

## PROJECT ADMINISTRATION DATA SHEET



ORIGINAL



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

Project No. D-48-610GTRI/~~GTX~~DATE 6 / 22 / 83Project Director: J. A. KellySchool/~~Lab~~ArchitectureSponsor: VA Medical CenterDecatur, GeorgiaType Agreement: P.O. 508/D30215Award Period: From 4/5/83 To 6/15/83 (Performance) \_\_\_\_\_ (Reports) \_\_\_\_\_

Sponsor Amount:

This ChangeTotal to DateEstimated: \$ \_\_\_\_\_ \$ 5,090Funded: \$ \_\_\_\_\_ \$ 5,090

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

Title: Pre Test Preparation of Bathroom Fixture Prototypes

## ADMINISTRATIVE DATA

OCA Contact

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2) Sponsor Admin/Contractual Matters:

Robert H. WillisVeterans Administration Medical Center1670 Clairmont RoadDecatur, Georgia 30033Defense Priority Rating: N/AMilitary Security Classification: N/A(or) Company/Industrial Proprietary: N/A

## RESTRICTIONS

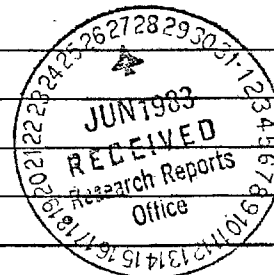
See Attached -- Supplemental Information Sheet for Additional Requirements.

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 N/A

## COMMENTS:

## COPIES TO:

Project Director  
Research Administrative Network  
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Project File  
Other I. Newton

8R 401230

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date October 25, 1983

Project No. D-48-610 School/~~Box~~ Architecture

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

Project Director(s) John A. Kelly GTRI/~~GT~~

Sponsor VA Medical Center

Title: Pre-Test Preparation of Bathroom Fixture Prototypes

Effective Completion Date: 6/15/83 (Performance) \_\_\_\_\_ (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. \_\_\_\_\_

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FINAL REPORT  
PURCHASE ORDER 508/D30215

I. Physical Preparation of Fixtures

As specified in the purchase order, all four bathroom fixture prototypes have been prepared for testing by human subjects. Repairs and additions to all fixtures have been completed. Water controls and hand held shower heads have been repaired and tested. Each unit is now ready for transport to the VA Hospital, Decatur.

II. Pre-Test Documentation

The pre-testing methodology contained in this report is to be applied to determine the relative worth of each of four bathroom fixture shower prototypes. To do this, a total of six shower fixtures will be tested: Four prototypical showers and two typical fixtures, a bathtub and a built in roll in shower. Relative worth of each fixture will be determined by quantitative analyses in terms of: user performance criteria; accomplishment (bathing) of tasks, the physical capabilities of the subjects, and by qualitative evaluation of user satisfaction criteria. These evaluation criteria will be standardized in order to provide data that can be compared across all six fixtures.

The evaluation of the six fixtures will focus on disabled and non-disabled veteran subjects taking showers. Data used for the evaluation will be recorded on video tape and on data sheets. Each video tape camera has an internal digital timer that will be used for documentation of task duration. The data sheets will be used to record test results and results of a post trial interview with each subject.

III. Proposed Pre-Testing Procedures

A. Subjects

1. Subject Selection

The pool of disabled subjects will be identified from the patient records of the Decatur, VAMC. This subject pool will be comprised of current and past patients (all individuals who have been discharged from the hospital within the past five years or longer if a sufficient number of subjects cannot be obtained) with diagnoses of quadriplegia, paraplegia, hemiplegia, amputee, and arthritis. These persons will be sent a brief description of the study and a Skills Inventory Survey (Attachment A) which they will be asked to complete and return. Respondents will also be asked to indicate whether they would consent to participate in the study, and if so, to fill out an Informed Consent Form (Attachment B). Follow-up telephone contacts will be made as necessary to ensure the participation of a sufficient number of individuals in each of the disability groups.

All individuals who are interested in participating, are medically stable and do not pose a health risk to either themselves or the researchers will be selected for the subject pool. In addition, subjects must have written approval from their doctor.

## 2. Subsample Populations

Able-Bodied: Because able-bodied as well as disabled persons are potential users of the bathing fixtures, it is necessary to test the utility and safety for non-disabled users. Therefore, a sample of hospital personnel representing a range of ages, occupations body sizes etc. will be selected for testing.

Simulated Disability: In addition, it may be necessary to test, as a baseline for comparison, non-disabled persons who are constrained in a variety of ways which would simulate (to some extent) a disability (i.e. arms tied back). This will control for degree of subject motivation, level of training and potential dissonant reactions of disabled persons the acceptance of a new fixture.

## 3. Subject Test Groups

Each prototype has been designed for use by one or more disability groups (e.g. quadriplegic, paraplegic etc.) Therefore not all of the subject groups will be able to use all of the fixtures. For example, quadriplegics who cannot transfer will only be able to use the 2-piece Roll-in Shower. As a consequence, test groups for each fixture will be divided into primary and secondary groups. The primary test group will include those individuals for whom the shower was conceptually designed. The secondary test group will include persons with any other disabilities (as well as able-bodied persons) who might be expected to be able to use the fixture. A listing of the test groups by fixture type is as follows:

<u>Fixture</u>	<u>Test Group</u>	
	Primary	Secondary
Cushioned Shower	Quadriplegics who can transfer from wheelchair to fixture with or without assistance High level paraplegics (T1-T4) Double amputees	All other subjects who can get in and out of fixture
Hemiplegic Shower	Right and left hemiplegics both ambulatory and non-ambulatory	Able-bodied, single and double amputees and arthritics (note: fixture does not lend itself to transfer from wheelchairs)

## Test Group

<u>Fixture</u>	Primary	Secondary
Roll-In Shower With Seat	Wheelchair users able to transfer (paraplegics, some amputees, arthritics)	Able-bodied, hemiplegics (note: most quadriplegics cannot transfer into a seat and therefore cannot use)
2-piece Roll-In Shower		
a. 1-piece configuration	Attendant care bathing severely disabled individuals	Any individuals who can shower independently standing or seating in a wheelchair or shower seat)
b. 2-piece configuration	Individuals unwilling or unable to transfer	Independent usage by people standing or seated in a wheelchair or shower seat
Standard Fixture		
a. 5-foot tub	Individuals who can transfer (with or without moveable seat)	
b. Roll-in shower	Individuals who cannot transfer	

#### 4. Training of Subjects

Training of subjects will consist of:

1. Viewing a videotape demonstration of usage procedures, and
2. Completing a "Dry Run" of transferring in and out of the fixture, simulated use of controls, etc. (note: the number of dry runs by each subject will be dependent upon successful completion of each of the tasks involved, i.e. transfer, use of controls etc.)

To test the affects of learning on an individual's ability to use a fixture, the following research design is suggested:

	Test	Retest
Trained Subjects	X	X
Partially Trained Subjects	X	X
Untrained Subjects	X	

Trained subjects will be those who view the videotape demonstration and go through one or more dry runs prior to actual testing partially trained subjects will view the videotape only and untrained subjects will only be told to follow the test procedures (which will be explained verbally prior to testing).

## B. Training of Observers

To ensure validity and observer reliability, all project personnel will undergo an extensive training period. This will involve:

1. An explanation of procedures and data coding using a videotape training film;
2. Acted out demonstrations of fixture use and dry runs by project personnel on each fixture;
3. An explanation of data requirements;
4. Practice data coding from training film and use of data coding sheets;
5. Pre-testing to refine procedures and (see attachment C) to serve as a reliability check of observer data coding;
6. Training in use of videotape equipment - (set up and operation), and
7. Training in safety precautions and emergency procedures.

## C. Testing of Fixtures - Test Facility

All four prototypical fixtures will be operable (usable with running hot and cold water) and should be located within the same room or general testing area. The testing facility should be designed to allow simultaneous usage of two fixtures and will offer reasonable privacy and temperature control for subject comfort and safety.

The two standard fixtures, the 5 foot bathtub and the built in roll in shower, will be located in other rooms to allow simultaneous testing.

Documentation of all testing (pre-testing, training, and final testing) will be on videotape. At least two and possible three cameras will be used simultaneously to provide a front view, overhead view and side view. Each camera will record a digital time (in tenth seconds) for later synchronization and time-motion data evaluation.

The test facility will offer reasonable privacy and temperature control for subject comfort and safety.

## D. Test Procedure

All subjects will be brought to the test facility by an Occupational Therapist. Subjects will be fully clothed prior to testing (preferably in street clothes - researchers will note type of clothing on data sheet). The test will commence with the subject disrobing and will continue until the subject finishes the trials and begins to dress again.

All subjects will attempt to execute the following bathing tasks.

## Bathing Tasks

### Body Cleansing -- Bathtub

1. Disrobe  
Approach
  - A. In a wheelchair
  - B. Walking with aids (crutches, cane, walker)
2. Transfer to Shower Seat
  - A. From wheelchair
    1. approach rim of shower seat
    2. transfer from chair to seat
  - B. Walk in transfer  
(For ambulatory)
3. Position Body for Bathing
4. Regulation of Controls
  - A. From outside the fixture
    1. with a single control faucet
      - a. regulate temperature and flow
      - b. regulate shower control
  - B. From inside the fixture
    1. with a single control faucet
      - a. regulate temperature and flow
      - b. regulate shower control
5. Totally Cleansing Body
  - A. usage of soap
  - B. usage of washcloth
  - C. usage of brush
6. Cleansing Hair
  - A. handle shampoo
  - B. apply shampoo to head
  - C. lather
  - D. rinse
7. Drying of Body and Hair
  - A. in fixture
    1. get towel
    2. drying
  - B. outside fixture
    1. get towel
    2. drying
8. Transfer from Fixture to Outside
  - A. for wheelchair users
    1. transfer from shower seat to rim
    2. transfer from rim to wheelchair
  - B. for semi-or non-ambulatory who do not use a wheelchair
    1. transfer from the bottom of tub to rim
    2. transfer from rim to floor
    3. transfer from rim to a chair
  - C. for users who stand in the tub
    1. transfer from inside tub to outside

## E. Test Protocol

Introduction: (read to participants) This is a study to find out how well disabled persons can use a number of different bathing fixtures. We have constructed several fixtures for this purpose and we will be observing how well you can use them. For each fixture you will be asked to disrobe, approach the fixture, and transfer into it. You will then proceed to bathe yourself (with assistance if necessary). When you are finished, exit from the fixture and dry off. If you cannot complete any of the tasks, such as transferring, please tell us. This is not a test of how well you can do. The test is being done to see how good the fixture is. Any questions? O.K., then we can begin.

### Procedure (for each fixture)

1. Disrobe and change into gown (possibly with bathing suit)  
(note: this disrobing may have to occur away from the test space because some subjects will need assistance in changing clothes and will need to do this on a bed.)
2. Approach Fixture - (walking or in a wheelchair) - Test begins
  - \*\* As the subject is ready to start the test, start and check the video equipment.
  - \*\* Observer will see that they have the correct data take off sheet and that subject I.D. and disability code are recorded.
  - o Once the subject starts the test (indicated by approach to fixture) he/she will continue with no scheduled breaks until exit from fixture is completed.
  - o The test can stop if the subject is unable to accomplish a task or the next series of tasks -- for example: the subject finishes bathing but cannot exit the fixture due to slippage or inadequate strength -- it would be noted that the subject was unable to accomplish this and then the test would end. (How the subject accomplished exit from the fixture would be recorded on video).

Following exit the subject will dry off (first he will attempt to dry off independently then if needed he will be assisted). Then he will dress (this dressing will occur only at the end of all testing). Following this, a post trial interview will occur (a post trial interview will occur for each fixture use).

Fixtures will be tried on a random basis -- for instance if all 6 can be used the order of trials will be scrambled -- this will also apply for subjects who can use only 2 or 3 fixtures.

## F. Evaluation

Four types of evaluation methods will be used. First the fixture usage will be judged on whether the subject can perform the basic tasks outlined above. This success/fail test will give a preliminary indication of fixture usability and will eliminate unnecessary testing when the results indicate significant dysfunction.



The second evaluation will be by time-motion studies. Task accomplishment time will be compared against an average time to determine ease and competency of usage.

The third evaluation will be through an analysis of the behavioral observation techniques conducted in during the study.

The fourth type of evaluation will be based on user satisfaction with the fixtures.

#### G. Data Collection

Because use of bathroom fixtures is complex and difficult to measure and because self-report methods tend to be biased by past experiences, no single method of data collection is completely adequate. Consequently, a user satisfaction survey will be augmented by information on the demographic and anthropometric characteristics of the subjects, a behavioral analysis of the actual use of the fixtures and measurements of environmental conditions.

1. **User characteristics:** The initial questionnaire will provide a general profile of the physical and demographic characteristics of the subject population. It will include general information on (see attachment A) physical characteristics such as age, occupation, income, extent of rehabilitative training etc.
2. **Environmental Conditions:** These variables will provide physical descriptions of the various fixtures. Measurements of the design features (i.e., height and diameter of grab bars, location of shower spray, height of shower seat etc.)
3. **User behavior:** Direct videotape observations of use of the bathroom fixtures will also be conducted. Because this method of data collection documents the use of each of the fixtures for analysis later it is therefore the most reliable method for linking the behaviors at issue (i.e., disrobing, transfer, cleansing) with the appropriate design elements. The performance criteria associated with these critical design features have been carefully defined so as to be consistent for all fixtures. A partial listing of performance criteria is as follows:

#### Performance Criteria

1. **Stability Problems**
  - a. loss of balance in transfer
  - b. lateral movement of chair in transfer
  - c. sliding of chair in transfer
  - d. tipping forward of chair in transfer
2. **Transfer**
  - a. wheelchair position
  - b. location along fixture
  - c. position of hands and arms/legs etc.
  - d. clearance (inches) over side of fixture
  - e. initial position of body in fixture

3. Body Support (Seat Shape and Height)
  - a. does body remain upright - lean forward etc.?
  - b. does individual remain in place - slip forward etc.?
4. Body Stability (Grab Surfaces)
  - a. hand or arm use of grab bar (R&L)
  - b. position of hand on bar (R&L)
  - c. foot or leg use of bar
  - d. position of foot/leg on bar
  - e. use of hand hold grab surface
  - f. position of hand on hold surface
  - g. use of foot hold surface
  - h. position of foot in hold surface
5. Shower Spray and Controls
  - a. location of grasp of hand held unit
  - b. amount of hand and arm function required for valve opening and closing
  - c. location of hand in using controls
4. Environmental Satisfaction Criteria: After testing a user satisfaction survey will address issues of comfort, ease of use and general useability of each of the fixtures. This questionnaire (see attachment D) will utilize a 5 pt. scale rating system to determine the relative satisfaction with each of the various design features of the fixtures (i.e., ease of transfer, comfort of seat shape and height, ease of use of grab bars and spray, ease of remaining in place, etc.).

#### H. Data Analysis

The design of this testing methodology must be tested in a pretest. At that time both test protocol and data analysis will be examined and modified as necessary. The data analysis explained below is likely to be streamlined and improved during this pretesting. We expect that some measurements will be found unnecessary and will therefore be eliminated.

All videotapes will be studied by trained encoders to identify the critical characteristics of user behavior. Coder training will involve detailed instruction and trial data takeoffs. Much of the training will be directed toward assuring a high level of observational reliability (the reliability was re-checked periodically during the data processing phase). During the period, the observer was familiarized with the:

- o variables to be identified;
- o levels of each variable;
- o observation procedures;
- o recording procedures.

Thirty percent of the tapes will be rechecked to ensure reliability.

1. User performance will be evaluated by measuring position of the subjects' limbs and body in the fixtures. For example, the location of hand or arm placement on the grab bar or positioning of body in the seat. This data will then be correlated with user satisfaction and

environmental condition data to determine if there are positive relationships between ease of use and actual use and between location of the various design elements and the use of these elements.

2. A chi-square analysis will be performed on the frequency data derived from the user satisfaction survey. This will determine what features of the fixtures are easier to use and more desirable.
3. Demographic characteristics will be correlated with performance criteria (i.e., do persons with rehabilitation training perform better?) in order to determine if there are social influences which affect performance.
4. Physical characteristics will be correlated with performance criteria to determine if physical stature and ability affect performance in any of the fixtures.
5. Any abnormal behavior associated with the use of the fixtures will be noted. This includes such behaviors as mis-transfers or slips, loss of balance, bumping into the fixture, failure to grasp the grab bar and any form of disruption in the subjects' intended pattern of performance. The incidents will be selected from the videotape records and analyzed as a special subsample.

Discriminate analyses will compare: 1) the demographic and performance characteristics of subjects who had miscues, slips or other incidents with the characteristics of those who did not have mishaps. From this analysis, the relationships between incidents and characteristics of users can be established. 2) the physical characteristics of the fixtures with the incident and non-incident groups in order to determine what design parameters are causes of mishaps.

#### IV. Results

The data analysis will generate several results. Most important is a quantitative indication of the relative worth of each bathing fixture prototypes. A secondary product is a similar indication of the worth of specific design features contain on each fixture. These include water controls grab bars, seat shape etc.) A third product of the analysis will be an indication of which specific designs better accommodate specific physical disabilities and finally there will be a qualitative indication of user satisfaction with each of the fixtures.

The design of this pre-testing methodology is now complete. The methodology is ready for application on the bathroom fixture prototype pre-testing.

ATTACHMENT A:  
SUBJECT INFORMATION SHEET

Name \_\_\_\_\_ Code No. \_\_\_\_\_

1. Age \_\_\_\_\_ 2. Sex \_\_\_\_\_ 3. Height \_\_\_\_\_ 4. Weight \_\_\_\_\_

5. What type of disability do you have? (circle one)

- a. Paraplegic (level \_\_\_\_\_)
- b. Quadriplegic (level \_\_\_\_\_)
- c. Hemiplegic Right \_\_\_\_\_ Left \_\_\_\_\_
- d. Amputee
- e. Arthritis

6. Do you use a wheelchair? Yes No

7. What type of wheelchair do you typically use? (circle one)

- a. Electric powered chair
- b. Manual chair with removable armrests
- c. Manual chair with non-removable armrests

8. a. Can you reach over your head with your left hand? Yes No  
b. Can you reach over your head with your right hand? Yes No  
c. Can you reach to your left side with your left hand? Yes No  
d. Can you reach to your right side with your right hand? Yes No  
e. Can you reach out in front of you with your left hand? Yes No  
f. Can you reach out in front of you with your right hand? Yes No

9. a. Can you pick up and hold a drinking glass with your left hand? Yes No  
b. Can you pick up and hold a drinking glass with your right hand? Yes No

10. a. If you use a wheelchair, do you transfer? (circle one)

- a. by yourself
- b. with assistance

b. Can you transfer to (circle one)

- a. a bathtub seat
- b. a bed
- c. another chair
- d. cannot transfer

11. a. Do you wear eye glasses? Yes No  
b. Without eye glasses can you read newspaper print? Yes No  
c. With or without eye glasses, do you have difficulty seeing objects at a distance? Yes No  
d. With or without eye glasses, do you have difficulty seeing objects to your side? Yes No
12. Do you have other medical problems? (circle all that apply)  
a. Skin breakdown  
b. Spasticity -- leg, arm, trunk  
c. Pain  
d. Heart condition  
e. High blood pressure  
f. Other \_\_\_\_\_
13. Do you have a job? Yes \_\_\_\_\_ No \_\_\_\_\_  
If yes: What is your present occupation? \_\_\_\_\_
14. What is the approximate total income of your household? (circle one)  
a. \$0 - 5,000  
b. \$5,001 - 10,000  
c. \$10,001 - 15,000  
d. \$15,001 - 20,000  
e. \$20,001 - 25,000  
f. \$25,000 - 40,000  
g. \$40,000 -
15. Are you?:  
a. married  
b. single  
c. divorced  
d. widowed
16. How many people live in your household? \_\_\_\_\_
17. What type of residence do you live in?  
a. apartment  
b. single-family house  
c. mobile home  
d. condominium  
e. other (specify) \_\_\_\_\_
18. Do you a. own or b. rent your home?
19. a. How many rooms does your home have? \_\_\_\_\_  
b. How many floor levels does your home have? \_\_\_\_\_  
c. How many bathrooms does your home have? \_\_\_\_\_

20. a. How many rooms in your home can you get into? \_\_\_\_\_  
b. How many levels in your home can you get to? \_\_\_\_\_  
c. How many bathrooms in your home can you get into? \_\_\_\_\_
21. a. Have any modifications been made to your bathroom so you can use the fixtures? Yes No  
b. If so, what modifications? (list)  
a. \_\_\_\_\_  
b. \_\_\_\_\_  
c. \_\_\_\_\_  
d. \_\_\_\_\_  
e. \_\_\_\_\_  
c. Can you take a shower (or bath) in your own home? Shower: Yes No, Bath: Yes No  
d. Do you need assistance to take a shower (or bath)? Shower: Yes No, Bath: Yes No
22. a. Have you ever slipped or lost your balance while bathing in your home? Yes No  
b. Have you ever hit your head while bathing in your home? Yes No  
c. Have you ever bruised your arms or legs while bathing in your own home? Yes No  
d. Have you ever slipped or lost your balance while transferring into or out of the bathtub or shower in your home? Yes No  
e. Have you ever hit your head while transferring into or out of the bathtub or shower in your home? Yes No  
f. Have you ever bruised your arms or legs while getting into or out of the bathtub or shower in your home? Yes No  
g. Approximately how often have any of the accidents listed in 22a to 22f occurred in the past year? (circle one)  
a. only once or twice  
b. less than 5 times  
c. less than 10 times  
d. more than 10 times
23. When you travel (vacation, etc.) do you have problems taking showers/baths in motels, homes you visit etc.? Yes \_\_\_\_\_ No \_\_\_\_\_  
If yes, what problems? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# OUTLINE FOR CONSENT FORM FOR INFORMED CONSENT:

## Bathroom and Bathroom Fixture Design for Elderly and Disabled Veterans:

### Development of Bathing and Cleaning Fixtures.

- a) Explanation of Procedures to be followed: The bathroom fixture prototypes are a result of research to significantly improve safe usability of the bathroom by the disabled and the elderly. The various prototypes have been developed from user information provided by disabled people. Testing of the prototypes is necessary to determine how well they meet the varying needs of different disabilities and age groups.

Please test this prototype in a manner that both you and the attending therapist feel is appropriate. You will be advised before the test on how you might use the fixture(s). Testing of the fixture will occur either as a dry simulated transfer (entry/exit) evaluation or as an actual usage activity with water for cleansing, etc.

At various stages of the test you will be asked to comment on the appropriateness of the design.

- b) Attendant risks and discomforts: There is no anticipated risk or discomfort to the patient in this procedure. A therapist (either Occupational or Physical) will be present for all testing.
- c) Expected Benefits: There is no immediate benefit to the patient.
- d) Alternate procedures that would be advantageous to the patient: None.
- e) I understand that I may make any inquiries concerning the procedure.
- f) I understand that I am free to withdraw my consent and to discontinue participation in the project at any time. I also understand that my decision to participate or not participate will not affect my treatment.
- g) If the protocol requires it and/or it is required by the FDA, I give my permission for the release of these records.
- h) Although the investigator will make available or arrange for appropriate management and treatment for any physical injury resulting from this project, I understand that the Emory University will not assume financial responsibility or liability for the expenses of such medical treatment or management or compensation for that injury.

I hereby consent to under this procedure.

Witnessed by

\_\_\_\_\_  
Patient's Signature

Witnessed by

\_\_\_\_\_  
Investigator

\_\_\_\_\_  
Date

This consent form includes no exculpatory language through which the subject is made to waive any of his legal rights or to release the institute from liability for negligence.

\_\_\_\_\_  
Investigator

(This form will be read aloud to those subjects whose visual handicap prevents them from reading this form.)

ATTACHMENT C:  
DATA CODING

Cushioned Shower

A. Pre-Entry: Factors to Control For in Test Groups

1. Positioning for Entry -- wheelchair (also measure of location)
  - a. Side transfer -- left \_\_\_\_\_
  - b. Side transfer -- right \_\_\_\_\_
  - c. Frontal transfer \_\_\_\_\_
  - d. 45° transfer left \_\_\_\_\_
  - e. 45° transfer right \_\_\_\_\_
2. Positioning for entry -- standing (also measure of location)
  - a. Facing into fixture \_\_\_\_\_
  - b. Facing right fixture wall \_\_\_\_\_
  - c. Facing left fixture wall \_\_\_\_\_
3. Positioning for entry -- standing with assistance -- behind wheelchair (measure wheelchair position and subject position)
  - a. Facing into fixture \_\_\_\_\_
  - b. Facing right fixture wall \_\_\_\_\_
  - c. Facing left fixture wall \_\_\_\_\_
4. Positioning for entry -- off floor
  - a. Facing fixture (location) \_\_\_\_\_
5. Placement of hands at pre-entry (measure location) \_\_\_\_\_
6. Elapsed time for pre-entry: \_\_\_\_\_

B. Entry: Factors to be Tested and Evaluated

1. Design Principle: Fixture transfer seat height at 19" to be level with wheelchair seat to facilitate transfer.

Evaluation Criteria:  
(vertical component)

- a. Action -- Can transfer be accomplished (success/fail)? \_\_\_\_\_
  - b. Consequence -- What are the results of task accomplishment (incident/non-incident)? \_\_\_\_\_  
e.g. -- hitting legs on side of tub, wheelchair pushed away from fixture, subject falls
  - c. Measurements -- What is the distance which subject clears or does not clear side of tub by? \_\_\_\_\_
  - d. Elapsed time \_\_\_\_\_
2. Design Principle: Side step platform to assist quads in lifting legs over fixture rim.



Evaluation Criteria:

- a. Action -- Is platform used (yes/no)? \_\_\_\_\_
- b. Consequences -- Results of action  
e.g. -- subject leans too far over, slips on platform or uses platform to get into fixture
- c. Measurements -- Where are legs placed on platform? \_\_\_\_\_
- d. Elapsed time \_\_\_\_\_

3. Design Principle: Hand hold area on left front of fixture to assist quads to transfer (prevents slipping and does not require grasping)

Evaluation Criteria:

- a. Action -- Is hand hold used (yes/no)? \_\_\_\_\_
- b. Consequence -- What are results of use? \_\_\_\_\_  
e.g. -- subject leans too far over, lose balance etc. \_\_\_\_\_
- c. Measurements -- Where is hand placed on hold? \_\_\_\_\_

4. Design Principle: Transfer area is located to allow wheelchair clearance.

Evaluation Criteria:

(horizontal measurement)

- a. Action -- Is the transfer successful? yes/no \_\_\_\_\_
- b. Consequence -- \_\_\_\_\_
- c. Measurements -- Where is the wheelchair positioned in relation to transfer surface? \_\_\_\_\_  
Where does the user transfer to upon leaving wheelchair seat? \_\_\_\_\_

5. Design Principle: Seat back provides stability and relieves pressure on spine.

Evaluation Criteria:

- a. Action: Can subject maintain upright position (yes/no)? \_\_\_\_\_
- b. Consequences: What are results? \_\_\_\_\_  
e.g. -- feet propped against fixture to maintain position in seat
- c. Measurements -- (possibly mark spine of and evaluate amount of pressure fixture is putting on spine)

6.
  - a. elapsed time \_\_\_\_\_
  - b. success/fail \_\_\_\_\_
  - c. total# incidents \_\_\_\_\_

C. Cleansing: Factors to be Tested and Evaluated

1. Design Principle: Upper trough area serves to hold cleansing aids and hold hand from slipping off.

Evaluation Criteria:

- a. Action -- Can cleansing aids be secured (success/fail)? \_\_\_\_\_
- b. Consequences: What are results? \_\_\_\_\_  
e.g. -- subject slips down in seat while reaching for soap \_\_\_\_\_
- c. Measurements -- How far can subject reach? \_\_\_\_\_

2. Design Principle: Grab bars are further from wall to allow hooking of elbows.

Evaluation Criteria:

- a. Action -- Is right bar used (yes/no)? \_\_\_\_\_
- b. Consequence -- Results of action (inc/non)? \_\_\_\_\_  
e.g. -- arm hits bar, subj. slips while reaching
- c. Measurements -- Where along length of bar is it used? \_\_\_\_\_

Evaluation Criteria:

- a. Action -- Is left bar used (yes/no)? \_\_\_\_\_
- b. Consequence -- Results of action (inc/non)? \_\_\_\_\_  
e.g. -- arm hits bar, subj. slips while reaching
- c. Measurements -- Where along length of bar is it used? \_\_\_\_\_

3. Design Principle: Hand held shower positioned for reaching with right hand.

Evaluation Criteria:

- a. Action -- Can shower be reached with (success/fail)? \_\_\_\_\_
- b. Consequences -- Result of action (inc/non)? \_\_\_\_\_  
e.g. -- subj. tries to reach with left hand and slips or subj. cannot use right hand at all and slips out of seat while reaching
- c. Measurements -- Where along shower head is it grasped? \_\_\_\_\_

4. Design Principle: On/off button is for left hand operation.

Evaluation Criteria:

- a. Action -- Can button be operated (success/fail)? \_\_\_\_\_
- b. Consequence -- Result of action (inc/non)? \_\_\_\_\_  
e.g. -- subj. has grabbed shower with left hand and has to hit button with right causing slipping in seat
- c. Measurement -- Where (on button or next to it does subject hand hit)? \_\_\_\_\_

5. Design Principle: Seat area is sloped up and drain area raised to hold user in seat

Evaluation Criteria:

- a. Action -- Does user stay upright in seat (yes/no)? \_\_\_\_\_
- b. Consequence -- Results of action? \_\_\_\_\_  
e.g. -- by remaining upright user cannot accomplish other tasks.
- c. Measurements \_\_\_\_\_

6. Design Principle: Set has scooped out areas for relief of pressure and for cleansing of genital region.

Evaluation Criteria:

- a. Action: Can genital area be cleansed (yes/no)? \_\_\_\_\_
- b. Consequence -- Results? \_\_\_\_\_  
e.g. -- user must lean over to cleanse genital area and slips out of seat or cannot pull self back up.
- c. Measurements \_\_\_\_\_

7. Design Principle: Drain area is raised to keep feet high for ease of cleansing of the feet.

Evaluation Criteria:

- a. Action -- Can the feet be cleansed adequately? \_\_\_\_\_
- b. Consequence -- Results \_\_\_\_\_
- c. Measurement \_\_\_\_\_

8. Design Principle: Fixture is cushioned to reduce potential for slippage and bruising of the skin.

Evaluation Criteria:

- a. Action -- Does the subject slip on the surface? \_\_\_\_\_
- b. Consequence -- Results of action \_\_\_\_\_

9.
  - a. Elapsed time \_\_\_\_\_
  - b. Success/Fail for task \_\_\_\_\_
  - c. Total number incidents \_\_\_\_\_

EXIT (reverse of entry procedure while wet)

## II. TWO SEAT SHOWER

### A. Pre-Entry: Factors to Control for in Test Groups

1. Positioning for Entry - Wheelchair (measure location)
  - a. Front approach (90° to fixture) \_\_\_\_\_
  - b. Parallel approach (right or left) \_\_\_\_\_
  - c. 45° approach (right or left) \_\_\_\_\_
2. Positioning for Entry - Standing (measure location)
  - a. Front approach (facing fixture) \_\_\_\_\_
  - b. Side approach (side adjacent to (R or L) fixture front) \_\_\_\_\_
  - c. 45° approach (subject faces opposite seat) \_\_\_\_\_
3. Placement of hands at pre-entry (measure) \_\_\_\_\_
4. Elapsed time for pre-entry \_\_\_\_\_

### B. Entry: Factors to be Tested and Evaluated

1. Design Principle: Subject will enter fixture by leading with his strong side. Therefore grab bars must accommodate this by allowing subject to pull himself into the fixture.

#### Evaluation Criteria:

- a. Action
  - o Can the subject transfer into the fixture? Yes \_\_\_\_ No \_\_\_\_
  - o Does he lead with his strong side? Yes \_\_\_\_ No \_\_\_\_
  - o Does he use the grab bars to assist the entry?  
Yes \_\_\_\_ No \_\_\_\_
- b. Consequence -- What are the results of the task accomplishment? (incident or non-incident) \_\_\_\_\_  
e.g. losing the hand hold of the grab bar, losing balance during entry, falling, inability to enter fixture
- c. Measurements -- Where does the subject grasp the grab bar?  
\_\_\_\_\_  
When does he change grasp from one grab bar to the other?  
\_\_\_\_\_

2. Design Principle: Shower seat and back are contoured to help hold the user in the seat and therefore limit the tendency for slipping out of seat (forward) or for uncontrolled lateral movement.

#### Evaluation Criteria:

- a. Action
  - o Does the subject slide forward (and possibly off the seat)?  
\_\_\_\_\_
  - o Is the subject's lateral trunk movement stable and restrained?  
\_\_\_\_\_
- b. Consequence -- Does the subject have adequate clearance for the shoulders? \_\_\_\_\_ Buttocks? \_\_\_\_\_ Arms? \_\_\_\_\_  
Does the subject stay in stable upright position throughout bathing? \_\_\_\_\_ What are the results of usage of the seat?  
\_\_\_\_\_  
(incident or non-incident?) \_\_\_\_\_  
e.g. Does subject slip forward? Does the seat back fail to restrain trunk?

- c. Measurements -- How much clearance does the subject have between the sides of the seat and the buttocks? \_\_\_\_\_  
between the shoulder supports and the shoulder? \_\_\_\_\_  
between the arms and shower walls? \_\_\_\_\_
- 3. Design Principle: Foot rest/support for strong side foot and leg to help maintain body balance.
  - a. Action -- Is the footrest used? \_\_\_\_\_
  - b. Consequence -- What are the results of usage? \_\_\_\_\_
  - c. Measurements -- Where is the foot placed? \_\_\_\_\_  
Where is the leg placed? \_\_\_\_\_
- 4. Design Principle: Grab bars on rear wall are designed for user to hold on to while sitting without the need to let go of bar as body changes vertical position.
  - a. Action -- Are the grab bar(s) used? \_\_\_\_\_
  - b. Consequence -- What are the results of usage? \_\_\_\_\_
  - c. Measurements -- Where does subject initially grasp the bar? \_\_\_\_\_  
Where is the subjects hand placed at the conclusion of sitting? \_\_\_\_\_  
Does the subject take his hand off the bar during the sitting activity? \_\_\_\_\_

C. Cleansing

- 1. Design Principle -- Seat bottom is contoured to allow cleansing of buttocks.

Evaluation Criteria:

- a. Action -- Can buttocks be cleaned? Yes \_\_\_\_ No \_\_\_\_  
Partially \_\_\_\_
- b. Consequence -- What are the results? \_\_\_\_\_
- c. Measurements -- Can all parts of buttocks area be reached? \_\_\_\_\_  
What area cannot be reached? \_\_\_\_\_

- 2. Water control is located on strong side.

Evaluation Criteria:

- a. Action -- Can the water be turned on and off? \_\_\_\_\_  
Can the temperature be accurately regulated? \_\_\_\_\_
- b. Consequence -- What are the results? \_\_\_\_\_
- c. Measurements -- success/fail \_\_\_\_\_

D. Exit -- (reverse of entry)

**III. Roll in Shower with Seat**

Testing criteria to be determined during pre-test activities. This unit has yet to undergo any testing therefore expected results of usage are difficult to predict.

**IV. Two Piece Roll-In Shower**

Testing criteria to be determined during pre-test activities. This unit has yet to undergo any testing therefore expected results of usage are difficult to predict.

**ATTACHMENT D**  
**POST TRIAL INTERVIEW: USER SATISFACTION SURVEY**

**Note:** Some of the following questions do not apply to all showers. Only answer those questions that apply.

- I.** On a scale of 1 to 5, where 1 is the easiest and 5 is the most difficult, how easy would you rate each of the following:

	<b>1. very easy</b>	<b>2. somewhat easy</b>	<b>3. not easy</b>	<b>4. somewhat difficult</b>	<b>5. very difficult</b>
<b>a.</b>	<b>Your ability to reach the hand held shower spray head.</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>b.</b>	<b>Your ability to turn on the cold water.</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>c.</b>	<b>Your ability to turn on the hot water.</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>d.</b>	<b>Your ability to adjust the water temperature to the desired level.</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>e.</b>	<b>Your ability to turn off the cold water.</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>f.</b>	<b>Your ability to turn off the hot water.</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>g.</b>	<b>Your ability to pick up the shower spray head.</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>h.</b>	<b>Your ability to use the shower spray head. (Rinse your whole body/control the spray direction)</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>i.</b>	<b>Your ability to replace the shower spray head on its hook.</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>j.</b>	<b>Your ability to reach the side grab bar.</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

I. Continued

On a scale of 1 to 5, where 1 is the easiest and 5 is the most difficult, how easy would you rate each of the following:

	1. very easy	2. somewhat easy	3. not easy	4. somewhat difficult	5. very difficult
k. Your ability to hold onto the front grab bar.					
	1	2	3	4	5
l. Your ability to reach the rear grab bar.					
	1	2	3	4	5
m. Your ability to hold the rear grab bar.					
	1	2	3	4	5
n. Your ability to use the hand hold.					
	1	2	3	4	5
o. Your ability to remain upright in the seat.					
	1	2	3	4	5
p. Your ability to get into the fixture.					
	1	2	3	4	5
q. Your ability to place yourself in the seat (where applicable)					
	1	2	3	4	5
r. Your ability to get out of the fixture.					
	1	2	3	4	5

II. On a scale of 1 to 5, where 1 is the most comfortable and 5 is the least comfortable, how comfortable would you rate each of the following:

	1. very comfortable	2. somewhat comfortable	3. not comfortable	4. somewhat uncomfortable	5. very uncomfortable
a. Holding the grab bars.					
	1	2	3	4	5
b. Holding the shower spray.					
	1	2	3	4	5



**II. Continued**

On a scale of 1 to 5, where 1 is the most comfortable and 5 is the least comfortable, how comfortable would you rate each of the following:

<b>1. very comfortable</b>	<b>2. somewhat comfortable</b>	<b>3. not comfortable</b>	<b>4. somewhat uncomfortable</b>	<b>5. very uncomfortable</b>
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**c. The shape of the seat.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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**d. The height of the seat.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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**III. On a scale of 1 to 5, where 1 is the safest and 5 is the least safe, how safe would you rate each of the following:**

<b>1. very safe</b>	<b>2. somewhat safe</b>	<b>3. not too safe</b>	<b>4. somewhat dangerous</b>	<b>5. very dangerous</b>
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**a. Transferring into the fixture.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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**Positioning yourself in the fixture.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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**b. Reaching for the front grab bar.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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**c. Reaching for the rear grab bar.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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**d. Reaching for the controls.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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**e. Reaching for the shower spray.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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**f. Removing the shower spray.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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**g. Using the spray head.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
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III. Continued

On a scale of 1 to 5, where 1 is the safest and 5 is the least safe, how safe would you rate each of the following:

	1. very safe	2. somewhat safe	3. not too safe	4. somewhat dangerous	5. very dangerous
h. Replacing the spray head.	1	2	3	4	5
i. Getting out of the fixture.	1	2	3	4	5
j. Soaping, washing and rinsing yourself?	1	2	3	4	5

On the overall basis of your ability to use the fixture, how would you rate this fixture?

1. excellent    2. very good    3. good    4. fair    5. poor

If you could, would you buy this fixture for your home? Yes \_\_\_\_ No \_\_\_\_

Why or why not?

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