

PROJECT ADMINISTRATION DATA SHEET

ORIGINAL  REVISION NO. \_\_\_\_\_

Project No. D-48-602 ~~GTRI/XXX~~ DATE 10 /30 /84

Project Director: J. Bostrom School/~~Lab~~ Arch.

Sponsor: V. A. Medical Center  
1670 Clairmont Rd. Decatur, Ga. 30033

Type Agreement: Purchase Order #508-D40871

Award Period: From 9/11/84 To none specified (Performance) No date specified (Reports)

Sponsor Amount: This Change Total to Date  
Estimated: \$ \_\_\_\_\_ \$ \_\_\_\_\_  
Funded: \$ 6,275 \$ 6,275

Cost Sharing Amount: \$ \_\_\_\_\_ Cost Sharing No: \_\_\_\_\_

Title: Provide R & D Video Presentation Covering Ongoing Research Activities

ADMINISTRATIVE DATA

1) Sponsor Technical Contact:  
Chief, Supply Officer  
V. A. Medical Center (ATL.)  
1670 Clairmont Rd.  
Decatur, Ga. 30033

OCA Contact Rlaph Grede x4820  
2) Sponsor Admin/Contractual Matters:  
Chief, Supply Officer  
V. A. Medical Center (ATL.)  
1670 Clairmont Rd.  
Decatur, Ga. 30033

Defense Priority Rating: N/A Military Security Classification: N/A  
(or) Company/Industrial Proprietary: N/A

RESTRICTIONS

See Attached \_\_\_\_\_ Supplemental Information Sheet for Additional Requirements.  
Travel: Foreign travel must have prior approval - Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of \$500 or 125% of approved proposal budget category.  
Equipment: Title vests with GIT

COMMENTS:

This purchase order is for \$6,275, with no specific termination date nor reporting requirement.

COPIES TO:

Project Director  
Research Administrative Network  
Research Property Management  
Accounting

Procurement/EES Supply Services  
Research Security Services  
Reports Coordinator (OCA)  
Research Communications (2)

ID #02.120.000.85N127

GTRI  
Library  
Project File  
Other A. Jones

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date 8/23/85

Project No. D-48-602 (R5855-0A0) School/~~Lab~~ Arch.

Includes Subproject No.(s) \_\_\_\_\_

Project Director(s) J. Bostrom GTRC / ~~GPI~~

Sponsor V. A. Medical Center

Title Video and Graphic Simulation of Shower Prototypes for Disabled Persons

Effective Completion Date: 8/14/85 (Performance) 8/14/85 (Reports)

Grant/Contract Closeout Actions Remaining:

- None
- Final Invoice or Final Fiscal Report
- Closing Documents
- Final Report of Inventions
- Govt. Property Inventory & Related Certificate
- Classified Material Certificate
- Other \_\_\_\_\_

Continues Project No. \_\_\_\_\_ Continued by Project No. \_\_\_\_\_

COPIES TO:

Project Director  
 Research Administrative Network  
 Research Property Management  
 Accounting  
 Procurement/GTRI Supply Services  
 Research Security Services  
 Reports Coordinator (OCA)  
 Mail Services

Library  
 GTRC  
 Research Communications (2)  
 Project File  
 Other A. Jones; M. Heyser

## REPORT ON SERVICE PROVIDED

Service Contract D40871

John A. Kelly, (for Jim Bostrom, Project Director D-48-602)

August 14, 1985

### 1. Service

Computer Laboratory services were provided for the following tasks:

1. Graphic representation of the four bathing and showering prototypes;
2. Revision and design modifications of the four bathing and showering prototypes;
3. Design simulation, modeling of the four prototypes.

The above tasks were performed in utilizing the results of the testing and evaluation of the bathing and showering fixtures conducted at the Atlanta Veterans Administration Medical Center between March and November 1984.

For your information I have attached the progress report "Evaluation of Bathing Fixtures Prototypes."

All work associated with this service has been completed and the results provided to Pascal Malassigne, Principal Investigator.

### 2. Service

This service involved the use of the video equipment of the College of Architecture Environmental Utilization Laboratory at Georgia Tech, for producing a videotape presentation requested by the Rehabilitation Central Office, to highlight the various research project and activities of the Atlanta Veterans Administration Medical Center Rehabilitation Research and Development Unit.

All work associated with this service has been completed and the videotape has been provided to Pascal Malassigne, Principal Investigator, and to the Director, R R & D Service, Veterans Administration Central Office.

**PROGRESS REPORT**

**EVALUATION OF BATHING FIXTURE PROTOTYPES**

**James A. Bostrom**

**Pascal M. Malassigne'**

**Atlanta Veterans Administration Medical Center**

**June 12, 1985**

## **I. INTRODUCTION**

This report presents an overview of an evaluation of four bathing fixtures that were designed for use by disabled and elderly persons. The testing of the fixtures was conducted at the Atlanta Veterans Administration Medical Center between March and November 1984.

The report consists of five sections; an overview of the subject sample, a review of the testing, the results of the testing, the results of the post-trial interview and the proposed modifications to the bathing fixtures.

## II. OVERVIEW OF THE SUBJECT SAMPLE

A total of 44 subjects, 31 males and 13 females, participated in the evaluation of the showers. The average age of the sample was 43.57 years with the oldest subject being 76 years old and the youngest 18 years old.

Various conditions and resulting physical disabilities were represented in the study. Among these were hemiplegia (from both CVA and head injury), paraplegia, quadriplegia (spinal cord injury), cerebral palsy, lower limb amputee, spina bifida, rheumatoid arthritis, and degenerative motor system disease.

Thirty eight of the forty four subjects used a wheelchair for mobility. Half of these subjects (19) reported that they were capable of independent transfers while the other 19 said that they required varying amounts of assistance during transfers.

Of the 44 subjects, 29 were currently using a bathtub (with or without a tub seat or bench), 9 were using a shower (roll-in or standard) and 6 were not using any bathing fixture (relying on sponge baths). In fact, a total of 10 subjects indicated that they relied on sponge baths for bathing (some took sponge baths in the bathtub.) Of the 38 subjects that currently use a bathtub or shower, 7 or 19% had hit their head between 1 and 4 times in the past year while bathing.

A tub seat, bench or stool was currently used by 19 of the subjects while bathing. Thirty-four subjects indicated that they bathe themselves independently for all or part of the bathing process. Ten subjects required significant assistance during bathing.

Subjects were recruited through contacts with several medical centers and rehabilitation facilities in the Atlanta metropolitan area. A deliberate effort was made to have a subject sample that was representative of the vast differences in physical ability that exist within the disabled population. Subjects were recruited from the following:

VA Medical Center, Atlanta, Georgia  
Grady Memorial Hospital, Occupational Therapy Dept.  
Northside Hospital  
St. Josephs Hospital, Occupational Therapy Dept.  
Shepard Spinal Center  
Atlanta Center for Independent Living  
Paralyzed Veterans of America, Atlanta chapter  
Emory University Center for Rehabilitation  
Wesley Woods Retirement Home

Initial recruitment of subjects was done by occupational therapists and others at these institutions. After the initial contacts, the investigators were given the names of persons who were suitable for participation in the study (these persons met certain criteria set by the investigators) and who expressed an interest in being a subject. These people were then contacted by the investigators.

### III. REVIEW OF THE TESTING

All testing of the fixtures occurred in the evaluation laboratory located at the Atlanta Veterans Administration Medical Center. This lab provided the facilities for the simultaneous wet testing of three fixtures. Initial evaluation was done with the cushioned shower, the two seat shower and the roll-in shower with seat. In later testing, the two piece roll-in shower was substituted for the two seat shower.

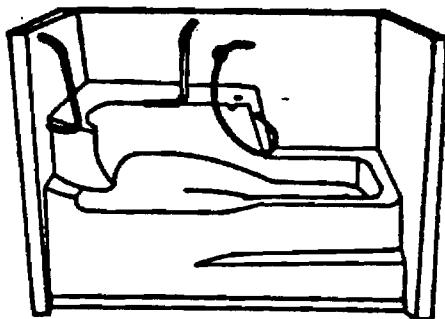


Figure 1.  
Cushioned Shower Prototype

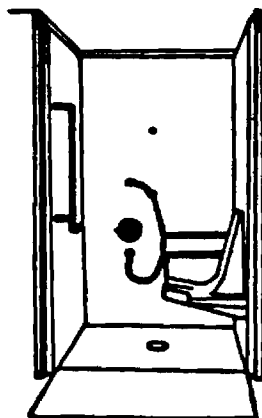


Figure 2.  
Roll-in Shower with Seat

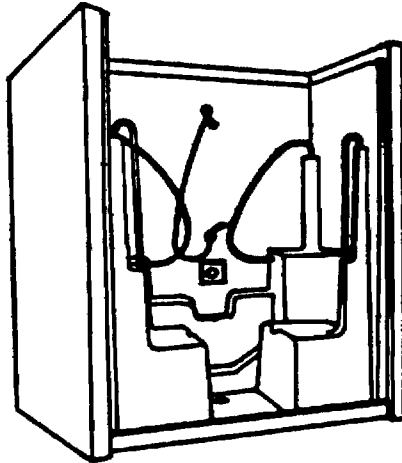


Figure 3.  
Two Seat Shower

All testing was done under the supervision of an occupational therapist. Each fixture trial was videotaped for later analysis of the movements and the elapsed time of specific tasks.

Subjects arrived at the laboratory dressed in street clothes. The occupational therapist supervised the changing into bathing suits both to assist the subject if necessary and to get a sense of the subject's mobility and movement skills. Some subjects possessed very poor dressing skills and required considerable assistance while others completed their dressing independently.

Following the dressing, the subject was brought into the evaluation laboratory. An informed consent form was explained to the subject by the OT (the form was read by the subject if possible, otherwise it was read to the subject by the OT.) Then a general introduction to the testing was done followed by specific instructions for each fixture.

The specific instructions were in the form of an illustrated pamphlet that showed the correct usage of each fixture. Before the subject used a fixture, the illustrated pamphlet for only that fixture was reviewed by the subject and the OT. Then the OT would ask the subject to explain to her how they were planning on getting into the fixture. If the subject could not explain the transfer sequence adequately then the OT would review the instructions with the subject for a second time. When the OT was satisfied that the subject knew how to enter the fixture, the trial began.



The shower trials were all conducted in the same manner. Videotape cameras recorded each sequence. Special video lighting was used for all trials to ensure good video images. The lighting was reflected off the ceiling to minimize the direct glare and reflectance on the shower fixtures and to avoid blinding the subjects.

The trial sequence consisted of the transfer to the shower, the operation of the shower controls, bathing and shampooing and the transfer out of the fixture. Following drying off, the subject was asked to complete a post-trial interview that recorded the subject's responses to the usage of the fixture. The evaluation of each fixture was conducted only one time for each subject.

All subjects also filled out a background questionnaire that recorded information about the bathing facilities in their homes and their use of those facilities.

In many cases, the sequence of instruction, use of the fixture and completion of the post-trial interview was repeated three times, once for each of the three showers being tested. Some subjects however, were able to use only one or two of the showers. In all cases, the testing concluded when either the subject or the OT indicated that the testing should stop.

All subjects were paid a stipend of \$50.00 to participate in the testing. The stipend was the same whether one, two or all three of the showers were used.

#### IV. RESULTS OF THE TESTING

In general, the fixtures performed in a manner that was expected. Twenty-five subjects were able to use the cushioned shower, the roll-in shower with seat and the two seat shower. Fourteen subjects were able to use two of the showers but not all three. There was no clear pattern of two particular showers that were more usable, rather it was typical that the two could be any two of the three showers. Five subjects were able to use only one shower. Two of these subjects were only able to use a roll-in shower (and a shower type wheelchair). The other three subjects were experiencing fatigue at the end of the first shower trial and elected to terminate participation in the study.

The four shower designs, as a group, do accommodate a wide range of physical disabilities and abilities. Certain disabilities and physical conditions are better accommodated by some shower designs. Based on the testing of the fixtures the following advantages and disadvantages have been documented.

##### Cushioned Shower

##### Advantages

- Very good for persons who have moderate transfer ability and no problem with lower extremity extension or spasm.

- Very good for persons with limited fingering ability, the pushbutton water valve is very easy to use.
- Persons with perceptual and interpretative problems seemed to benefit from the simplicity of the water control system and the fixture design.
- The cushioning reduced the potential for slippage and for skin breakdown due to bruising or concentrated pressure.
- Side transfer from a wheelchair was fairly easy for persons with moderate upper extremity strength. The height of the transfer area was the same as that of the wheelchair seat.

### Disadvantages

Some subjects were uncomfortable in the fixture for the following reasons:

- The seat shape was too restricting in that it limited lateral movement or was not able to accommodate large body weight.
- The lower back support was inadequate.
- The raised foot rest area required the legs to be straightened -- this produced lower extremity pain in some subjects and discomfort in others. Some subjects complained of a lack of calf support.
- The grab bars were not appropriate for some subjects -- some persons seemed to express a preference for other types of grab bars.
- No one used the step area on the outer face of the fixture.
- The fixture was too short to accommodate persons over 6'-3" tall.

### Roll-in Shower with Seat

#### Advantages

- This fixture was used by 41 of the 44 subjects.
  - Shower can accommodate both a wheelchair and standing transfer.

- Contoured seat provided very good body and trunk support.
- Very good for persons with lower extremity spasms or stiffness.
- Provided good wheelchair access (through a 90 degree transfer.)
- The water control was usable by persons with moderate levels of dexterity.
- The shower allows both standing or seated showering.

#### Disadvantages

- The hand held shower spray was sometimes hard to remove from the wall mounted support.
- Some subjects had difficulty regulating the water temperature, some due to fingering problems and others due to perceptual problems.
- The seat had a tendency to collect water while a person sits, this results in a pool of water after the shower is completed.
- The side grab bar may not extend out far enough.
- A side transfer from a wheelchair was not possible due to the ramp.
- Some drainage problems exist with the shower curtain not always keeping the water inside the fixture.

#### **Two-Seat Shower**

##### Advantages

- The seat provided very good body support.
- The fixture is able to accommodate both right and left transfers.
- Very good for standing entry and exit.
- The grab bars provided very good support during transfers.

### Disadvantages

- The pull on / push off water control is difficult to turn on and also difficult to regulate the water temperature.
- The standing area is small and sometimes restricts movement during entry/exit and while turning around.
- The curtain is difficult to close and position so that water does not escape the fixture.
- Wheelchair transfers are difficult with this fixture because the wheelchair cannot get close enough to the seat area.

### **Two-Piece Roll-in Shower**

(note: evaluation of this fixture was very limited due to the difficulty in recruiting suitable subjects. An extensive effort was made to find severely disabled subjects who would likely use a roll-in shower for daily bathing. However, due to the reduced mobility of this group, very few persons offered to participate in the study. The following comments are based on the results of four subjects using the roll-in shower and on telephone interviews with three disabled veterans in New York who have been using this fixture in their homes for the past four years.)

### Advantages

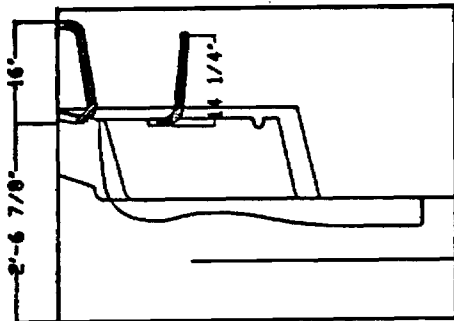
- This fixture is smaller than standard roll-in showers.
- The fixture accommodates both independent and assisted bathing.
- The push button water control is very easy to operate.

### Disadvantages

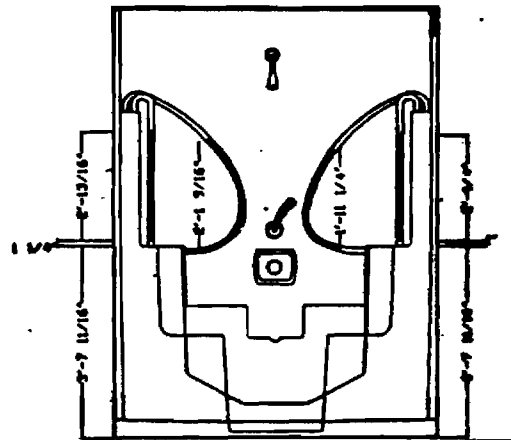
- Some persons experienced difficulty in closing the shower curtain completely - this resulted in drainage problems.
- The depth of the shower (distance from front to back) was inadequate to accommodate some taller persons.
- The ramped entry/exit was difficult to negotiate.

- The water temperature was pre-set and was not able to be regulated by the user.

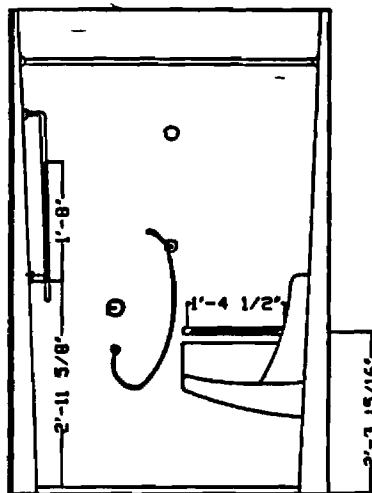
Another part of the analysis was the documentation of grab bar usage. The following sketches illustrate the areas of the grab bars that were used by the forty four subjects.



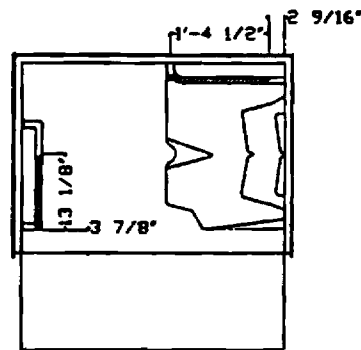
CUSHION SHOWER



TWO-SEAT SHOWER



ROLL-IN SHOWER  
FRONT VIEW



ROLL-IN SHOWER  
TOP VIEW

The design modifications currently planned for the cushioned shower, the roll-in shower with seat and the two-piece roll-in shower will correct most of the deficiencies and disadvantages found during the testing. Although many of the problems are minor, they are significant enough to limit the marketability of the fixtures.

## V. OVERALL RESULTS OF THE POST-TRIAL INTERVIEWS

Analysis of the results from the post-trial interviews are presented in the following charts. These contain the mean response from each question and the number of subject answers. For each chart, the Y axis represents both the mean score from 1 to 5 and the number of subjects times 10. The X axis represents data from the Cushioned Shower, the Two -Seat Shower and the Roll-in Shower with Seat.