
National Center on Accessibility
Indiana University
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Swimming Pool Accessibility
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RECOMMENDATIONS
&
PRODUCT INFORMATION

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Swimming Pool Accessibility Project

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**National Center on Accessibility
Swimming Pool Accessibility Project**

Table of Contents

Executive Summary	i
Recommendations	1
General	1
Ramps	4
Pool Lifts	8
Zero Depth Entry	10
Transfer Wall	11
Movable Floors	12
Transfer Steps	13
Stairs	14
Wading Pools	15
Spas	16
Removable Designs & Devices	16
Aquatic Chairs	17
Modified Delphi Technique	18
Areas for Further Research	19
References	
Appendix	
Product Tables	
Product Descriptions	

National Center on Accessibility
Swimming Pool Accessibility Project

Executive Summary

This project was conducted for the U.S. Architecture and Transportation Barriers Compliance Board to identify and evaluate methods and standards related to enabling access to swimming pools by people with disabilities. It focused on the appropriateness, independent use, degree of consistency with existing building standards, level of safety, and impact on pool design.

With the assistance of a national advisory panel, four principal activities were undertaken: a comprehensive review of literature; a national telephone survey of people with disabilities; a national telephone survey of swimming pool operators, managers, aquatic directors, and adaptive aquatic instructors; and actual pool testing of identified designs and devices by people with disabilities.

A comprehensive review of the literature was organized into four areas. The first area was a review of the published literature of the past 35 years. Seven means of pool access were identified: ramps, lifts, stairs, transfer steps, lifts, zero depth entry, movable floors, and transfer walls. The second area reviewed was the state building codes related to swimming pools. Relevant standards from each state code were presented in table format. The third area examined was the existing standards for public swimming pools and spas, ANSI/NSPI-1 1991 and ANSI/NSPI-2 1992. Finally, the fourth area analyzed the report of the Recreation Access Advisory Committee (1994). The recommendations of each of the sub-committee reports that dealt with swimming pools, sports facilities, places of amusement, and developed outdoor recreation areas, were analyzed separately. Though minor differences in technical specifications were found, there was general agreement among the various sources.

A national telephone survey of 300 people with disabilities was conducted to determine their needs and preferences relative to the effective access to swimming pools. Telephone interviews were completed with 205 subjects, 69% of the sample. Data were collected regarding subject characteristics; pool behavior including frequency, purpose and type of pool used; preferences and problems associated with various means used to access swimming pools. The findings indicated that people with disabilities do use swimming pools with some regularity. There was nearly unanimous agreement that at least one accessible means of entry and exit should be provided at all pools, and most believed that more than one accessible means should be provided. Subjects also clearly indicated that the ability to use a design or device independently was important to them. Although no one means of access was preferred by a majority of

subjects, the means of access most often preferred were lifts, ramps stairs, and zero depth entry. Stairs however were only preferred by those who were ambulatory. Similarly, ramps, zero depth entry, movable floors and lifts were the means of access most subjects would be willing to use at a pool. Yet, most of those who had previously used a movable floor would not be willing to use one again.

A national telephone survey of 150 professionals involved with swimming pool operation was conducted. The sample included swimming pool operators, pool managers, aquatic directors, adaptive aquatics instructors, and aquatic therapists. The purpose of this study was to determine the current practices of pool operations related to entering and exiting swimming pools by people with disabilities. Specifically, the study was designed to examine the prevalence of designs and devices used to provide pool access, related policies and procedures, as well as safety and maintenance concerns of aquatic professionals. The results supported the finding of the earlier survey that people with disabilities do frequent pools. People with disabilities account for 14% of pool users at those pools that collect data on pool users with disabilities. Seventy-three percent of the respondents indicated that each of the pools operated by their agencies had a least one accessible means of entry for people with disabilities and 48% reported more than one. Stairs, lifts, ramps, and zero depth entry were the means of access most frequently found at pools. Respondents reported on the safety and maintenance concerns for each of the devices or designs.

On-site testing of the identified means of pool access was conducted to examine the appropriateness, independent use, and safety of the identified means of pool access by people with diverse disabilities. This was accomplished by observing 84 people with disabilities using the identified means of providing access to swimming pools. Subjects' buoyancy points (\bar{x} =34.6 in.) and their perceptions of design/device strengths and weaknesses were presented. Entering was perceived as easier than exiting swimming pools using each of the identified means of water access. There were significant differences between ambulatory and non-ambulatory subjects in the perceived difficulty of the designs and devices. Most of the designs and devices were significantly easier to use by ambulatory subjects than they were for non-ambulatory subjects. Only lifts and transfer steps were easier for non-ambulatory subjects, although non-ambulatory subjects who required assistance in transfers were unable to use the transfer steps. Specific problems with each of the designs and devices were reported.

Recommendations

Based on the findings of the review of literature and three research studies, the following recommendations were presented:

General

- 1.1. At least one accessible means of water entry/exit shall be provided for each swimming pool and shall be located on an accessible route.
- 1.2. Swimming pools with more than 300 linear feet of pool wall shall provide at least two accessible means of water entry/exit located on accessible routes.
- 1.3. When only one accessible means of water entry is provided, it shall be a swimming pool lift, wet ramp, or zero depth entry.
- 1.4. When a second accessible means of water entry/exit is provided, it shall be a transfer wall, transfer steps, movable floor, stairs, swimming pool lift, wet ramp, or zero depth entry. Lifts, wet ramps, and zero depth entry may not be used as a second accessible means of water entry/exit if the same means is used as the first accessible means of water entry/exit.
- 1.5. When a second accessible means of water entry/exit is provided, it must be located so that in combination with the first accessible means of water entry/exit to serve both ends and sides of the pool.

Ramps

When pool ramps are provide, they should meet the following specifications:

- 2.1. Surface: The surface of pool ramps must be firm, stable, and slip resistant.
- 2.2. Slope: The least possible slope should be used for a pool ramp. The maximum slope of a pool ramp shall be 1:12.
- 2.3. The maximum rise for any run shall be 30 inches.
- 2.4. The minimum clear width of a pool ramp shall be 36 inches.
- 2.5. Landings: Level landings must be located at the bottom and top of each ramp and each ramp run. At least one level landing must be located between 24 inches and 30 inches below the stationary water level. The landings must:
 - 2.5.1. be at least as wide as the ramp run leading to it;
 - 2.5.2. have a minimum length of 60 inches clear;
 - 2.5.3. have a minimum of size of 60 inches by 60 inches if the ramp changes direction.
- 2.6. Handrails: Handrails should be required on all ramps. Ramp handrails should include the following:
 - 2.6.1. Two handrails shall be provided and located 32 to 36 inches apart.
 - 2.6.2. In addition to a top handrail gripping surface mounted at 34 inches to 38 inches above the ramp surface, a second handrail should be mounted between 16 inches and 26 inches.
 - 2.6.3. Handrails should not be required to extend beyond the base of stairs or the base of a ramp where such would protrude into a lane or otherwise programmable area.
 - 2.6.4. Handrails must be affixed so as to not allow movement in any direction.
 - 2.6.5. Handrail diameter should be 1.25 inches to 1.5 inches.

- 2.6.6. If handrails are mounted adjacent to the pool wall, the space between the wall and the handrail shall be 1.5 inches.
- 2.7. Aquatic chairs: Facilities that provide ramps must also provide an aquatic chair that meets recommendations 12.1 to 12.5.

Pool Lifts

When provided, pool lifts should meet the following specifications:

- 3.1. Pool lifts shall facilitate unassisted operation.
- 3.2. Clear space: A minimum clear deck space of at least 60 x 56 inches to one side and to the front of the lift seat must be provided. The space under the lift seat could be included as part of the clear space as long as the area is unobstructed.
- 3.3. Seat location: In the raised position the lift seat edge used for transfers must be located over the pool deck at least 12 inches inside the deck edge.
- 3.4. Seat height: Lift seats should be located 17 inches from the deck to the top of the seat surface.
- 3.5. Seat width: The lift seat width should be a minimum of 19 inches wide.
- 3.6. Footrest: A footrest should be attached to the lift seat.
- 3.7. Armrests should be located on both sides of the lift seat. The armrest located next to the clear deck space should be capable of moving away from the transfer area.
- 3.8. Controls and operating mechanisms: Controls and operating mechanisms at both the deck level and water level positions should be operable from the front edge of the lift seat and unobstructed by any other component of the lift. Controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls shall be no greater than 5 lbf (22.2 N).
- 3.9. Lifts shall be operable from both the deck level and water level.
- 3.10. Vertical travel: The vertical travel of the lift should allow the lift seat to be submerged 18 inches to 20 inches below the water level.
- 3.11. Minimum lifting capacity: A minimum weight of 300 lbs. is required for all single person lifts. The lift should also be capable of sustaining a static load of at least three times the rated load.

Zero Depth Entry (Beach Entry)

When zero depth entry is provided it should meet the following specifications:

- 4.1. Surface: The surface shall be firm, stable and slip resistant.
- 4.2. Slope: Zero depth entry pools are typically designed with very slight slopes. The maximum slope of a zero depth entry should not exceed 1:12 continuing to a minimum depth of 30 inches. For pools less than 30 inches deep, the slope should continue to the depth of the pool. Whenever the slope exceeds 1:20, it shall be considered a ramp and all recommendations for a ramp would apply.

- 4.3. Vertical rise: Whenever a zero depth entry slope exceeds 1:20, a maximum rise for any run should be 30 inches.
- 4.4. Landings: For zero depth entry slopes that exceed 1:20, at least one level landing must be located between 24 inches and 30 inches below the stationary water level. The landings must have a minimum length of 60 inches and a minimum width of 36 inches
- 4.5. Handrails: Whenever the slope of a zero depth entry exceeds 1:20, two handrails should be required 36 inches apart.
- 4.6. Whenever the slope of a zero depth entry exceeds 1:20, handrails shall have a top handrail gripping surface mounted at 34 inches to 38 inches and a second handrail mounted between 16 inches and 26 inches.
- 4.7. Handrails must be affixed so as to not allow movement in any direction.
- 4.8. Aquatic chairs: Facilities that provide zero depth entry must provide an aquatic chair that meets recommendations 12.1 to 12.5.

Transfer Wall

When a transfer wall is provided, it should meet the following specifications:

- 5.1. Clear deck space: Clear deck space of 60 inches by 60 inches should be required at the transfer wall.
- 5.2. Wall height: The wall height should be 17 inches above the pool deck.
- 5.3. Wall depth: The transfer wall should be 12 inches to 15 inches deep.
- 5.4. Wall surface: The transfer wall surface must be non-abrasive and without any sharp edges.
- 5.5. Handrails: A minimum of one handrail should be located perpendicular to the pool wall, 4 to 6 inches above the transfer wall and with a minimum of 22 inches clearance on either side of the handrail.
- 5.6. Dry ramp: If a dry ramp is used to achieve the transfer wall, all of the requirements of ADAAG 4.8.5 will apply to the ramp.

Movable Floors

When a movable floor is provided, it should meet the following specifications:

- 6.1. Pool coping: Changes in level in the pool coping should be no greater than one-half inch and be beveled with a slope no greater than 1:2.
- 6.2. Aquatic chairs: Facilities that provide a movable floor as an accessible means of water entry/exit shall provide an aquatic chair that meets recommendations 12.1 to 12.5.

Transfer Steps

When provided, transfer steps should meet the following specifications:

- 7.1. Clear deck space: Clear deck space of 60 by 60 inches should be required adjacent to the surface of the transfer steps.
- 7.2. Transfer surface: The transfer surface of the highest step should be 17 inches above the pool deck.

- 7.3. Surface: The surfaces should be firm, have no sharp edges, and should not be abrasive in texture.
- 7.4. Step risers: The risers of transfer steps should be 5 to 7 inches in height. The last step in the water should be at least 18 inches below the water surface.
- 7.5. Step surface: Transfer steps should have a minimum of 12 inches of tread depth and a minimum of 22 inches tread width.
- 7.6. Handrails: One handrail should be provided at the side of the transfer step opposite the clear deck space. The handrail should be between 4 inches and 6 inches above the step surface.
- 7.7. Handrail diameter should be 1.25 inches to 1.5 inches.

Stairs

If stairs are provided as an accessible means of water entry/exit, they should meet the following specifications:

- 8.1. Surface: The surface of pool stairs must be firm, stable, and slip resistant.
- 8.2. The minimum clear width of pool stairs shall be 36 inches.
- 8.3. All steps shall have uniform riser heights and uniform tread widths. Stair treads shall be no less than 11 inches wide.
- 8.4. Two handrails shall be provided and located 32 to 36 inches apart.
- 8.5. In addition to a top handrail gripping surface mounted at 34 inches to 38 inches above the ramp surface, a second handrail should be mounted between 16 inches and 26 inches.
- 8.6. Handrails should not be required to extend beyond the base of stairs or the base of a ramp where such would protrude into a lane or otherwise programmable area.
- 8.7. Handrails must be affixed so as to not allow movement in any direction.
- 8.8. Handrail diameter should be 1.25 inches to 1.5 inches.
- 8.9. If handrails are mounted adjacent to the pool wall, the space between the wall and the handrail shall be 1.5 inches.

Wading Pools

- 9.1. A minimum of one accessible means of water entry/exit shall be provided for each wading pool and shall be located on an accessible route.
- 9.2. An accessible means of water entry to wading pools shall be one of the following: transfer wall, transfer steps, pool lift, a wet ramp, or a zero depth entry, provided the means of entry/exit meets each of the recommendations for that means of entry/exit.

Spas

- 10.1. A minimum of one accessible means of water entry/exit shall be provided for each spa and shall be located on an accessible route.

10.2. An accessible means of water entry to spas shall be one of the following: transfer wall, transfer steps, or lift, provided the means of entry/exit meets all recommendations that apply to the selected means of entry/exit.

10.3. An accessible spa that is unattended shall have a means of emergency notification that is adjacent to the accessible means of egress, within reach of someone seated in the spa, and operable at all times.

10.4. Controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls shall be no greater than 5 lbf (22.2 N).

Removable Designs & Devices

11.1. A removable device must remain in place until all users of the device have exited the pool tank.

11.2. Removable devices shall be on-site, readily available, maintained and operable at all times. Whenever possible, removable devices should be in place.

11.3. Signage: Whenever devices are removable and not in place at all times, signs must be posted to instruct users as to how the designs/devices can be requested.

Aquatic Chairs

12.1. Whenever a ramp, zero depth entry, or movable floor is used as an accessible means of water entry/exit, an aquatic chair with push rims must be provided.

12.2. At least one aquatic chair with a top surface of the seat at 17 inches above the deck shall be provided.

12.3. Seat width: The aquatic chair seat width should be a minimum of 19 inches wide.

12.4. Footrest: Footrests should be provided on the aquatic chair.

12.5. Armrests should be located on both sides of the aquatic chair seat. At least one armrest should be capable of moving away from the side of the chair.

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U.S. Access Board
Swimming Pool Accessibility Project

Recommendations

Based on a review of the literature and findings of the three studies completed as part of this project, the following recommendations are proposed. These recommendations are intended for new construction of pools unless otherwise noted. These recommendations do not apply to pools used exclusively as part of an amusement ride.

General

1.0. At least one accessible means of water entry/exit shall be provided for each swimming pool and shall be located on an accessible route.

Rationale: Results of this project suggest that people with disabilities frequent pools with some regularity despite the many barriers noted by Mace (1993), Osinski (1993), Popke (1994) and others. The telephone survey of people with disabilities indicated that 60% of those surveyed had used a pool during the previous year, and most commonly once a month. Also, the pool facility survey found that those pools for which attendance data were collected averaged 3,713 visitors with disabilities during the past year. People with disabilities accounted for an average of 14% of the total visitors for those pools.

The importance to people with disabilities of providing accessible means of entering and exiting pools was clearly demonstrated in the survey of people with disabilities. Of those individuals surveyed, 99% indicated that one or more means of access should be required at each pool.

The feasibility of this recommendation was supported in the findings of the pool facility survey. At least one means of access for people with disabilities was already being provided at each pool operated by 73% of the respondents. The prevalence of accessible means of access was found across all types of agencies.

1.1. Swimming pools with more than 300 linear feet of pool wall shall provide at least two accessible means of water entry/exit located on accessible routes.

Rationale: Recognizing the need to provide multiple access points for all users, ANSI/NSPI-1 standard 5.2 requires at least two means of entry/exit for all pools "so as to serve both ends of the pool." In addition, standard 5.2.4. requires a means of entry/exit "a minimum of every seventy-five (75) linear feet of pool wall or fraction thereof." Multiple access points provided for greater safety and convenience to users, allowing them to exit a pool easily when they become tired or in danger, as well as to enter and exit a pool near an area of interest (e.g., shallow end or deep end).

The principle is equally important to pool users with disabilities. The majority (58%) of respondents in the telephone survey of people with disabilities indicated more than one means of access should be provided for all pools. Recognizing the need for multiple access points is most important at larger pools, this recommendation would only apply to those pools.

1.2. When only one accessible means of water entry is provided, it shall be a swimming pool lift, wet ramp, or zero depth entry.

Rationale: Each means of pool access was examined to determine its appropriateness, independent use, degree of consistency with existing building standards, level of safety, and impact on pool design. Based on the findings of this project, the designs and devices that most effectively met these criteria were lifts, ramps, and zero depth entries.

Although no one design or device would meet the needs or fully satisfy everyone; ramps, lifts, and pools provide independent operation to the greatest extent possible to the broadest scope of people. In the telephone survey of people with disabilities, 81% of the respondents indicated the ability to use a design/device was important or very important. Also, 57% of the pool facility staff indicated it was important or very important that the device/design be used without pool staff assistance. The telephone survey of people with disabilities found that lifts (29%), ramps (25%), stairs (11%), and zero depth entry (9%) were the preferred means of access by people with disabilities, although stairs were only a preferred means by those who were ambulatory (20%). When asked which means of access they would be willing to use, most subjects were willing to use ramps (73%), zero depth entry (70%), movable floors (63%), and lifts (60%). However, only 33% of those experienced with movable floors indicated a willingness to use them again. As indicated in the study of swimming pool facilities, the identified means of water entry access were also among the designs and devices most frequently found at pools. Fifty-five percent (55%) of the surveyed sites had lifts, 36% had ramps, and 29% had zero depth entry. The prevalence of these designs/devices is evidence of their feasibility. Also, lifts, ramps, and zero depth entry were among the devices pool staff indicated had the fewest safety concerns, fewest problems and required the least amount of maintenance.

The other tested means of water access provide effective access to pools, however, the target population for each of the devices is limited in scope. Transfer walls and transfer steps target people with very limited or no controlled movement in their legs. In the on-site testing of transfer walls and transfer steps, only people with significant upper-body strength were able to use them effectively or with ease. Findings of the telephone survey also indicate the limited use of these designs, as only 49% of the

respondents indicated a willingness to use transfer steps and 56% indicated a willingness to use a transfer wall.

Stairs are especially helpful for people with limited function, weakness, or soreness in their legs. However, less than half (45%) of the respondents in the telephone survey of people with disabilities were willing to even attempt to use stairs.

Though movable floors required the least amount of effort by subjects in the on-site testing, there were several factors that led to it not being included as a primary means of water access. First, movable floors provide very limited independent functioning by people with disabilities. The safe operation of movable floors requires the controls be located away from the pool. This eliminates the possibility of a person in the pool also operating the movable floor. Second, operation of the floor disrupts pool activity for everyone using the pool, drawing undue attention to the person with a disability. Finally, movable floors are often installed on only a portion of the pool with all four sides blocked by a bulkhead. A person with a disability is limited to that section of the pool, eliminating participation in a wide range of activities.

1.3. When a second accessible means of water entry/exit is provided, it shall be a transfer wall, transfer steps, movable floor, stairs, swimming pool lift, wet ramp, or zero depth entry. Lifts, wet ramps, and zero depth entry may not be used as a second accessible means of water entry/exit if the same means is used as the first accessible means of water entry/exit.

Rationale: As previously noted, no single design or device will meet the needs of all people with disabilities. The telephone survey of people with disabilities found that while some devices were preferred more often than others, no single device was the preferred device of a majority of the respondents. Selecting a second accessible means of water entry/exit that complements the first means will provide greater access to more people with disabilities. Based on the findings of this project, the accessible means of water entry/exit that complement one another are listed in Table 5.1.

Table 5.1. Primary means of water access and their complements.

First Means of Water Access	Second Means of Water Access
Lift	<ul style="list-style-type: none"> •Ramp •Stairs •Transfer steps •Transfer wall •Zero depth entry •Movable floor
Ramp	<ul style="list-style-type: none"> •Lift •Stairs •Transfer steps •Transfer wall •Movable floor
Zero Depth Entry	<ul style="list-style-type: none"> •Lift •Stairs •Transfer steps •Transfer wall •Movable floor

1.4. When a second accessible means of water entry/exit is provided, it must be located so that in combination with the first accessible means of water entry/exit to serve both ends and sides of the pool.

Rationale: This recommendation provides parallels to ANSI/NSPI-1 standards 5.2, 5.2.2, and 5.2.4. Recognizing the need by all swimmers to access different areas of a pool, ANSI/NSPI-1 standard 5.2 requires two means of entry/exit located “so as to serve both ends of the pool.”

ANSI/NSPI-1 standard 5.2.2 requires entries/exits on “both sides of the deep portions” of pools over 30 feet in width. As nearly all pools will be “deep” for people unable to stand, the principle of 5.2.2 is appropriately applied when a second accessible means of water entry/exit is provided. To provide for greater safety to pool users, ANSI/NSPI-1 5.2.4 requires a means of entry/exit for every 75 linear feet of pool wall. The recommendation for locating the accessible means of access to serve both ends and sides of the pool would provide greater safety and convenience for people with disabilities, though still not to an extent equal to other pool users.

Ramps

Pool ramps begin at the pool’s deck level and provide an even sloped surface into the water. They may be constructed as part of the pool or may be portable or removable equipment. Ramps are located either in the primary pool area or in a swimout area that leads into the primary pool area. When ramps,

whether permanent or movable, are provided, they should meet the following specifications:

2.1. Surface: The surface of pool ramps must be firm, stable, and slip resistant.

Rationale: ANSI/NSPI-1 (p.50) defines a slip resisting surface as one "that has been so treated or constructed as to significantly reduce the chance of a user slipping. The surface should not be an abrasion hazard." The findings of this project provide further evidence that both slipping and abrasion are potential hazards in pools. Slipping was observed by the investigators in the on-site testing and both slipping and abrasion were mentioned as problems in the telephone survey of people with disabilities.

2.2. Slope: The least possible slope should be used for a pool ramp. The maximum slope of a pool ramp shall be 1:12.

Rationale: The findings of this project indicate that pool ramp slopes greater than 1:12 are not only very difficult for many non-ambulatory users but can also be hazardous for non-ambulatory and ambulatory users. Though subjects in the on-site testing perceived the 17% ramp as relatively easy to use, each of the non-ambulatory subjects who attempted to use the 17% ramp required assistance in pushing out of the water. Observations during the on-site testing also indicate that wheelchairs were more difficult to control once the user's hands were wet.

Among the limitations of the on-site testing were that only ramps with 8.3% and 17% slopes could be tested and a small sample of children who were tested. Consequently, there is not enough evidence from the study to suggest a change in the maximum slope, however additional research into this area is recommended.

2.3. The maximum rise for any run shall be 30 inches.

Rationale: Though ADAAG 4.8.2 requires a maximum rise of 30 inches for any ramp run, many state codes require multipurpose pool tank depths to be a minimum of 36 inches deep at the shallow end of the pool. To determine the appropriate water depth for some using a wheelchair, mean buoyancy and mean seated height were calculated. The buoyancy point was the water depth at which subjects became buoyant or floated off their chairs. When this occurred, subjects also began to lose control of their chairs. The mean buoyancy point of 34.2 inches for adult wheelchair users would indicate a flat surface at 36 inches would be problematic. Though a small number of children participated in the on-site testing, the data suggest a mean buoyancy point of 30.8.

This recommendation was also supported by the on-site testing for seated height of wheelchair users. The mean seated heights found for children (43.5 inches) and adults (51.3 inches) were consistent with the anthropometric data of the American Institute of Architects (Hoke, 1994). When the shoulder to head length for an average sized 9-year old (11.4 inches) is subtracted from the 43.5 seated height found for children, the

water depth at shoulder level for the average seated child is 32.1 inches. A water depth of 36 inches would be over the mouth and nose of an average 9-year old child.

- 2.4. The minimum clear width of a pool ramp shall be 36 inches.

Rationale: This recommendation is consistent with ADAAG 4.8.3. The portable ramp used in the on-site testing had a clear width of 30 inches, which was too narrow for some chair users. The other ramps tested had clear widths of 36 inches and no problems were encountered.

- 2.5. Landings: Level landings must be located at the bottom and top of each ramp and each ramp run. At least one level landing must be located between 24 inches and 30 inches below the stationary water level. The landings must:

- 2.5.1. be at least as wide as the ramp run leading to it;

Rationale: This recommendation is consistent with ADAAG 4.8(1). Each of the ramps tested had landings at the top and bottom consistent with this recommendation, and no problems were encountered related to the landing width.

- 2.5.2. have a minimum length of 60 inches clear;

Rationale: This recommendation is consistent with ADAAG 4.8.4(2). Thought was given to recommending a minimum length of 48 inches, based on the assumption that electric wheelchairs and scooters would not be operated in pools. A minimum length of 48 inches would accommodate an average wheelchair (ADAAG 4.2.4.1), but it would not allow space for a wheelchair user to exit the chair.

- 2.5.3. have a minimum of size of 60 inches by 60 inches if the ramp changes direction.

Rationale: This recommendation is consistent with ADAAG 4.8(3). There was no evidence in this project that would suggest a deviation from ADAAG, as none of the ramps tested included a change in direction and no comments were received in either the survey of people with disabilities or the survey of pool facilities.

- 2.6. Handrails: Handrails should be required on all ramps. Ramp handrails should include the following:

- 2.6.1. Two handrails shall be provided and located 36 inches apart.

Rationale: The Places of Amusement Sub-committee recommended that handrails only be placed on one side of a ramp, away from the body of water in the pool. The findings of this project indicate both a need and preference by people with disabilities for handrails on both sides. As noted in the survey of people with disabilities, experienced pool ramp users were more likely to use handrails when they were on both sides of the ramp (68%) than when there was only one handrail (50%). Non-ambulatory users were less likely to use the handrail if only one handrail was available. The survey of pool facilities also indicated that two

handrails were most often found on pool ramps. Of those pools with ramps, 91% indicated two handrails were already installed.

- 2.6.2. In addition to a top handrail gripping surface mounted at 34 inches to 38 inches above the ramp surface, a second handrail should be mounted between 16 inches and 26 inches.

Rationale: The height of the top gripping surface is consistent with ADAAG 4.8.5(5). The majority of the subjects (90%) indicated the top rail heights were adequate, however, each of the four subjects who indicated the handrails were too high were wheelchair users. Mace (1993) recommended a second handrail be placed at 20 inches to 24 inches. The 16 inches to 26 inches height was recommended for ramp handrails in children's environments (U.S. Access Board, 1992). The National Sporting Goods Association (1994) reports that 33% of the people who participate in swimming are under the age of 18.

- 2.6.3. Handrails should not be required to extend beyond the base of stairs or the base of a ramp where such would protrude into a lane or otherwise programmable area.

Rationale: The Places of Amusement Sub-committee appropriately noted that handrails partially submerged in the water or adjacent to swimming lanes are a protrusion hazard for swimmers and are often banned in swimming pool design codes. Though the building codes do not specifically prohibit submerged handrails, many prohibit underwater protrusions and areas of entrapment.

- 2.6.4. Handrails must be affixed so as to not allow movement in any direction.

Rationale: During testing, the handrails on a movable ramp moved up to 3 inches from left to right, causing difficulty for both ambulatory and non-ambulatory users.

- 2.6.5. Handrail diameter should be 1.25 inches to 1.5 inches.

Rationale: This recommendation is consistent with ADAAG 4.26.2. Each of the ramps in the onsite testing had handrails within the specified range and no problems were observed. Consequently, there was no evidence to suggest a deviation from ADAAG.

- 2.6.6. If handrails are mounted adjacent to the pool wall, the space between the wall and the handrail shall be 1.5 inches.

Rationale: This recommendation is consistent with ADAAG 4.26.2. There was no evidence in the current study to suggest a deviation from ADAAG.

- 2.7. Aquatic chairs: Facilities that provide ramps must also provide an aquatic chair that meets recommendations 12.1 to 12.5.

Rationale: As evidenced in this project, wheelchair users are not inclined to use their wheelchairs to enter and exit the water. The damage to chairs not designed to be used in water was apparent in as few as three uses of a standard wheelchair in the water. The unwillingness to use

ramps by many respondents in the telephone survey was due to the need for an aquatic chair.

Pool Lifts

Pool lifts are mechanical devices that move a person into or out of the water. Some lifts are permanently installed others are portable, placed in a deck mounting or rolled into place when needed.

When provided, pool lifts should meet the following specifications:

3.1. Pool lifts shall facilitate unassisted operation.

Rationale: Consistent with the ADAAG standard for platform lifts (4.11.3), this recommendation would provide comparable access to pool lifts.

There are limitations in assuring independent transfer to and from pool lifts, therefore, the requirement for unassisted entry and exit to platform lifts is not included in this recommendation. This recommendation is supported by findings of the telephone survey of people with disabilities in which 81% of the respondents indicated the ability to use a design/device without assistance was important or very important. Also, 57% of the pool facility staff indicated it was important or very important that a device or design be used without pool staff assistance.

3.2. Clear space: A minimum clear deck space of at least 60 x 56 inches to one side and to the front of the lift seat must be provided. The space under the lift seat could be included as part of the clear space as long as the area is unobstructed.

Rationale: In order to safely transfer from a wheelchair to the lift seat, a wheelchair user must have sufficient room to place the wheelchair next to the lift seat. As the optimum positioning will vary according to the user's functional abilities, clear space is needed at both the front and side of the lift seat. Again, ADAAG (4.17.3) standards for toilet stalls provide a parallel situation from which to draw. The standard toilet stall provides a clear space on one side of the water closet to enable persons who use wheelchairs to perform a side or diagonal transfer from the wheelchair to the water closet.

3.3. Seat location: In the raised position the lift seat edge used for transfers must be located over the pool deck at least 12 inches inside the deck edge.

Rationale: The requirement of a minimum of 12 inches from the seat edge to the deck edge is necessary to allow for a transfer away from the water. There were several lifts tested, including lifts installed less than one year prior to use in this study, for which the nearest seat edge was at the deck edge or over the water surface. The danger to users in those situations was both real and perceived. Also, seat location was identified as a problem by respondents in the telephone survey of people with disabilities.

3.4. Seat height: Lift seats should be located 17 inches from the deck to the top of the seat surface.

Rationale: This height range is needed to allow easy transfer from wheelchairs to the raised edge. The height is consistent with the seat height ranges for water closets in ADAAG (4.16.3) and at the upper range of the Access Board's recommendations for fourth graders (9 years old) in children's environments (1992, Chapter 5, p. 12). It may be advisable for the lift seat to be readily adjustable to other heights to accommodate users with seats of varying heights, however, the seat must have the capability of stopping in the transfer position at a height of 17 inches.

3.5. Seat width: The lift seat width should be a minimum of 19 inches wide.

Rationale: Each of the tested seats met or exceeded this width and no problems were observed.

3.6. Footrest: A footrest should be attached to the lift seat.

Rationale: For many adults, their legs will extend beyond the 17 inches distance below the lift seat. Without a footrest, the user's feet will drag across the deck, which may cause an injury to the individual. The on-site testing provided evidence of the problem.

3.7. Armrests should be located on both sides of the lift seat. The armrest located next to the clear deck space should be capable of moving away from the transfer area.

Rationale: For stability purposes, subjects in the telephone survey and on-site testing indicated both a need and strong preference for armrests on both sides of lifts. A movable armrest is needed next to the clear deck space to allow for transfers.

3.8. Controls and operating mechanisms: Controls and operating mechanisms at both the deck level and water level positions should be operable from the front edge of the lift seat and unobstructed by any other component of the lift.

Controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls shall be no greater than 5 lbf (22.2 N).

Rationale: The mechanism for operation of the lift should allow for safe, independent operation by the user. Several lifts used in the onsite testing had lift operating mechanisms located in areas that required the user to quickly move his/her hand when the lift began to move. Most of the mechanisms were difficult to reach for someone seated in the lift seat. Typically, they were located too close to the seat back and on the outside of the armrests, making them difficult and/or dangerous to use.

3.9. Lifts shall be operable from both the deck level and water level.

Rationale: This recommendation would assure that a person in the pool would always have access to the pool lift, while also providing access to other potential users. Each of the power operated lifts used in the on-site testing had this capability.

3.10. Vertical travel: The vertical travel of the lift should allow the lift seat to be submerged 18 inches to 20 inches below the water level.

Rationale: In order to facilitate a person transferring onto and off of the lift seat while in the water. Based on the buoyancy data of the on-site testing, a water depth of 18-20 inches would provide sufficient buoyancy for most users to enter and exit the water from the lift seat.

3.11. Minimum lifting capacity: A minimum weight of 300 lbs. is required for all single person lifts. The lift should also be capable of sustaining a static load of at least three times the rated load.

Rationale: ANSI A.17.1 Rule Number 2002.7A requires a minimum weight capacity of 250 lbs. for single seat lifts. However, there were several indicators during this project that the 250 lbs. may be insufficient. Lifts at two of the facilities used for on-site testing had been replaced because of weight damage. Breakdowns and injuries due to insufficient weight capacity were cited in the telephone surveys of pool facility staff and people with disabilities.

Zero Depth Entry (Beach Entry)

Zero depth entry pools provide an end of the pool where the pool bottom begins at the deck level and gradually slopes to a deeper level. This creates an entry similar to that of a beach. When zero depth entry is provided it should meet the following specifications:

4.1. Surface: The surface shall be firm, stable and slip resistant.

Rationale: ANSI/NSPI-1 1991 (p.50) defines a slip resisting surface as one "that has been so treated or constructed as to significantly reduce the chance of a user slipping. The surface should not be an abrasion hazard." The findings of this project provide further evidence that both slipping and abrasion are potential hazards for pools. Slipping was observed by the investigators in the on-site testing and both slipping and abrasion were mentioned as problems in the telephone survey of people with disabilities.

4.2. Slope: Zero depth entry pools are typically designed with very slight slopes. The maximum slope of a zero depth entry should not exceed 1:12 continuing to a minimum depth of 30 inches. For pools less than 30 inches deep, the slope should continue to the depth of the pool. Whenever the slope exceeds 1:20, it shall be considered a ramp and all recommendations for a ramp would apply.

Rationale: The findings of this project indicate that submerged slopes greater than 1:12 are not only very difficult for many non-ambulatory users but can also be hazardous for non-ambulatory and ambulatory users. Though wheelchairs were more difficult to control when wet, there was no evidence that would indicate that the maximum slope should be reduced or increased from that required of buildings and facilities in ADAAG 4.8.2.

The requirement for the slope to continue to a minimum depth of 30 inches is to assure that a gradual slope continues to a point at which a person using an aquatic chair could comfortably exit the chair. Based on the buoyancy data of the on-site testing, 30 inches would be a reasonable depth.

4.3. Vertical rise: Whenever a zero depth entry slope exceeds 1:20, a maximum rise for any run should be 30 inches.

Rationale: Once the zero depth entry slope exceeds 1:20 it is a ramp, and all of the recommendations for pool ramps (2.6.0 to 2.6.7) should apply.

4.4. Landings: For zero depth entry slopes that exceed 1:20, at least one level landing must be located between 24 inches and 30 inches below the stationary water level. The landings must have a minimum length of 60 inches and a minimum width of 36 inches

Rationale: Once the zero depth entry slope exceeds 1:20 it is a ramp, and all of the recommendations for pool ramps (2.6.0 to 2.6.7) should apply.

4.5. Handrails: Whenever the slope of a zero depth entry exceeds 1:20, two handrails should be required 36 inches apart.

Rationale: Once the zero depth entry slope exceeds 1:20 it is a ramp, and all of the requirements for pool ramps (2.6.0 to 2.6.7) should apply. The findings of this project clearly indicate both a need and preference by people with disabilities for handrails at zero depth entries.

4.6. Whenever the slope of a zero depth entry exceeds 1:20, handrails shall have a top handrail gripping surface mounted at 34 inches to 38 inches and a second handrail mounted between 16 inches and 26 inches.

Rationale: Once the zero depth entry slope exceeds 1:20 it is a ramp, and all of the requirements for pool ramps (2.6.0 to 2.6.7) should apply.

4.7. Handrails must be affixed so as to not allow movement in any direction.

Rationale: During testing, the handrails on a portable ramp moved up to three inches from center, causing difficulty for both ambulatory and non-ambulatory users.

4.8. Aquatic chairs: Facilities that provide zero depth entry must provide an aquatic chair that meets recommendations 12.1 to 12.5

Rationale: As evidenced in this study, wheelchair users are not inclined to use their wheelchairs to enter and exit the water. The damage to chairs not designed for use in water was apparent in as few as three uses in this study.

Transfer Wall

A transfer wall is created by having the pool wall above the pool deck but at water level. This may be achieved by a continuous elevated wall around the perimeter of the pool or a dry ramp that lowers a section of the deck. When a transfer wall is provided, it should meet the following specifications:

5.1. Clear deck space: Clear deck space of 60 inches by 60 inches should be required at the transfer wall.

Rationale: The clear deck space is needed to enable a wheelchair user to locate the wheelchair in an optimal transfer position and to allow adequate turning space in accordance with ADAAG 4.2.3.

5.2. Wall height: The wall height should be 17 inches above the pool deck.

Rationale: This height range is needed to allow easy transfer from wheelchairs to the raised edge. The height is at the lower range of adult seat height for water closets in ADAAG (4.16.3) and at the upper range of the Access Board's recommendations for fourth graders (9 years old) in children's environments (1992, Chapter 5, p. 12).

5.3. Wall depth: The transfer wall should be 12 inches to 15 inches deep.

Rationale: A transfer wall deep enough to provide an adequate surface on which to transfer yet not so deep as to require the user to scoot across the surface is needed.

5.4. Wall surface: The transfer wall surface must be non-abrasive and without any sharp edges.

5.5. Handrails: A minimum of one handrail should be located perpendicular to the pool wall, 4 to 6 inches above the transfer wall and with a minimum of 22 inches clearance on either side of the handrail.

Rationale: The handrail will assist a person making the transfer to and from the transfer wall as well as into and out of the water.

5.6. Dry ramp: If a dry ramp is used to achieve the transfer wall, all of the requirements of ADAAG 4.8.5 will apply to the ramp.

Rationale: Dry ramps lower the deck to a point 17 inches below the water line. As dry ramps are outside of the pool tank, the existing ADAAG standards for ramps (4.8.5) should apply.

Movable Floors

Movable pool floors allow the entire pool floor or just a section of the floor to be raised or lowered to any depth or to a desired slope. Hydraulic pistons are used to slowly move the floor. When the floor is raised to deck level, participants can either walk or roll their wheelchairs onto the pool floor and be lowered to the desired water depth.

6.1. Pool coping: Changes in level in the pool coping should be no greater than one-half inch and be beveled with a slope no greater than 1:2.

Rationale: A person using a wheelchair must be able to move onto and off of the movable floor without obstruction. The ADAAG standard for changes in level (ADAAG 4.5.2) has been applied here.

6.2. Aquatic chairs: Facilities that provide a movable floor as an accessible means of water entry/exit shall provide an aquatic chair that meets recommendations 12.1 to 12.5

Rationale: As evidenced in this study, wheelchair users are not inclined to use their wheelchairs to enter and exit the water. The damage to chairs not designed for use in water was apparent in as few as three uses in this study.

Transfer Steps

Transfer steps are a series of surfaces that descend into the water allowing a person to sit and transfer from one surface to the next to enter or exit the pool. They can be either permanent or movable. When provided, transfer steps should meet the following specifications:

7.1. Clear deck space: Clear deck space of 60 by 60 inches should be required adjacent to the surface of the transfer steps.

Rationale: The clear deck space is needed to enable a wheelchair user to locate the wheelchair in an optimal transfer position and still allow space for someone else to maneuver around the parked wheelchair.

7.2. Transfer surface: The transfer surface of the highest step should be 17 inches above the pool deck.

Rationale: This height range is needed to allow easy transfer from wheelchairs to the raised edge. The height is at the lower range of adult seat height for water closets in ADAAG (4.16.3) and at the upper range of the Access Board's recommendations for fourth graders (9 years old) in children's environments (1992, Chapter 5, p. 12).

7.3. Surface: The surfaces should be firm, have no sharp edges, and should not be abrasive in texture.

Rationale: The surface is not required to be slip resistant as this may prevent a person from successfully transferring from step to step.

7.4. Step risers: The risers of transfer steps should be 5 to 7 inches in height. The last step in the water should be at least 18 inches below the water surface.

Rationale: Based on the buoyancy data of the on-site testing, most people should be able to comfortably transfer to and from the water at 18 inches.

7.5. Step surface: Transfer steps should have a minimum of 12 inches of tread depth and a minimum of 22 inches tread width.

Rationale: The transfer steps used in the on-site testing were within the recommended limits. The difficulties with transfer steps experienced by subjects in the on-site testing were not related to the depth and width of the steps. Each of the transfer steps currently available comply with this recommendation, and no problems associated with the tread depth or width were identified by respondents in the telephone survey of people with disabilities or by those in the pool facility survey.

7.6. Handrails: One handrail should be provided at the side of the transfer step opposite the clear deck space. The handrail should be between 4 inches and 6 inches above the step surface.

Rationale: The transfer steps used in the on-site testing were within the recommended limits. Each of the subjects who used the transfer steps in the on-site testing were satisfied with the handrail height.

7.7. 2.6.5. Handrail diameter should be 1.25 inches to 1.5 inches.

Rationale: This recommendation is consistent with ADAAG 4.26.2. The transfer steps used in the onsite testing had handrails within the specified range and no problems were observed. Consequently, there was no evidence to suggest a deviation from ADAAG.

Stairs

Stairs may be constructed as part of the pool or may be portable or removable equipment. Stairs may be located either in the primary pool area or in a swimout area that leads into the primary pool area. If stairs are provided as an accessible means of water entry/exit, they should meet the following specifications:

8.1. Surface: The surface of pool stairs must be firm, stable, and slip resistant.

Rationale: ANSI/NSPI-1 (p.50) defines a slip resisting surface as one "that has been so treated or constructed as to significantly reduce the chance of a user slipping. The surface should not be an abrasion hazard." The findings of this project provide further evidence that both slipping and abrasion are potential hazards for pools. Slipping was observed by the investigators in the on-site testing and both slipping and abrasion were mentioned as problems in the telephone survey of people with disabilities.

8.2. The minimum clear width of pool stairs shall be 36 inches.

Rationale: This recommendation is consistent with ADAAG 4.8.3. Each of the stairs used in the on-site testing complied with this recommendation. There was no evidence to indicate a change in this area.

8.3. All steps shall have uniform riser heights and uniform tread widths. Stair treads shall be no less than 11 inches wide.

Rationale: This recommendation is consistent with ADAAG 4.9.2. Each of the stairs used in this study met this requirement and no problems were encountered, thus there was evidence to suggest a deviation from ADAAG.

8.4. Two handrails shall be provided and located 36 inches apart.

Rationale: The findings of this project indicate both a need and preference by people with disabilities for handrails on both sides. As noted in the survey of people with disabilities, experienced users of pool stairs preferred handrails on both sides of the stairs (77%). The on-site testing reinforced the need for handrails on both sides, especially for those with weakness or paralysis in one arm. The survey of pool facilities also indicated that two handrails were most often found with pool stairs. Of those pools with stairs, 83% indicated two handrails were already installed.

8.5. In addition to a top handrail gripping surface mounted at 34 inches to 38 inches above the ramp surface, a second handrail should be mounted between 16 inches and 26 inches.

Rationale: The height of the top gripping surface is consistent with ADAAG 4.8.5(5). Mace (1993) recommended a second handrail be placed at 20 inches to 24 inches. The 16 inches to 26 inches height was recommended for ramp handrails in children's environments (U.S. Access Board, 1992). The National Sporting Goods Association (1994) reports that 33% of the people who participate in swimming are under the age of 18.

8.6. Handrails should not be required to extend beyond the base of stairs or the base of a ramp where such would protrude into a lane or otherwise programmable area.

Rationale: The Places of Amusement Sub-committee appropriately noted that handrails partially submerged in the water or adjacent to swimming lanes are a protrusion hazard for swimmers and are often banned in swimming pool design codes. Though the building codes do not specifically prohibit submerged handrails, many prohibit underwater protrusions and areas of entrapment.

8.7. Handrails must be affixed so as to not allow movement in any direction.

Rationale: During testing, the handrails on a movable ramp moved up to 3 inches from left to right, causing difficulty for both ambulatory and non-ambulatory users. The same principle would apply to stairs.

8.8. Handrail diameter should be 1.25 inches to 1.5 inches.

Rationale: This recommendation is consistent with ADAAG 4.26.2. Each of the stairs in the onsite testing had handrails within the specified range and no problems were observed. Consequently, there was no evidence to suggest a deviation from ADAAG.

8.9. If handrails are mounted adjacent to the pool wall, the space between the wall and the handrail shall be 1.5 inches.

Rationale: This recommendation is consistent with ADAAG 4.26.2. There was no evidence in the current study to suggest a deviation from ADAAG.

Wading Pools

9.0. A minimum of one accessible means of water entry/exit shall be provided for each wading pool and shall be located on an accessible route.

Rationale: Though wading pools were not examined in this project, many of the principles for swimming pool accessibility would apply. Providing an accessible means of entry/exit would facilitate independent pool use by young children with disabilities as well as parents who have disabilities. Also, people with disabilities who are weak or non-swimmers might feel more comfortable in the shallow depths of wading pools.

9.1. An accessible means of water entry to wading pools shall be one of the following: transfer wall, transfer steps, pool lift, a wet ramp, or a zero depth entry, provided the means of entry/exit meets each of the recommendations for that means of entry/exit.

Rationale: The shallow depth of wading pools make some designs and devices untenable. For example, existing designs for pool lifts would not be usable in the shallow depths of wading pools and the pool space required for a wet ramp would not be available in small wading pools. Consequently, transfer walls and transfer steps are allowed as accessible means of access into wading pools.

Spas

10.0. A minimum of one accessible means of water entry/exit shall be provided for each spa and shall be located on an accessible route.

Rationale: Though spas were not specifically examined in this project, many of the principles for swimming pool accessibility would apply.

Providing an accessible means of entry/exit would facilitate independent spa use by people with disabilities.

10.1. An accessible means of water entry to spas shall be one of the following: transfer wall, transfer steps, or lift, provided the means of entry/exit meets all recommendations that apply to the selected means of entry/exit.

Rationale: Generally, size of spas make some designs and devices untenable. For example, wet ramps and zero depth entry are not feasible for spas. Consequently, transfer walls and transfer steps are allowed as accessible means of access into spas.

10.2. An accessible spa that is unattended shall have an means of emergency notification that is adjacent to the accessible means of egress, within reach of someone seated in the spa, and operable at all times.

Rationale: ANSI/NSPI-2 (1992) standard 17.2.1.6 acknowledges that "overexposure to hot water may cause nausea, dizziness, and fainting." As many spas are left unattended, there may be situations when a device breaks down or become unusable. Though not specifically addressed in the study, survey respondents with disabilities did note the need for a means of contacting someone should a device break down or become unusable.

10.3. Controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls shall be no greater than 5 lbf (22.2 N).

Rationale: See rationale for recommendation 3.8.

Removable Designs & Devices

11.1. A removable device must remain in place until all users of the device have exited the pool tank.

Rationale: It is assumed that a person who uses a device to enter a pool will also need that same device to exit the pool. This recommendation assures that the device is available when the person desires or needs to exit the pool.

11.2. Removable devices shall be on-site, readily available, maintained and operable at all times. Whenever possible, removable devices should be in place.

Rationale: Many of the respondents in the telephone survey of pool facilities indicated their agency's removable devices (e.g., lifts, ramps, transfer stairs, etc.) were not in place at all times. For example, of those agencies with portable lifts, 73% indicated the lifts were not in place at all times. This shifts responsibility to the potential user to request the device, in effect separating that person from other pool users. Unless a hazard to users and staff or an undue hardship for the agency can be clearly demonstrated, devices should be in place.

11.3. Signage: Whenever devices are removable and not in place at all times, signs must be posted to instruct users as to how the designs/devices can be requested.

Rationale: New visitors or less assertive individuals may not know of the devices and may not be aware of the procedures by which the devices can be procured.

Aquatic Chairs

12.0. Whenever a ramp, zero depth entry, or movable floor is used as an accessible means of water entry/exit, an aquatic chair with push rims must be provided.

Rationale: Wheelchair users in the telephone survey of people with disabilities clearly indicated the need for aquatic chairs when using a ramp, zero depth entry, or movable floor. Respondents indicated they would be more willing to use each of the three alternatives if an aquatic chair were provided.

12.0 At least one aquatic chair with a top surface of the seat at 17 inches above the deck shall be provided.

Rationale: The seat height is needed to allow easy transfer from wheelchairs for a range of individuals. The height is consistent with adult seat height ranges ADAAG (4.16.3) and at the upper range of the recommendations for fourth graders (9 years old) in children's environments (Access Board, 1992, Chapter 5, p. 12). It may be advisable for the seat height to be readily adjustable to other heights to accommodate users with seats of varying heights, however, the seat must have the capability of easily being positioned to a height of 17 inches.

12.1. Seat width: The aquatic chair seat width should be a minimum of 19 inches wide.

Rationale: Each of the tested seats met or exceeded this width and no problems were observed. This width is consistent with available wheelchairs and aquatic chairs.

- 12.2. Footrest: Footrests should be provided on the aquatic chair.

Rationale: For many adults, their legs will extend beyond the 17 inches distance below the chair seat. Without a footrest, the user's feet will drag across the deck, which may cause an injury to the individual.

- 12.3. Armrests should be located on both sides of the aquatic chair seat. At least one armrest should be capable of moving away from the side of the chair.

Rationale: For stability purposes, subjects in the telephone survey indicated both a need and preference for armrests on both sides of aquatic chairs. A movable armrest is needed to allow for transfers.

Modified Delphi Technique

To test the recommendations and build consensus, a Modified Delphi Technique (Moore, 1987) was conducted. This technique was used to enable the project advisory panel to evaluate and build consensus on the proposed recommendations. The objectives of the technique are to ensure that all possible options have been considered, to estimate the impact and consequences of the options, and to build consensus on preferred options.

The Modified Delphi Technique was conducted by mailing the draft recommendations and rationales to the project advisory panel. Panel members were asked to rate each recommendation on a 10-point Likert-type scale ranging from 1 (Strongly Disagree) to 10 (Strongly Agree). The group means and standard deviations were calculated and comments compiled. Based on the analysis of the first round Delphi and further analysis of the project's other data, the recommendations were modified and a second round of the Delphi was sent to panel members.

The results of the two rounds provide substantial evidence that the Modified Delphi was effective in building consensus within the advisory panel (Appendix A). There was much more agreement among the panel members after the second round than there had been after the first round. The group's mean rating from the first round was 8.05. The group's mean rating increased to 9.21 in the second round, and the mean of standard deviations across all items decreased from 2.03 in the first round to 1.36 in the second round. In the first round, 23 items rated below an eight but only three items rated below an eight in the second round. Also, the ratings of nine items had standard deviations greater than 3.0 in the first round and only one was greater than 3.0 in the second round. These findings strongly suggest that the group agreed more strongly with the recommendations in the second round and agreed with each other more.

Three items received mean ratings below 8.0: 1) The maximum rise for any run on a ramp should be 30 inches (\bar{x} =7.75, s =3.14). 2) Whenever the slope of a zero depth entry exceeds 1:20, two handrails should be required 36 inches apart (\bar{x} =7.25, s =2.98). 3) Whenever the slope of a zero depth entry exceeds 1:20, handrails shall have top handrail gripping surfaces mounted at 34 inches to 38 inches and a second handrail mounted between 16 inches and 26 inches (\bar{x} =7.58, s =2.81). They were also the items with the greatest standard deviations, indicating greater disagreement within the advisory panel. Even with those items, however, there was substantial agreement with the recommendations, and there was no evidence to suggest a change in the recommendations.

Areas for Further Research

1. Due to limitations posed by the available sites and resources, maximum ramp slope could only be tested at 8.3% and 17%. Additional research is needed to determine the maximum slope on wet ramps.
2. The scope of this study was restricted to entering and exiting swimming pools. The pool entry and exit needs of people with visual impairments (e.g., handrails, uniform riser heights, etc.) were addressed, however, there were additional concerns not addressed. Specifically, the issue of tactile warnings at the pool edge, around ladders, diving boards, sliding boards, lifts and transfer steps were not addressed. Also, the need for tactile warnings for overhead or protruding objects, such as lifeguard platforms, sliding boards, and diving boards was not addressed.
3. The need for heat resistant surfaces on designs and devices on which there might be skin contact was not addressed in this study. As the majority of the testing was done indoors, surface temperature was not a factor and therefore not addressed in the recommendations.
4. Concern was expressed regarding what constitutes a “reasonable time” to put in place portable or removable devices. Respondents in the telephone survey of people with disabilities who had waited for a device to be put in place had waited from 1 to 20 minutes.
5. As electric wheelchairs will not be used in pools and it is recommended that aquatic chairs be required at pools with ramps or zero depth entries, the need for a 36-inch clear width for ramps may be excessive. Also, a more narrow distance between handrails may be more effective for both ambulatory and non-ambulatory pool users. Additional research is needed to determine the most effective handrail distance on wet ramps.

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Appendix

Product Tables

Product Descriptions

Product Tables

Ladders			
PRODUCT	Aquatrek Ladder	Therapy Ladder	Easy Ladder
PORTABLE	✓		✓
TREAD MATERIAL			
durable plastic	✓		
fiberglass		✓	✓
HANDRAIL MATERIAL			
stainless steel		✓	✓
durable plastic	✓		
WIDTH			
clearance (inches)	30	18	26
overall (inches)	34	20	31
TREADS			
depth (inches)	9	4	12
riser height (inches)	7 - 9	10	9.75
CUSTOMIZE	✓	✓	✓
COST	\$1,735 - \$2,234	\$503 - \$1,030	\$1,550 - \$1,695
CONTACT	Rehab Systems	Spectrum	Triad Technologies

Pool Lifts									
PRODUCT	IG14, IG21& IG28	IG AT-90	IG AT-180	AG48WP, AG48 & AG72	SLE	Safe-Lift	Independent Lift 41-BD	Independent Lift 55-A	Therapy Access 46-650
POWER									
water	✓	✓	✓	✓	✓		✓		✓
electric						✓		✓	
PORTABLE	✓	✓	✓	✓	✓				✓
OPERATION									
asslstant	✓			✓	✓				✓
user		✓	✓			✓	✓	✓	
ROTATION	180 degrees	90 degrees	180 degrees	180 degrees	180 degrees	90 degrees	N/A	N/A	180 degrees
SEAT	P	P	P	P	P	B, W	P	B	P
height (Inches)	19	19	19	19	19	22	17.5	adjusting; min. 12	19.5
CAPACITY	275 lbs.	400 lbs.	400 lbs.	275 lbs.	250 lbs.	500 lbs.	300 lbs.	450 lbs.	300 lbs.
ACCESSORIES									
Included	A	A	A, F	A		A	A	C	A
optional	S	S	U, H, S	I, S	A, I				H, S, U
CUSTOMIZE	✓	✓	✓	✓	✓	✓	✓	✓	✓
COST	\$2,420-\$2,640	\$2,860	\$3,245	\$2,310 -\$3,300	\$1,980-\$ 2,310	\$8,250	\$7,500	\$25,000	\$3,029
CONTACT	Aquatic Access	Aquatic Access	Aquatic Access	Aquatic Access	Aquatic Access	Mengo Industries	Morris Independent Lift	Morris Independent Lift	Recreonics

CODE: A- Armrest
B- Bench seat
C- Cross bar
F- Footrest
H- Headrest

I- Independent operation
L- Legrest
N- Sling
O- Other seating unit
P- Plastic molded seat

S- Safety strap
U- Flip-up outer arm
W- Wheelchair platform

Pool Lifts, continued

PRODUCT	Pool Access Lift (180) Complete	Pool Access Lift (90) Complete	Wheelchair-to- Water 2000	Freedom Lift FL400	Swim Lift SL100	Swim Lift II SL350	Swim Lift III SL500	Wheelchair Lift SL600	Nolan Lift 040-0100R
POWER									
water	✓	✓		✓	✓	✓	✓	✓	✓
electric			✓						
PORTABLE	✓	✓				✓			
OPERATION									
assistant					✓			✓	
user	✓	✓	✓	✓		✓	✓		✓
ROTATION	180 degrees	90 degrees	N/A	110 degrees	N/A	180 degrees	180 degrees	N/A	90 degrees
SEAT	P	P	N, O	P	W	P	P	W	P
height (inches)	19.5	19.5	N/A	19	N/A	19	19	N/A	19
CAPACITY	400 lbs.	300 lbs.	320 lbs.	300 lbs.	600 lbs.	300 lbs.	450 lbs.	600 lbs.	300 lbs.
ACCESSORIES									
Included	A, F, H, S, U	A, S, H	N, O	A, L, S		A, F, H, S, U	A, S, U		A
optional				H, U					S
CUSTOMIZE	✓	✓	✓	✓	✓	✓	✓	✓	✓
COST	\$3,403	\$2,868	\$4,500	\$3,832	\$11,000	\$3,195	\$9,695	\$10,993	\$3,117
CONTACT	Recreonics	Recreonics	SureHands	Spectrum	Spectrum	Spectrum	Spectrum	Spectrum	SunMed

CODE: A- Armrest
B- Bench seat
C- Cross bar
F- Footrest
H- Headrest

I- Independent operation
L- Legrest
N- Sling
O- Other seating unit
P- Plastic molded seat

S- Safety strap
U- Flip-up outer arm
W- Wheelchair platform

Pool Lifts, continued

PRODUCT	Swimming Pool Lifter WC-702	Otter	Lifeguard 20A	Stainless Steel Lifter	Wheelchair-to-Water 1000	Econo Lift	Hoyer Lift SS-HSP
POWER							
manual	✓	✓	✓	✓	✓	✓	✓
PORTABLE	✓	✓	✓	✓	✓	✓	✓
OPERATION							
assistant	✓	✓	✓	✓	✓	✓	✓
user							
ROTATION	360 degrees	180 degrees	360 degrees	360 degrees	360 degrees	360 degrees	360 degrees
SEAT	N	P	N	N	N, O	N	N
CAPACITY	400 lbs.	350 lbs.	400 lbs.	400 lbs.	320 lbs.	400 lbs.	400 lbs.
ACCESSORIES							
Included	N	A	N	N	N, O	N	N
optional				S			
COST	contact for cost	\$6,500	\$935	\$1,207	\$3,200	\$939	\$1,196
CONTACT	AFW	Arjo	Lifeguard Lift	Recreonics	SureHands International	Spectrum	SunMed

CODE: A- Armrest
B- Bench seat
C- Cross bar
F- Footrest
H- Headrest

I- Independent operation
L- Legrest
N- Sling
O- Other seating unit
P- Plastic molded seat

S- Safety strap
U- Flip-up outer arm
W- Wheelchair platform

Ramps				
PRODUCT	Access Ramp	Access Ramp	Swim-Step Access System	Therapy Ramp
PORTABLE	✓	✓	✓	✓
MATERIAL				
stainless steel	✓	✓		✓
thermoplastics			✓	
WALKWAY				
thermoplastics			✓	
dura-deck		✓		✓
stainless steel with non-slip tread strips	✓			
LENGTH				
13 feet			✓	
15 feet	✓	✓		✓
WIDTH				
clearance (Inches)	30	36	30	30 or 36
overall (Inches)	34	40	34	34
HANDRAILS				
both sides	✓	✓	✓	✓
height (Inches)	24 and 36	18 and 34	17 and 36	36
EDGE PROTECTION				
height (Inches)	N/A		3	3
CUSTOMIZE	✓	✓	✓	✓
COST	\$4,600	\$6,330	\$5,706	\$5,393
CONTACT	AFW	Recreonics	Rehab Systems	Spectrum

Steps				
PRODUCT	EZ Steps	Aqualrek Step	Therapy Steps	Access Stairs
PORTABLE	✓	✓	✓	✓
TREAD MATERIAL				
polyethylene	✓			
durable plastic		✓		✓
fiberglass			✓	
stainless steel				option
HANDRAIL MATERIAL				
durable plastic		✓		
stainless steel	✓		✓	✓
height (Inches)	32	30	32	30 - 32
WIDTH				
clearance (Inches)	32	30	31	20 or 37
overall (Inches)	35	34	34	22 or 39
TREAD				
riser height (Inches)	9.5	6	9	8
depth (Inches)	10	13	10	14.5
CUSTOMIZE		✓	✓	✓
COST	contact for cost	\$2,734 - \$2,975	\$2,413 - \$3,000	\$972 - \$1,634
CONTACT	Fox Pool Corporation	Rehab Systems	Spectrum	WMS Aquatic Specialists

Transfer Steps		
PRODUCT	Transfer Tier	Transfer Platform
PORTABLE	✓	✓
MATERIALS		
fiberglass	✓	
plastic		✓
GRABRAIL		
one side	✓	✓
back	✓	✓
diameter (Inches)	1.9	2.25
height (Inches)	6	6
TOP TIER/PLATFORM		
height from deck (Inches)	18	18-20
TIERS		
width (Inches)	22	30
depth (Inches)	12	13
riser height (Inches)	6	6
# on deck	3	3
# In water	4	N/A
ADDITIONAL EQUIPMENT NEEDED	N/A	✓
CUSTOMIZE	✓	
COST	\$2,450	\$864
CONTACT	Triad Technologies	Rehab Systems

Wheelchairs: Aquatic/Shower

PRODUCT	Series JTG 624 Shower/Commode	Model #462-20 Rolling, Folding Shower/Commode	Stainless Steel Series 480-24 Shower/Commode	Model #490 Shower/Commode	Model #80209011 Mobile Shower/Tollet Chair
SEAT					
width (Inches)	18.5	16.5	16.5 or 18	16.25	18.75
height from floor (Inches)	22	19.5	21.75	23.25	21.62
ARMREST					
standard					
flip-up/swing-away	✓				✓
removable	✓	✓	✓	✓	
FOOTREST					
standard					
adjustable height	✓	✓		✓	
removable	✓	✓	✓	✓	additional option
WHEELS					
rear (Inches)	20	20	20	24	22
rear brakes	✓	✓	✓	✓	✓
rear wheel push rims	✓	✓	✓	✓	✓
OVERALL DIMENSIONS					
width (Inches)	25.25	25	25	24.25	26.75
depth (Inches)	41	38.5	40.5	41.75	28.62
CUSTOMIZE	✓	✓	✓	✓	
ACCESSORIES	✓	✓	✓	✓	✓
COST	\$936	\$945	\$1,649	\$1,185	\$1,913
CONTACT	Activeaid	Activeaid	Activeaid	Activeaid	ETAC USA

Wheelchairs: Aquatic/Shower, continued

PRODUCT	Steel Wheel Aquatic Chair	Rehab Shower/Commode Chair #6692 & 6695	Rehab Shower/Commode Chair #6492 & 6495	Model # 6873 Wheeled Commode Shower Chair	Aquatrek Aqua Chair
SEAT					
width (inches)	18	18.5	16	15	17
height from floor (inches)	19.5	21.75	21.75	22	19.5
ARMREST					
standard					✓
flip-up/swing away		✓	✓	✓	
removable	✓				
FOOTREST					
standard					✓
adjustable height	✓	✓	✓	✓	
removable	✓	✓	✓	✓	
WHEELS					
rear (inches)	24	24	24	24	24
rear brakes	✓	✓	✓	✓	✓
rear wheel hand rims	✓	✓	✓	✓	✓
OVERALL DIMENSIONS					
width (inches)	24	26.75	25.5	27	28.5
depth (inches)	32	44.5	44.5	31.5	30.5
CUSTOMIZE	✓	✓	✓		✓
ACCESSORIES	✓	✓	✓	✓	✓
COST	\$1,500	contact for cost	contact for cost	\$1,490	\$697
CONTACT	Interior Mediglobe	Invacare	Invacare	Lumex	Rehab Systems

Product Descriptions

Product Information

The following pages contain information about equipment designed to enable people with mobility impairments to enter and exit a swimming pool or spa. The information was provided by manufacturers and distributors of the equipment during August, 1996. Current costs and product dimensions may vary from what has been reported in this section. Contact the specific manufacturer or distributor for possible changes. Equipment is listed in alphabetical order by manufacturer/distributor under each product type.

The National Center on Accessibility **does not** promote or endorse any of the following products. The products listed **may not** meet the recommendations developed during this project or comply with any accessibility standard.

Ladders

Product: **AQUATREK LADDER**

Description: Wide tread and handrails provide stability. Constructed of durable and lightweight plastic. Non-slip safety treads on each step. Portable and removable. Length is 72 inches and overall width is 34 inches; 30 inches clearance width between handrails. Tread depth is 9 inches and riser height is between 7 and 9 inches. Built to specifications of pool. Available in 3-step model (125 lbs); 4-step model (135 lbs.); or 5-step model (150 lbs). 1-year warranty.

Cost: \$1735.00 for 3-step
 \$1987.00 for 4-step
 \$2234.00 for 5-step

Contact: Rehab Systems
 2014 First Avenue South
 Fargo, ND 58103
 800-726-8620

Product: **THERAPY LADDER**

Description: Sloping, angled ladder designed for pools when a standard vertical ladder is not appropriate. Customized for each pool. Railing height from deck is 32 inches, 18 inch clearance between rails; overall width is 20 inches. Treads are made of durable plastic with a maximum rise of 10 inches, and tread depth of 4 inches. Stainless steel railings.

Cost: \$503.00 - \$1030.00

Contact: Spectrum Pool Products
 9800 Inspiration Drive
 Missoula, MT 59802
 406-543-5309 / 800-776-5309

Product: EASY LADDER

Description: Easy ladder provides safe pool entry and exit, has steps instead of standard ladder configuration. Gentle sloping ladder eliminates back and arm strain experienced when using a vertical pool ladder. All depths and deck configurations can be accommodated because the easy ladder is custom trimmed to each individual pool. Fits flush to pool wall and simply lifts in and out, permanent anchoring is not necessary. Durable fiberglass and stainless steel construction, non-skid epoxy coating, no moving parts, no maintenance. Slip-resistant tread provides secure footing. Maximum depth 70 inches. Overall unit width is 31 inches. Non-skid treads are 26 inches wide with 9.75 inches for riser height and 12 inch depth. Handrail on each side. Side skirts prevent swimmer entrapment. Locate in pool corner or on sides or end wall. Includes dolly.

Cost: \$1550.00 - \$1695.00

Contact: Triad Technologies
219 Lamson Street
Syracuse, NY 13206
800-729-7514

Lifts

Product: SWIMMING POOL LIFTER WC-702

Description: Manually operated portable hydraulic lifter. Stainless steel construction. Available with nylon one piece seat, back, and chains. Additional options include dacron mesh one piece seat and back or stretcher. Lifting range is 65 inches with 90 degree horizontal swing. Can rotate 360 degrees. Mast length, 57.5 inches; boom length, 45 inches.

Capacity: 400 pounds

Cost: contact for cost

Contact: AFW Company of North America
P.O. Box 648
1 Aquatic Center
Cohoes, NY 12047
518-783-0038

Product: IG14, IG21 & IG28-INGROUND POOL LIFTS

Description: These water-powered, portable lifts can be installed into a single socket in the deck and are operated by an assistant. Manually turn 180 degrees over the deck. Upper and lower controls are mounted on the cylinder. Seat travels 42" up or down. Seat height is 19 inches. 70 inches tall. 55 pounds without seat assembly. Includes recessed socket for concrete decks. Seat is 19 inches from deck. Includes inner armrest and optional safety strap. Products warranted to be free of mechanical defects for one year from purchase date.

Capacity: 275 pounds at 55 p.s.i. water pressure

Cost: \$2420.00 - \$2640.00

Contact: Aquatic Access Inc
417 Dorsey Way
Louisville, KY 40223
800-325-LIFT / 502-425-5817

Product: IG AT-90

Description: Compact, portable and efficient water powered lift. Mounts into a socket in the deck and operates with water from a garden hose connected to a nearby faucet. Seat height is 19 inches and travels 42" up and down and automatically turns 90 degrees over the deck. Upper and lower controls mounted on cylinder allow independent operation. Under 5 feet high and 70 pounds and can be carried by one person. Seat height is 19 inches from deck. Includes inner armrest. Optional safety strap. Can be customized for inground spas.

Capacity: 400 pounds at 55 p.s.i. water pressure

Cost: \$2860.00

Contact: Aquatic Access
417 Dorsey Way
Louisville KY 40223
800-325-LIFT / 502-425-5817

Product: IG AT-180

Description: Compact, portable and efficient water powered lift. Mounts into a socket in the deck and operates with water from a garden hose connected to a nearby faucet. Its adjustable seat travels 42" up and down and automatically turns 180 degrees over the deck. Upper and lower controls mounted on cylinder allow independent operation. Seat height is 19 inches from deck. Includes footrest and inner armrest. Optional flip-up armrest, safety strap, and headrest available. Under 5 feet high and 70 pounds. Can be customized for inground spas.

Capacity: 400 pounds at 55 p.s.i. water pressure

Cost: \$3245.00

Contact: Aquatic Access
417 Dorsey Way
Louisville KY 40223
800-325-LIFT / 502-425-5817

Product: AG48WP, AG48 & AG72-ABOVEGROUND POOL LIFTS

Description: Water-powered lifts for above ground pools up to 4-feet deep at the point the lift is installed. Assistant operated with some modifications that may allow some users to operate independently. Seat height is 19 inches. Includes inner armrest. Optional safety strap. Rotates 180 degrees.

Capacity: 275 pounds at 55 p.s.i. water pressure

Cost: \$2310.00 - \$3300.00

Contact: Aquatic Access Inc
417 Dorsey Way
Louisville, KY 40223
800-325-LIFT / 502-425-5817

Product: SPA LIFTS--MODEL SLE

Description: Portable, water-powered lift for spas. Assistant operated, however customization may be possible to allow some users to independently operate. Two models (SLE-36" or SLE-48") depending on height of the spa wall. The seat travels 24 inches up and over the side of the spa, and down into the water. Seat height is 19 inches. Seat rotates 180 degrees. Optional armrests may be ordered in addition. Products warranted to be free of mechanical defects for one year from purchase date.

Capacity: 250 pounds at 55 p.s.i. water pressure

Cost: \$1980.00 - \$2310.00

Contact: Aquatic Access Inc
417 Dorsey Way
Louisville, KY 40223
800-325-LIFT / 502-425-5817

Product: OTTER PORTABLE POOL LIFT

Description: Manually assistant operated, portable pool seat lift. Wheeled base for ease of storage. Claw feet fasten with "T" hooks into installation sockets at side of pool for stability. Swivel armrest to facilitate side transfers from wheelchair. Lift has swivel mast which rotates 180 degrees by foot operated locking plate which automatically locks when in position over deck or water. Stainless steel mast and base assemblies. Molded plastic seat. Mechanical screw drive lift mechanism. Free wheel device stops chair lowering on obstruction. Fits most standard pool sides.

Capacity: 350 pounds

Cost: \$6500.00

Contact: Arjo Inc
8130 Lehigh Avenue
Morton Grove, IL 60053
800-323-1245

Product: LIFEGUARD POOL LIFT—MODEL 20A

Description: Hydraulic portable lifter for swimming pools and spas. Mounts in permanently installed sleeve in pool deck. One piece dacron mesh sling, cement-in sleeve with flush cover and a speed hydraulic pump. Lift is manually operated by an assistant. 62 inch lifting range on a 45 inch boom. Boom rotates user sitting in sling in either direction (360 degrees). Lightweight and storable. Restraining straps, extension arm and surface mounts and additional options available. Weighs 54 pounds.

Capacity: 400 pounds maximum

Cost: \$935.00

Contact: Lifeguard Lift Inc.
1950-B Olivera Road
Concord, CA 94520
800-688-3958

Product: MANGO SAFE-LIFT

Description: Smooth operation with choice of armrest or pool side controls. Quiet, reliable 24-volt motors are UL listed, waterproof, and includes safety brake. Remote transformer steps down simple 110-volt current. The six-volt, four button sealed controller moves the Safe-Lift smoothly and precisely. Can be operated by the user or a pool side attendant. Seat height minimum is 22 inches from deck and can be raised to higher height by user. Lift rotates 90 degrees. Measures 26 inches square at the machine base and 63 inches tall at its mast. Accommodates chair seat, wheelchair platform, or stretcher. Chair seat has armrests on both sides. Low maintenance and 3-year warranty.

Capacity: 500 pounds maximum

Cost: \$8250.00

Contact: Mengo Industries
4611 Green Bay Road
Kenosha, WI 53144
414-652-3070

Product: MORRIS INDEPENDENT LIFT 41-BD

Description: Operated with standard water pressure. Controls allow for independent operation. No electricity involved. Lift can be stopped at any time during travel by releasing the controls or reversed by pressing the controls in the opposite direction. Seat height is 17.5 inches from the deck and has an inner armrest. Travel is capable to 26 inches below the baseline. Lift can be removed for storage, but designed to be left in place so it is always available to users.

Capacity: 300 pounds at 50 p.s.i. of water pressure

Cost: \$7500.00

Contact: Morris Independent Lift
3236 Patterson Road
Bay City, MI 48706
517-684-5333

Product: MORRIS INDEPENDENT LIFT 55-A

Description: Operated with standard water pressure. Controls allow for independent operation. Chair is 28 inches wide and travels 32 inches below the base level of the unit. Chair height can be adjusted upward for transfers, positioned and held in place by electromagnetic brakes for stability. Minimum height off deck is 12 inches. Patented guard system protects from pinch points. Hinged cross bar. Seat back is made of PVC and coated with a non-slip moisture proof flexible paint with ultraviolet inhibitors. Lift can be stopped at any time during its travel by releasing the controls or direction of travel reversed. Lift can be removed easily, but is designed to be left in place so it is always available to users.

Capacity: 450 pounds

Cost: \$25,000.00

Contact: Morris Independent Lift
3236 Patterson Road
Bay City, MI 48706
517-684-5333

Product: THERAPY ACCESS LIFT (46-650)

Description: Water powered lift allows access to high therapy tubs as tall as 69 inches. The seat is 19.5 inches from the floor, moves straight up, swings freely 180 degrees over the pool, then down into the water. Assistance is required to lift the patients ankles and turn the seat. The control knob is mounted on the cylinder at a convenient height for the assistant. The cylinder is attached to the top flange of the pool with a bracket and the base is bolted to the floor. Custom designs are available.

Capacity: 300 pounds at 55 p.s.i. water pressure.

Cost: \$3029.40

Contact: Recreonics
4200 Schmitt Avenue
Louisville, KY 40213
800-428-3254

Product: POOL ACCESS LIFT--180 COMPLETE

Description: Automatic, water powered, full 180 degree turn. Accommodates lateral transfers and has footrest. Seat height is 19.5 inches from the deck. Lift mounts into deck socket and water from hose provides power. Seat travels 42 inches up and down with upper and lower controls allowing independent operation from deck or water. Complete model includes headrest, flip-up outer armrest, stationary inner armrest, and safety strap. 3 year warranty on structural components.

Capacity: 400 pounds at 55 p.s.i. water pressure

Cost: \$3403.03

Contact: Recreonics
4200 Schmitt Avenue
Louisville, KY 40213
800-428-3254

Product: POOL ACCESS LIFT--90 COMPLETE

Description: Portable, automatic, water powered, full 90 degree turn. User or assistant operated. Seat height is 19.5 inches from deck. Only 5 feet, 1 inch high in its down position and weighs only 65 pounds. Complete model includes headrest, armrest, and safety strap. 3-year warranty on all structural components, including cylinder.

Capacity: 300 pounds at 38 p.s.i. water pressure

Cost: \$2867.83

Contact: Recreonics
4200 Schmitt Avenue
Louisville, KY 40213
800-428-3254

Product: STAINLESS STEEL LIFTER

Description: Manually operated, portable lift. Operated by pool side assistant. Lift rotates 360 degrees. Lowering range of 62 inches. Includes a one piece nylon seat/back support and lifting chains.

Capacity: 400 pounds

Cost: \$1207.00

Contact: Recreonics
4200 Schmitt Avenue
Louisville, KY 40213
800-428-3254

Product: WHEELCHAIR-TO-WATER LIFT 1000

Description: Hydraulic-powered with self-contained nitro tech plated ram. Outward pumping action of ram handle will raise unit. Pushing of handle against ram body will lower unit. Can easily be removed for storage or multiple locations. 65" lifting/power range and 360 degree rotation. Available with the Handi-Move frame, made with stainless steel arms, with chest supports and adjustable leg supports or hammock attachment. 3-year warranty for structural components and 1-year warranty for ram.

Capacity: 320 pounds maximum

Cost: \$3200.00

Contact: SureHands International
982 Route 1
Pine Island, NY 10969
914-258-6500/ 800-724-5305

Product: WHEELCHAIR-TO-WATER LIFT 2000

Description: The 2000 motorized model runs on an overhead track and offers complete vertical and horizontal range of motion. Push-button control allows some individuals to move out of their wheelchair, into the water, and back again. Available with the Handi-Move frame, made with stainless steel arms, with chest supports and adjustable leg supports or hammock attachment. 3-year warranty for structural components.

Capacity: 320 pounds maximum

Cost: \$4500.00

Contact: SureHands International
982 Route 1
Pine Island, NY 10969
914-258-6500/ 800-724-5305

Product: ECONO LIFT

Description: Manually assistant operated lift with a mesh, nylon sling seat. The lift is made of stainless steel structural components with a polished and buffed finish. Outward pumping action of the nitro-tech plated ram handle will raise the sling; pushing of handle against the ram body will lower the sling. The lift will raise or lower the sling a maximum of 62 inches. The sling can rotate around the cylinder 360 degrees. No tools required for setup or removal from the socket. Portable and easy to remove for storage. Lift customization for needs of pool and users. 3-year limited warranty on the structural components; 1-year warranty on the ram, sling, and chain.

Capacity: 400 pounds maximum

Cost: \$939.00

Contact: Spectrum Pool Products
9600 Inspiration Drive
Missoula, MT 59802
406-543-5309 / 800-776-5309

Product: **FREEDOM LIFT FL400**

Description: Water-powered spa and above-ground pool lift. This fully automatic, adjustable lift has a water-powered drive system that is controlled by the user. The unit does not fasten to any portion of the spa and includes all necessary mounting hardware, hoses, plastic seat, safety strap, stationary inner arm, and pull-out leg support. Options include a headrest, flip-up outer arm, and adjustable footrest. The seat has a 25-inch raising capacity, and can be rotated 110 degrees. All structural components are stainless steel with a polished finish. Adjustable overall height from 50 to 75 inches; base width of 16 inches; and overall length of 40 inches. Seat height is 19 inches. Lift customization for needs of pool and users. 3-year limited warranty on structural components; 1-year warranty on valves, cylinder, and hoses.

Capacity: 300 pounds

Cost: \$3832.65

Contact: Spectrum Pool Products
9600 Inspiration Drive
Missoula, MT 59802
406-543-5309 / 800-776-5309

Product: **SWIM LIFT SL100**

Description: Platform lift. Wheelchair fastens to platform and lowers wheelchair and user into water. Water powered from the nearest hose connection. Stainless steel construction. Lift customization for needs of pool and users. 3 year warranty.

Capacity: 600 pounds

Cost: \$11,000.00

Contact: Spectrum Pool Products
9600 Inspiration Drive
Missoula, MT 59802
406-543-5309/ 800-776-5309

Product: SWIM-LIFT II COMPLETE--SL350

Description: Lift is water powered and has a 3 position, 4-way control valve. Does not require an attendant to operate. Portable with quick release stainless steel deck sockets. Wheel stands for transport. Breaks down into two components for storage. Plastic molded seat is 19 inches from deck. Lowering depth is 24 inches from the deck into pool. 180 degree rotation with automatic locks. Includes deck anchors, hoses, soft plastic seat, safety strap, flip-up outer arm, stationary inner arm, footrest, and headrest. Customized for needs of pool and users. Overall height 5 feet 6 inches. Base width 2 feet 8 inches; length, 2 feet. 3 year warranty.

Capacity: 300 pounds at 55 p.s.i. water pressure, greater capacities can be obtained by increasing pressure or size of the cylinder.

Cost: \$3195.00

Contact: Spectrum Pool Products
9600 Inspiration Drive
Missoula, MT 59802
406-543-5309 / 800-776-5309

Product: SWIM LIFT III SL500

Description: Powered by common water pressure. No hoses on the pool deck, no manual cranking, no electricity. The unit may be controlled from the pool or out. Stainless steel cylinders with oil-less PVC, so water used remains clean and can be discharged into drain or pool. Built to elevator standards. Non-corrosive stainless-steel construction. Customized for needs of pool and users. Additional options include flip-up arm, stretcher, wheel carriage for stretcher, wheelchair, or control for independent use. 3-year warranty.

Capacity: 450 pounds

Cost: \$9695.00 SL500 IG (in-ground model)
\$8969.00 SL500 AG (above-ground model)

Contact: Spectrum Pool Products
9600 Inspiration Drive
Missoula, MT 59802
406-543-5309 / 800-776-5309

Product: SL600 WHEELCHAIR LIFT

Description: Wheelchair platform lift designed to assist wheelchair users to enter and exit pools. The wheelchair is positioned onto platform and lowers the user into the water. Built to elevator standard. Stainless-steel construction. Lift customization for needs of pool and users. 3-year warranty.

Capacity: 600 pounds

Cost: \$10,993.00

Contact: Spectrum Pool Products
9600 Inspiration Drive
Missoula, MT 59802
406-543-5309 / 800-776-5309

Product: NOLAN POOL LIFT—Model 040-0100R

Description: Self-operated, water-powered pool lifter. Control levers at deck and water level. Seat automatically turns 90 degrees as it raises and lowers. Seat height is 19 inches off deck. Seat travels 42 inches. Accessories include left arm, wheel assembly, safety strap, additional sockets. 1-year warranty. Less than 2 gallons of fresh water is used for each cycle and dispersed back into the pool. Suitable for most in-ground pools. Easy to remove and store when not in use.

Capacity: 300 pounds at 55 p.s.i. water pressure

Cost: \$3117.00

Contact: SunMed
5601 Lindero Canyon Road, Suite 205
Westlake, CA 91362
800-333-4000

Product: HOYER SWIMMING POOL LIFT-Model SS-HSP

Description: A hydraulic powered lift designed for the person who requires assistance in transfer and use. Fits into a flush mounted sleeve at pool side. Easily operated by attendant with a manual hydraulic-powered lifting mechanism. Rotates 360 degrees. Equipped with a standard 112-D white dacron sling, the lifter is also available with an optional extension arm for increasing horizontal reach. It has a 62 inch lifting range, a 90 inch horizontal swing, and 40 inch chains for seat sling.

Capacity: 400 pounds

Cost: \$1196.00

Contact: SunMed
5601 Lindero Canyon Road, Suite 205
Westlake, CA 91362
800-333-4000

Movable Floors

Product: AFW MOVABLE SWIMMING POOL FLOOR

Description: Movable floor for new or existing pools. Reinforced concrete floor with hydraulic lift. Any water depth can be created. The floor moves at a rate of one foot per minute. Makes the pool very flexible for a variety of programming uses.

Cost: contact AFW for cost

Contact: AFW Company of North America
P.O. Box 648
1 Aquatic Center
Cohoes, NY 12047
518-783-0038

Product: PADDOCK MOVING FLOOR

Description: Variable depth permits programming for all ages and abilities. Moving floor may be concrete or the flow-thru design fabricated of stainless steel with PVC and stainless steel grating. Hydraulic cylinders raise and lower the whole floor or portions of the floor. Trailing ramps and safety rails are available.

Cost: contact Paddock for cost

Contact: Paddock Pool Equipment Company
P.O. Box 11676
555 Paddock Parkway
Rockhill, SC 29730
803-324-1111

Ramps

Product: SWIMMING POOL ACCESS RAMP

Description: Portable stainless steel access ramp with side rails allows gradual incline into swimming pool. Non-slip surface. Mounting bracket for pool edge. 15 feet long, 30 inches walkway clearance width. Handrail heights are 24 and 36 inches. Overall ramp width is 34 inches. Wheels to assist in moving. Ramp capable of supporting a distributed load of 1500 pounds. Ramp weight is 186 pounds.

Cost: \$4600.00

Contact: AFW Company of North America
P.O. Box 648
1 Aquatic Center
Cohoes, NY 12047
518-783-0038

Product: ACCESS RAMP

Description: Removable stainless steel access ramp is custom designed for gutter or perimeter profile. Does not affect pool design or configuration. The ramp can be installed and removed as needed. Manufactured from corrosion resistant, low-carbon T-304 stainless steel, with non-slip fiberglass grating for ramp surface. 15 feet long, 40 inches wide overall, and 36 inches clearance width between handrails. Dual handrails on both sides, top railing height is 34 inches and lower railing is 18 inches.

Cost: \$6330.56

Contact: Recreonics
4200 Schmitt Avenue
Louisville, KY 40213
800-428-3254

Product: SWIM-STEP POOL ACCESS SYSTEM

Description: 3-in-1 system, converts from stairs into ramp and parallel bars with optional ramp kit. Length is 13 feet; overall width is 34 inches, with a walkway clearance of 30 inches wide. Manufactured from highly durable light-weight, non-corrosive thermo-plastics. Two dual handrails of 1.5 inches diameter are at heights of 17 and 36 inches. Also has 3 inch high edge protection on walkway. Non-skid safety treads on each step. Top attaches securely to decks.

Cost: \$5706.00 for Swim-Step and ramp conversion kit

Contact: Rehab Systems
2014 First Avenue South
Fargo, ND 58103
800-726-8620

Product: THERAPY RAMP

Description: Removable access ramp is 30 inches wide between rails and 15 feet long. Stainless steel construction with non-skid fiberglass walkway. Handrails are 36 inches high. Has 3 inch high edge protection to prevent wheelchair wheels from falling off sides. Includes deck anchors. Ramp also available with 36 inch clearance width. Overall width is 34 inches. 10 year warranty on structural components and 1 year warranty on Dura-deck.

Cost: \$5393.00

Contact: Spectrum Pool Products
9600 Inspiration Drive
Missoula, MT 59802
406-543-5309 / 800-776-5309

Steps

Product: EZ STEPS

Description: Four tread, drop in steps that fit various pool wall heights in above- and in-ground pools. Made from white structural polyethylene. Two models available with overall tread widths of 35 inches. Clearance width between handrails is 32 inches. Tread riser height is 9.5 inches and tread depth is 10 inches. One offers an adjustable height of 46-50 inches for above ground pools and the other has an adjustable range of 40-43 ½ inches for in-ground units. Two stainless steel handrails. Handrail height is 32 inches. Marketed by Quaker Plastics Corporation and sold through wholesale distributors.

Cost: contact for cost

Contact: Contact for local United States dealer
Fox Pool Corporation
P.O. Box 549
York, PA 17405
800-723-1011 / 717-764-8581

Product: AQUATREK STEP

Description: Removable stairs constructed of durable, non-corrosive plastic. Non-slip treads on each step. Lightweight and portable. Built on wheels for transporting. Allows users to enter and exit walking forward. Available in 6 or 7 step models. Overall width is 34 inches, tread width is 30 inches, length is 98 inches, weight 175 pounds. Tread riser height is 6 inches and tread depth is 13 inches. Handrail height is 30 inches.

Cost: \$2734.00 for 6 steps
\$2975.00 for 7 steps

Contact: Rehab Systems
2014 First Avenue South
Fargo, ND 58103
800-726-8620

Product: THERAPY STEPS

Description: Stainless steel therapy steps allow the user to enter and exit the water in a forward position. Distance into water ranges from 48 - 60 inches. Depth from pool deck to pool floor varies. Clearance width between handrails is 31 inches; overall width is 34 inches. Handrails are 1.66 inches by 0.109 inches; height is 32 inches. Available in 3, 4, or 5 step models. Steps are Dura-deck fiberglass with tread depth of 10 inches and tread riser height of 9 inches. Unit includes grounding screw. Anchors available as an option. Portable unit with four polyolefin wheels which are 4 inch in diameter. Rated load of 450 pounds. 10-year structural warranty and 1-year warranty for Dura-deck.

Cost: \$2413.00 for 3-step model
\$2682.00 for 4-step model
\$3000.00 for 5-step model

Contact: Spectrum Pool Products
9600 Inspiration Drive
Missoula, MT 59802
406-543-5309 / 800-776-5309

Product: ACCESS STAIRS

Description: Portable stainless steel access stairs feature heavy duty welds for reliability and strength, and adds versatility to pools due to its ease of installation and removal. The stairs are available with either 20 inch wide plastic steps or 37 inch wide 316 gauge stainless steel steps, and offer a choice of four to eight steps. Riser height, 8 inches; tread depth, 14.5 inches.

Cost: \$972.18 - \$1634.48

Contact: WMS Aquatic Specialists
P.O. Box 398
Ellensburg, WA 98926
800-426-9460 / 800-443-7946

Transfer Steps

Product: AQUATREK TRANSFER PLATFORM

Description: Allows user to transfer from wheelchair to the platform and down into the water. Usable with other AQUATREK pool access products. Portable, non-skid surface, stainless steel fasteners, light weight and durable. Three tier unit that is 30 inches wide; tiers depth is 13 inches with 6 inch riser height between tiers. Top tier is 18 to 20 inches above the deck. Grabrails on back and one side of platform.

Cost: \$864.36

Contact: Rehab Systems
2014 First Avenue South
Fargo, ND 58103
800-726-8620

Product: TRANSFER TIER

Description: A set of portable on deck and underwater tiers. User transfers laterally from wheelchair onto upper deck unit and lowers into water tier by tier, using upper body mobility. Made of durable, reinforced fiberglass with 1.9 inch stainless steel handrails. Smooth, non-abrasive finish. Water fills the base for increased stability. Completely self-contained. No operator or mounting required. Can easily be removed for storage. Back and side railings, order left or right side models. Each tier riser height is 6 inches; tier depth is 12 inches; tier width is 22 inches. Top tier is 18 inches from the deck. Three tiers on deck and 4 tiers in the water. Grabrail on backside of top tier and along one side of the unit. Removable, no anchoring necessary, lifts in and out. Custom trimmed to each pool.

Cost: \$2450.00

Contact: Triad Technologies
219 Lamson St
Syracuse, NY 13206
800-729-7514

Aquatic Wheelchairs

Product: SERIES JTG 624 SHOWER/COMMODE CHAIR

Description: Seamless Ensolite seat and back. Swing away, removable arms. Adjustable, removable footrests. Push handle back. Corrosion-resistant finish and high strength molded components. Toggle brakes and anti-tippers. 5 inch front casters and 20 inch rear wheels with push rims. Seat width and depth, 18.25 inches; seat width between armrests, 18.5 inches; back height from seat, 16.5 inches; seat height from floor, 22 inches; top of seat to top of footrest adjustment, 17 to 18 inches; distance between wheel lugs, 14.37 inches; overall width, 25.25 inches; overall depth, 41 inches. Customizing available.

Cost: \$936.00

Contact: Activeaid Inc
1 Activeaid Road
PO Box 359
Redwood Falls, MN 56283-0359
507-644-2951 / 800-533-5330

Product: ROLLING, FOLDING SHOWER/COMMODE CHAIR (462-20)

Description: Chair has 20-inch rear wheels with push rims and 5-inch front casters with sealed bearings. Corrosion-resistant finish and high strength molded components. Double plunger brake system. Includes an interchangeable cushioned commode seat and a cushioned solid seat; a cushioned, removable push handle back; removable arms; and adjustable, removable, swing under footrests. Overall width is 25 inches; seat to top of back measures 14.75 inches; seat width is 16.5 inches; and seat depth is 16 inches; seat height from floor is 19.5 inches; overall depth, 38.5 inches. Weighs 45 pounds. Customizing available.

Cost: \$945.00

Contact: Activeaid Inc
1 Activeaid Road
PO Box 359
Redwood Falls, MN 56283-0359
507-644-2951/ 800-533-5330

Product: SHOWER/COMMODE STAINLESS STEEL SERIES 480-24

Description: Stainless steel framework, corrosion resistant components and seamless Ensolite foam seat and back. Removable arms. Rigid frame. Velcro safety strap. Toggle brakes. Swing-away, detachable footrests. Push handle back. 5 inch front casters and 20 inch rear wheels with push rims. Seat width, 16.5 or 18 inches; seat depth, 16 inches; back height from seat, 18 inches; seat height from floor, 21.75 inches; armrest height, 8.75 inches; overall width, 25 inches; overall depth, 40.5 inches. Customizing available.

Cost: \$1649.00

Contact: Activeaid Inc
1 Activeaid Road
P.O. Box 359
Redwood Falls, MN 56283-0359
507-644-2951/ 800-533-5330

Product: SHOWER/COMMODE CHAIR (MODEL 490)

Description: A wheelchair shower commode with two 24-inch rear wheels with and 5-inch front casters. Corrosion-resistant finish and high strength molded components. Cushioned, removable, push handle back. Double plunger brake system. Removable arms. Adjustable, removable, swing away footrests. Foldable. Features include an epoxy coated frame finish; disc brakes with lever release; full-length padded armrests; and thick cushioned, front or rear opening seat. Hand rim projections and brake arm extension are available. Seat width between arms is 16.25 inches; seat depth is 16.25 inches; seat height from floor is 23.25 inches; back height from seat is 16 inches; overall width is 24.25 inches; footrest adjustment range is 3 inches; overall depth, including footplates is 41.75 inches.

Cost: \$1185.00

Contact: Activeaid Inc
1 Activeaid Road
P.O. Box 359
Redwood Falls, MN 56283-0359
507-644-2951/ 800-533-5330

Product: MOBILE SHOWER/TOILET CHAIR #80209011

Description: Designed to allow the user to independently propel the chair. The chair is made of steel and aluminum construction with a molded, textured polypropylene seat. The chair has 22 inch wheels with push rims. Flip-up armrests and push handles are standard. Optional accessories include: a safety strap, footrests, and safety bar. Overall depth, 28.62 inches and overall width is 26.75 inches; seat width is 18.75 inches, depth is 17.75 inches; floor to seat height is 21.62 inches.

Cost: \$1913.30
accessories: \$301.70 (footrests); \$48.00 (safety strap)

Contact: ETAC USA Inc
2325 Parklawn Dr., Suite J
Waukesha, WI 53186
800-678-3822 / 414-796-4600

Product: STEEL WHEEL AQUATIC CHAIR

Description: Designed for use in swimming pools. Allows for user to independently power chair. The frame and all bolts, screws, castors are made of type 316 non-corrosive stainless steel. The tubing (1 inch diameter) is rounded to eliminate sharp corners. Equipped with 2 nylon web seat belts with Velcro closures for chest and waist areas. Seat and back material is textilene (similar to nylon cord) which won't run or stretch. Pull-out armrests with plastic pads. 8x1 inch front casters. Urethane foam mag rear wheels, 24x1.37 inch solid tires with push rims. Wheel locks and footrests are a combination of durable plastic and stainless steel; fold-up adjustable and removable footrests. Overall width; 24 inches; overall depth, 32 inches; seat width, 18 inches; seat height, 19.5 inches. Custom sizes can be made.

Cost: \$1500.00

Contact: Contact for dealers in the United States
Interior Mediquip Ltd
PO Box 1875
Vernon, BC V1T 8Z7
Canada
800-561-8998 / 604-542-1363

Product: REHAB SHOWER/COMMODE CHAIR
MODELS (6692, 6492, 6695, 6495)

Description: Corrosion-resistant coating on frame. Available with rear 24 inch drive wheels with push rims. Flip-up arms; swing away, removable, and adjustable footrests. Removable, multi-position seat, 3 inch foam cushion with seamless Ensolite foam that does not absorb moisture, minimizing skin irritation. Front cutout seat. Rear wheel locks. Foldable. Overall chair height, 39.25 inches; overall depth, 44.5 inches; overall width 26.75 inches; seat height, 21.75 inches; seat width, 16 or 18.5 inches; back height, 37.25 inches; adjustable footrest range, 5.75 to 9.75 inches; and weight, 47 to 49 pounds.

Cost: contact for cost

Contact: Invacare Corporation
P.O. Box 4028
899 Cleveland St
Elyria, OH 44036-2125
216-329-6000 / 800-333-6900

Product: WHEELED COMMODE SHOWER CHAIR #6873

Description: Shower commode wheelchair, polymer coated steel frame. Seamless padded seat. Flip-up, plastic armrests. Front 5 inch casters, rear 24 inch wheels with standard push rims. Toggle brakes for back wheels. Hook on adjustable, removable footrests with heel strap. Seat height, 22 inches. Seat width and depth, 15 inches. Overall width, 27 inches; depth, 31.5 inches; height, 38 inches. Dacron back support.

Cost: \$1490.00

Contact: Lumex
Division of Lumex Inc
100 Spence Street
Bay Shore, NY 11706-2290
516-273-2200 / 800-645-5272

Product: AQUATREK AQUA CHAIR

Description: Designed to be used in and around water. Can be customized with push rims on wheels to allow user to independently power. Constructed of PVC plastic and stainless steel fasteners which make it durable and non-corrosive. Composite bearings and aluminum brakes on rear wheels. Lightweight, safe and comfortable. Totally submersible. Armrests and footrests included. Mag wheels are 7 inches in front and 24 inches in rear. Overall width, 28.5 inches; depth, 30.5 inches; height, 37 inches. Seat width, 17 inches; seat height from floor, 19.5 inches. 1-year warranty.

Cost: \$662.11
additional charge for pair of push rims \$35.00

Contact: Rehab Systems
2014 First Avenue South
Fargo, ND 58103
800-726-8620
