



Working toward  
universal access  
through research,  
design & education

December 2012

## Dear Friends & Supporters,

The Beneficial Designs' team had a busy year.

Our powered wheelchair test lab was quite busy this year, and we continue to devote time and resources to wheelchair standards development. The trails and pedestrian access components of Beneficial Designs continues to grow. We are developing new technologies with USDA and FHWA government-funded research and development that improve the efficiency of conducting assessments of shared use paths and public rights-of-ways.

We would like to share with you the status of our current projects and our successes over the last year. Thank you for your continued support of our work. We wish you the very best for the New Year!

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### STAFF

- ❖ **Peter Axelson**, Founder and Director of R&D, presents our work worldwide. He loves spending time with his family and is an avid mono-skier and pilot.
- ❖ **Bill Blythe**, Technical Assistant, likes to cook, play guitar, work with computers, and leads music at church.
- ❖ **Barton Cline**, Software Developer and Electronics Technician, enjoys in-depth Bible study, family time, languages (incl. computer lang.), and loves his job.
- ❖ **Evelyn Wheeler**, Administrative Assistant, enjoys time with her kids and church family, walking her dog, baking, movies, and scrapbooking.
- ❖ **Harmony Hilderbrand**, Office Manager, is an avid photographer, loves baking, Bible study, and spending time with her husband and their dog.
- ❖ **Ben Hubbard**, Graphic Artist, is currently traveling on charity work with his wife and loves to paint and hike.
- ❖ **Harvie Keith**, Design and Testing Technician, loves his wife and children, and enjoys motocross.
- ❖ **Stephen Pieters**, Wheelchair Technician, enjoys riding motorcycles, off-roading trucks, and fishing.
- ❖ **Samuel Schnorbus**, Shop Assistant, graduated high school and enjoys snowboarding, paintballing, and shooting.

- ❖ **Nathan Tolbert**, Sidewalk Assessment Coordinator, loves hiking, fishing, and camping with his wife and sons, and enjoys coaching high school basketball.
- ❖ **Sharon Vazquez**, Office Coordinator, loves to read, spend time with family, and bake.

### CONSULTANTS

- ❖ **Martin Clemons**, Electronics Circuit Designer, keeps busy with his wife Katie as a flight instructor and aircraft inspector on the side.
- ❖ **Seanna Kringen**, Research Associate, focuses on universal design projects, enjoys traveling with her husband and three children.
- ❖ **Ted Nagel**, Graphic Artist, enjoys hanging out with Christian friends and loves entertaining, whether with his barbershop chorus, karaoke, or as a solo artist.
- ❖ **Carla Shepard**, Bookkeeper, enjoys her rest home ministry, playing piano, and singing.
- ❖ **Jeremy Vican**, Trails Assistant, enjoys hiking, photography, and trail related projects.

### INTERN

- ❖ **Michelle Hoogwout**, Rehabilitation Engineering Intern, Technical University of Delft, The Netherlands. Working on Masters in Mechanical Engineering. She loves to play sports and hang with friends and family.

## UTAP & TrailWare<sup>2.0</sup> Workshops

NIH/NICHD SBIR Phase II Grant #2 R44 HD29992-02

NIH/NICHD SBIR Phase II Grant #2 R44 HD36538-02

There are currently over 1,100 trail enthusiasts trained to lead assessments using the Universal Trail Assessment Process (UTAP). Workshops were recently held by the Florida Parks Service in Mar 2012 and by Beneficial Designs in Aug 2012. The next UTAP/HETAP Workshops are scheduled to be held at the Professional Trail Builders Association Conference in Albuquerque, NM on 15-16 Feb, 2013 and at the 21<sup>st</sup> American Trails International Trails Symposium in Phoenix, AZ on 13-14 Apr, 2013. Beneficial Designs provides the training materials and tools through Pax Press while American Trails coordinates most UTAP training courses. TrailWare 2.0 can be used to generate Trail Access Information, signage, and trail management reports. Data is uploaded to <www.trailexplorer.org>, the TrailExplorer Website. For more information, contact <trails@beneficialdesigns.com> or visit <www.americantrails.org>.



## Nevada Recreation Trails Program & NV State Parks

NVRTP Grant #FY 2008-22 & FY 2010-11

We are finishing our third Nevada Recreational Trails Program project to provide signage throughout Nevada. The goal is to continue making Trail Access Information (TAI) widely available in Nevada for a variety of trails and trail users. To date, we have assessed over 200 miles of trail in 26 different park areas. We have installed 13 different panel maps and over 100 TAI signs with another 57 maps and approximately 70 more TAI's left to be created and installed.

### Nature Trail

Fort Churchill  
State Historic Park

Length **1.6** mi (2.5 km)

Elev Gain **45.2** ft (13.8 m)

Elev Loss **265.7** ft (81.0 m)

-  Hikers
-  Bikes
-  Dogs on Leash
-  No Equestrians
-  No Motorized Vehicles

### Grade

Typical Grade **3.8%**

8% of trail is **10% to 20%**

132 ft (40 m) is **20% to 37%**

Standard Ramp Grade **8.3%**

**Trail Access  
Information  
Signage Sample**

## Tahoe Meadows (near Lake Tahoe)

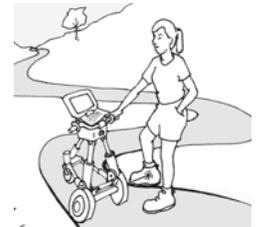
NVRTP Grant #FY 2008-24

This project improved trail access and opportunities while protecting the natural and archeological resources within and around Tahoe Meadows. In cooperation with the U.S. Forest Service, Tahoe Rim Trail Association, and Nevada State Parks, three new loop trails totaling 3.4 miles have been built or improved. Improvements included two new stair sets into the meadow, and access to Ophir Creek was improved with 1,745 feet of boardwalk, a new turnpike and a new bridge. New maps, directional signs, and an interpretive sign have also been installed.

## High Efficiency Trail Assessment Process (HETAP)

USDA SBIR Phase II Grant # 2005-03226

This project created the Wheeled Instrumentation Sensor Package (WISP) to collect more accurate, objective information about trails, including shared-use paths, backcountry single-track trails, OHV, and cross-country ski trails. HETAP systems are being purchased by private entities, state and city land managers, and the National Park Service throughout the U.S. and Canada. This system has been commercially available through Beneficial Designs since 2009. HETAP workshops are available to help train personnel on using the HETAP software and hardware (see UTAP & TrailWare<sup>2.0</sup> Workshops).



## Accessible Trail Gate Barrier

USDA SBIR Phase II Grant # 2005-00325

The Pedestrian and Motorized Vehicle Trail Traffic Counter is commercially available. The counter is designed to identify and count trail entry and exit by both pedestrians and motorized vehicles. A mechanical trail gate barrier is also available to be used on its own or with the electronic system.

## A Standardized Assessment Process of Outdoor Recreation Facilities

USDA SBIR Phase I Grant # 2008-33610-18906

This project will create repeatable measurement methods for assessing the accessibility of recreation elements used for outdoor recreation, picnic, and camping facilities, such as picnic tables and fire rings.

## Public Rights-of-Way Assessment Process to Determine Accessibility

US DOT #DTRT57-08-C-10058 & DTRT57-10-C-10081

Beneficial Designs is developing an automated Public Rights-of-Way Assessment Process (PROWAP) to systematically measure elements within the pedestrian environment, such as curb ramps and driveway crossings. We have been able to reduce the time to perform assessments to 10-20% of the time required to perform assessments manually. In addition to the assessment cart, we have wireless devices to measure tripping hazards and linear measurements of features and sidewalk panels. Our current focus is on preparing the hardware and software for beta testing. An online training and certification program is being developed.



## Surface Accessibility

NIH/NICHD SBIR Phase II Grant #2 R44 HD30979-02

The Rotational Penetrometer (BDRP) measures the firmness and stability of indoor and outdoor surfaces, including: trail surfaces, carpet, and other pedestrian routes. The RP is commercially available through Beneficial Designs.



## Universal Design Guidelines for Fitness Equipment (UDFE)

NIH/NICHD SBIR Phase I Grant #1 R43 HD049236-01  
RERC NIDRR Grant #H133E070029 & H133E120005

In phase I, draft guidelines for the universal design of aerobic and strength training equipment for greater accessibility were developed. During our first five-year RERC on

Recreational Technology and Exercise Physiology (RecTech) with the University of Illinois at Chicago, we developed a draft ASTM UDFE Standard for General Criteria in collaboration with the Inclusive Fitness Initiative (IFI) in the U.K. We are now in year one of another five-year RERC RecTech now with the University of Alabama at Birmingham and will focus on universal design criteria for specific equipment, such as bicycles and treadmills. This work is creating a set of internationally applicable ASTM Standards on universal design specifications for the manufacturers of accessible fitness equipment.



## Development of Uniform Standards for Cognitive Technologies

RERC NIDRR Grant #H133E090003 and the Coleman Institute for Cognitive Disabilities.

We are in year three of a five-year RERC on the Advancement of Cognitive Technologies (ACT) through the University of Colorado. We are working closely with the RERC and cognitive disability groups and individuals in order to develop Universal Design standards for products used daily by people with cognitive impairment, such as cell phones and other consumer products. This project will work with projects underway internationally that address website accessibility, including Fluid, AEGIS, and the Raising the Floor initiative.

## Adaptive Ski Equipment Standards

Rehabilitation Engineering and Assistive Technology Society of North America (RESNA)

Peter is Chair of the RESNA standards committee that developed test methods and specifications for adaptive ski equipment. The standard was published in 2007 as a RESNA American National



Standard. The committee meets each year in December in conjunction with the Ski Spectacular event in Breckenridge, Colorado.

## Wheelchair/AT Standards

PVA & RESNA

As Vice-Chair of the RESNA Assistive Technology Standards Board (ATSB), Peter oversees the work of the RESNA Assistive Technology Standards (ATS) Committees. There are 12 ATS Committees that develop National ATS for the US, while harmonizing where possible with internal standards such as those developed through ISO. RESNA WC-4:2012 Wheelchairs and Transportation and RESNA ASE-2:2012 Adaptive Golf Cars were published in 2012 and are available for purchase through the RESNA store <www.resna.org>.

## Wheelchair Testing & Design

We continue to provide testing and design services on a consulting basis for the wheelchair industry. For more information, contact <mail@beneficialdesigns.com>.

## Wheelchair Training Guides

PVA Research and Education Foundation

The Manual and Powered Wheelchair Selection & Training Guide books provide wheelchair users and therapists with step-by-step instructions for selecting wheelchairs and negotiating various environments. These books are available through PaxPress, a division of Beneficial Designs. For more information contact <paxpress@beneficialdesigns.com>.

## FlexRim®

NIH/NICHHD SBIR Phase II Grant #2 R44 HD36533-02A2

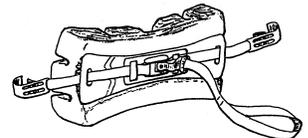
The FlexRim® is a compliant handrim that replaces the rigid interface between the wheelchair wheel and the handrim, reducing the gripping force and the impact forces. The FlexRim is manufactured by Spinergy and has been commercially available since September of 2007. For more product information, please visit Spinergy <www.spinergy.com> or Max Mobility <www.max-mobility.com>.

## PaxBac

NIH/NICHHD SBIR Phase II Grant #2 R44 HD29983-02

The PaxBac is a lightweight back support that provides lumbar/ sacral back support on wheelchairs with sling upholstery. It was manufactured by Invacare for a limited time. It will soon be manufactured again by BES

Rehabilitation, Ltd. and will be distributed in the U.S. by Bodypoint <www.bodypoint.com>.



## Canoe Seating System

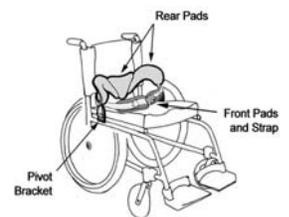
NIH/NICHHD SBIR Phase II Grant #2 R44 HD36944-02A1

The Universal Design Canoe Seat is now commercially available. The seat replaces or attaches to the existing bench seat in a canoe. It provides adjustable pelvic, back, and lateral supports to improve balance and comfort. For more information, contact Chosen Valley Canoe Accessories <cvca@gear4portaging.com>.

## HipGrip

NIH/NICHHD SBIR Phase II Grant #2R44 HD36156-02A2

The HipGrip is a dynamic spring-loaded pelvic support device for people who have difficulty maintaining pelvic positioning in their wheelchair. The HipGrip



allows the user to lean forward and provides variable resistance to assist the user back into an upright position. The HipGrip is manufactured and distributed worldwide by Bodypoint. For more information, contact Bodypoint <www.bodypoint.com>.

Funding Agencies and other Acronyms:

DOT Department of Transportation  
ISO International Organization for Standardization  
NICHHD National Institute of Child Health and Human Development  
NIDRR National Institute on Disability and Rehabilitation Research  
NIH National Institutes of Health  
NVRTP Nevada Recreational Trails Program  
PVA Paralyzed Veterans of America  
RERC •Rehabilitation Engineering Research Centers  
RESNA Rehabilitation Engineering and Assistive Technology Society of North America  
SBIR Small Business Innovation Research  
USDA United States Department of Agriculture

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