

National Forum on Accessible Golf IV
Hilton Head Island, S.C.
March 12-14, 1995

Background

The National Forum on Accessible Golf is a coalition of individuals, organizations and other entities interested in making the game of golf accessible to all people. Indiana University's National Center on Accessibility and Clemson University's Department of Parks, Recreation and Tourism Management and Department of Horticulture have co-coordinated and sponsored each of the 4 forums held, dating to 1993. Proceedings from each of the previous forums are available from the National Center on Accessibility and Clemson University.

Forum Purpose

The National Forum on Accessible Golf has as its primary purposes:

1. Facilitating communication and cooperation among golfers with disabilities, golf organizations and others who have an interest in promoting the game of golf for ALL people.
2. Identifying barriers to participation in golf by persons with disabilities and seeking solutions in overcoming those barriers.
3. Providing educational and training information for golf organizations and golf operations, as well as for golfers with disabilities on making the game of golf accessible to ALL people.
4. Identifying research needs and facilitating the conduct of research that will provide accurate and necessary information and data to facilitate the integration of golfers with disabilities into the game.

FORUM IV

The National Forum on Accessible Golf was convened by Forum organizers Gary Robb of the National Center on Accessibility, Indiana University and Larry Allen, Department of Parks, Recreation and Tourism Management, Clemson University. The program was kicked off by Dr. Allen by welcoming participants to Hilton Head and South Carolina. After participants introduced themselves, Gary Robb provided a brief overview and review of previous forums and discussed the issues to be deliberated during Forum IV. The primary emphasis of Forum IV was on issues related to Pace of Play; Turf Grass Research and Equipment Modifications as related to golfers with disabilities. Robb emphasized that the Forum provides the opportunity for all participants to have equal input into the discussions and that Apresenters≅ were there to stimulate discussion of the various topics to be addressed. He concluded his remarks by emphasizing that while we hear that there are 49,000,000 Americans with disabilities, we need to be cognizant that only a small portion of that number require special accommodations to play the game of golf.

The remainder of the first day of the Forum, focused on presentations and discussions on issues that had been addressed, but not finalized during previous forums. Summaries of those presentations follow.

The 2nd National Forum on Accessible Golf

held in the Denver area in the summer of 1993 focused on assisting the United States Access Board's Recreation Advisory Committee in recommending guidelines for golf course accessibility. (See appendix for copy of recommended golf course accessibility guidelines)

Ms. Peggy Greenwell of the United States Architectural and Transportation Barriers Compliance Board (Access Board) presented a status report on the proposed guidelines. The following is a summary of her presentation.

Status of Recommended Guidelines for the Construction and Alteration of Golf Courses

Peggy Greenwell, U.S. Access Board

The U.S. Architectural and Transportation Barriers Compliance Board is working toward the development of accessibility guidelines for golf

courses and other recreation facilities and outdoor developed areas. The Access Board is an independent Federal agency that has the authority under the Americans with Disabilities Act (ADA) to establish minimum accessibility guidelines for buildings and facilities covered by the Act. Existing Americans with Disabilities Act Accessibility Guidelines (ADAAG) contain technical and scoping provisions required for newly constructed and altered buildings and facilities. While many facilities such as the club house, rest rooms and parking areas have already been adequately addressed, various features and elements on the golf course are under review.

The effort underway at the Board has included the establishment of a federal advisory committee charged with providing recommended guidelines in this area. The Golf Subcommittee of the Recreation Access Advisory Committee developed recommended car path, and other course amenities. The Board published an advance notice of proposed rule making in the Federal Register on September 21, 1994 requesting public comment on the golf recommendations along with recommended accessibility guidelines for other recreational facilities. Over 600 comments were received on the entire report, with approximately 120 responding directly responding to the golf recommendations.

Comments were received from a diverse group cross section of individuals and groups interested with either 18/9 hole golf or miniature golf courses. The majority of comments were received from individuals, followed by state and local governments. Several cities (New York, Kent, Santa Cruz and Madison) and states (New Jersey, Arkansas and Utah) were among the commenters. Seven professional and trade associations also responded and included the National Club Association, Golf Course Superintendents Association, International Association of Amusement Parks and Attractions, Putt-Putt Golf Courses of America, Miniature Golf Association of America, California Park and Recreation Society, and the Illinois Park and Recreation Society. Groups representing individuals with disabilities also commented on the recommendations and included the Paralyzed Veterans Association, Eastern Paralyzed Veteran=s Association and the National Council on Independent Living.

The Access Board is currently in the process of analyzing these comments. Some preliminary finding based on the responses include:

- 1. General support for the recommended accessibility guidelines for newly constructed 18/9 hole golf courses with some modifications.**
- 2. Concern was raised about the lack of recommended accessibility guidelines for hazards on the course.**

3. While many commenters supported 100% access on all newly constructed miniature golf courses, owners/operators and several trade associations were opposed to this recommendation.

The next step for the Board includes the development of a notice of proposed rulemaking, after further review of the report and the comments. This notice will also be published in the Federal Register for public comment. This notice will also be published in the Federal Register for public comment. Public hearings are also likely to be held at this stage at various locations in the country. The Board is also examining ways to gain even further input from various affected parties in the golf community during the rulemaking process. These parties include, but are not limited to; manufacturers, superintendents, owners and operators, golfers with disabilities, designers and others with significant expertise.

Questions or comments about the work at the Access Board should be directed to Peggy Greenwell at (202) 272-5434 or (800) USA-ABLE or TTY (202) 272-5449.

During Golf Forum III, held at Wild Dunes

in the spring of 1993, several committees were formed to further study various issues related to golfers with disabilities. These committees included 1) Training; 2) Education; 3) Research; and 4) Rules. The following presentations reflect some of the efforts of those committees over the past year.

Dr. Trey Holland of the United States Golf Association's Rules of Golf Committee has developed an initial draft of proposed rules modifications for consideration by the USGA. This draft will be studied and discussed in length in future forums and other meetings prior to being submitted to the USGA.

A MODIFICATION OF THE RULES OF GOLF FOR GOLFERS WITH DISABILITIES

Dr. Trey Holland
USGA Rules of Golf Committee

In modifying the Rules of Golf for golfers with disabilities, the desired result should allow the disabled golfer to play equitably with an able-bodied individual or a golfer with another type of disability. For some situations, this objective will necessitate solutions which may seem unfair because a more simplified answer may appear to exist when two golfers with the same disability are playing against one another.

In considering this subject, it seems useful to subdivide disabled golfers into

groups which have similar needs. Five such groups are easily identified. They are blind golfers, amputee golfers, golfers requiring canes or crutches, golfers requiring wheelchairs and mentally handicapped golfers.

What follows is an initial attempt to adapt the Rules of Golf to these groups of disabled golfers, using the objective noted above as the ultimate goal. While this report is intended to be a reasonably thorough consideration of the subject, its primary purpose is to initiate discussion. This is not the completed project, as there may be important issues which have not been raised herein. Likewise, issues which are raised may ultimately necessitate no change in the application of the Rules.

BLIND GOLFERS

Definition of "Coach"- The status of the coach and the duties which he may perform should be defined clearly. Without such clarification, it would be difficult, for example, to determine how a blind golfer must proceed if his ball were to strike his or another player's coach after a stroke. Therefore, the following definition is suggested:

Coach

A "coach" is one who assists a blind golfer in addressing the ball and with alignment prior to the stroke. A coach has the same status under the Rules as a caddie.

Note: A player may ask for and receive advice from his coach.

Rule 6-4 (Caddie)- There is nothing the Rules which would prohibit the coach of a blind golfer from functioning as his caddie. For a variety of reasons, however, a coach may not be able to perform the duties of a caddie. Therefore, there should not be a prohibition against a blind golfer having both a coach and a caddie. In such circumstances, however, the coach may not carry or handle the player's clubs, or the player would be subject to disqualification for having more than one caddie.

Rule 8-1 (Advice)- In view of the Definition of "Coach", it is suggested that Rule 8-1 be modified as follows:

8-1 Advice

A player shall not give advice to anyone in the competition except his partner. A player may ask for advice from only his partner, either of their caddies, or, if applicable, his coach.

Rule 13-4b (Grounding Club in Hazard)- The following additional Exception

under Rule 13-4 is suggested:

Exception:

...3. Provided nothing is done which constitutes testing the condition of the hazard or improves the lie of the ball, there is no penalty if a blind golfer grounds his club in a hazard preparatory to making a stroke. However, the player is deemed to have addressed the ball when he has taken his stance.

Rule 16-1f (Position of Caddie or Partner)- Given the intent of Rule 16-1f, it would be appropriate to modify this Rule as follows:

f. POSITION OF CADDIE OR PARTNER

While making a stroke on the putting green, the player shall not allow his caddie, his partner, his partner's caddie or, if applicable, his coach to position himself on or close to an extension of the line of putt behind the ball.

AMPUTEE GOLFERS

At present, the only significant issue with respect to amputee golfers is the status of prosthetic devices. Decision 14-3/15 clarifies the USGA's position on such devices and is included herein for reference.

14-3/15 Artificial Limbs

An artificial leg or arm is not an artificial device within the meaning of the term in Rule 14-3, even if an artificial leg has been modified to aid the player in playing the game or an artificial arm has a fitting specially designed for gripping a golf club. However, if the Committee believes that an artificial limb so modified would give a player an undue advantage over other players, the Committee has authority to deem it to be an artificial device contrary to Rule 14-3.

Clubs used by a player with an artificial arm must conform with Rule 4-1 except that an attachment may be fitted to the grip or shaft to assist the player to hold the club. However, if the Committee believes that the use of a club modified in this way would give the player an undue advantage over other players, it should deem the attachment an artificial device contrary to Rule 14-3.

The USGA Rules of Golf Committee is in the process of examining the much larger issue of medical devices and their conformance under Rule 14-3. While that analysis has not been completed, the position expressed in Decision 14-3/15 is not

likely to change.

A potential issue is the inability of some lower extremity amputee golfers who wear a prosthesis to climb into or out of bunkers. This situation probably occurs rather infrequently, and on that basis Rule 28 (Unplayable Ball), should govern without further modification.

GOLFERS REQUIRING CANES OR CRUTCHES

Definition of "Stance"- The use of assistive devices raises the question of what constitutes taking the stance, which is a critical element in determining relief from immovable obstructions and ground under repair and whether or not a player is subject to penalty if his ball moves prior to his playing a stroke. The following Definition is suggested:

Stance

Taking the "stance" consists in a player who is using an assistive device placing the device and, if applicable, his feet in position for and preparatory to making a stroke. The assistive device is deemed to be part of the player's stance.

Rule 6-4 (Caddie)- By analogy to Decision 6-4/4.5, someone, including another caddie or player, who assists a player with the retrieval of his ball is not acting as the player's caddie. Such an act does not constitute a breach of Rule 6-4, which prohibits a player from having more than one caddie at any one time under penalty of disqualification.

Rule 13-2 (Improving Lie, Area of Intended Swing or Line of Play)- The interpretation of what constitutes a player "fairly taking his stance" is one of the most difficult judgment calls in golf. Whereas most of the Rules are objective, this Rule is highly subjective. Decision 13-2/1 (Explanation of "Fairly Taking His Stance"), lends some clarification to this phrase, but significant gray areas remain. The disabled golfer who is using an assistive device is entitled to bend or even break the branches of a tree or bush in order to fairly take his stance. However, he may not use the device to deliberately hold back branches which would otherwise interfere with the area of his intended swing or line of play. There is not, nor will there probably ever be, a substitute for the judgment required to interpret this Rule.

Rule 13-3 (Building Stance)- The use of assistive devices by disabled golfers does not constitute building a stance within the meaning of the term in Rule 13-3. However, there may be an issue with regard to assistive devices which may be adjusted to various positions during a stipulated round. The USGA Rules of Golf

Committee will be asked to consider this issue in the course of reviewing medical devices and their conformance under Rule 14-3.

Another issue relating to this Rule concerns the following query:

If a player builds a stance so that his supporting crutch does not slip during the swing, is he in breach of this Rule?

This is an interesting question, because the answer is also dependent on the concept of "fairly taking his stance". (Rule 13-2).

A player who "builds a stance" by creating a raised mound of soil against which he braces his crutch would be in breach of Rule 13-3 for building a stance. However, a certain amount of "digging in" with the feet is permitted. By analogy, this would allow for some amount of "digging in" with an assistive device in an effort to prevent slipping, but there is a point beyond which the player would be in violation of "fairly taking his stance". As noted in the discussion of Rule 13-2 above, this is a very subjective determination, which the Committee must make after considering all of the circumstances.

Rule 13-4a (Testing the Condition of the Hazard) and Rule 13-4b (Touching the Ground in the Hazard)- By analogy to Decision 13-4/22 (Rake Handle Stuck in Bunker Before Stroke), it could be argued that a disabled golfer who enters a bunker with a cane or crutches is testing the condition of that hazard, and, therefore, is subject to penalty. However, the intent of Decision 13-4/22 is to clarify that a player may not gain additional information about the condition of a hazard through action other than those which are necessary to allow him to reach his ball and take his stance. Therefore, a player who enters a hazard with canes or crutches would not be in breach of Rules 13-4a or 13-4b, provided that his actions are not intended to test the condition of the hazard.

Rule 14-2 (Assistance)- It is permissible for a disabled golfer to accept physical assistance from anyone for the purpose of positioning himself or his assistive devices prior to the stroke. The provisions of this Rule apply only while the player is making a stroke.

Rule 14-3 (Artificial Devices and Unusual Equipment). Assistive devices are considered artificial devices or unusual equipment under Rule 14-3. Nevertheless, a Committee may allow a disabled golfer to use such an assistive device, even if it has been modified to aid the player in playing the game. However, if the Committee believes that an assistive device so modified would give the player an undue advantage over other players, the Committee has the authority to prohibit its use under Rule 14-3.

Rule 16-1e (Standing Astride or on Line of Putt)- In view of the proposed Definition of "Stance" it is suggested that Rule 16-1e be modified to read:

e. **STANDING ASTRIDE OR ON LINE OF PUTT**

The player shall not make a stroke on the putting green from a stance astride, or with either foot or any assistive device touching, the line of putt or an extension of that line behind the ball.

Rule 17-3b (Ball Striking Flagstick or Attendant)- The language in Rule 17-3b makes it clear that if a ball strikes an assistive device which is being used by any person while he attending the flagstick with the player's authority or prior knowledge, the player incurs a penalty for a breach of this Rule.

Rule 20-1 (Lifting)- See same entry under Golfers requiring Wheelchairs.

Rule 22 (Ball Interfering with or Assisting Play) See same entry under Golfers Requiring Wheelchairs.

Rule 24-2 (Immovable Obstruction) and Rule 25-1 (Abnormal Ground Conditions)- The amended Definition of "Stance" would entitle a player to relief from an immovable obstruction or ground under repair if, in fairly taking his stance, the obstruction or the ground under repair interfered with the positioning of his assistive device. However, the Exceptions under Rules 24 and 25 would preclude relief for a player who has interference from these conditions as a result of placing his assistive device in an unnecessarily abnormal position for the required shot or using an unnecessarily abnormal direction of play.

Rule 28 (Ball Unplayable)- It is a fact that one able-bodied golfer may attempt and successfully execute a stroke with a ball which another able-bodied golfer may have declared unplayable. It is also a fact that the disabled golfer who requires the use of canes, crutches or any other type of assistive device may occasionally be unable to play a stroke at a ball which the able-bodied golfer could play. For example, a player using crutches may need to declare a ball which lies on a steep slope of wet grass unplayable in an effort to eliminate the possibility of injury from a fall. However, this situation is not any different than a case where the balls of two able-bodied golfers lie on a gravel cart path, and one player plays the stroke and the other player declares his ball unplayable, thus obviating the any chance of injury from flying gravel.

One might argue that because the situations noted above are potentially dangerous, Decision 1-4/10 (Dangerous Situation; Rattlesnake or Bees Interfere with Play) should apply, and the player should be entitled to free relief as

prescribed by that Decision. While the situations described in the preceding paragraph are potentially dangerous, they are not analogous to the circumstances contemplated or the answer offered in Decision 1-4/10. That Decision concerns the player who encounters a dangerous situation which is both totally out of his control and unrelated to the normal playing of the game. Additionally, it presupposes that the player's ball is in a playable position. If this were not the case, the player would have to proceed under the Unplayable Ball Rule incurring a penalty of one stroke, rather than obtaining free relief as prescribed by the Decision.

Ultimately, all players must exercise their best judgment in determining whether they are placing themselves at risk by playing a particular stroke. If they are, then their best option may be to declare the ball unplayable. Rule 28 must govern in these situations. To allow free relief in some instances because of the possibility of injury will open the door for an unmanageable situation ripe with the potential for abuse.

GOLFERS REQUIRING WHEELCHAIRS

Definition of "Stance"- See same entry under Golfers Requiring Canes and Crutches.

Rule 1-2 (Exerting Influence on the Ball) Rule 13-1 (Ball Played as It Lies) and Rule 18-2a (Ball at Rest Moved by Player). - Everyone would like to increase the pace of play while simultaneously decreasing turf damage. Consequently, the rationale for "bumping" the ball is not without some merit. However, such an action violates one of the two most fundamental principles of the game - playing a ball as it lies.

Drafting language which would permit such a procedure is more difficult than it might seem. For example: By what means may the player "bump" the ball? How far may he "bump" it? When is the ball back in play? If the ball moves after it has been "bumped" must it be replaced, played as it lies or may the player "re-bump" it? If the ball moves after it has been "bumped" is the player subject to penalty? Must the ball remain on the same part of the golf course (teeing ground, through the green, hazard and putting green) after it has been "bumped"? If it must remain in the same part of the golf course, may a player who is "bumping the ball" only several inches *through the green* move it from high rough to short rough or to the fairway? If the original ball had come to rest in a divot hole, may the player "bump" the ball out of the divot hole?

With respect to the next-to-the-last question, it seems logical to conclude that, when the heat is on, the player who has the opportunity to move his ball from tall grass to short grass is much less likely to make a concerted effort to precisely position his chair than the player who would have to move his ball from short grass to tall grass.

Ultimately, "bumping the ball" becomes a mechanism by which "preferred

lies" are endorsed. Certainly, this is not a desired result. Therefore, this practice should be discouraged, realizing that there is and will continue to be a marked difference in how strictly the Rules of Golf are applied by and to recreational and competitive golfers.

Rule 6-4 (Caddie)- See same entry under Golfers Requiring Canes and Crutches. In addition, it would be permissible for a wheelchair golfer to employ both a caddie and an aide to assist him, provided that the aide does not carry or handle the player's clubs. Depending on his responsibilities, the status of the aide would need to be clarified (see discussion of "Coach" under Blind Golfers, see also discussion of "Supervisor" under Mentally Handicapped Golfers.

Rule 8-1 (Advice)- If a wheelchair golfer employs both a caddie and an aide (see Rule 6-4 above), the aide would be prohibited from giving the player advice.

Rule 13-2 (Improving the Lie, Area of Intended Swing or Line of Play)- See same entry under Golfers Requiring Canes and Crutches.

Rule 13-3 (Building Stances)- See same entry under Golfers Requiring Canes and Crutches.

Rule 14-2 (Physical Assistance)- See same entry under Golfers Requiring Canes and Crutches.

Rule 14-3 (Artificial Devices and Unusual Equipment)- See same entry under Golfers Requiring Canes and Crutches.

Rule 16-1e (Standing Astride or on Line of Putt)- See same entry under Golfers Requiring Canes and Crutches.

Rule 17-3b (Ball Striking Flagstick or Attendant)- See same entry under Golfers Requiring Canes and Crutches.

Rule 20-1 (Lifting) -Rule 20-1 states in part:

If a ball or the ball-marker is accidentally moved in the process of lifting the ball under a Rule or marking its position, the ball or the ball-marker shall be replaced. There is no penalty provided the movement of the ball or the ball-marker is directly attributable to the specific act of marking the position of or lifting the ball. Otherwise the player shall incur a penalty stroke under this Rule or Rule 18-2a.

This rule requires no modification for use by disabled golfers. However, because physical limitations and assistive devices, especially chairs, may restrict access to the ball, the Rule should be interpreted loosely enough to give the disabled golfer the benefit of the doubt in cases where "directly attributable" becomes an issue.

Rule 20-2a (Dropping and Re-dropping; By Whom and How)- Rather than have a disabled golfer who uses a wheelchair hold the ball above his head and drop it or throw the ball upwards to what shoulder height would be if he were able to stand erect, and in an effort to provide some uniformity, the following modification to Rule 20-2a is suggested:

20-2. Dropping and Re-dropping

a. BY WHOM AND HOW

A ball to be dropped under the Rules shall be dropped by the player himself. He shall either stand or sit erect, hold the ball at shoulder height and arm's length and drop it. If a ball is dropped by any other person or in any other manner, and the error is not corrected as provided in Rule 20-6, *the player shall incur a penalty stroke.*

Rule 20-3 (Placing and Replacing) - While a player may give another person the authority to retrieve or lift his ball, only the player or his partner may place a ball under the Rules. Because of physical limitations, it may be difficult or impossible for the disabled golfer playing in a wheelchair to place a ball as provided in Rule 20-3a. The solution to this issue is not very straightforward. Rather than suggesting that another person be authorized by the player to place the ball for him or that the player simply do his best, even if this means dropping the ball a few inches, it seems reasonable to wait and see how much of a problem this concern really creates.

Replacing the ball should rarely pose any difficulty, as Rule 20-3 allows for replacement not only by the player, or his partner but also by the person who lifted it.

Rule 22 (Ball Interfering with or Assisting Play)- Disabled golfers using assistive devices may be inclined not to lift their ball on the putting green in an effort to reduce the potential for damage to the putting green surface. This is not the problem it may seem to be, as the player may authorize another person to lift and mark his ball. The development of assistive devices which minimize the load per square inch will also help eliminate this concern.

Rule 24-2 (Immovable Obstructions) and Rule 25-1 (Abnormal Ground Conditions)- See same entry under Golfers Requiring Canes and Crutches.

Rule 28 (Ball Unplayable)- See same entry under Golfers Requiring Canes and Crutches for additional considerations regarding this Rule.

Obviously, the most significant issue here is how this Rule should be applied to the disabled golfer who is using a wheelchair and cannot get to his ball when it lies in a bunker. At present, it is customary for the wheelchair golfer to move the ball close to the edge of the bunker and play it, without penalty, or to drop a ball outside of the bunker under penalty of one stroke.

This procedure creates the potential for a very definite inequity. Consider the case in which two wheelchair golfers are playing against one another and the ball of both players comes to rest in a bunker. If one of the balls is playable and the other ball is truly unplayable, both players are handled identically-a decidedly advantageous result for the player whose ball was unplayable.

Before suggesting a solution to this problem, another potential inequity must be examined. Consider the available options for the able-bodied golfer when he plays a stroke and the ball comes to rest in a bunker. He may play the ball as it lies. If the player deems his ball to be unplayable, he shall, *under penalty of one stroke*:

- a. Play a ball as nearly as possible at the spot from which the original ball was last played; or
- b. Drop a ball within two club-lengths of the spot where the ball lay, but not nearer the hole; or
- c. Drop a ball behind the point where the ball lay, keeping that point directly between the hole and the spot on which the ball is dropped, with no limit to how far behind that point the ball may be dropped.

If the unplayable ball lies in a bunker, the player may proceed under Clause a, b or c. If he elects to proceed under Clause b or c, a ball must be dropped in the bunker.

Therefore, the able-bodied golfer may play his next stroke from outside of the bunker, but instead of simply dropping a ball just outside of the bunker, he must go back to the spot from which he last played. In some instances, this may result in his having to play one more stroke to get back to the area of the bunker- essentially a two stroke penalty to drop out of the bunker. Consequently, this problem results in an even greater inequity when the able-bodied golfer plays against the disabled golfer.

Keeping in mind our goal of allowing able-bodied and disabled golfers to play against one another on an equitable basis, the following language is suggested:

- If a disabled golfer deems his ball to be unplayable in a bunker, he shall:
- a. Proceed under Rule 28 a, b or c; or

b. Add an additional penalty of one stroke and play a ball outside the bunker, keeping the point where the ball lay directly between the hold and the spot on which the ball is dropped.

While the above language may provide the basis for handling the problem wheelchair golfers face in dealing with bunkers, it will raise some significant handicapping issues if it is ultimately adopted as the solution. The handicapping issues are addressed more specifically below.

MENTALLY HANDICAPPED GOLFERS

Modification of the Rules of Golf for the mentally handicapped golfer appears unnecessary. If it is elected to play by the Rules, this group of individuals should be able to do so, although some players may require on-course supervision to facilitate some or all aspects of play, including etiquette. In that regard, the on-course supervisor would in some cases, be somewhat analogous to the coach used by the blind golfer. In other situations, the supervisor might function more like an observer, helping one or more groups of golfers on an "as-needed" basis. In that case, he would be considered as an outside agency. In defining the status and the duties of a "supervisor", potential conflicts with Rules 6-4 (Caddie) and 8-1 (Advice) will need to be considered.

A relatively abbreviated experience with mentally handicapped golfers precludes addressing their needs under the Rules of Golf more specifically at this time. However, as these individuals become more involved in the game, it will be necessary to insure that the Rules are being properly adapted to accommodate any special requirements which interfere with their playing of the game.

MISCELLANEOUS ISSUES

Etiquette-Priority on the Course- The final paragraph of this section states:

If a match fails to keep its place on the course and loses more than one clear hole on the players in front, it should invite the match following to pass.

Both able-bodied and disabled golfers should make their best effort to maintain their pace of play and their position on the course. No one deserves special consideration with regard to this point.

Etiquette- Care of the Course- Through the green, the player should repair any damage caused by spikes, tires and any other type of assistive device. On the

putting green, such damage should be repaired after all players in the group have completed the hole. Due to certain weather or turfgrass conditions, disabled golfers may be precluded temporarily from using certain types of assistive devices.

It is hoped that current research will result in the development of assistive devices which have minimal effect on agronomic conditions and that the GCSAA, the PGA of America and the USGA will lead the effort to re-educate the public regarding the true, rather than the perceived, impact of these devices on turfgrass.

Rule 6-7 (Undue Delay)- The interpretation and application of this particular Rule provides a more than enough difficulty in dealing with able-bodied golfers by themselves. To suggest a mechanism by which this Rule should be applied to disabled golfers is equally as difficult. Clearly, there is enough subjectivity in defining undue delay that considerable Committee discretion is required. In that regard, a slightly liberal interpretation of what constitutes undue delay is suggested. Ultimately, each Committee must establish what it considers to be reasonable parameters, given the difficulty of the golf course, weather conditions and the quality of the field. To offer more specific guidance to the Committee than that is probably not realistic.

HANDICAPPING

In establishing handicaps for disabled golfers, two issues manifest themselves immediately. The first issue is that adapting the USGA Handicap System for disabled golfers is impossible until an adaptation of the Rules of Golf has been agreed upon. Rule 28 (Ball Unplayable) and its application to a wheelchair golfer whose ball lies in a bunker serves as a useful example. Resolution of the handicap problem associated with this Rule will be necessary to eliminate the discrepancy in Handicap Indices which could arise when a disabled golfer establishes his handicap at a golf course which is heavily bunkered. The solution may necessitate determining a maximum number of unplayable penalty strokes allowable during a stipulated round based on the player's Handicap Index and the Hazard allowable during a stipulated round based on the player's Handicap Index and the Hazard rating of the golf course on which he is playing. Until a method of handling this situation under the Rules can be agreed upon, there is no basis upon which to perform the mathematical calculations which will determine what changes are required in the USGA Handicap System to establish accurate Handicap Indices.

The second issue concerns the type of handicap index the disabled golfer should be given once the Rules of Golf and the USGA Handicap System have been adapted for use by disabled golfers-regular, provisional, local or some other restricted designation which has yet to be determined? The answer will depend, at least in part, to how far the adapted Rules used by disabled golfers depart from the Rules of Golf.

Anticipating the eventual need to resolve handicapping issues, preliminary

discussions have been held with members of the USGA Handicap Research Team and the USGA Handicap Committee.

SUMMARY

This is an initial attempt to adapt the Rules of Golf for disabled golfers with the intent of providing a means by which they may play equitably with able-bodied golfers or golfers with other types of disabilities. It is not intended to be a revision to the Rules of Golf as they currently exist. Hopefully, all of the key issues have been addressed and the foregoing will serve as the basis for more in-depth discussion which will ultimately lead to resolution of this project, although continued analysis and modification will be necessary, as is the case for the Rules of Golf.

The Education Committee formed during Forum III focused its initial efforts on the development of a brief educational brochure that could be distributed to golf course personnel as an **FIRST** step in assisting them in integrating persons with disabilities into the game of golf. Gary Robb of the National Center on Accessibility developed the brochure with the input of over 40 golf course architects, golfers with disabilities, golf course superintendents, golf professionals and others. The brochure is currently in its 4th revision, and is in the process of being finalized. The distribution strategy (yet to be finalized), is to have each of the major golf organizations distribute the brochure to their membership. The following pages represent the **Atext**≅ but not necessarily the format of the brochure, in its 3rd draft. The brochure will under go one final edit once the printing and marketing strategy has been finalized.

Golfers with Disabilities ..a primer for golf course personnel

Who are they?

It is estimated that there are about 50 million people with disabilities in the U.S.A. They include people who have visual, hearing, physical and mental impairments. They are people who use canes, crutches, and wheelchairs, and people who use service animals and/or other assistive devices to assist them in maximizing their abilities. They are also people who may have a "temporary" disability due to accident, illness or injury.

How many play or want to play golf?

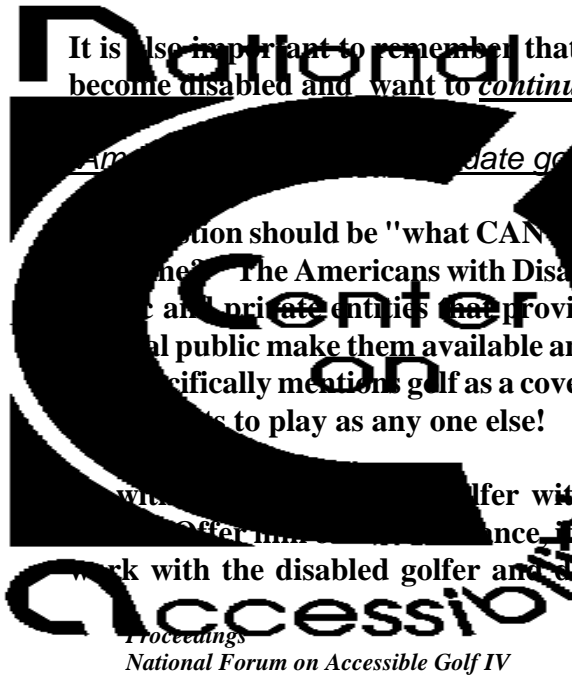
People with disabilities have the same interests as those who may not have any apparent disability. The NGF estimates that approximately 12% of the American people play or have played golf. It is not unreasonable to expect that as people with disabilities become more aware of the game and the opportunities to play, the percentages will be about the same. Currently, the National Center on Accessibility at Indiana University is conducting research to determine the number of people with disabilities who are playing or wish to play the game. The results of this study will be available from the Center in late 1995.

It is also important to remember that many who currently play golf may one day become disabled and want to continue playing golf.

Am I responsible for providing accommodations for golfers with disabilities?

The question should be "what CAN we do to help golfers with disabilities to enjoy the game?" The Americans with Disabilities Act of 1990 (ADA) requires that most public and private entities that provide goods and/or accommodations for the general public make them available and accessible to persons with disabilities. The Act specifically mentions golf as a covered activity. Golfers with disabilities have the right to play as any one else!

When a golfer with a disability asks for help, you should feel welcome at your golf course. Offer him or her the assistance needed to enjoy the course. Be willing to work with the disabled golfer and discard any prejudices and/or preconceived



thoughts that you might have. Be open minded! This approach could go a long way in insuring a pleasurable experience for the golfer with a disability, your staff and other golfers.

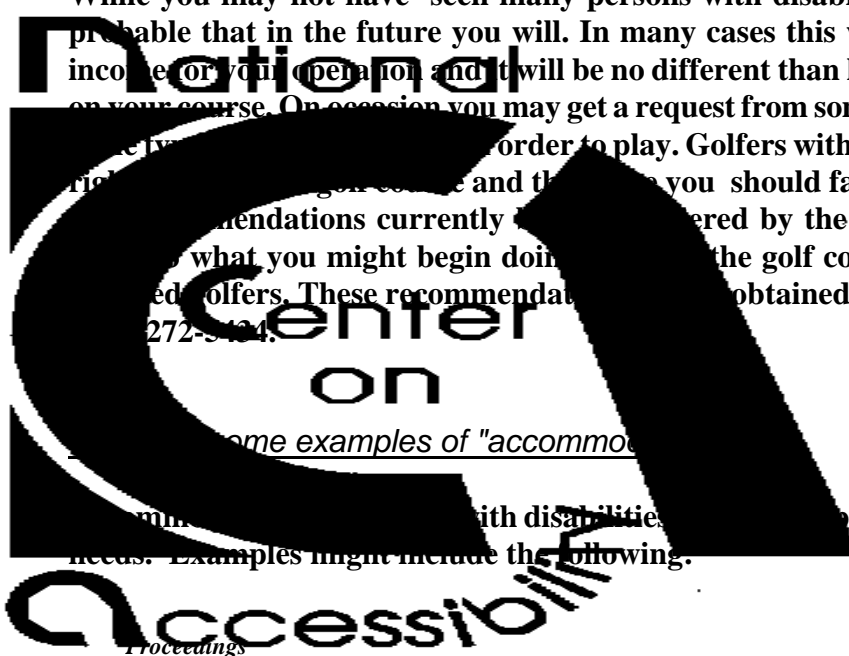
What do I have to do to make my golf course accessible to golfers with disabilities?

The ADA Accessibility Guidelines provide detailed information regarding how facilities and buildings must be constructed or altered to allow persons with disabilities to effectively use them. Specific guidelines covering new golf courses and courses that undergo alterations have been developed and should become part of the law sometime in 1996. All new buildings and major alterations to existing structures (such as to the club house) are already covered and must follow the current standards. While you are required to make certain accommodations so that golfers with disabilities can play the game like anyone else, accommodations do not have to be made when they create an undue burden or hardship. For example, if you have a standard for pace of play, golfers with disabilities can be held to that same standard. The golf course operator must determine if a burden or hardship is created. If this judgement is called into question, the U.S. Department of Justice has the responsibility of resolving such disputes.

What can or should I be doing now?

While you may not have seen many persons with disabilities playing golf, it is probable that in the future you will. In many cases this will simply mean more income for your operation and it will be no different than having any other golfer on your course. On occasion you may get a request from someone who may require some type of accommodation in order to play. Golfers with disabilities do have the right to play on your course and therefore you should familiarize yourself with the recommendations currently recommended by the US Access Board as a means of making your golf course more playable by disabled golfers. These recommendations can be obtained without cost by calling the National Center on Accessability at 272-5434.

Some examples of "accommodations" for persons with disabilities, depending upon individual needs. Examples might include the following.



- < A TTY (telecommunications device for the deaf) might be installed so that golfers with speech or hearing impairments will have access to tee time reservations and other services (assuming that you provide those services to other golfers).
- < It may be that a blind or visually impaired golfer needs a sighted person to accompany him or her onto the course as a "coach". There should be no charge for the coach, unless he or she wishes to play.
- < It may be that someone who uses crutches would benefit from your allowing him or her to take the golf car into areas normally restricted to other golfers (e.g. off the car paths, close to the tees or greens). In such cases the golf car could be flagged or a magnetized sign be affixed to the front panel indicating to others that an accommodation is being made. This will help avoid possible confrontations with the public and/or golf course staff.
- < It may be that someone who uses a wheelchair or other mobility device to play will request access onto the green surfaces with that device. While climactic conditions may sometimes dictate that such accommodation requests would damage the golf course, in many cases those accommodation requests are reasonable and should be honored. Currently, there are no specific guidelines or measurement tools to assist you in determining if an accommodation request is reasonable. By calling the number at the end of this brochure, we can put you in touch with individuals and organizations that can provide advise. You may wish to develop certain procedureds and policies so that your attendant staff and grounds keepers will be prepared.

National
Center
on
Accessibility

Proceedings
National Forum on Accessible Golf IV

... on greens?
 ... GCSAA and the PGA... have funded a two year research
 ... to specifically look at potential use of assistive mobility devices on
 ... under diverse climactic and green conditions. Hopefully the outcomes
 ... this research will provide specific information to golf courses on policy
 ... development. In the meantime, manufacturers and users of wheelchairs are
 ... ing new technology that will reduce impact on green surfaces from
 ... ces to less than that of the golf cart. The typical ambulatory golfer
 ... nd... machines and other maintenance equipment.
 ... and more... available, it is suggested that you work on a case-by-case
 ... basis. For example, if someone in a wheeled device wants to play, it may be

appropriate to go to the practice green to determine any impact on the green surface that particular day. But remember, the law indicates that the responsibility for proving damage to the golf course rests with the golf course management and NOT with the golfer who has a disability.

Where can I get more information or assistance?

There are several organizations that provide information, technical assistance and consulting services to assist golf courses in addressing issues of access for golfers who have disabilities. Many golf professionals and operators have had experience accommodating golfers with disabilities. The National Center on Accessibility will provide the names, telephone numbers and addresses of golf professionals and golf course personnel and/or other organizations that would most likely be able to assist you with specific questions. Contact:

National Center on Accessibility
5040 State Road 67 N.
Martinsville, Indiana 46151
Phone : 1-800-424-1877 (voice or TTY)
Fax: 1-317-349-1086



The remainder of the first day of Forum IV was spent discussing the status of the Clemson University Golf Course accessibility project. Larry Allen showed slides of the course under construction and pointed out the accessible features of the course. For further information on the Clemson University golf course, contact Larry Allen.

The second day of Forum IV focused on research projects in progress.

The first presentation was given by Richard Singer of the National Golf Foundation.

Golfer/Non-Golfer

Market Study
September 1994

National Golf Foundation

INTRODUCTION

During the summer of 1994, the National Golf Foundation, (NGF) collected data surveys from individuals defined as golfers, non-golfers, and former golfers in other NGF surveys.

A total of 1,252 golfers were measured to assess demographics, frequency of play, participation in other activities, areas of other general interest, reasons to be a golfer, money spent on golf, and use of various non-golf products. In addition, the NGF also collected similar surveys from 367 former golfers and 527 non-golfers. These surveys were conducted to ascertain some of the reasons why people don't play golf, as well as exploring some ways to bring more people into the game.

This consumer profile represents one of the most significant golf market studies ever conducted. The results of this study are expected to form the basis on which many golf business decisions are made over the next few years. NGF intends to publish the results of the *Consumer Profile Survey* under various titles in the next few years. Some of the key results relating to the Americans With Disabilities Act (ADA) and disabled golfers have been presented as follows:

Non-Golfers:

Non-Golfers are defined as individuals who have never participated in the game of golf.

- C 11.5% of non-golfers strongly agree that having a physical impairment is a significant reason for not participating in golf.**
- C Of those non-Golfers who cited a physical impairment as a significant reason for not participating, 20% are not likely to ever participate in golf.**

Former Golfers:

Former Golfers are defined as individuals who have not participated in golf in the last two years, but had previously played the game.

- C 7.8% of former golfers strongly agree that having a physical impairment is a significant reason for no longer participating in golf.**
- C Of those former golfers who cited a physical impairment as a significant reason for no longer participating, 35% are not likely to ever participate in golf again.**

GOLFERS:

All NGF surveys define golfers as those who have played at least one round of golf during the 12 month survey year. NGF has estimated in *Golf Participation in the United States- 1993* that there are 22.7 million golfers over 18 years of age in the United States. This represents 11.8 percent of the U.S. population over the age of 18.

Some of the key results relating to the Americans With Disabilities Act (ADA) and disabled golfers have been presented as follows:

- C 10.5% of golfers live in households with at least one family member having a physical impairment.**
- C 3.4% of golfers are themselves physically impaired.**

Of the 3.4 percent of golfers who reported themselves to be physically impaired, the following observations were made:

- C **71% are male**
(78% for all golfers)
- C **58% are over 50 years of age**
(25% for all golfers)
- C **40% live in households that earn in excess of \$40,000 annually**
(63% for all golfers)
- C **68% rate their overall golfing satisfaction as 7 or better in a scale of 1 to 10**
(76% of all golfers)
- C **73% rate access to golf facilities as below average**
(62% for all golfers)
- C **24% play golf mostly at private facilities**
(11% for all golfers)
- C **45% are occasional (1-7 rounds) golfers**
(46% for all golfers)
- C **14% are core golfers**
(24% for all golfers)
- C **41% are avid golfers**
(30% for all golfers)
- C **44% spent less than \$50 on playing fees in the last 12 months**
(32% for all golfers)
- C **45% spent less than \$25 on equipment and apparel in the last 12 months**
(34% for all golfers)

The second presentation of the day focused on a survey conducted jointly by Clemson University and the National Center on Accessibility at Indiana University. Information on this study was presented by Dr. Edward Hamilton, Director of Research, National Center on Accessibility.

People with Disabilities
and the Game of Golf

Edward J. Hamilton, Ph.D.
Gary M. Robb
National Center on Accessibility
Larry Allen, Ph.D.
Clemson University

When the Americans with Disability Act (ADA) was signed into law in 1990 it prohibited discrimination on the basis of disability. More specifically, the ADA required that people with disabilities have equal opportunities to participate in and benefit from facilities, goods and services, and that those opportunities be made available, where possible, with individuals without disabilities.

The ADA acknowledged recreation and leisure as "critical areas" in assuring equal opportunity for people with disabilities to fully participate in society. Although employment and housing are of fundamental importance to the lives of people with disabilities, the ADA recognized that if people with disabilities are to become full participants in society, they must have equal access to recreation opportunities. Golf courses are specifically mentioned as an example of a public accommodation in the ADA.

Golf is the fastest growing recreational activity in America today. The National Golf Foundation reported 24.8 million golfers played 479 million rounds of golf in 1991, numbers that nearly doubled in five years. The growth in golf is evidenced by the increase in female golfers (5.5 million in 1991) and junior golfers (1.5 million in 1991) and the development of 1,300 new golf course between 1987 and 1991. The majority of golf is played at public access courses (60.6%).

Golf is no longer a game that only the elite play. The growth of public golf facilities over the past decade has opened the game up to literally all segments of society. Golf is truly a lifetime sport. The game requires very little organization or planning on the part of the participant. It allows a single individual or entire organizations to participate. Via the standardized "handicapping system", all golfers, regardless of ability, can participate on equal terms.

As individuals with disabilities continue to gain access to the mainstream of America, it is expected that more and more will also want to have equal access to the game of golf. Yet, very little is presently known about the participation of people with disabilities in golf. There is virtually no research on the number of

people with disabilities who currently play the game. No one has examined the barriers that may be inhibiting people with disabilities from participating. There have been no attempts to determine the degree to which people with disabilities would be interested in participating even if the game was made accessible to them.

Therefore, the National Center on Accessibility at Indiana University and the Department of Park, Recreation and Tourism Management at Clemson University have undertaken a study to examine these critical questions. The purpose of the study is to determine the participation, experience, interests, and perceived barriers of people with disabilities in the game of golf. The study will also examine the relationships of age, income, disability, age of onset of disability, and functional abilities to each of the principal variables of interest.

A total of 1076 people with disabilities throughout the U.S. were surveyed by mail in March, 1995 as part of this study. A modified Dillman procedure was used; an initial survey, a follow-up postcard, and a follow-up survey were mailed to subjects. Data collection is expected to be concluded in early April, 1995. A report on the study will be made available during the summer of 1995.

The next presentation focused on research being conducted on Apace of play \cong by the National Center on Accessibility and the Western Laboratory for Leisure Research at the University of Utah.

Variation in Pace of Play for Golfers
With and Without Disabilities:
A Pilot Study

Edward J. Hamilton & Gary M. Robb
National Center on Accessibility
Indiana University
Erik Rosegard & David M. Compton
Western Laboratory for Leisure Research
University of Utah

Pace of play is one of the most persistent and perplexing problems facing the game of golf. Slow play frustrates players and diminishes revenues for courses. It is often assumed that people with disabilities will further slow the pace of play. At the third National Forum on Accessible Golf, it was reported that pace of play was one of the two most frequently cited concerns of golf course operators regarding the inclusion of people with disabilities in the game (Hamilton, 1994).

Consequently, the National Center on Accessibility and the Western Laboratory for Leisure Research, conducted a pilot study to examine the effects of disability on pace of play in golf. Specifically, the study addressed the following research questions:

1. Does pace of play vary significantly between golfers with disabilities and golfers without disabilities given equal playing indexes?
2. Does pace of play vary significantly according to the distribution of golfers with disabilities and golfers without disabilities in foursomes?
3. Does pace of play vary significantly for individuals and groups by hole rating?

The study was conducted at Foothills Golf Course in Denver, Colorado, August 14, 1994. The Foothills Course measures 6,786 yards from the back tees and 6,372 yards from the middle tees. The course rating is 71.1 (122 slope rating) from the back tees and 69.1 (116 slope rating) from the middle tees.

The sample population for the study was drawn from a pool of volunteers who were volunteers who were active golfers with established playing indexes in the Denver metropolitan area and individuals with disabilities who were committed to play in the Association for Disabled American Golfers (ADAG) National Tournament, August 15-16, 1994. Letters indicating the purpose of the study and requesting volunteers were mailed to potential subjects from a list of 100 individuals provided by ADAG. Of the 67 positive contacts, 26 individuals indicated a willingness to participate. Based on the composition requirements of the playing groups, 24 subjects were selected for the study. The subjects were assigned to play in one of the following foursomes:

1. Four players without disabilities
2. Three players without disabilities; one player with a disability
3. One player without a disability; three players with disabilities
4. Two players without disabilities; two players with disabilities
5. Three players with disabilities; one player without a disability
6. Four players with disabilities

Each foursome played 18 holes in a regular manner. At the first tee, a timer noted the exact time each foursome departed the tee box. At four ascribed "time par" intervals, on-course timers recorded the exact time the foursome arrived at the interval "time par" sign. The following data was recorded by hole timers at each of the par-three holes:

Interval #1 - Initial tee Shot: Timing of this interval began with notification that it was the individual's turn to play and ended when the player's tee shot was hit.

Interval #2 - Advancement to the Next Shot(s): Timing was initiated when the entire foursome departed the tee box and ended when each individual arrived at his or her ball.

Interval #3 - Execution of Next Shot: Timing of the interval began when the individual was notified it was his or her turn and ended when the individual hit the ball. Intervals #2 and #3 were repeated for each subsequent shot until the player reached the green.

Interval #4 - Putting at the Green: Timing was initiated when the individual was notified it was his or her turn and ended when the ball was hit. This procedure was repeated until the ball was holed.

The results of the pilot study were confounded by several factors: course accessibility, a lack of golf indexes for golfers with disabilities, one golfer who chose not to use a motorized golf car, and timer inconsistencies. There were several locations on the Foothills Golf Course where there was limited access to the tee boxes or greens. The use of curbing along pathways also limited access to fairways especially on holes #4, #7, #8, #9, and #18. These barriers caused golfers with disabilities to travel further to reach their balls than golfers without disabilities. A disproportional number of the golfers without disabilities did not have established golf indexes. This prevented controlling for golfer ability. Golfing ability could significantly affect the number of shots, which would subsequently affect pace of play. All golfers were requested to use a motorized golf car. One golfer with a disability chose to travel the course in his own manual wheelchair rather than in a motorized golf car. Pace of play for that player's foursome and all subsequent foursomes was delayed by more than 30 minutes. Finally, there were dramatic variances in timing by different course and hole timers. This was likely due to insufficient training of timers prior to the study. As a result of these confounding factors, the results of the pilot were not interpretable.

Based on this study, the following recommendations for future research are provided:

1. Future studies should control for experience, knowledge of the game, and skill level. Experience and knowledge of the game will be relatively easy to measure, however, skill level may be more difficult to ascertain. Ideally, all subjects should have a USGA golf index. The difficulty is that many golfers without disabilities do not have USGA golf indexes. Handicaps established under local rules will be much

less reliable but may be the best available measure.

2. If the effects distribution of golfers with disabilities and golfers without disabilities in foursomes is measured in future studies, it is recommended that groups be scheduled on different days or segments of the day to avoid contamination of other study groups.

3. It is recommended that video cameras be used to record the actual time for individual players. This should significantly increase inter-observer correlations.

4. A questionnaire should be administered to all subjects prior to pace of play data collection. The questionnaire should obtain information regarding knowledge of the game, experience and affiliations in golf, playing habits and tendencies, and current health status.

5. In order to increase inter-observer reliability among on-course timers, it is recommended that training in timing protocols be conducted with the timers.

A follow-up study is scheduled to be conducted at the 1995 ADAG National Tournament at Fox Hollow Golf Course in Denver, Colorado. This will provide a much larger sample. It will also provide a sample with a greater percentage of golfers with disabilities who have an established index and greater golf experience. Video cameras will be used to record times for each golfer.

Following the pace of play discussions, the forum focus turned to research that is currently underway in the area of impact of assistive and wheeled devices on greens surfaces. Two presentations were made that described research in progress. Summaries of those presentations follow.

Assistive-Device Traffic on Golf Greens - Effect on Putting Trajectories: A Preliminary Study

R.B. Dodd, R.E. Williamson, L.R. Allen and David White, Clemson University

INTRODUCTION

Golf course managers are concerned about possible detrimental effects of traffic from assistive devices used by mobility impaired golfers. At present, there is very little information on the possible horticultural effects or playing-quality effects on golf greens as a result of such traffic. The information described herein is a preliminary and quite unsophisticated effort to determine if there is any readily-observed effect on ball trajectories when putted where such traffic has occurred in

the putting path. It must be emphasized that the data reported is very limited in scope and is preliminary in nature. It does not have sufficient replications and controls to be considered definitive but merely as a rough indicator of the magnitude of any effects of foot traffic and wheelchair traffic in causing a putt to deviate from an observed path.

The objective was to determine if limited traversing of the putting path by a wheelchair-mobile golfer causes any significant deviation and variability of the putt trajectory when compared with a non-traffic condition and with a foot-traffic condition. We also wanted to learn if any observed effect persisted after several minutes.

METHODS AND EQUIPMENT

A simple mechanical putting device was constructed as a preliminary tool to investigate the variability of putting trajectories. This device consisted of a horizontal shaft mounted with flange-mount ball bearings fastened to two vertical supports at a distance of 75 cm above the putting surface. A putter was clamped to the freely rotating horizontal shaft in a position so that the head of the putter was held in the proper angle and position to strike the ball squarely and swing through without contacting the putting surface.

To use the mechanical putting device, a release stand was constructed to hold the putter head at a repeatable distance above the putting surface. The release stand released the putter head and allowed the putter head to swing through the arc due to the freely rotating horizontal mounting shaft and strike the ball with a very repeatable direction and energy. The height of the release point could be adjusted to give more or less energy to the putter head at the point of impact.

Data was taken with this device on the practice green at Clemson University in early March, 1995. The conditions during the test were not ideal since data was taken within an hour after the beginning of a light rain. The rain was continuous throughout the trials. The procedure consisted in: 1) Setting up the equipment on the green in a spot that had no traffic (foot or other) for several hours prior; 2) Recording the distance from the point where the ball was placed to an imaginary "hole" (the direction of the putt was adjusted in combination to the putter head energy to get the ball to the hole with adequate, but not excessive, speed to drop the putt consistently in the hole; 3) Visually determine the path of the ball when putted with the direction and energy determined; 4) Place a tape across perpendicular across the expected path; 5) Putt a series of ten balls with a constant direction and energy and record the point where the ball crossed the tape right or left of the expected point; 6) Impose the wheelchair or foot traffic in the desired pattern on

the pattern; 7) Immediately putt another series of ten balls and record the point where the ball crossed the tape; 8) Wait for a period of time with no traffic on or within the ball path and repeat the series and record the data.

The traffic imposed on the green was:

1. Walking diagonally across the ball path (195lb. male - golf shoes);
2. Wheelchair traffic (all weight on the rear wheels), perpendicular to the ball path;
3. Wheelchair traffic (all weight on the rear wheels), at 45 degree angle to ball path.

RESULTS AND DISCUSSION

The effect of foot traffic is shown in Table 1.

Table 1. Effect of foot traffic (golf shoe) across path on a 10-foot putt.

Putt No.	Deviation from pin (inches) before traffic	Deviation from pin (inches) immediately after traffic
1	1.0	0.0
2	-1.0	-1.5
3	-1.5	0.0
4	0.0	-1.8
5	-1.0	1.0
6	-1.0	1.0
7	0.0	-2.0
8	-1.0	-1.5
9	-1.0	0.0
10	-1.5	-2.0
Mean	-0.70	-0.68
Std. Dev.	0.748	1.140

In this table, positive and negative values indicate that the actual ball path was right or left of the expected path, respectively. A zero value would have been dead center of the pin. No statistical analysis was performed on the data; however, it

appears that foot traffic across the path of a 10-foot putt did not affect the ball path.

The values shown in Table 2 are for a wheelchair fitted with 26-inch diameter tires with 1 3/8-inch tread carrying a 190 lb. golfer. When crossing the ball path, the chair was supported only on the large wheels with the smaller caster wheels in front of the main wheels off of the putting surface.

Table 2. Effect of one-pass wheelchair traffic perpendicular across ball path, midway to hole on a 10 foot putt.

Putt No.	Deviation from pin (inches) before traffic	Deviation from pin (inches) immediately after traffic	Deviation from pin (inches) 5 minutes after traffic
1	3.5	2.0	2.0
2	2.0	2.0	0.0
3	3.5	3.0	0.0
4	2.5	0.0	2.5
5	3.5	1.0	3.3
6	3.5	1.0	3.5
7	0.0	0.0	2.0
8	3.5	1.0	3.0
9	2.0	2.0	2.0
10	2.0	2.5	2.5
Mean	2.60	1.45	2.08
Std. Dev.	1.091	0.960	1.151

The data in column two is the result before any traffic and indicates that the putts were all to the right of the pin. More careful alignment of the putting device before recording the data should have reduced the mean deviation before traffic. The data in column three indicates that immediately after the traffic on the putting surface, the ball path seems to have shifted to the left about one inch. The data in column four indicates that, after a five-minute wait, the putting surface was recovering and the ball path was shifted back toward the original position. It is noted that the variability of the ball paths was essentially the same for the data in each column.

For the data in columns 2-5 of Table 3, the wheelchair passed over the ball path at approximately a 45° angle to the ball path. The deviations of ten putts was

recorded immediately after the wheel chair traffic and this data is shown in column 3. The putting device was left in place and after five and ten minute waits, ten additional putts were made and the deviations recorded in columns 4 and 5 respectively. The data in column 6 was recorded without moving the putting device after completing the trails recorded in columns 2-5. The wheelchair then crossed the ball path several times (5-7) at paths ranging from nearly parallel to the ball path to nearly perpendicular to the ball path. This data is shown in column 6 of Table 3.

Table 3. Effect of one-pass wheelchair traffic diagonally (45⁰) across ball path, midway to hole on deviations of a 10-foot putt (columns 2-5) and multi pass crossings (column 6) .

Putt No.	Deviation from pin (inches) before traffic	Deviation from pin (inches) immediately after traffic	Deviation from pin (inches) after 5 min. wait	Deviation from pin (inches) after 10 min. wait	Deviation from pin (inches) after multi crossings with wheelchair (no waiting)
1	0.0	-2.0	-2.0	2.5	-1.5
2	-1.0	1.0	-1.5	-1.5	-2.5
3	0.0	-2.0	-2.5	-2.0	-1.5
4	-1.0	-2.5	-1.5	-2.5	-2.0
5	0.0	-2.0	0.0	-2.5	-1.0
6	0.0	-3.0	2.5	-1.0	-3.5
7	0.0	-2.0	-2.0	-1.5	0.0
8	0.0	0.0	-2.0	-1.5	0.0
9	0.0	-1.5	0.0	0.0	-1.0
10	0.0	0.0	-2.0	-2.0	-1.5
Mean	-0.20	-1.40	-1.10	-1.20	-1.45
Std. Dev.	0.400	1.221	1.446	1.418	1.011

This table give the most convincing indication that the ball path was shifted by wheelchair traffic across the ball path. Before traffic, the data in column 2 indicates that the ball path was consistent with a low mean deviation and low standard deviation. Immediately after wheelchair traffic at a diagonal direction (45⁰ angle), the data in column three indicates that the ball path had shifted left about one inch and the standard deviation increased. After a five-minute wait, the path seemed to have shifted slightly back toward the original path (column 4).

However, the path after a ten-minute wait was nearly the same as the path just after the traffic.

The final result column of Table 3 (column 6) shows the results of multi-passes at somewhat random directions across the ball path. This data was taken immediately after the random traffic in the same location used for the data in columns 2-5. The result shows that the ball path was about the same as measured for one pass at a 45⁰ angle.

SUMMARY

A mechanical putting device was constructed which was able to strike a ball on the putting surface with a consistent direction and energy. This device was used to conduct a series of unsophisticated trials to determine whether foot traffic and wheelchair traffic on a putting surface affected the ball path.

While very limited in scope, the results indicated that the path of ten-foot putts, maybe altered somewhat by both foot traffic and wheelchair traffic. It is cautioned that this result was for one green, under wet conditions.

The second presentation on impact of assistive devices on greens reported on a study currently underway at Rutgers University as a result of a grant from the United States Golf Association, The Golf Course Superintendents Association of America and the Professional Golfers Association.

Impact of Assistive Devices on Greens

Gary Gentilucci and Dr. James Murphy
Rutgers University

INTRODUCTION:

The Americans with Disabilities Act of 1990 has resulted in an increased interest and play by disabled golfers. Access to golf course turf by disabled golfers has introduced traffic conditions not commonly encountered on putting greens and has raised questions about the resulting impact on turfgrass growth and playing surface quality. The effects of assistive devices used by disabled golfers on turf are

unclear and research is needed to characterize the equipment used on golf greens by disabled golfers. The impact of the traffic needs to be evaluated for turfgrass problems including compaction, rutting and wear. Research is currently being conducted at Rutgers University to investigate the impact of assistive devices on golf greens.

OBJECTIVE:

The project has three objectives: (1) The assembly of information on assistive devices and maintenance equipment that may be used on golf greens. Assistive devices used by disabled golfers and equipment used by golf course managers for maintenance practices need to be quantitatively characterized for impact pressures and capacity to produce wear. (2) Development of tests for characterizing surface bearing capacity and wear susceptibility of golf greens. (3) Relate surface bearing capacity and wear susceptibility data to the data acquired from assistive devices and maintenance equipment and develop relationships between the two to allow for quantitative evaluation of different forms of traffic. Based on these relationships, guidelines can be developed to allow for objective decision making on golf course accessibility.

MATERIALS AND METHODS:

Tests for characterizing surface bearing capacity of golf greens will be assessed during 1995. Bearing capacity determines when damage from rutting and deformation will occur and the extent of interference with playing quality of the surface. Quantitative tests can determine the physical characteristics of a surface. The playing quality of a golf green can be evaluated through measurements of surface uniformity and consistency of ball roll. The evaluation of different forms of traffic over a wide range of environmental conditions and management practices can assess whether the tests used for determining the bearing capacity of golf greens are adequate.

Tests for Playing Quality

Putting green surface playing quality will be quantified by two measurements:

(1) A micro-reliefmeter will be used to gauge deformation of a surface. The micro-reliefmeter is a foot long wooden bracket that hold pins (1/16th of an inch diameter) in a straight line. The pins are allowed to slide up and down and follow the contour of a surface. A trace of the pins will depict the surfaces appearance. An ideal green would have a smooth pattern with no disruptions.

(2) Ball roll deflection will indicate interference of ball travel caused by deformation. A stimpmeter will create a repeatable ball roll that will cross the path of traffic. The starting and stopping points will be recorded for the path of ball travel.

The measurements of the micro-reliefmeter and ball roll deflection will be taken prior to and after traffic occurrence.

Test for Physical Characteristics

The equipment used for measuring the physical characteristics of a putting green surface are the Clegg Soil Impact Tester (2.5 kg hammer) and a Soiltest CL700 pocket penetrometer. The Clegg Soil Impact Tester will be used to determine the hardness of the greens surface. The tester measures the deceleration of a hammer that is dropped down a guide tube. The tester gives a value associated with the hammer's deceleration due to surface hardness. A hard surface would measure higher than a soft surface.

The penetrometer will be used to test surface strength. A penetrometer is a spring-loaded piston that is pushed into a surface to a predetermined depth. The force exerted is measured by a sliding ring on the outside of the piston barrel. A higher measurement shows greater soil strength.

Procedure for Testing

The bearing capacity of a surface could be objectively described by associations between the physical characteristics and playing quality of a putting green. The evaluation of a putting green surface bearing capacity presently includes the following steps:

- 1) Testing of surface hardness and strength (impact tester and penetrometer)
- 2) Testing surface quality (micro-reliefmeter and ball roll deflection)
- 3) Application of traffic (wheelchair, triplex mower, golf shoes, etc.)
- 4) Testing surface quality (micro-relief meter and ball roll deflection)

The evaluation of the tests over a wide range of environmental conditions and management practices can assess whether the tests are adequate for determining the bearing capacity of golf greens. The tests for surface hardness and strength need to accurately measure the stability of putting green surfaces. The tests for playing quality need to accurately represent to what extent playing quality was interfered with traffic.

The final assessment is to determine if the tests for hardness or strength effectively predict the degree of interference in quality of play for a putting green. If surface hardness or strength are found to efficiently predict the degree of interference to quality of play, these relationships would allow for determining "threshold" levels for surface bearing capacities of golf greens for different traffic

forms.

FUTURE OUTLOOK:

The assessment of tests for determining the bearing capacity of a golf green will begin the assimilation of data on the impact of traffic on golf greens. Future collection of impact pressures of different traffic will allow for evaluation of these traffic forms in relation to the bearing capacity of putting greens.

The development of a test for wear susceptibility on turfgrass needs to be addressed in a comparable manner as surface bearing capacity. The use of a device similar to a pendulum-foot could be designed to provide a quick assessment of wear susceptibility. Research is scheduled for this type of evaluation.

In addition to formal presentations and discussions, the forum provided opportunities for participants to share information, ideas and materials. Some participants also had available for review and demonstration, equipment such as tires and single rider golf cars. Additional information and details on any of the following may be obtained by contacting the presenters directly (see addresses in Participant List at end of these Proceedings.)

Bob Andrews, President of the U.S. Blind Golfers Association spoke about the organization and showed participants a video on the latest national blind golfers golf championship.

Stephan Breisach, Austrian Golf Car Industries presented slides on a single rider golf car that is being manufactured in Austria. The *PARA GOLF CAR* is also used for purposes other than golf.

Mindy Derr, Director of Fore Hope, Inc. In Columbus, Ohio provided participants with information about her organization. Fore Hope is a program that provides a therapeutic golfing program for persons with disabilities or inactive lifestyles, while assisting them with their physical and emotional development.

Gus Churchill, Director of the Heartland Disabled Golfers Association, located in St. Louis, Missouri informed Forum participants that they were just in the process of starting the organization and that they had received much local interest from golfers with disabilities

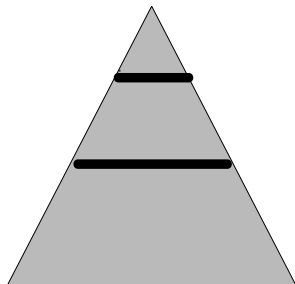
Michael Flowers of Electric Mobility, Inc. Had several of the latest adaptation of a prototype single rider golf car. They explained the development of the car and that

it was still undergoing testing and modification. Electric Mobility had several *AGOLF EXPRESS* cars available for participants to try out during the Forum.

Alex Pali, PCS Clubmaker was representing the Professional Clubmaker's Society at the Forum. Alex discussed the Society's interest and involvement in developing personally adapted clubs for golfers with disabilities. He mentioned that they had formed a Task Force for Fitting the Physically Challenged Golfer. The Task Force has as its objective, the development of a fitting plan and club making specifications for various challenges faced by disabled golfers.

Mike Scanlan of the Star Vehicle Company presented a tire that is manufactured in Ireland (Flexi Pad) and that has the potential for use on both single and dual rider golf cars. The tire is unique in design and could potentially greatly lessen the impact on tees and greens by golf cars. In addition, it is designed to provide maximum stability and safety for the rider.

The final morning of Forum IV focused on the development of technology and in particular, single rider golf cars. Forum participants were divided into four groups for group brainstorming and discussion on the major issues surrounding the development of technology and its potential impact on the game of golf.



The following represents a summary of the discussions from each of the work groups.

Group 1 (facilitated by Larry Allen, Clemson University)

ISSUES

1. Identify the need for and use of an adapted golf car.
2. Implications for the design of the course.
3. Meet safety spec. of existing golf car technology.
4. Advantages of single vs. double rider car.
5. Liability
6. Input from manufacturers

Currently....Adapted for play from Car(5%)

Adapted transport only (15%)

Standard Car (with flag) (80%)

Needs/Issues

- 1. Identify who will use:**
 - a. People must play from a vehicle.**
 - b. Need transportation with elements beyond existing golf car design**
- 2. Play right or left.**
- 3. One hand versus two hand play.**
- 4. Ability to brace self while stroking ball.**
- *5. Transfer from chair-car/roof height?**
- *6. Turning radius.**
- *7. PSI**
- *8. Hand controls**
- *9. Speed of car**

- *10 Safety Issues**
 - a. Stability**
 - b. Design for personal protection from injury-ANSI standards**
- *11. Power system- gas, electric, propane.**
- *12. Size of car-accommodate chair.**
- 13. Roof design**
- 14. Cost**
- 15. Seat design**
 - a. Set position(s)**
 - b. Transferability**
- *16. Universal use-non disabled and disabled**
- *17. Braking system**
- *18. Training of users**
- *19. Tires**
- 20. Marketability**

Group 2 (facilitated by Dr. Edward Hamilton, Indiana University)

Education of users

Wear Patterns

Education of course management

Advance notification
Car design

1. Education

Pamphlet to course management
Demonstrate lack of damage to course
Articles in GCA Meeting
Articles in Disability related magazines (e.g. Sports & Spokes)
Contact P.R. agency for NGF
How to approach management regarding problems
Training programs/sessions
Can cars be made accessible to all?

2. Universal design: usable by disabled and non-disabled.

Responsibility for purchase: individual or course
Responsibility of course in all conditions
Alternatives on courses that don't allow cars.
Requiring manual chair user to use car.

3. Use of car on greens

Golf car at bag drops
Additional adaptations for cars.
How far do we go? Adapt. kit.
Use of individuals car on course.
Insurance.

Group 3 (facilitated by David Park, National Park Service)

ISSUES

1. Course conditions

When, who decides etc.

2. Cart design

3. Where can they go?

4. Access Points

5. Management policies

6. Tires-PSI

7. Stability/Safety

8. Adaptability

APPROACHES

1. Talk with existing Manufacturers
2. Assure that ongoing research is comprehensive and consistent and addresses all variables.
3. Address issues of safety and stability and criteria for measuring it.
4. Training/Education/Research
5. T.A. Materials
 - Brochures
 - Case studies
6. Documentation of disabilities?
7. Single user versus standard cart with hand controls.
8. Ambulatory/Non-ambulatory
9. Insurance/TORT Claims
10. Evaluate existing carts
11. Design and construction of adaptations
 - a. PSI
 - b. Stability
 - c. Safety
 - d. Single person/Dual
 - e. Hand control/Swivel seats
12. Management Decisions
 - a. Who can use them?
 - b. Where can they go?
 - c. Under what conditions
 - d. Who decides?
13. Insurance issues.

Group (facilitated by Gary Robb, National Center on Accessibility)

Etiquette:

Educate User

1. Type of device applicable to golf course conditions
2. Pace of Play
3. Traffic Pattern-where devices go

Educate all users and companions.

Specifications of Vehicles

Seats (Universal Design)

1. a. Height
- b. Swivel
2. Canopy
3. Controls

4. Tires
5. Size; width, height
6. Stability
7. Access space

Safety/Liability

Golf course liability

Who is responsible for modifications? Manufacturer or Operator?

Structural considerations of equipment

On-course markings

User responsibility

Costs associated in providing:

Initial cost of device?

Maintenance

Parts/supplies availability

Cost recovery? Fees

Insurance costs

Single rider car-fee structure

Education/Research

Who needs them (adapt.)

Who=s required to supply them

Turf grass issues

Availability of adaptations/single rider cars

ADA education

Cost of: Purchase

Maintenance

Fee policies

Personal cars-fees?

Policy (trail fees?)

If golf course does not provide golf cars, what is their responsibility to provide modified car?

How would policy be altered (if at all) if disabled golfer has own equipment?

Pace of play

Golf car specifications?

Etiquette of use

Rules implications for people who play from golf car

Policy Decision Re: Who uses adapted cars>on course

Policies

Education of public/golf

What are research needs.

ISSUES

Marketing of products (Golf cars)

Golf Car Accessories (adaptations)

Safety issues

Liability

Availability-need? For

What are greatest modification needs

Who required to make modifications?

Education of G.C.

Effect of devices on turf grass

The forum concluded with each group reporting out their discussions and with general discussions additional research needs and how technology may impact on both the game of golf as well as on individuals with disabilities playing the game.

The final discussion focused on increasing needs to educate both golf industry personnel as well as golfers with disabilities. A particular area of interest was in developing both instructional programs for golf course personnel and educational materials and training for golfers with disabilities on pace of play and golf course etiquette.

Future forums will continue to focus on the outcomes of research; educational and training needs and how technology and rules of the game impact on golfers with disabilities.

Hilton Head Island, SC
March 12-14, 1995

Note: 2nd # is fax

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