



Beneficial Designs

research/design/education

Designing beyond the norm to meet the needs of all people.

Project Examples Presentation
by Peter Axelson

Beneficial Designs, Inc.
Minden, NV



Arroya Sit Ski

Hand Bike





Mono Ski



Dynamic Seating Spring Assist

Cross Country Ski



Pax Back



Available from
BES Rehab Ltd



Aircraft Aisle Chair



Dynamic Seating

Dynamic Seating



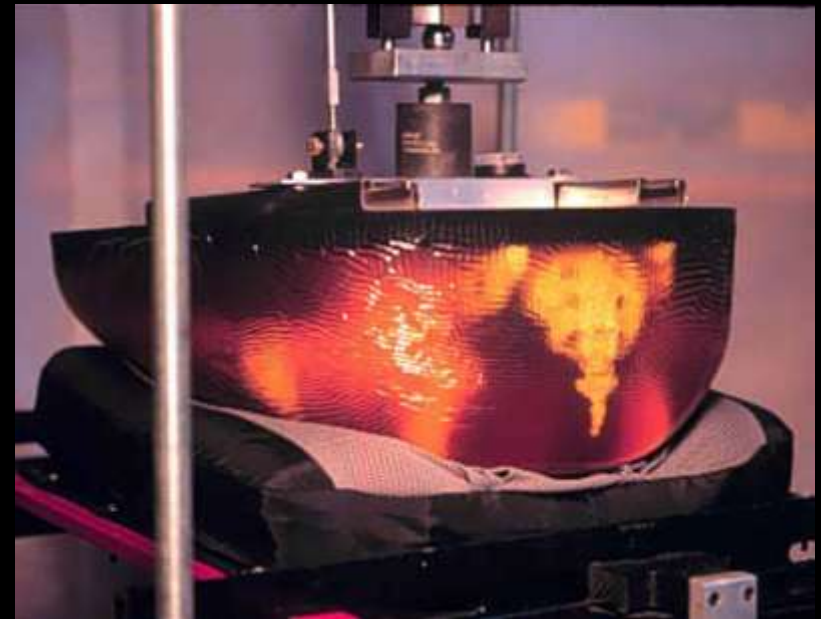
Contoured Seating



Beneficial Designs has played a key part in the ongoing effort to develop **Wheelchair Seating Standards** within the ISO. The **Skeletal Imbedded Loading Indenter (SKELI)** was developed to provide an anatomically based loading indenter for the standard.



Seat Cushion Testing



HipGrip



The HipGrip is a postural seating device designed to help control pelvic position and provide stability while in a wheelchair while allowing range of motion and movement in anterior and posterior pelvic tilt.

Available from
Bodypoint

FlexRim



Design

The FlexRim consists of a durable high friction rubber surface that spans between the aluminum pushrim and the wheel. The shape of the rubber is ergonomically designed to conform to your hand when gripped, making it the most comfortable pushrim you will ever use.

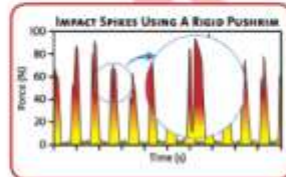


Because the rubber is flexible, the pushrim can compress to allow your wheelchair to squeeze through narrow doorways.



Overuse Injuries

Shoulder and wrist problems are very common among wheelchair users. Impact loading is one of the contributing factors. Your hands and arms absorb impact spikes when you first hit the pushrim, illustrated in the graph below.



- Reducing impact is one strategy recommended to help protect you from developing overuse injuries.

Impact Testing

Impact loading of the FlexRim was studied for a wide range of impact intensities.

- The FlexRim was found to consistently **reduce impact loading by 10%**.



Propulsion Testing

In lab testing, wheelchair users pushed with both a standard pushrim and the FlexRim on a research treadmill. Grip muscle activity, oxygen demand and power generated were all measured during propulsion and compared across pushrims.



Results of the testing were:

- Users required **12% less grip force** to push with the FlexRim.
- Overall **grip exertion was reduced by 15%**.
- On average users required **12% less oxygen** to push with the FlexRim than with a standard pushrim.
- Users generated **18% more power** when using the FlexRim.

The ergonomic benefits of the FlexRim have been published in numerous scientific journals and in a PhD dissertation at Stanford University.

FLEXRIM
BY INNOVATION
Advanced Ergonomics

Beneficial Designs
research/design/education

Designing beyond the norm to meet the needs of all people.

GripRim



Adaptive Canoe Seating



Available from
Chosen Valley
Canoe Accessories



Denise Axelson of Beneficial Designs and Mike Passo of Wilderness Inquiry practice and discuss the refinement of measurement protocols before testing begins with the full subject study on the canoe seat development project.

Kathy Mispagel of Beneficial Designs and Mike Passo practice the measurement of maximum lateral stability on the dry land canoe simulator. The angle is measured with a smart level and the tipping is accurately controlled by a vertical extension to the canoe.





Test subjects are coached during the water portion of the evaluation in which the subject finally gets dumped on the count of three to verify safe egress from the canoe. At least one water safety expert is always on hand for this part of the evaluation.



The adjustment of the canoe seating system to adapt to many different makes and models of canoes and to as many different body sizes and shapes is the great benefit of the Universal Canoe Seating system under development by Beneficial Designs.





Universal Trail Assessment Process (UTAP)



Objective measurement system for trails

Proven accuracy and reliability

Simple, inexpensive tools

All trail data in one assessment
(mapping, interpretation, access, etc.)

UTAP Assessment Team





High Efficiency Trail Assessment Process

USDA SBIR Phase II Grant # 2005-03226

Phase II research to create a streamlined, cost-effective instrument for obtaining accurate, objective information about trail environments is progressing well.

Preliminary results indicate that the sensor package will be able to attach to a variety of third party vehicles (cart, rola-wheel, ATV, etc.). Prototypes have been constructed and are currently being tested. This device will enable outdoor recreation and trail access routes to be assessed more efficiently.

Rotational Penetrometer



Objective surface measurement device

Draft Standard for firmness with stability measurement under development

Available from Beneficial Designs

TrailWare

Computerized data management and analysis

Summarize trail information for users

Summarize trail information for land managers

Export data to Web site and other software

TrailWare



TrailWare Park List

[New Park](#)[Begin Find](#)[Show All](#)[Help](#)[Exit TW](#)

Park Name	Agency	State/Province/ Territory
go Morgan Grist Mill	Missouri State Parks	MO
go Henry W. Pitman	Allisonville Parks and Recreation	CT
go Apostle Islands National Lakeshore	National Park Service	MI
go Point Lobos	California State Parks	CA
go Turkey Run	Indiana Department of Natural	IN
go White Mountain National Forest	USDA Forest Service	NH

trails@beneficialdesigns.com
tel: 775-783-8822

Trail Access Information Sheet

Trail Uses



Hiking



No Equestrians



No Bikes

Hazards and Obstructions



Dropoff
10 feet



Vertical Overhanging
Rock



Steps
32 Railroad
Ties

Pioneer

Morgan Grist Mill

Trail Length 2 mi (3.3 km)

Linear trail

Pioneer trail goes through a wooded area of Hickory, Maple, and Beech trees. Seasonal wildflowers abundant in the spring and fall.

Cumulative Elevation Change Gain 171 ft (52 m)
Loss 106 ft (32 m)



Typical Grade is 2.6%

5% of the trail is between 8% and 20%
164 ft (50 m) is between 12% and 20%
8% grade is a standard ramp.



Typical Cross Slope is 2.2%

0% of the trail is between 8% and 17%
39 ft (12 m) is between 10% and 17%



Typical Tread Width is 55 in (139 cm)

Tread Width ranges from 45 in (114 cm) to 60 in (152 cm)
Minimum Clearance 22 in (56 cm)



Trail Surface is Soil

80% of the trail is Firm or better
2097 ft (639 m) of the trail is Soft or worse

Trailhead Location

Parking Lot



Trail
Access
Information

Warning: Trail conditions may have changed since this trail was assessed. Temporary obstructions (e.g. fallen trees or land slides) may not have been mapped. Maximum grades and cross slopes may vary.

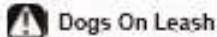
This report is generated by TrailWare which has been created by Beneficial Designs, Inc.
10/14/02

Tahoe Meadows Interpretive Trail

Length 1.5 mi (2.3 km)



Hiking



Dogs On Leash



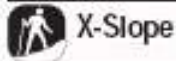
Grade

Typical Grade 2.3%

7% of the trail is 6%

327 ft (100 m) is 7%

6% grade is a standard ramp.



X-Slope

Typical Cross Slope 2.0%

99% of the trail is 3% to 6%

304 ft (93 m) is 6% to 10%



Tread Width

Typical Tread Width

7.5 ft (2.3 m)

Minimum Clearance Width

42 in (107 cm)

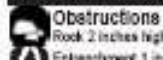


Surface Type

Aggregate / Gravel

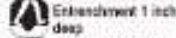
82% is Firm or better

1408 ft (429 m) is Soft or worse

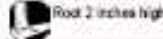


Obstructions

Rock 2 inches high



Entrenchment 1 inch deep



Rock 2 inches high

WARNINGS: The conditions have been changed since any condition has been assessed. Temporary obstructions (e.g., fallen rocks or dead wood) may not have been mapped or indicated. (A) (B) (C) (D) (E) (F) (G) (H) (I) (J) (K) (L) (M) (N) (O) (P) (Q) (R) (S) (T) (U) (V) (W) (X) (Y) (Z) (AA) (AB) (AC) (AD) (AE) (AF) (AG) (AH) (AI) (AJ) (AK) (AL) (AM) (AN) (AO) (AP) (AQ) (AR) (AS) (AT) (AU) (AV) (AW) (AX) (AY) (AZ) (BA) (BB) (BC) (BD) (BE) (BF) (BG) (BH) (BI) (BJ) (BK) (BL) (BM) (BN) (BO) (BP) (BQ) (BR) (BS) (BT) (BU) (BV) (BW) (BX) (BY) (BZ) (CA) (CB) (CC) (CD) (CE) (CF) (CG) (CH) (CI) (CJ) (CK) (CL) (CM) (CN) (CO) (CP) (CQ) (CR) (CS) (CT) (CU) (CV) (CW) (CX) (CY) (CZ) (DA) (DB) (DC) (DD) (DE) (DF) (DG) (DH) (DI) (DJ) (DK) (DL) (DM) (DN) (DO) (DP) (DQ) (DR) (DS) (DT) (DU) (DV) (DW) (DX) (DY) (DZ) (EA) (EB) (EC) (ED) (EE) (EF) (EG) (EH) (EI) (EJ) (EK) (EL) (EM) (EN) (EO) (EP) (EQ) (ER) (ES) (ET) (EU) (EV) (EW) (EX) (EY) (EZ) (FA) (FB) (FC) (FD) (FE) (FF) (FG) (FH) (FI) (FJ) (FK) (FL) (FM) (FN) (FO) (FP) (FQ) (FR) (FS) (FT) (FU) (FV) (FW) (FX) (FY) (FZ) (GA) (GB) (GC) (GD) (GE) (GF) (GG) (GH) (GI) (GJ) (GK) (GL) (GM) (GN) (GO) (GP) (GQ) (GR) (GS) (GT) (GU) (GV) (GW) (GX) (GY) (GZ) (HA) (HB) (HC) (HD) (HE) (HF) (HG) (HH) (HI) (HJ) (HK) (HL) (HM) (HN) (HO) (HP) (HQ) (HR) (HS) (HT) (HU) (HV) (HW) (HX) (HY) (HZ) (IA) (IB) (IC) (ID) (IE) (IF) (IG) (IH) (II) (IJ) (IK) (IL) (IM) (IN) (IO) (IP) (IQ) (IR) (IS) (IT) (IU) (IV) (IW) (IX) (IY) (IZ) (JA) (JB) (JC) (JD) (JE) (JF) (JG) (JH) (JI) (JJ) (JK) (JL) (JM) (JN) (JO) (JP) (JQ) (JR) (JS) (JT) (JU) (JV) (JW) (JX) (JY) (JZ) (KA) (KB) (KC) (KD) (KE) (KF) (KG) (KH) (KI) (KJ) (KK) (KL) (KM) (KN) (KO) (KP) (KQ) (KR) (KS) (KT) (KU) (KV) (KW) (KX) (KY) (KZ) (LA) (LB) (LC) (LD) (LE) (LF) (LG) (LH) (LI) (LJ) (LK) (LL) (LM) (LN) (LO) (LP) (LQ) (LR) (LS) (LT) (LU) (LV) (LW) (LX) (LY) (LZ) (MA) (MB) (MC) (MD) (ME) (MF) (MG) (MH) (MI) (MJ) (MK) (ML) (MM) (MN) (MO) (MP) (MQ) (MR) (MS) (MT) (MU) (MV) (MW) (MX) (MY) (MZ) (NA) (NB) (NC) (ND) (NE) (NF) (NG) (NH) (NI) (NJ) (NK) (NL) (NM) (NN) (NO) (NP) (NQ) (NR) (NS) (NT) (NU) (NV) (NW) (NX) (NY) (NZ) (OA) (OB) (OC) (OD) (OE) (OF) (OG) (OH) (OI) (OJ) (OK) (OL) (OM) (ON) (OO) (OP) (OQ) (OR) (OS) (OT) (OU) (OV) (OW) (OX) (OY) (OZ) (PA) (PB) (PC) (PD) (PE) (PF) (PG) (PH) (PI) (PJ) (PK) (PL) (PM) (PN) (PO) (PP) (PQ) (PR) (PS) (PT) (PU) (PV) (PW) (PX) (PY) (PZ) (QA) (QB) (QC) (QD) (QE) (QF) (QG) (QH) (QI) (QJ) (QK) (QL) (QM) (QN) (QO) (QP) (QQ) (QR) (QS) (QT) (QU) (QV) (QW) (QX) (QY) (QZ) (RA) (RB) (RC) (RD) (RE) (RF) (RG) (RH) (RI) (RJ) (RK) (RL) (RM) (RN) (RO) (RP) (RQ) (RR) (RS) (RT) (RU) (RV) (RW) (RX) (RY) (RZ) (SA) (SB) (SC) (SD) (SE) (SF) (SG) (SH) (SI) (SJ) (SK) (SL) (SM) (SN) (SO) (SP) (SQ) (SR) (SS) (ST) (SU) (SV) (SW) (SX) (SY) (SZ) (TA) (TB) (TC) (TD) (TE) (TF) (TG) (TH) (TI) (TJ) (TK) (TL) (TM) (TN) (TO) (TP) (TQ) (TR) (TS) (TT) (TU) (TV) (TW) (TX) (TY) (TZ) (UA) (UB) (UC) (UD) (UE) (UF) (UG) (UH) (UI) (UJ) (UK) (UL) (UM) (UN) (UO) (UP) (UQ) (UR) (US) (UT) (UU) (UV) (UW) (UX) (UY) (UZ) (VA) (VB) (VC) (VD) (VE) (VF) (VG) (VH) (VI) (VJ) (VK) (VL) (VM) (VN) (VO) (VP) (VQ) (VR) (VS) (VT) (VU) (VV) (VW) (VX) (VY) (VZ) (WA) (WB) (WC) (WD) (WE) (WF) (WG) (WH) (WI) (WJ) (WK) (WL) (WM) (WN) (WO) (WP) (WQ) (WR) (WS) (WT) (WU) (WV) (WW) (WX) (WY) (WZ) (XA) (XB) (XC) (XD) (XE) (XF) (XG) (XH) (XI) (XJ) (XK) (XL) (XM) (XN) (XO) (XP) (XQ) (XR) (XS) (XT) (XU) (XV) (XW) (XX) (XY) (XZ) (YA) (YB) (YC) (YD) (YE) (YF) (YG) (YH) (YI) (YJ) (YK) (YL) (YM) (YN) (YO) (YP) (YQ) (YR) (YS) (YT) (YU) (YV) (YW) (YX) (YZ) (ZA) (ZB) (ZC) (ZD) (ZE) (ZF) (ZG) (ZH) (ZI) (ZJ) (ZK) (ZL) (ZM) (ZN) (ZO) (ZP) (ZQ) (ZR) (ZS) (ZT) (ZU) (ZV) (ZW) (ZX) (ZY) (ZZ)



Trail Access Information

Nevada Recreation Trails (NV NRT)

The NV NRT project has been ongoing since 2003. The NV NRT goal is to make Trail Access Information (TAI) widely available for a variety of trails in Northern NV. During 2006, priority trails were determined for Douglas, Washoe, Carson City, and Sparks Counties. Over 15 trails were assessed. In addition, a social trail at the Tahoe Meadows Interpretive Trail was obliterated with the help of volunteers and some trail reconstruction was completed.



www.triaexplorer.org



HOME ABOUT US DEFINITIONS LINKS TRAIL ACCESS INFORMATION

TRAIL FEATURES
Customize your search by trail use and features.

TRAIL ACCESS
Find a trail to suit your ability. Search by grade, cross-slope and surface.

TRAIL MANAGEMENT
Authorized trail managers may add or edit trail information. Contact [Beneficial Designs](#).

CONTACT US



QUICK TRAIL SEARCH



Type in (a few letters of) a park or trail name:

OR

View trails by state:

PICK OF THE MONTH



Big Basin Redwoods State Park
Boulder Creek, CA

Features 2,000 year-old redwoods and over 50 miles of trails. Reservations required for camping. Phone: 831.338.8860

Have you ever finished a three hour hike in one hour? Have you struggled on a "moderate" trail? Have you ever encountered barriers on an "easy" trail? If so, you already know the benefits of having objective trail information. The Trail Explorer website conveys objective trail information in a unique [Trail Access Information](#) format to help trail users make informed decisions about which public lands to visit, and which trails will best meet their interests, abilities and desired experiences. Trail Explorer benefits all users, but is particularly helpful for individuals who may have specific trail needs, such as individuals with disabilities, older adults, parents with young children, and novice hikers.

Acknowledgement
Trail Explorer was designed by [Beneficial Designs](#) in collaboration with [American Trails](#), land management, and disability organizations and with the support of the US Department of Education.

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Search Results



HOME ABOUT US DEFINITIONS LINKS TRAIL ACCESS INFORMATION

Click on the trail name for more information. Click on the column heading to sort by column.
9 trails found. Use the "Back" button on your browser to refine your selection.

Trail	Park	Nearest Town(s) State	Length	Uses	Typical Grade	Surface Firmness	Trail Information
Trail 10	McCormick's Creek State Park	IN	0.7 miles (1.1 km)	Hiking	3.3%	Firm	Trail 10 begins near the stairs on Trail 3. The trail follows McCormick's Creek downstream to the Old Statehouse Quarry and Trail 2. Depending on the season and water levels, that trail borders the creek, crosses the creek numerous times, or is completely in the creekbed.
Trail 8	McCormick's Creek State Park	IN	0.7 miles (1.1 km)	Hiking	2.3%	Paved	Trail 8 connects the campground to the swimming pool and Nature Center. Pine Bluff Shelter and picnic/playground area can be reached from the trail.
Trail A	McCormick's Creek State Park	IN	0.2 miles (0.3 km)	Hiking	2.2%	Firm	Trail A is a connector trail from the Class A campground to Trail 7.
Trail 6	Spring Mill State Park	IN	0.4 miles (0.7 km)	Hiking	2.3%	Paved	Trail 6 is a paved loop trail near the Virgil I. "Gus" Grissom Memorial.
Trail 7	Spring Mill State Park	IN	0.9 miles (1.5 km)	Hiking	3.3%	Firm	Trail 7 loops around the Oak Ridge Picnic Area and connects with Trail 7 Spur that leads to Trail 4.
Trail 7 Spur to Trail 4	Spring Mill State Park	IN	0.4 miles (0.6 km)	Hiking	3.9%	Firm	Trail 7 Spur connects Trail 7 from the Oak Ridge Picnic Area to Trail 4
Trail 10 Spur to Camels Back	Turkey Run State Park	IN	0.1 miles (0.2 km)	Hiking	0.9%	Firm	The spur to Camel's Back begins at the junction of Trail 10. The short trail ends at Camel's Back. There is an observation deck and bench.
Trail 11	Turkey Run State Park	IN	0.2 miles (0.3 km)	Hiking	3.1%	Firm	Trail 11 starts from the Service Road besides the Turkey Run Inn. A short hike about Turkey Run Hollow to the Lieber Memorial and Log Church.
Trail 7 Spur to Campground	Turkey Run State Park	IN	0.1 miles (0.2 km)	Hiking	3.3%	Firm	Connector trail between the Campground and Trail 7.

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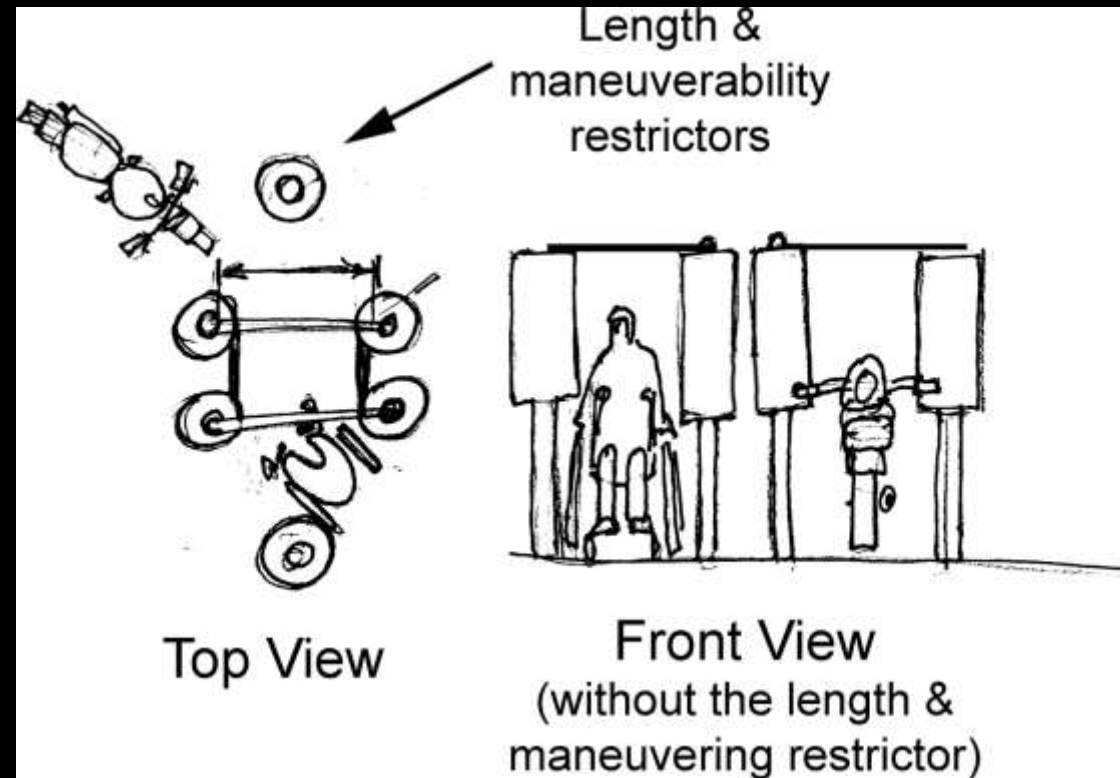


Accessible Trail Gate Barrier

USDA SBIR Phase II Grant #
2005-00325

The goal of this project is to design a trail gate barrier that will restrict access to motorized trail vehicles, but allow access to all non-motorized users and personal mobility devices.

Current gates that allow mobility devices also allow small motorized vehicles, forcing land managers to choose between providing access to people with disabilities and protecting the trail environment. A phase II grant was awarded for this project and is underway



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