management Associates. 1984.

(6) James D. I. "A Broader Look at Pedestrian Friction." Rubber Chemistry and Technology, Vol. 53, pp. 512-541.

(7) Society of Automotive Engineers. Standards, Recommended Practices, Information Reports.

(8) "Veterans Administration Wheelchair Lift Systems: VA Standard Design and Test Criteria for Safety and Quality of Automatic Wheelchair Lift System for Passenger Motor Vehicles." Federal Register (43 FR 21390). May 17, 1978.

2.0 TECHNICAL REQUIREMENTS

The ramp shall meet the technical requirements given in Section 2.0.

2.1 General Requirements

2.1.1 Operating Environment

The ramp should operate in a temperature range of -10 F to 115 F, at relative humidities between 5 percent and 100 percent, and at altitudes up to 5,000 feet above sea level. Degradation of performance due to atmospheric conditions should be minimized at temperatures below -10 F, above 115 F, or at altitudes above 5,000 feet.

Rationale: The urban areas of the United States have broad ranges of climatic conditions. Weather data indicate that many cities have recorded 100 days or more per year of over 90 F temperatures. Likewise, many have recorded 20 or more days per year below 0 F. The annual rainfall ranges as high as 60 inches per year to a low of 4 inches per year. The normal snow and sleet precipitation in some cities reach 88 inches per year. The above guidelines cover a broad range of conditions found in the United States and are taken from the White Book specifications.

2.1.2 Operation Constraints

The ramp should operate when the vehicle is on level ground and up to road grades of seven (7) percent or four (4) degrees.

Rationale: A ramp will be required to operate under a variety of different topographic conditions. A balance needs to be made between the topographical conditions to be accommodated by a ramp and the conditions where a ramp will not be required to operate. A seven percent grade specification is currently used by Seattle Metro in its lift procurements. Since Seattle has a relatively hilly topography, using its limits for road grade seemed reasonable.

By its very nature a ramp will be able to accommodate different roll attitudes of a vehicle. The result will be an increased or decreased ramp slope. Section 2.1.7 identifies the maximum ramp slope; and from this section local operating policies concerning ramp slope can be developed to accommodate vehicle roll.

2.1.3 Boarding Direction

A ramp should be capable of handling a wheelchair with the occupant facing toward or away from the vehicle.

Rationale: The ability to maneuver inside the vehicle or at a vehicle stop may require a person in a wheelchair to use a ramp in either direction. However, the Advisory Panel recommends that under normal operating conditions the wheelchair passenger face the vehicle with the attendant or driver back of the wheelchair.

2.1.4 Location of Ramp

The ramp should be installed on the side of the vehicle opposite the driver's seat (recommended) at the rear of the vehicle; or on both sides of the vehicle.

Rationale: A ramp could be used in a regular vehicle door or in a separate entrance. For safety reasons, the preferred location is the curbside of the vehicle. However, in some cases, a rear entrance may be preferred. If a rear entrance is used, vehicle loading and unloading should occur at off-street locations. In urban environments with one-way streets, having openings on both sides of a vehicle may be convenient.

2.1.5 Useful Life

When used and maintained in accordance with manufacturer's recommended procedures, the ramp structure should be designed to have a useful service life at least equal to that of the vehicle in which it is installed.

Rationale: Once installed the ramp becomes a part of the vehicle. As with other subsystems of the vehicle, the ramp with recommended maintenance (including repair and replacement of mechanical parts) should be operable as long as the vehicle. The service life of a standard transit bus is 12 to 15 years. The service life of a smaller bus is normally less, in the range of 7 to 10 years, with a van having a service life typically from 3 to 5 years.

2.1.6 Weight

2.1.6.1 The weight of the ramp should not adversely affect the legal axle loadings, the maneuverability, or the safe operation of the vehicle.

2.1.6.2 The ramp should be able to be deployed and stowed by one person.

Rationale: For legal and safety reasons the weight of the ramp should not adversely affect the vehicle on which it is used. Most transit operations have one operator per vehicle. Whether the ramp is powered or manual, it should be safely handled by one person. The use of counter balances to assist in manual operation may be necessary.

2.1.7 Ramp Slope

The maximum slope of a ramp for <u>unassisted</u> wheelchair operations or ambulatory passengers should be 1 in 12. For assisted operations slopes up to 1 in 3 are allowable.

Rationale: The Canadian Standards Association recommends a maximum gradient of 1 in 4. The Booz, Allen and Hamilton report indicated that the 1 in 4 slope would be difficult for unassisted wheelchair entry and may require assistance for exit. The ANSI architectural standards for longer building ramps are slopes no greater than 1 in 12. Assisted operations can allow greater slopes. Local operating policies will determine what the operable slopes should be. Roof height can limit ramp length and make it necessary to use slopes up to 1 in 3.

2.1.8 Ramp Width

The ramp should have a minimum usable width of 28-1/2 inches. It is desired to have a width of 32 inches.

Rationale: The 28-1/2-inch width does not preclude existing ramp manufacturers and accommodates approximately 95 percent of the existing wheelchair population. The wider ramp would facilitate entry, provide more maneuvering room, and accommodate a larger wheelchair population.

2.1.9 Ramp Surface

2.1.9.1 Slip Resistant
The surface of the ramp should be slip resistant for the operating environment conditions defined in Section 2.1.1.

2.1.9.2 Cleats (Optional)
The ramp may have cleats located to assist an attendant using a lift.

2.1.9.3 Protrusions
The ramp should have no protrusions and from the surface greater than 1/4 inch above the load bearing surface in the wheel tracks when deployed for use, except when cleats are chosen as an option.

2.1.9.4 Openings and Gaps
When the ramp is positioned horizontally any opening or gap in the ramp should reject a 3/4-inch diameter metal ball.

Rationale: The ramp must provide a non-slip surface under wet and winter conditions so that the wheelchair wheels will not slip during entry or exit. Also, the surface must provide a slip-resistant surface for persons walking on the ramp. Cleats for attendant assistance are optional and should not inhibit the movement of a wheelchair. However, it is recognized that cleats could interfere with a three-wheeled mobility aid.

Movement on and off the ramp should be easy and not inhibited by protrusions. The 1/4-inch dimension is consistent with the protrusion limits specified in the California Administrative Code.

It is desirable to minimize the gaps or openings in a ramp. The VA specifications, which require wheelchair lift platforms to have openings that meet the 3/4-inch guideline, have been adapted for these guideline specifications.

2.1.10 Ramp Threshold

The entryways of a ramp should have a vertical rise (bump) of 5/8 inch or less.

Rationale: A series of subjective tests by the VA identified 5/8 inch as a maximum allowable vertical distance.

2.1.11 Ramp Barriers

Each side of a ramp should have an edge barrier no less than one and one-half (1-1/2) inches. A 2-inch barrier is desired.

Rationale: The Booz, Allen and Hamilton report recommended 1-1/2-inch barriers, and the Canadian Standard Association requires a 1- to 2-inch height. The 1-1/2-inch height is the recommended minimum for lifts in unassisted operation. The 2-inch height is suggested for all ramps in keeping with the upper limit of CSA.

2.1.12 Ramp Passenger Assists (Optional)

Ramps should have handrails to assist wheelchair passengers in the use of the ramp. When provided, handrails should be on both sides of the ramp, 25 to 34 inches above the surface of the ramp, 1-1/4 to 1-1/2 inches in diameter or width, and positioned to permit a full hand grip with no less than 1-1/2 inches of knuckle clearance. The handrails should be capable of withstanding a horizontal force of 100 pounds concentrated at any point.

Rationale: This section is optional. The Advisory Panel felt handrails should not be recommended when passenger assistance is provided. Handrails can interfere when driver or attendant assistance is provided. The Advisory Panel also does not recommend that ambulatory passengers be permitted to use a ramp. However, if a local operator desires to allow ambulatory passengers, handrails should be used. The Booz, Allen and Hamilton report recommended the use of handrails. The height and 100-pound force requirements are found in the Canadian Standards Association document.

2.1.13 Padding and Protective Covering (Optional)

All exposed edges or other hazardous protrusions on the stowed ramp or on vehicle areas associated with the ramp should be padded with energy absorbing material to minimize injury to passengers.

Rationale: To ensure safer operations all potentially hazardous areas should be protected. Tests have shown that edges and protrusions can be especially hazardous in accident situations. To reduce the potential danger, energy absorbing material should be used to protect these areas. This guideline is optional because some operators consider the obstruction of vision a greater hazard than exposed edges.

2.1.14 Securement

If the ramp is stowed in the passenger compartment, it should be secured to the vehicle so that it can withstand a horizontal force resulting from a 20 g deceleration in any direction.

Rationale: The Canadian Standards Association document contains this requirement. Ramps are frequently used on small vehicles, such as vans. Crash tests have shown that peak decelerations of 21 to 25 g's can be experienced in small vehicles.

2.2 Structural Requirements

2.2.1 Capacity

The ramp should be designed for a load of 400 pounds distributed evenly over a length of 48 inches and the full width of the ramp halfway up the ramp.

Rationale: The Advisory Panel adopted a 400-pound capacity based on the capacity of existing ramps. The market for ramps is very small. Manufacturers indicated that the existing capacity met the market need and there were no objections by the paratransit and transit operators on the Advisory Panel.

2.2.2 Structural Safety Factor

The structural safety factor should be at least three (3) based on the ultimate strength of the construction material.

Rationale: This safety factor is in agreement with that used in the California Administrative Code for wheelchair lifts and with good engineering practices. With this safety factor there should be no bending that could produce permanent deformation of the ramp at rated load capacity.

2.2.3 Materials

Ramp structural components should be made of steel or other durable construction material.

2.2.3.1 Ferrous surfaces should be either plated with a protective coating or be cleaned and have a corrosion and abrasion resistant flat protective finish.

2.2.3.2 Nonferrous and nonmetallic surfaces should be coated using a durable flat or matte finish.

2.2.3.3 Stainless steel does not require coating or surface treatment.

Rationale: The ramp is to have a useful life equal to that of the vehicle upon which it is mounted. Materials and coatings identified in these guidelines are intended to ensure this useful life. The discussions of the Advisory Panel with regard to materials included using a salt spray test or paint thickness measurement to ensure compliance. No specific tests or coating methods have been designated so that manufacturers can continue to use their preferred methods. Panel members considered placing any coatings or surface treatments on stainless steel unnecessary.

2.2.4 Interface With Vehicle

Installation of the ramp should not reduce or in any way compromise the structural integrity of the vehicle nor cause an imbalance of the vehicle that would adversely affect vehicle handling characteristics.

Rationale: The installation of a ramp in a vehicle may require some modification. It is the responsibility of the vehicle manufacturer to determine compatibility of his vehicle's structural design with the selected ramp.

2.3 Power Ramp Requirements (The following guidelines are for power ramps.)

2.3.1 Warning Signals

2.3.1.1 Sound
When the ramp is being deployed or stored, an audible warning signal of 85 dBA, as measured 5 feet outside the door of the vehicle, should be sounded.

2.3.1.2 Lights
When the ramp is being deployed or used, the four-way flasher, hazard lights on the vehicle should be automatically operating.

Rationale: The audible warning will signal passengers at a bus stop that a powered ramp is being deployed. The 85 dBA level is a frequently used level for annunciators. A person can be exposed to this sound level for long periods of time without hearing damage; and the level is loud enough that it can be heard above normal background noise.

The four-way flasher, hazard lights will serve as a visual signal that the ramp is being deployed or used. Since ramp operation adds to the dwell time at a bus stop, the visual signal will alert motorists that the bus will be stopped for a longer than usual period.

2.3.2 Controls

2.3.2.1 Ramp Control Terminology

The following ramp control terminology should be used:

Ramp Authorized or Ramp Power -- enables the ramp to deploy or stow
Ramp Out -- ramp is commanded to a deployed position
Ramp In -- ramp is commanded to a stowed position

2.3.2.2 Ramp Authorized or Ramp Power Switch

The ramp authorized or power switch should have two positions, on and off. When in the "on" position, the ramp is enabled to deploy or stow. When in the "off" position, ramp operation is prevented.

2.3.2.3 Function Switch

The function switch or switches for ramp movement should be of the momentary type for the ramp out and ramp in commands so that ramp movement requires constant pressure on the switch. The ramp should stop moving when the "ramp out" or "ramp in" switch is released. It should not be possible to command both the "ramp out" and "ramp in" simultaneously.

2.3.2.4 Control Location

The control should be on a pendant or mounted on the vehicle. The control location shall be such that the operator can observe the ramp while using the control. Provision shall be made for storage of a pendant control unit when not being used by the operator.

Rationale: The intent is to have a simple control so as to reduce the potential of operator error and reduce cost. The general control terminology and approach is patterned after existing ramps currently supplied by a small bus manufacturer.

The ramp power switch may be a key type to prevent use of the ramp by unauthorized persons. The function switch could be a 3-position toggle switch, spring loaded to return to the center position when released or it could be done with two push button switches or other suitable implementation.

2.3.2.5 Interlocks

2.3.2.5.1 **Interlocks may prevent vehicle movement or provide a driver warning light unless the ramp is stowed and the power is off.**

2.3.2.5.2 **Interlocks may prevent operation of the ramp unless the vehicle is stopped and inhibited from moving and the appropriate door is open.**

2.3.2.5.3 **Interlocks or inherent design features should prevent stowing when ramp is occupied.**

Rationale: Interlocks are designed to prevent unsafe conditions and damage to the ramp or vehicle. The first interlock has two options. Although preventing vehicle movement is recommended, providing an interlock to prevent movement for small vehicles is technically difficult and, therefore, raises the cost. This interlock is easier for vehicles with air brakes. At a minimum, a driver warning light is recommended.

The second interlock is advisory. Some Advisory Panel members felt that this interlock could cause problems in an accident situation. It has been made optional, and if used, must be designed with allowance for possible lift operation in emergency situations by people not familiar with lift details.

The third interlock is recommended. A ramp that cannot be stowed when occupied provides for increased safety in ramp operations.

2.3.2.6 Manual Operation

The power ramp should be equipped with a manual override to enable the operator to deploy and stow the ramp in case of power failure.

Rationale: In the event of power failure a ramp must be available to unload passengers. Also, the manual operation should allow a ramp to be stowed in order to continue vehicle operations.

2.3.2.7 Wiring

Wiring should be in accordance with SAE Recommended Practice SAE J1292 OCT 81 and referenced Standards, except when good engineering practice dictates special conductor insulations.

Rationale: This SAE Recommended Practice, "Automobile, Truck, Truck Tractor Trailer, and Motor Coach Wiring," is accepted by the automotive industry and provides a baseline for design. The practice recognizes that unique design will require engineering practices that cannot be envisioned and incorporated into a recommended practice.

3.0 TESTING, CERTIFICATION, INSPECTION, AND WARRANTIES

3.1 Design Tests

The tests defined in Section 3.1 should be performed on a representative production model of the ramp procured under this specification. The ramp should meet the requirements given in Section 2.0 when attached to a fixture that simulates the vehicle installation and when supplied by a power source typically available on the vehicle. Only one representative production unit is required to be tested for certification, with all tests of Section 3.1 conducted on the same unit without repairs or maintenance during the tests, other than that permitted by Section 3.1.2.4.

3.1.1 Static Load Test (All Ramps)

A static load of 1200 pounds shall be applied through the centroid of a test pallet placed in the center of the ramp when the ramp is positioned horizontally at its deployed position. The length and width dimensions of the test pallet should be 48 inches in length and the full width of the ramp. The load should remain on the ramp not less than two (2) minutes. After the load is removed, an inspection should be made to determine if fractures have occurred.

Rationale: Since the design capacity of the ramp is 400 pounds, the proof test load was selected to demonstrate that the ramp meets the safety factor of three that is required. This test could produce permanent deformation or set of the ramp. The test in Section 3.1.1 is an adaptation of the VA Wheelchair Lift Static Load Test.

3.1.2 Power Operated Ramp Tests

The tests of Section 3.1.2 should be performed on power operated ramps.

3.1.2.1 Durability Tests

For a power operated ramp, the ramp should be deployed and stowed for 15,600 cycles. The ambient temperature for the first half of the cycles should be at least 110 F. The tests may be continuous or separated into groups of not less than 10 cycles and may have nonoperating periods of not more than one minute between each cycle in the group.

Rationale: The above test is an adaptation of the tests required for wheelchair lifts in the California Administrative Code. The test is intended to give an indication of the expected service life of a ramp.

3.1.2.2 Self Damage Tests

The controls should be held in the operating position for five (5) seconds after the ramp meets resistance to its

travel under each control position with any limit switch disabled. The tests should be performed twice at each a ramp position of deploy and stow.

Rationale: The test is designed to show that the ramp will not damage itself or the vehicle when operated with any of the limit switches failed. The test is an adaptation of the tests for wheelchair lifts found in the California Administrative Code.

3.1.2.3 Visual Inspection
At the conclusion of the tests of powered ramps described in Sections 3.1.2.1 and 3.1.2.2, with all loads removed, the parts of the ramp should show no condition of fracture, permanent deformation, wear that would exceed manufacturer's tolerances, perceptible impairment, or other deterioration that would be hazardous.

3.1.2.4 Maintenance During Tests
During the Durability Test of Section 3.1.2.1, the inspection, lubrication, maintenance, and replacement of parts (other than bulbs and fuses) may be performed only as specified in the contractor's maintenance manual for the ramp.

Rationale: The guidelines given in Sections 3.1.2.3 and 3.1.2.4 are an adaptation of those found in the California Administrative Code.

3.1.3 Certification

The contractor should provide certification that the ramp procured under this specification has been tested as required by Section 3.1 and has met all requirements.

Rationale: This is a standard practice in design testing.

3.2 Acceptance Tests (Optional)

The contractor should submit for approval to the Procuring Agency an acceptance test plan to demonstrate that the ramps procured by this specification meet the requirements given in Section 2.0. This acceptance test plan, at a minimum, should contain tests that demonstrate that the ramp meets the safety interlock requirements as given in Section 2.3.2.5. The Procuring Agency may witness any or all of these tests. A mutually agreed upon notification time prior to the start of a test should be made between the two parties. The test results should be recorded, witnessed, and submitted to the Procuring Agency as proof of meeting the acceptance criteria contained in the approved test plan.

Rationale: This section is optional since ramps would normally be purchased as part of a vehicle procurement and ramp acceptance testing would be included in the vehicle acceptance testing.

THE WARRANTY PROVISIONS AND MAINTENANCE AND SERVICE GUIDELINES THAT FOLLOW ARE ADAPTED FROM THE WHITE BOOK SPECIFICATIONS. IF THE RAMP IS PROCURED AS A PART OF A VEHICLE SPECIFICATION, THESE SECTIONS MAY NOT BE REQUIRED.

3.3 Ramp Warranty

The ramp should be warranted and guaranteed to be free from defects for one (1) year beginning on the date of acceptance of each ramp. The warranty should not apply to any part or component of the ramp that has been subjected to misuse, negligence, accident, or that has been repaired or altered in any way so as to affect adversely its performance or reliability, except insofar as such repairs were in accordance with recognized standards of the industry. The warranty should not apply to scheduled maintenance items, and items damaged as a result of normal wear and tear in service such as floor coverings and paint.

4.0 MAINTENANCE AND SERVICE

4.1 Documents

The contractor should provide ---(*)--- current maintenance manual(s), ---(*)--- current parts manual(s), and ---(*)--- current operator's manuals, or ---(*)--- combination manuals thereof as part of this contract. The contractor should keep maintenance manuals available for a period of 3 years after the date of acceptance of the ramp procured under this contract.

(*) Procuring Agency to fill in pertinent information.

4.2 Maintenance and Inspection

Scheduled maintenance or inspection tasks, as specified by the contractor, shall require a skill level of 3M or less. Scheduled maintenance tasks should be related and should be grouped in maximum vehicle mileage intervals. Routine scheduled maintenance actions should not be required at intervals of less than 6,000 vehicle miles.

4.3 Service

4.3.1 Engineering

The contractor should, at its own expense, have a competent engineering representative(s) available on request to assist the Procuring Agency's staff in the solution of engineering or design problems within the scope of these specifications that may arise during the warranty period. This does not relieve the contractor of responsibilities under Section 3.6 Warranty Provisions.

4.3.2 Replacement Parts

The contractor should guarantee the availability of replacement parts for ramps procured under this contract for at least a ---(*)--- year(s) period after the date of acceptance. Spare parts should be interchangeable with the original equipment and should be manufactured in accordance with the same quality assurance as the original part.

(*) Pertinent information to be filled in by Procuring Agency.

COMMENTS SHEET

These guideline specifications are an industry document developed by professionals familiar with accessible transportation. The document is considered to be an important step in the evolution of accessible transportation. However, it is not the final step. It is anticipated that operational experiences and technology advancements will indicate areas where these guidelines can be improved. Your comments and suggested changes are solicited. Please use this comments sheet to forward your comments to:

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Urban Mass Transportation Administration
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Comments: (When referring to specific sections of the guideline specifications, please identify the section number and title.)