



Beneficial Designs

research/design/education

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

Peter Axelson

Beneficial Designs, Inc.

Minden, NV

Beneficial Design

Designing Beyond the Norm to Meet
the Needs of All People

Research
Design
Education

Stanford University

29 January 2015

Peter Axelson



Beneficial Designs' Mission Statement

Beneficial Designs works towards universal access through research, design, and education. We believe all individuals should have access to the physical, intellectual, and spiritual aspects of life.



Beneficial Designs' Mission Statement

We seek to enhance the quality of life for people of all abilities, and work to achieve this aim by developing and marketing technology for daily living, vocational, and leisure activities.





**Bill Blythe,
Technical Assistant**



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Research Associate**





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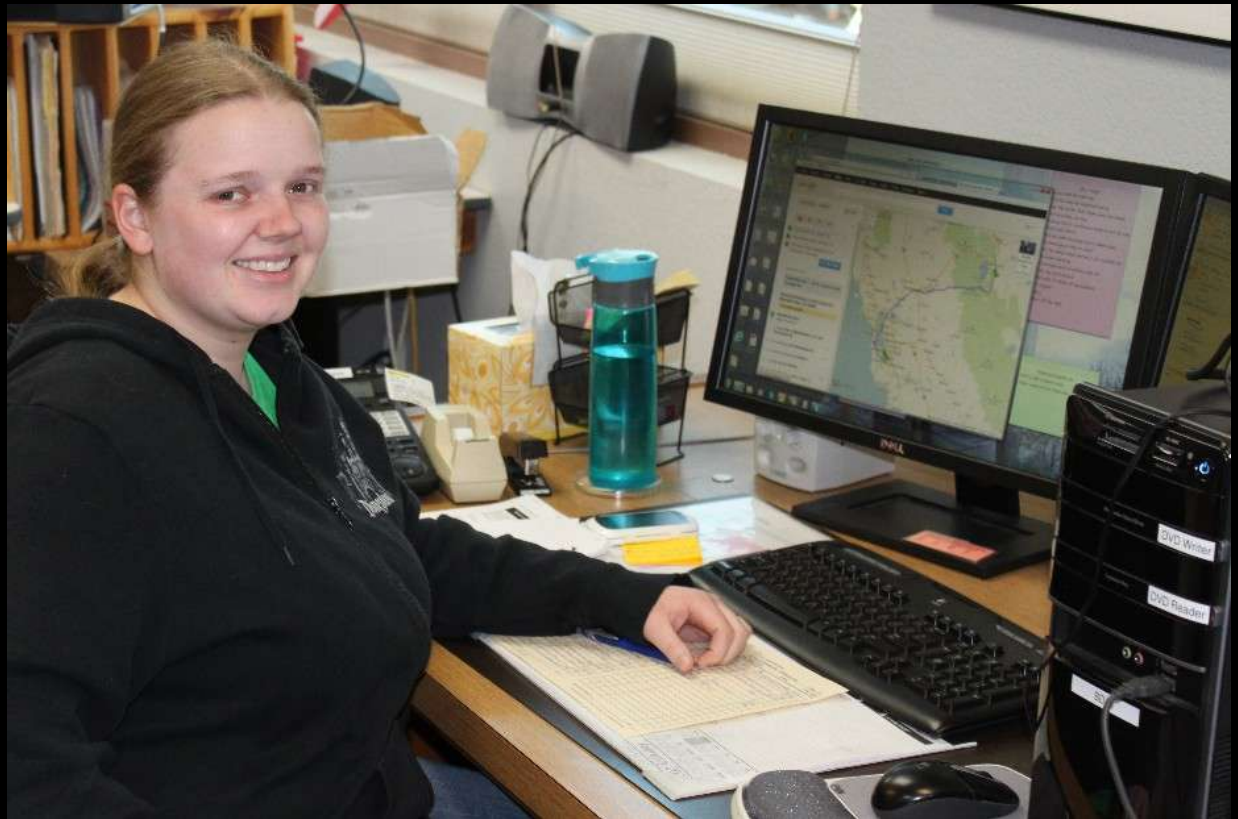




**Allison Ansel,
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**Jo Anne Snarr,
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**Cameron Tolbert,
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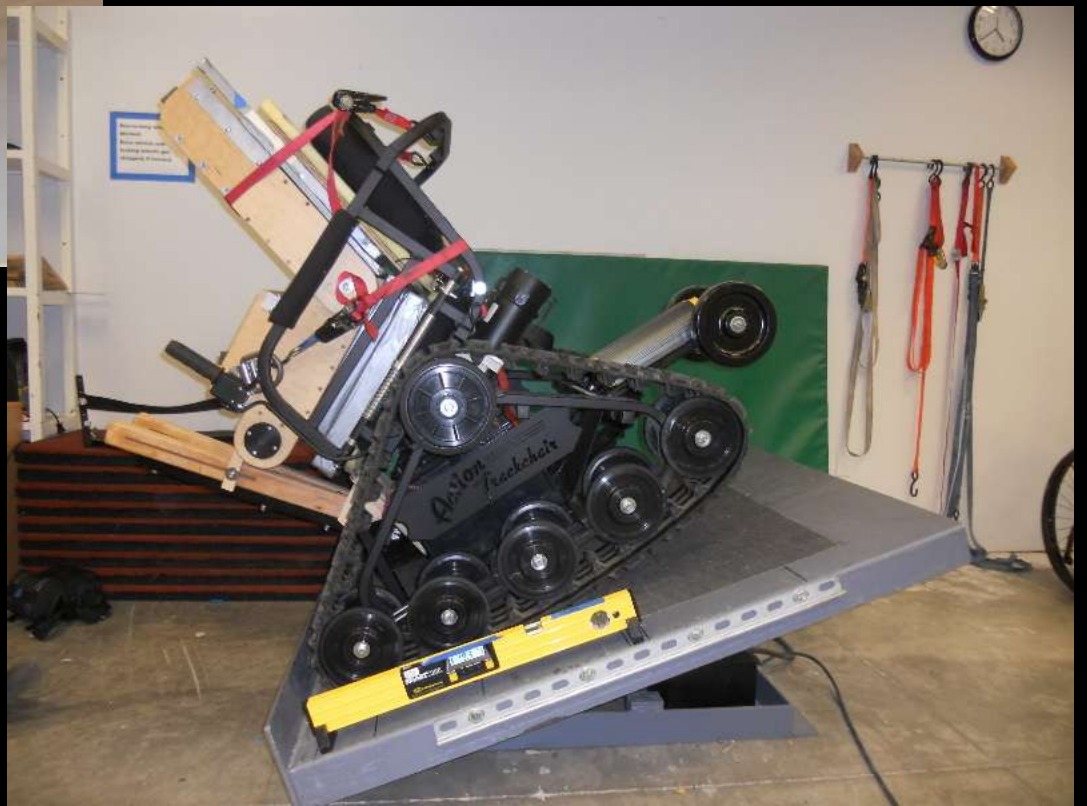


















Design of Consumer Products

Product Development

Assessment of Products

Universal Design of Products

Product Development

Mainstream Products

Opportunity for Universal Design

Adaptive Products

Personal Technologies

Activity Specific Technologies

Establishing Balance

Physical

Intellectual

Spiritual

















Sociological Dimension

Dependence

Independence

Interdependence







Personal Technologies

Activity-Specific Technologies

Environmental Technologies

Activity-Specific Technologies



Arroya Sit Ski





Mono Ski











Dynamic Seating Spring Assist

Cross Country Ski





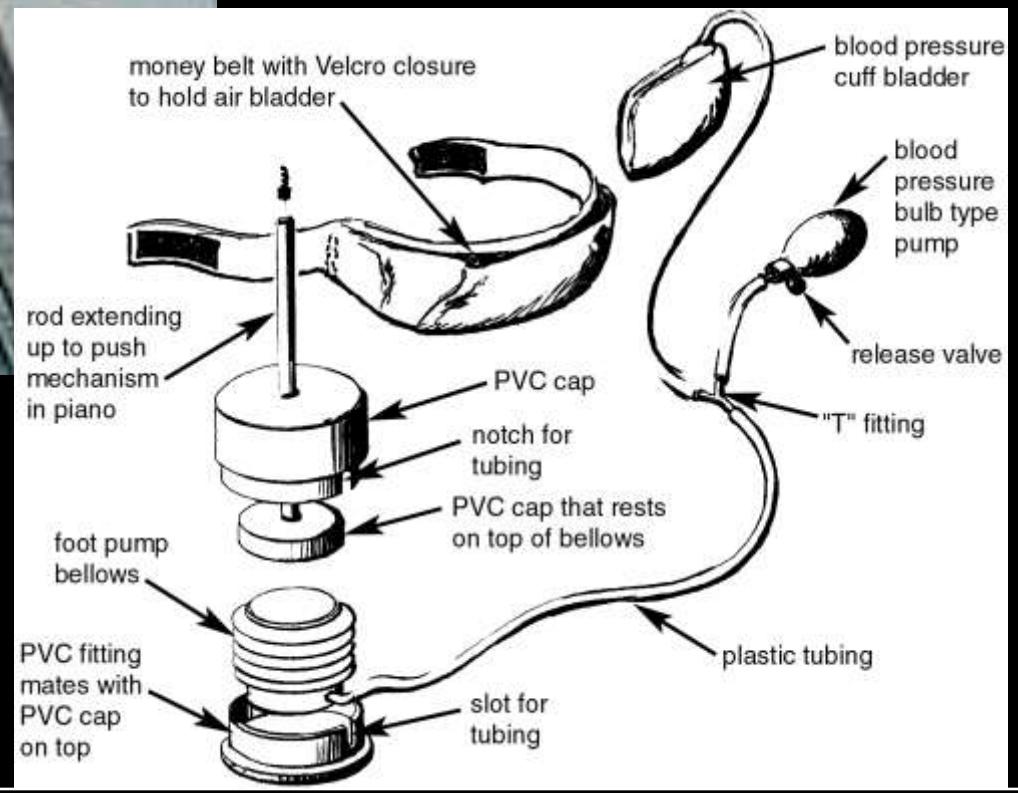


4.12.98

Pax Back



Available from
BES Rehab Ltd



Clutch, Brake, and Gas on Hand Control





Dynamic Seating

Dynamic Seating





Hand Bike

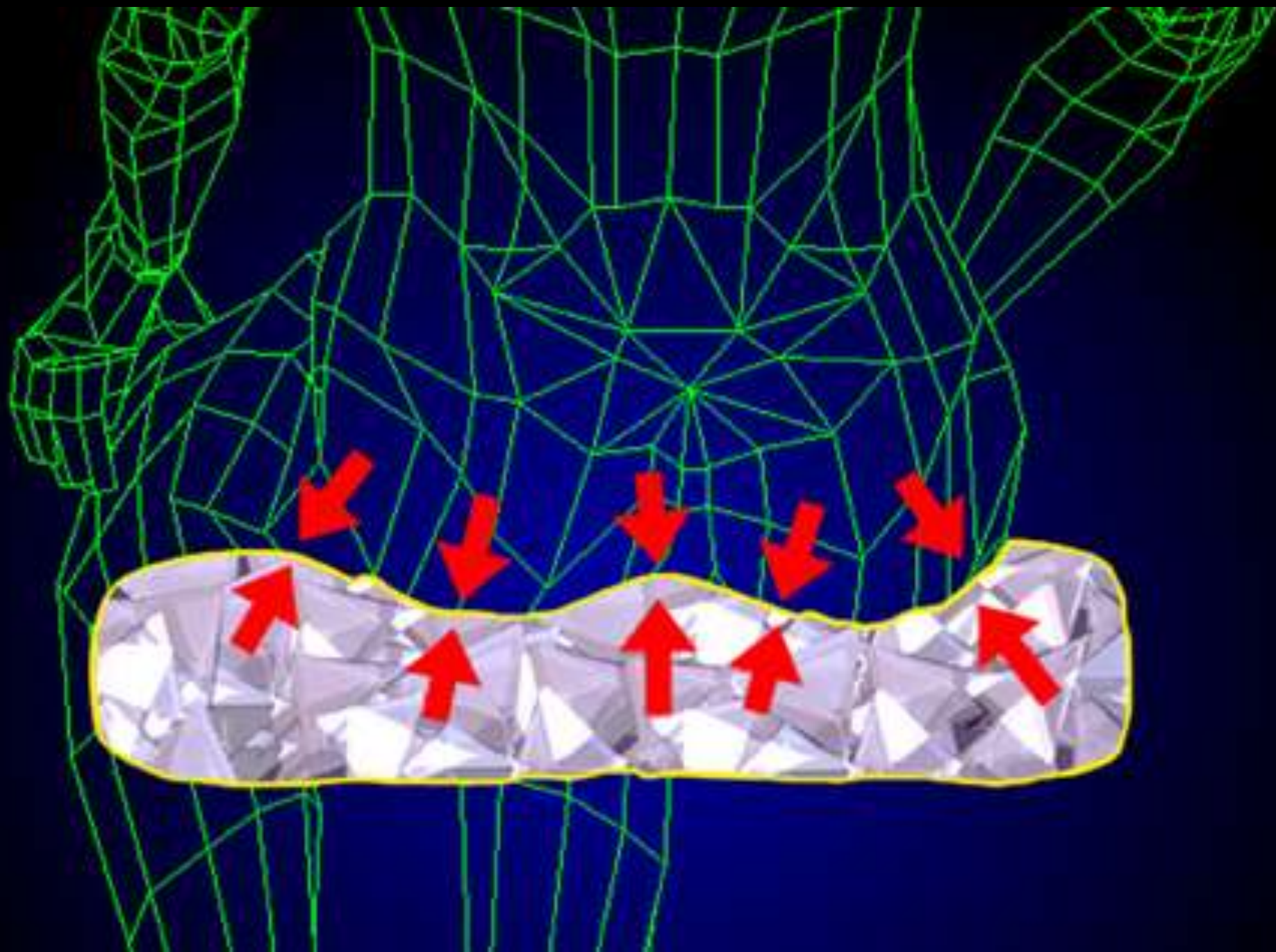


Hand Bike

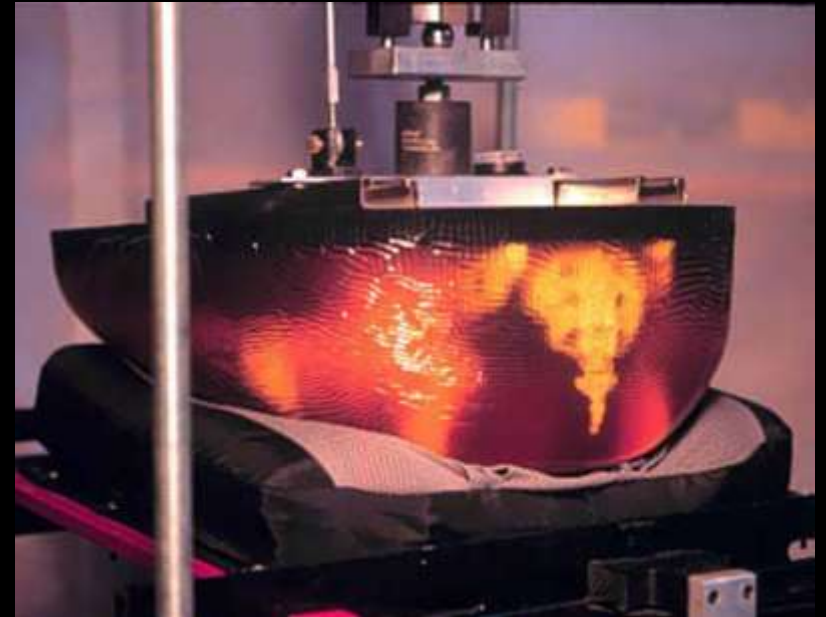


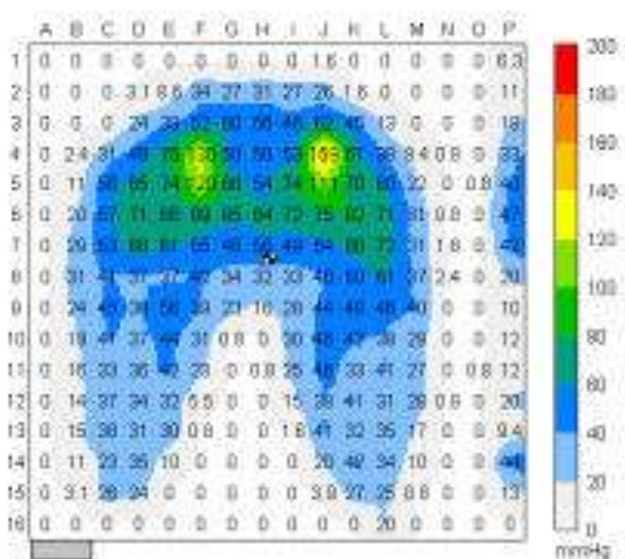
Contoured Seating



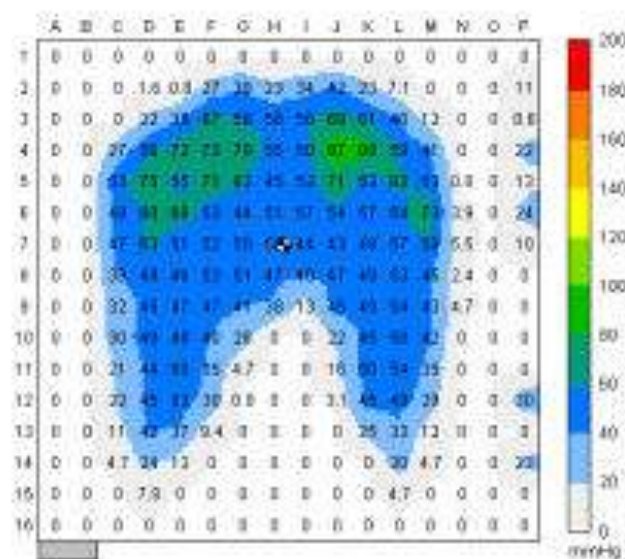


Seat Cushion Testing

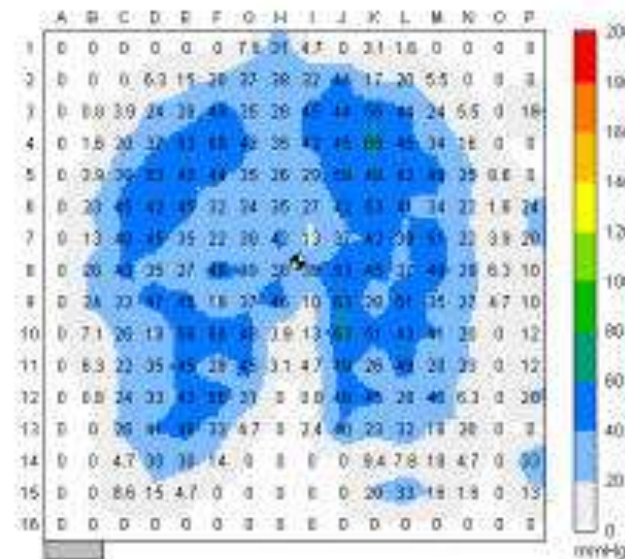




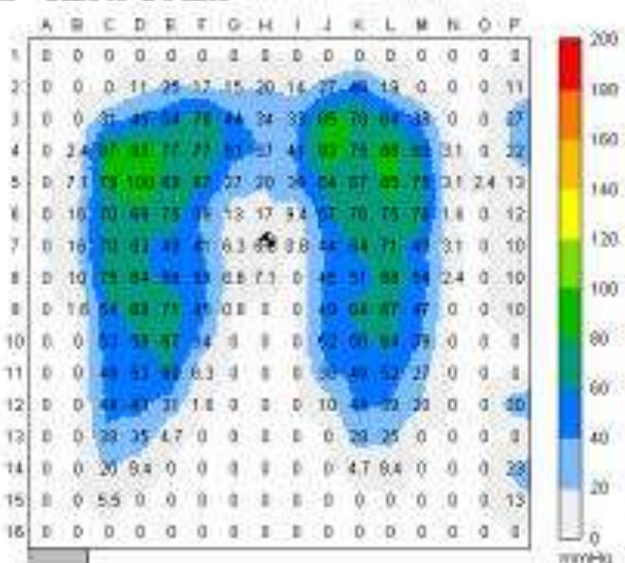
2" HR45 Foam



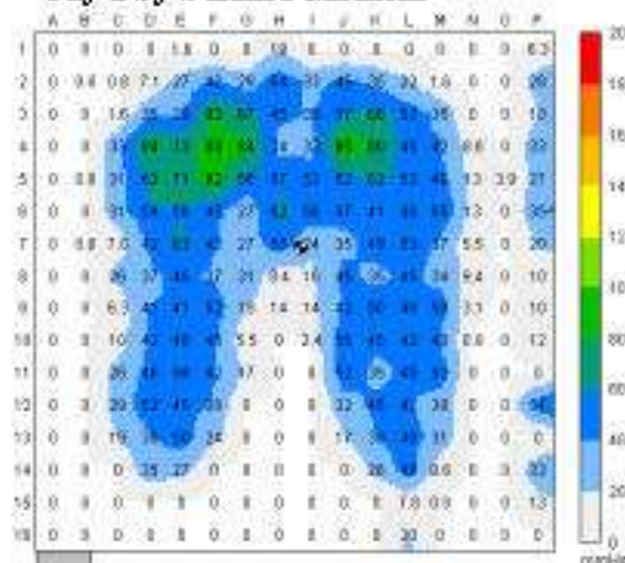
Jay 2 by Sunrise Medical



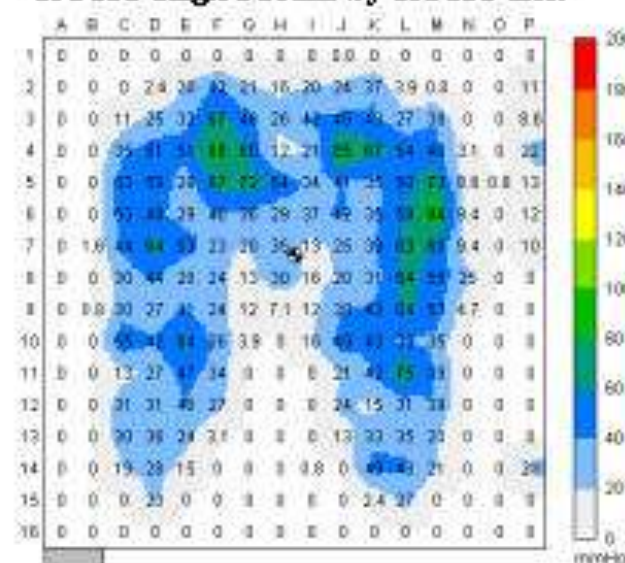
ROHO High Profile by ROHO Inc.



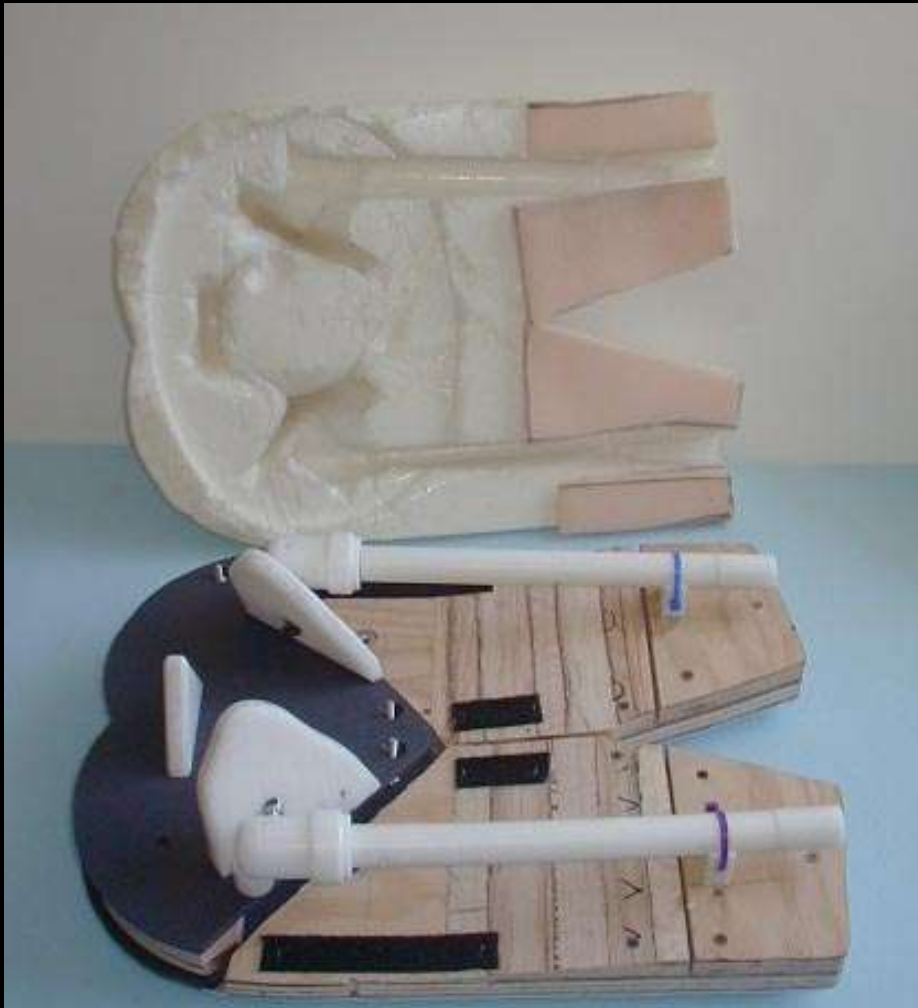
Contoured by Supracor



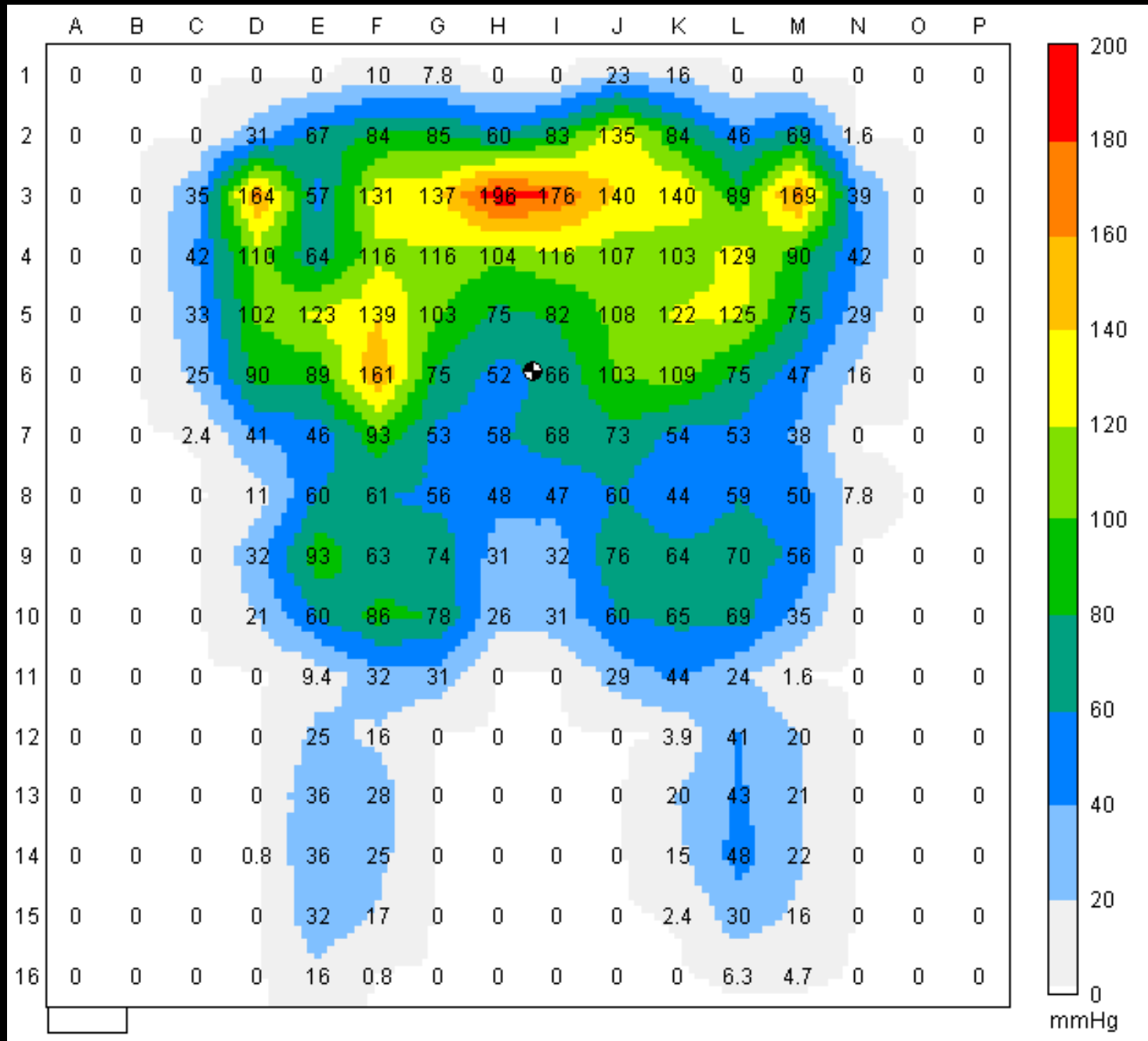
Model Pby Vicair



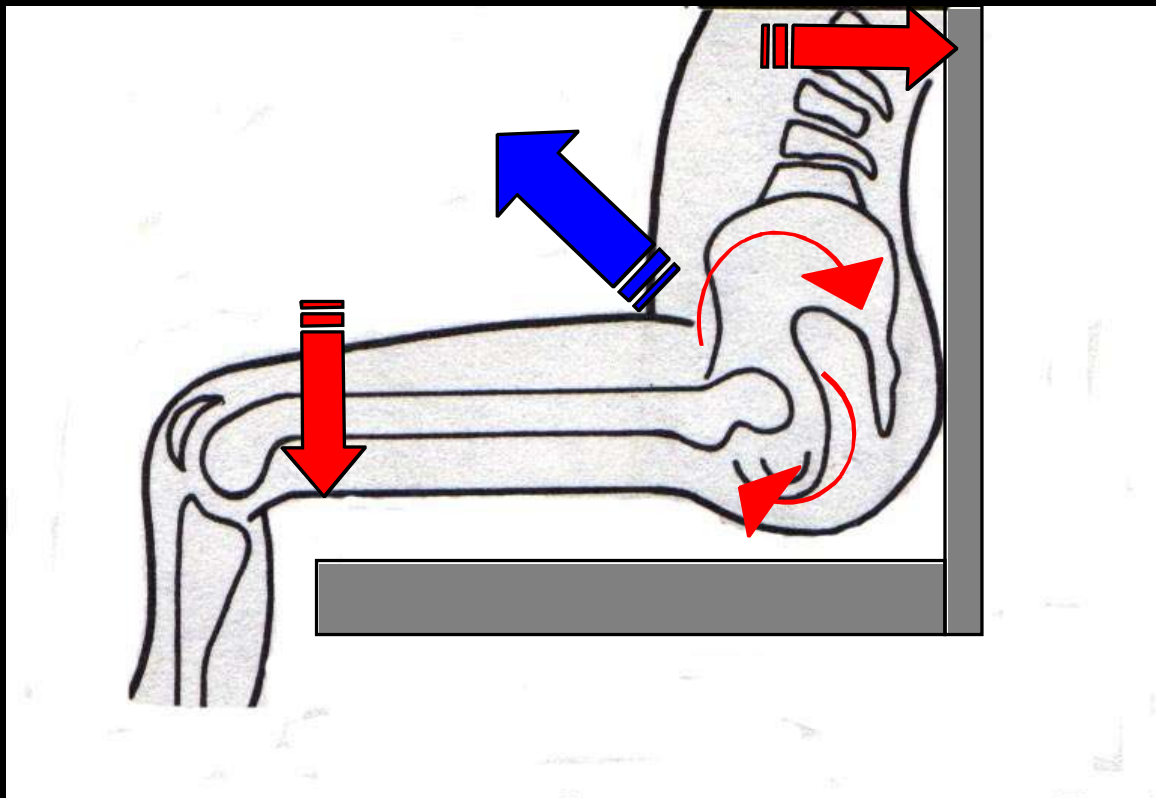
ASLI Prototype ISO Part 2 Shape



Pressure Measurements 15 Posterior Pelvic Tilt



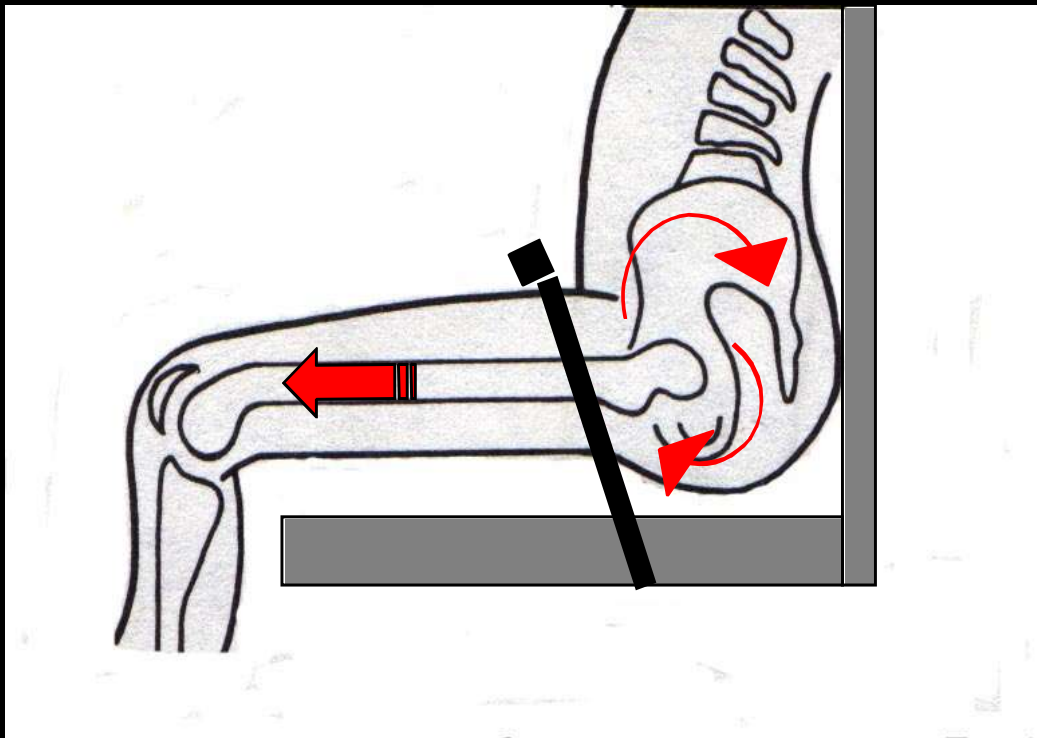
Pelvis Movement During Extensor Thrust Activity



Force at Thigh
and Backrest
During Extension

Pelvis Moves Up,
Out and Rotates

Variations of Belt Angle

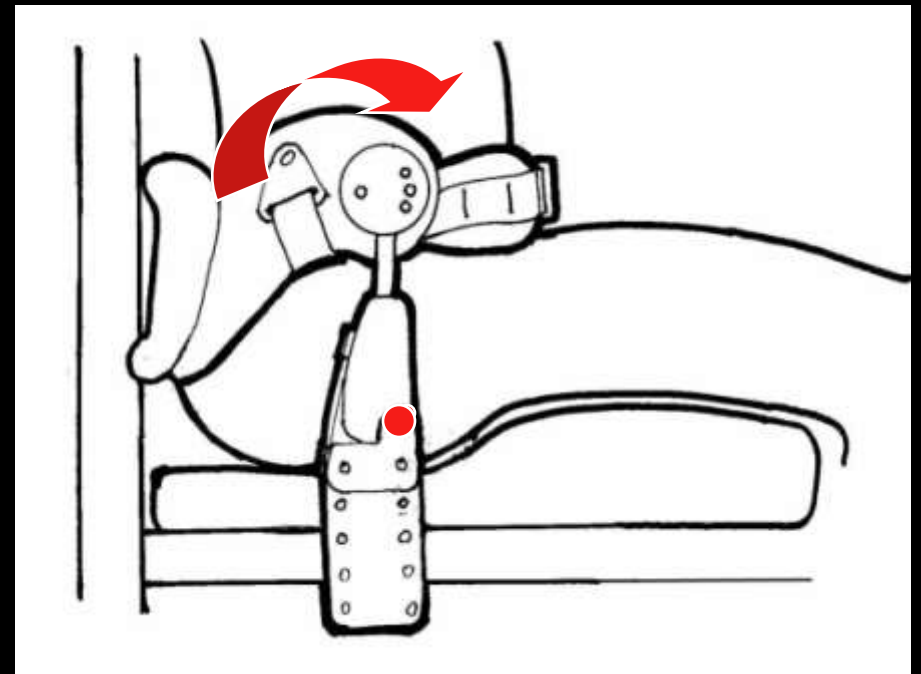
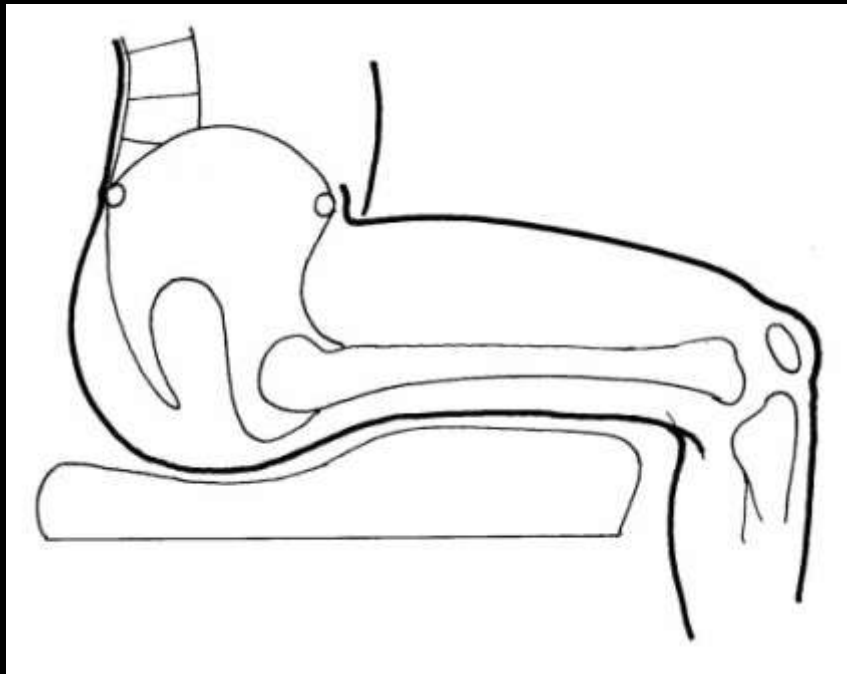


Downward Pull
Limits Upward
Movement

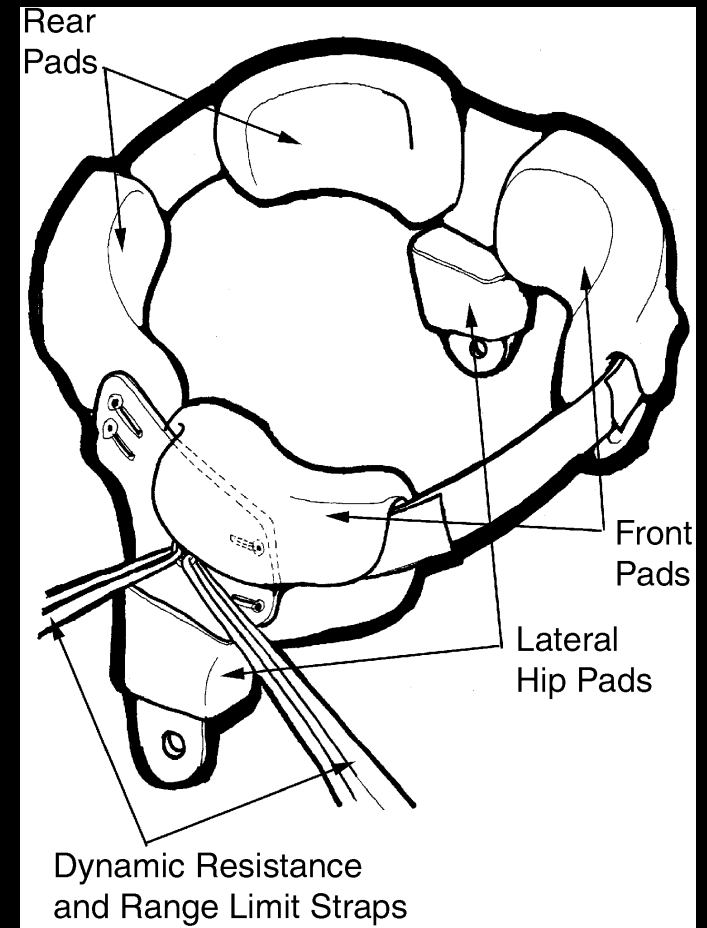
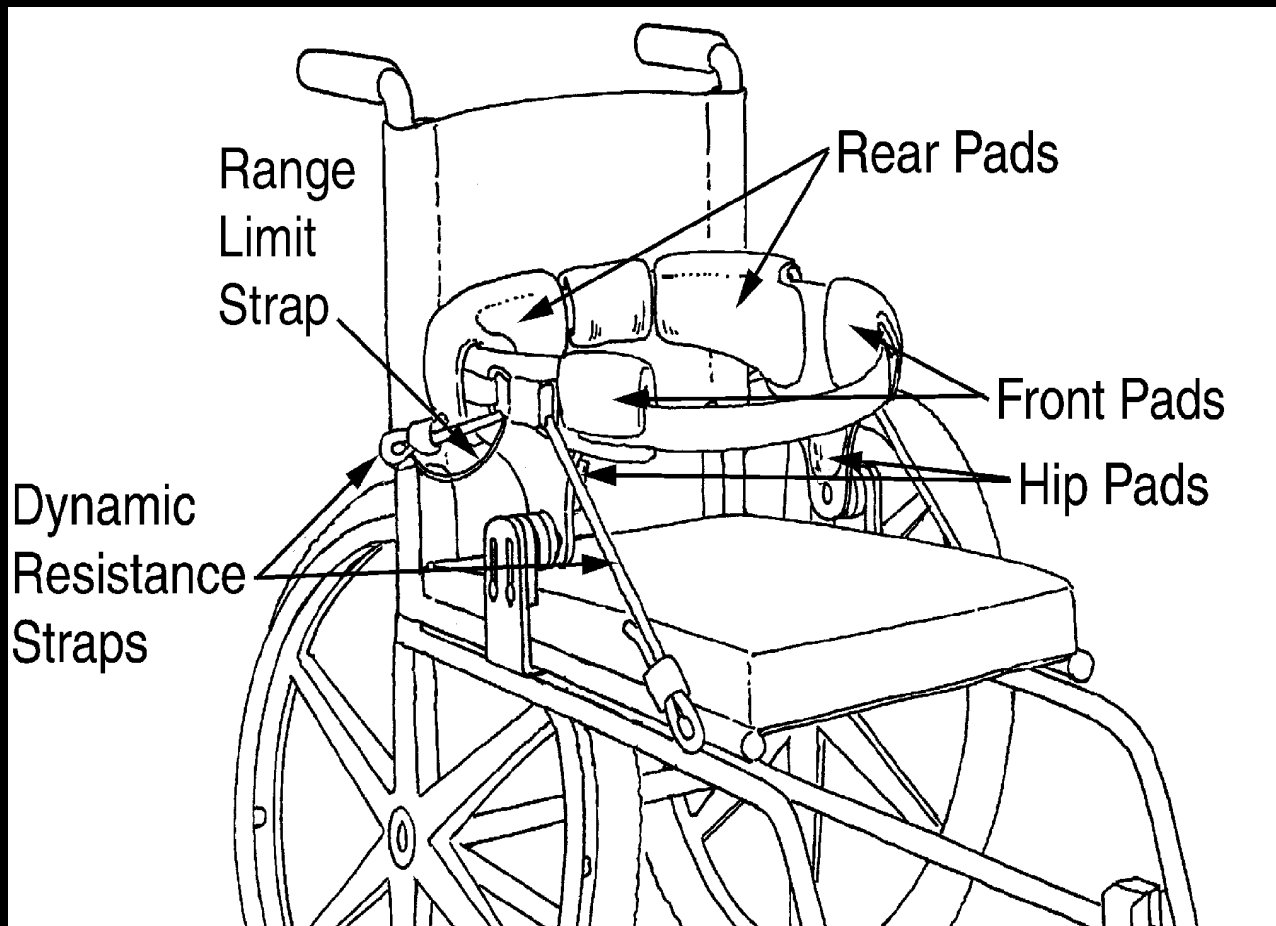
Allows Posterior
Pelvic Rotation

Limits Full Anterior
ROM

HipGrip Concept



HipGrip Ph1 - Prototype 2



What Is the HipGrip?



- Dynamic Pelvic Support
- Provides Pelvic Stability
- Allows Controlled Anterior Tilt ROM



HipGrip Test Fixture



Functional Forward Reach



Functional Reach Downward



HipGrip

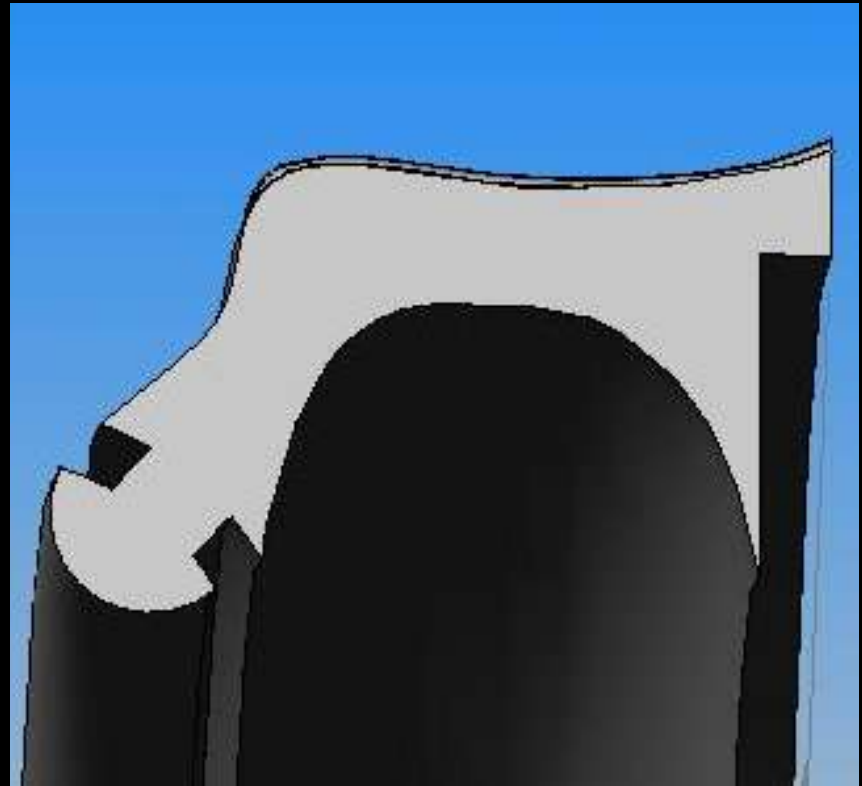
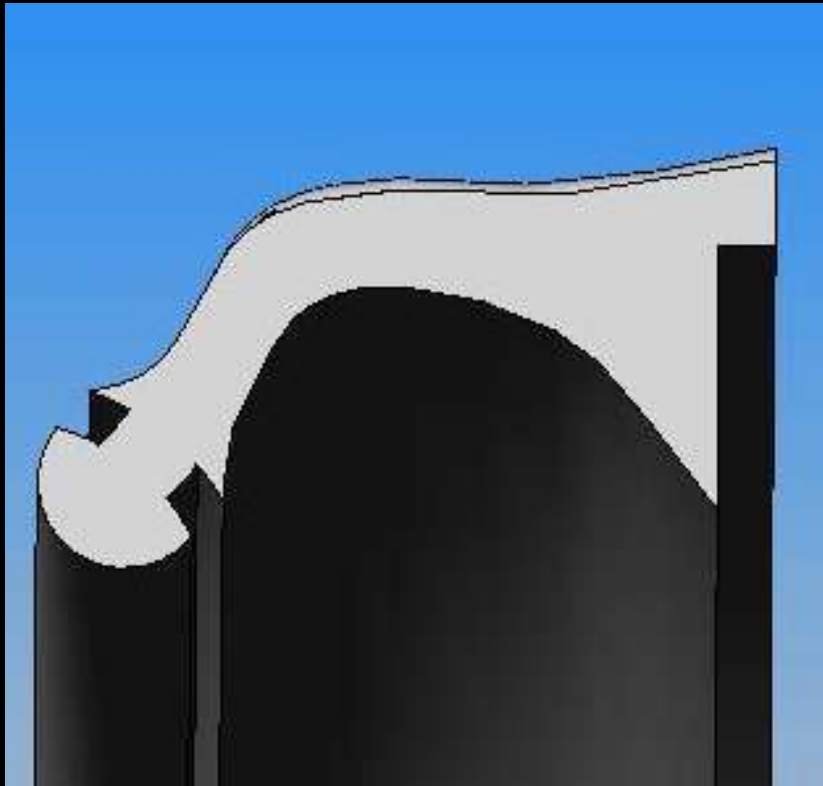


Available from
Bodypoint

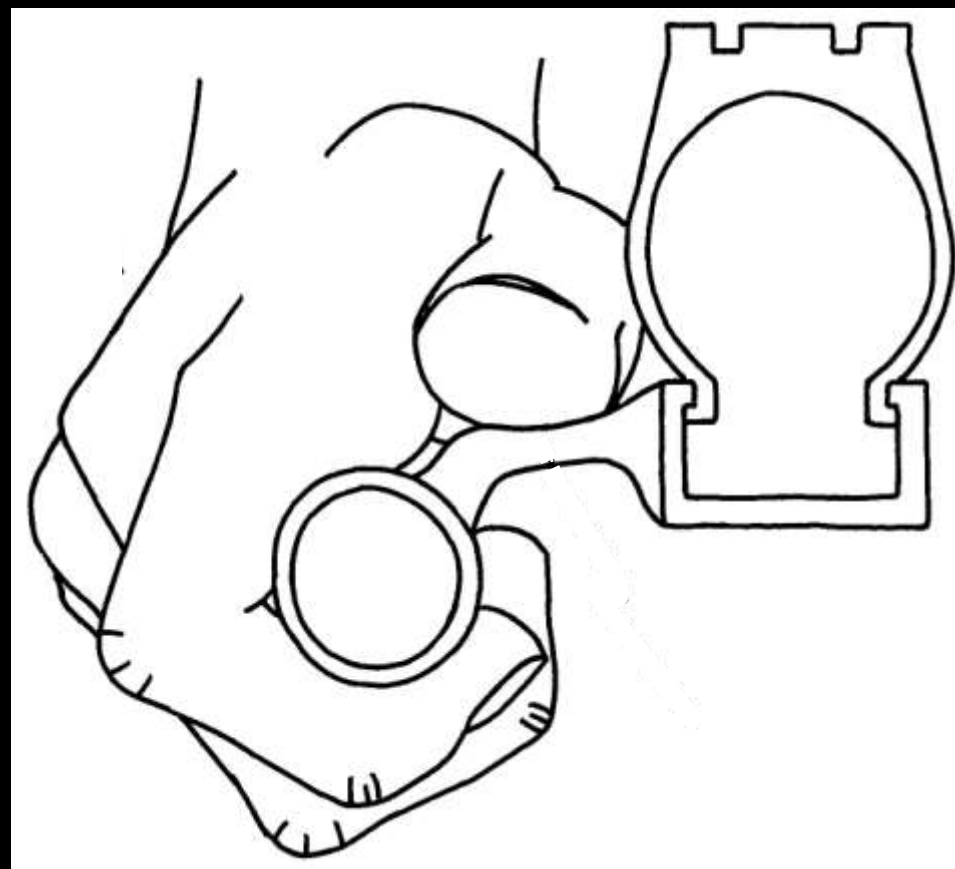
FlexRim – Combining the discrete compliant fasteners into one



**The best profiles were
fully developed and
tested**

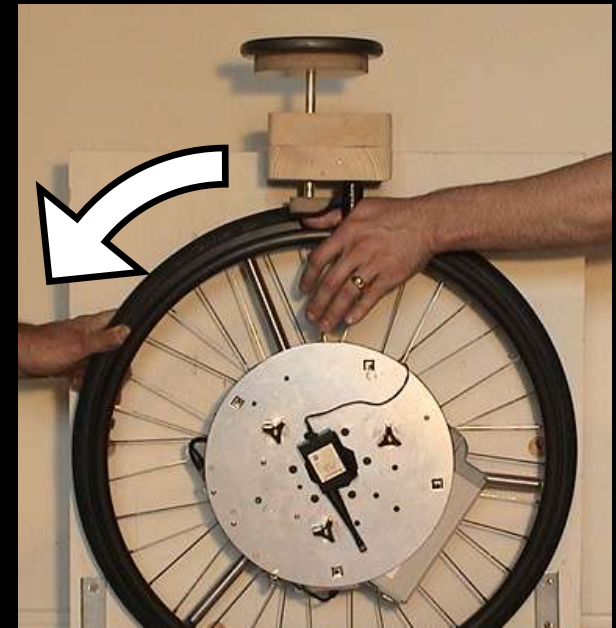


FlexRim Ergonomic Pushrim

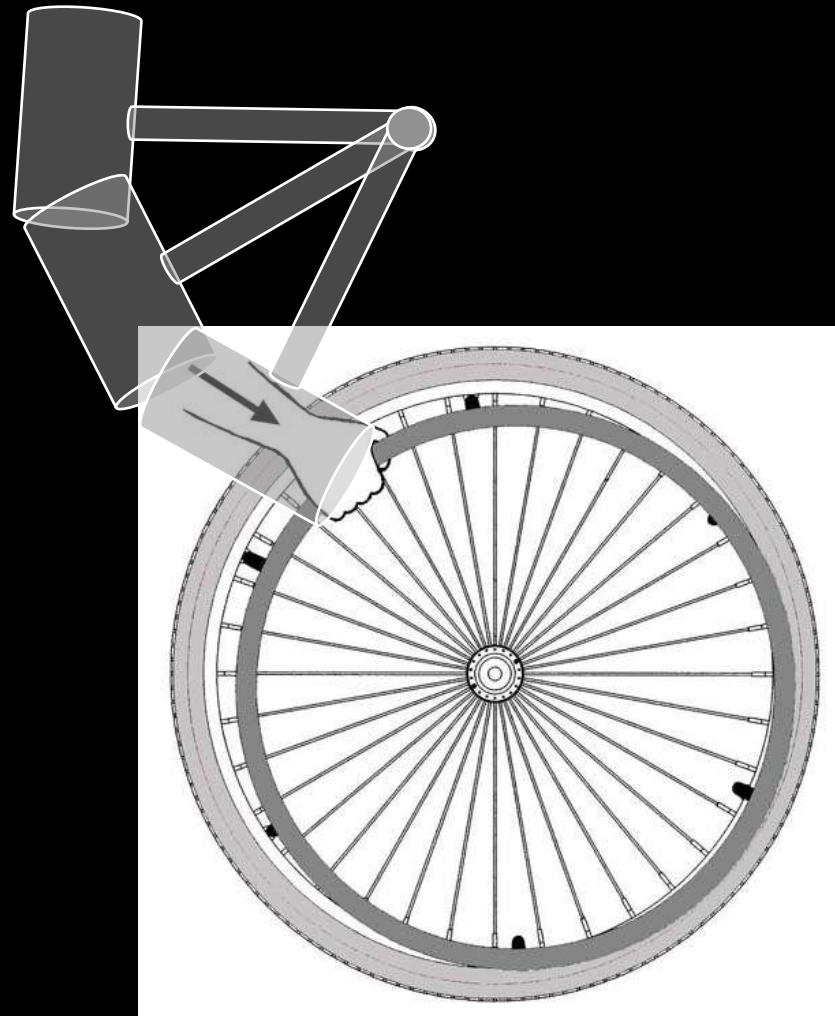


Frictional improvements

Preliminary tests show over a 2x increased frictional coefficient



Impact absorption



**Applied a 120 lb repetitive
load in one place until failure**



Baseline study – FlexRim

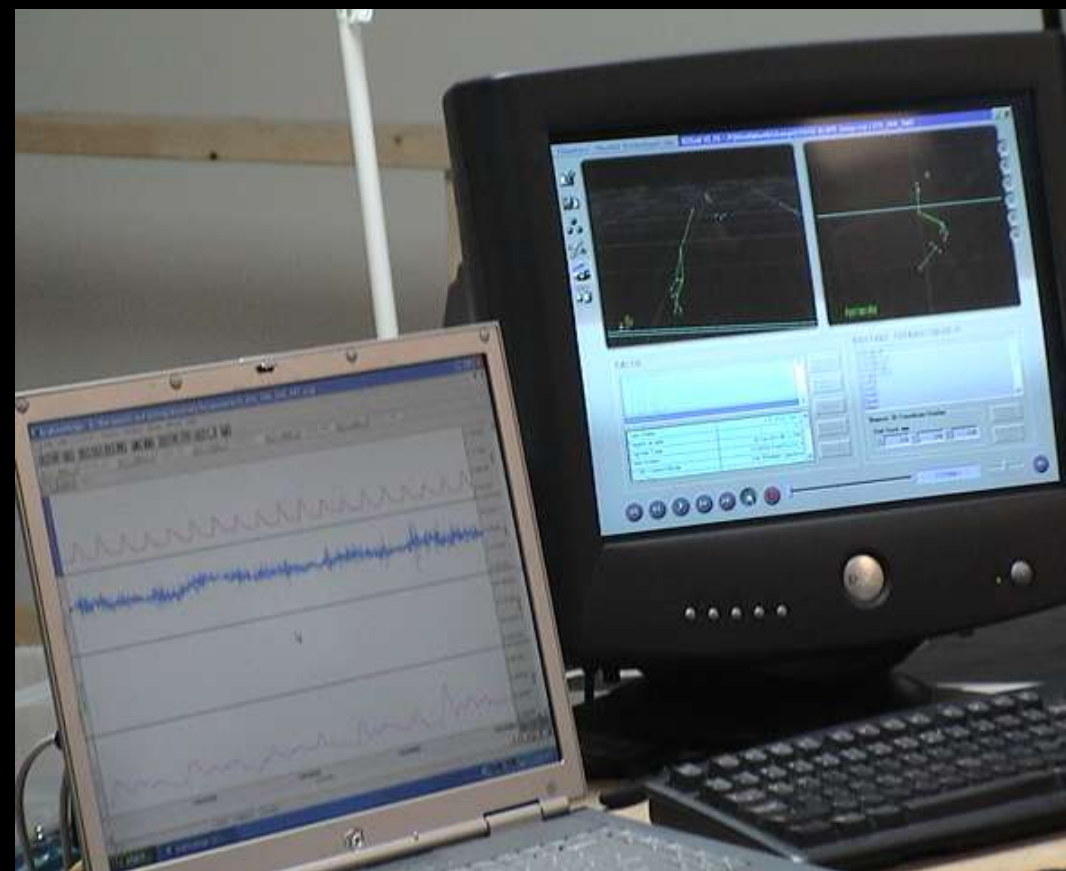
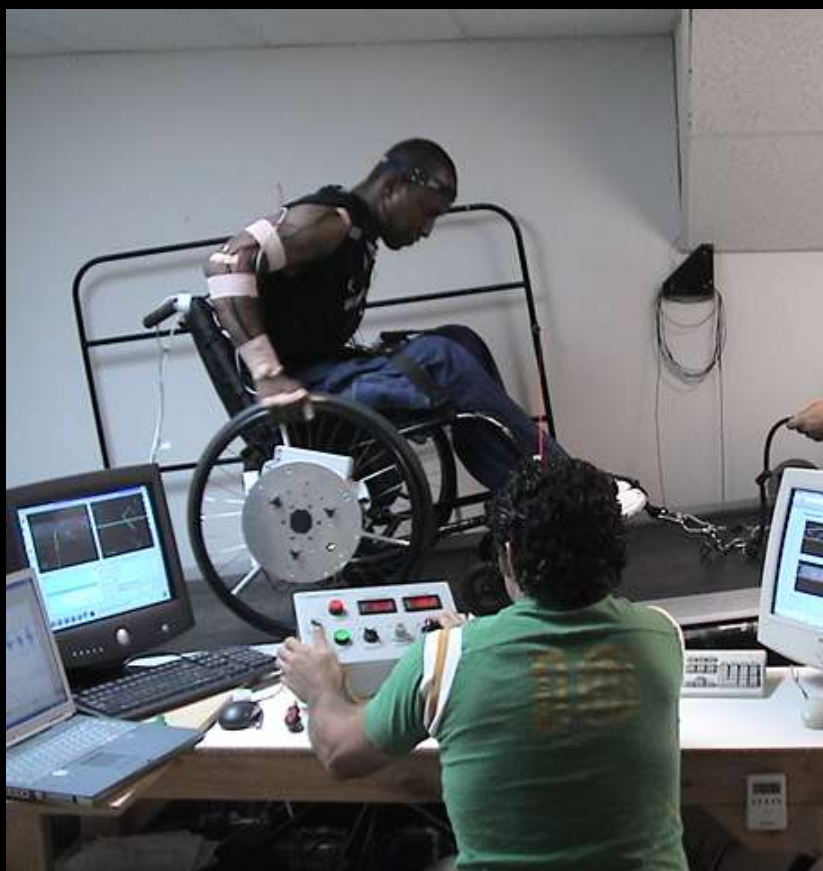


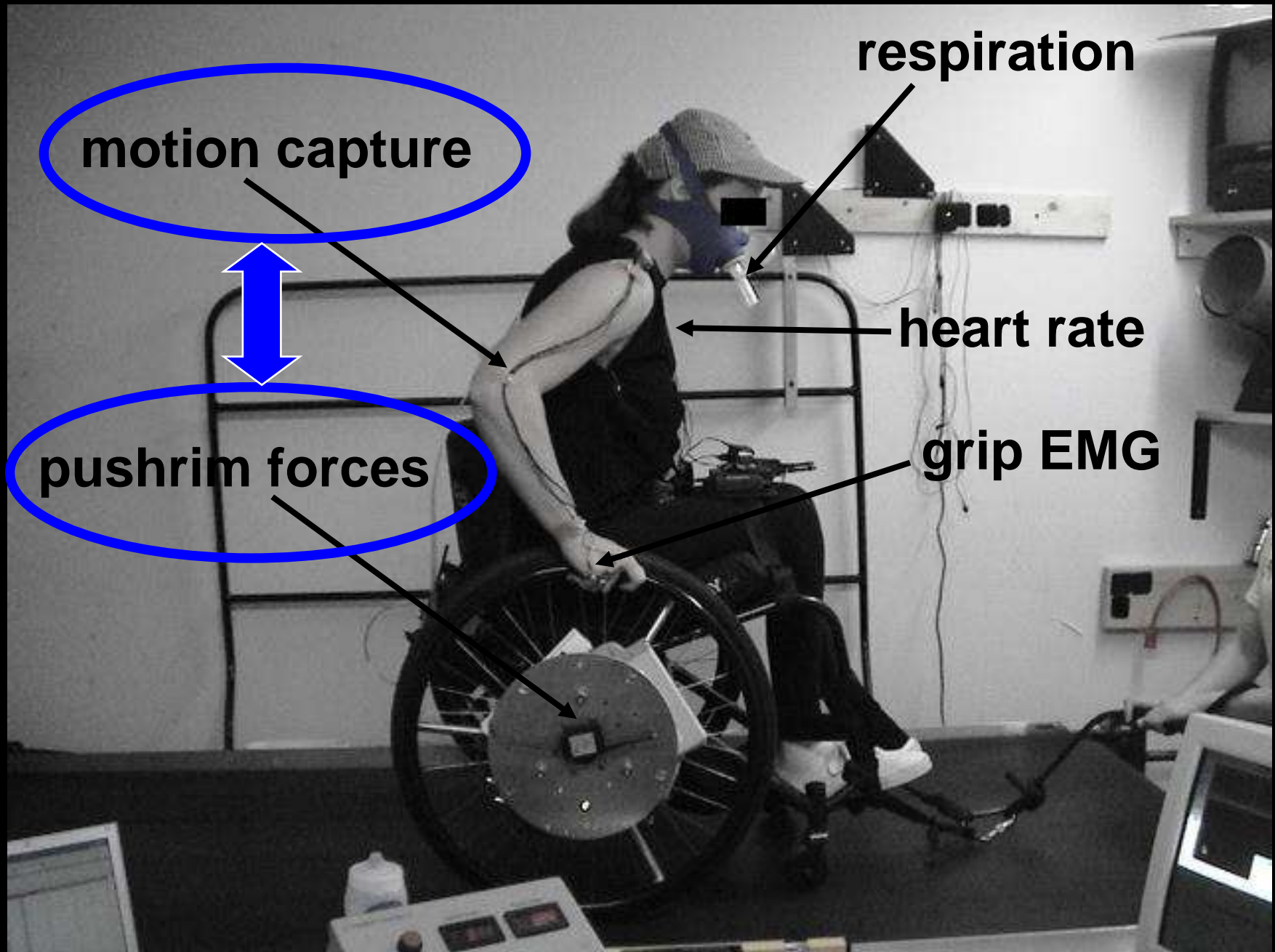
e



WICKIE RTR

Subjects are tested over a wide variety of usage environments





motion capture



pushrim forces

respiration

heart rate

grip EMG

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.

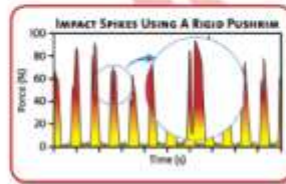


Because the rubber is flexible, the pushrim can compress to allow your wheelchair to squeeze through narrow doorways.



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









Methods - Endurance

MedGraphics VO2000
portable metabolic
system



Lateral Balance Test



Water Egress Testing





Wave Ski



Environmental Technologies

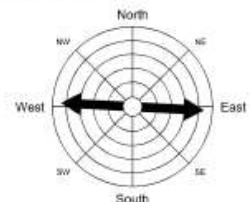
Things that do not move

Small Watercraft Launch Access



**Amenities & Allowed Uses:**

-  Boat launch
-  Drinking water
-  Canoe access
-  Fishing pier
-  Hand launch
-  Kayaking
-  Motorboating
-  Parking
-  Restrooms

Water Conditions / Exposure:**Fetch:****Current:**

Type: Tidal

Fluctuation: ~8 ft

Type: Tidal

Wave Height: < 1 ft

High Float Boat Launch Pier

San Francisco Bay Area Water Trail Program

**Water Trail Access Information****Access Route**

Parking to Launch Environment	
Length	+ 200 ft
Elev Loss	2 ft
Grade	
Typical	< 5%
Cross Slope	
Typical	< 2%
Tread Width	
Typical	> 10 ft
Surface	
Type	Asphalt/Concrete
Stability	Paved
Amount	100%

Water Access Route

Edge of Environment to Transfer Area	
Length	66 ft
Elev Loss	6.5 ft
Grade	
Typical	14%
Maximum	15%
Cross Slope	
Typical	< 2%
Tread Width	
Typical	98 in
Surface	
Type	Concrete/Composite Floating Dock Panels
Stability	Hard
Amount	100%

Transfer Area

Launch Type	Concrete Boat Launch / High Float Dock
Clear Space	
Length	Unlimited / ~60 ft
Width	~50 ft / 98 in
Grade	14% / 0%
Cross Slope	0% / 0%
Surface	
Concrete / Composite	
Height Above Water	0 / 19 in
Boat Orientation	Unlimited / Parallel

WARNING: Conditions may have changed since December 2012 when this facility was assessed. Temporary obstacles are not reported.

Signage created by Beneficial Designs Inc. using data collected by a certified trail assessment coordinator.

The State Coastal Conservancy is leading the implementation of the San Francisco Bay Area Water Trail (Water Trail) in close collaboration with the Association of Bay Area Governments (ABAG), the San Francisco Bay Conservation and Development Commission, and the Department of Boating and Waterways. The Water Trail is a growing network of access sites (or "trailheads") that will help people using non-motorized, small boats or other beachable sail craft, such as kayaks, canoes, dragon boats, stand-up paddle and windsurf boards, to safely enjoy single and multiple-day trips around San Francisco Bay.

<http://scc.ca.gov/2010/07/30/san-francisco-bay-area-water-trail/>

Universal Trail Assessment Process (UTAP)



Key UTAP Information

Length



Grade



Width



Surface



Cross
slope



Features &
Facilities



UTAP Assessment Team



UTAP – Implementation Status

Over 1200 people trained to lead UTAP
assessments

Over 155 trainers to teach UTAP
workshops

High Efficiency Trail Assessment Process



HETAP- Rollawheel





**Last Station Recorded**

25

Paved

Ice

Copy Surf. Data ->**Tread Width:****Surface Category:****Surface Type:****Distance:****Grade:****Cross Slope:****Current Station To Record**

25

in

Set MCW

Paved

Ice

7.2 Ft

-0.7 %

0.8 %

Record Station**Add Features****Return Home****Distance Hold****Manual Entry****View Data****Alarm Settings****Browse Images****New Segment****Current Segment:**

2 Joggin Lampe 2007-06-12

Outslope**Check Outslope Direction**

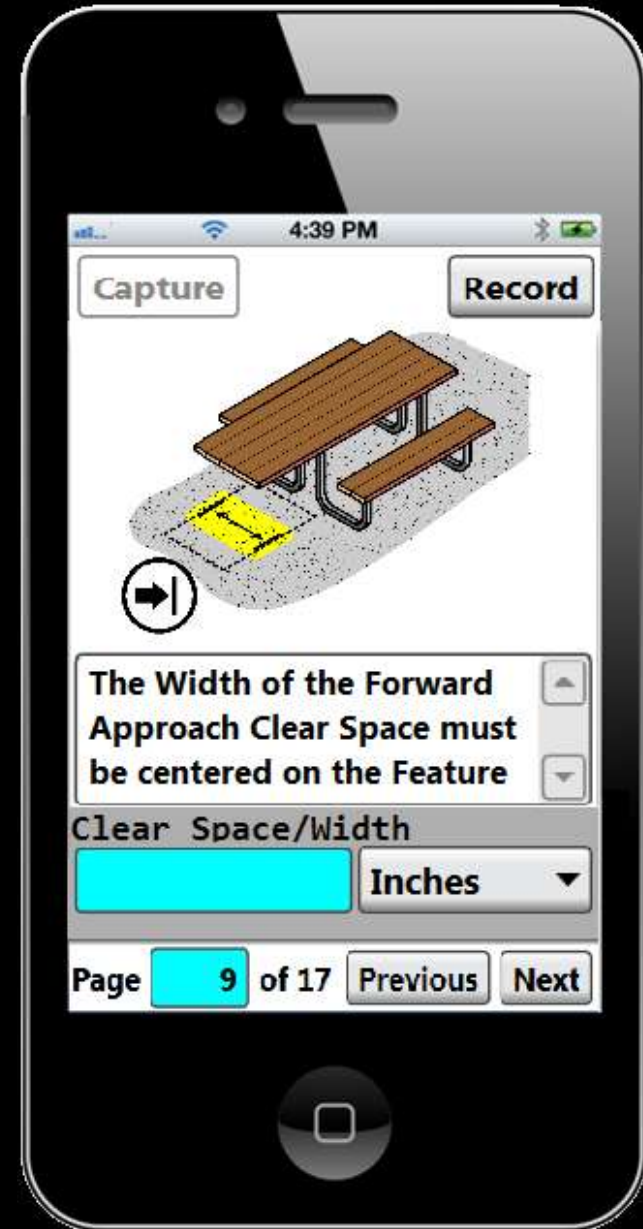
<- Left

Right ->

Vehicle Orientation **Forwards** **Backwards****Show Camera Preview****Compass Heading:** ° True**GPS Location and Status****Lat:****Lon:****Apprx. Err:****Elev:**

Error: Garmin GPS is not connected

Developed Outdoor Recreation Assessment Process



Outdoor Constructed Features

Bench

Camp Shelter

Cooking Surface/Grill

Fire Ring, Wood

Stove/Fireplace

Outdoor Rinsing

Shower

Parking Area

Picnic Table

Pit Toilet

Tent Pad/Platform

Toilet Building

Trash/Recycling

Receptacle

Utility/Sewage

Connection

Viewing Area at

Overlooks

Viewing Scope

Water Spout

Adjustable Height Cooking Grill



Water Pump with Closed Fist Operation



Water Pump Actuation Force

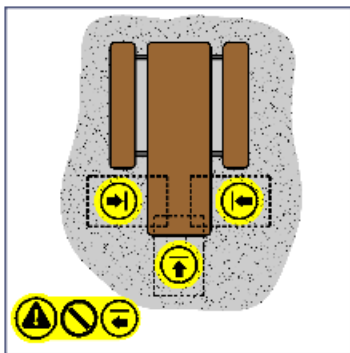


Water Pump Height Measurement



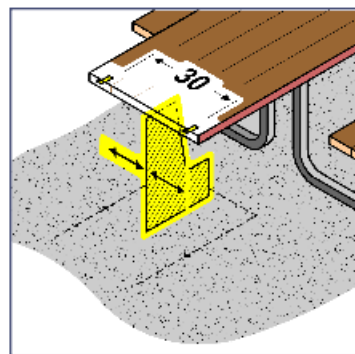
Picnic Table Clearance Space



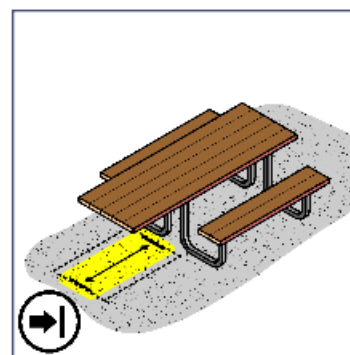


Specify the Approach Type

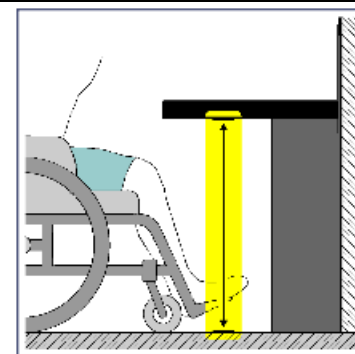
Verify that a Clear Space is positioned for Forward Approach to Tables



Using the appropriate profile, verify that the minimum clear space is provided below the table surface at each wheelchair space provided



The Length of the Parallel Approach Clear Space must be centered on the Fixture



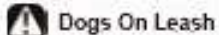
Measure the Vertical Distance from the Ground Surface to the top of the Knee Clearance

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 5%

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)

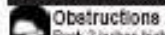


Surface
Type

Aggregate / Gravel

82% is Firm or better

1408 ft (429 m) is Soft or worse

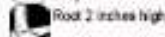


Obstructions

Rock 2 inches high



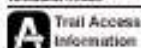
Entrenchment 1 inch
deep



Rock 2 inches high

NOTES: The conditions may have changed since any 2007 visit. The trail is not paved. Temporary obstructions (e.g., fallen trees or land clearing logs) may not have been updated in this data. (A) (S) (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)

For a trail map, visit www.beneficialdesigns.com. If you have any questions, please contact us at info@beneficialdesigns.com.



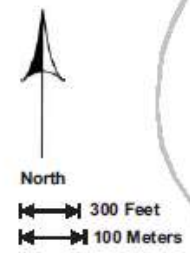
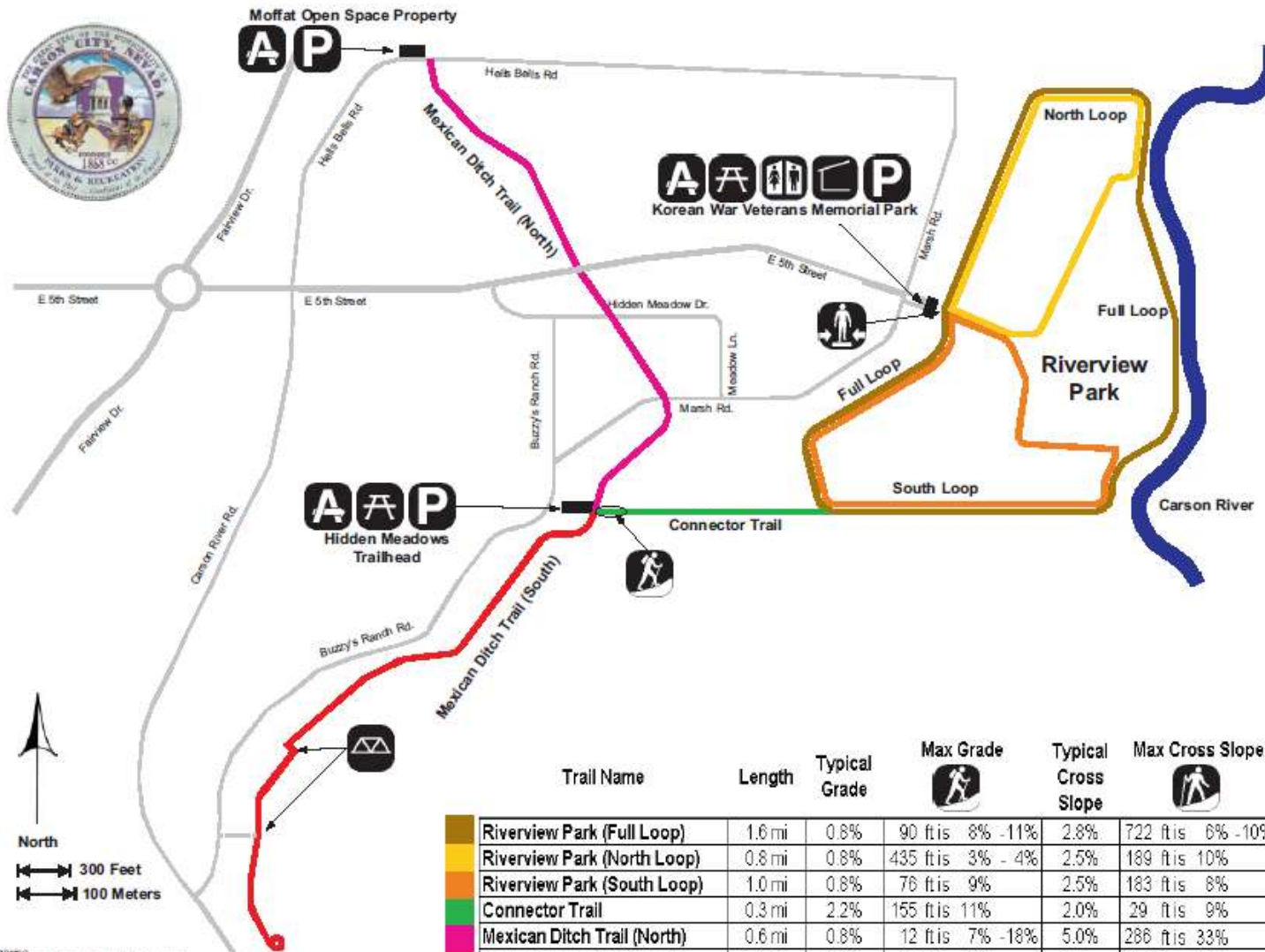
Trail Access
Information

Trail Access Informationin a Food Facts Label Format





Riverview Park / Mexican Ditch Trail System



MAP 081012
 This map was last updated on July 2012 when the Full Loop was completed. However, trail conditions may vary due to weather, construction, or other factors. Please contact the Carson City Parks and Recreation Department for more information.
 Map created by the Carson City Parks and Recreation Department. All rights reserved. No part of this map may be reproduced without the written permission of the Carson City Parks and Recreation Department.

Trail Use:

- Hiking
- Bicycling
- Equestrian
- Dogs Allowed
per posted restrictions
- No Motor Vehicles
Except City Maintenance Vehicles
- 16" Minimum Clearance Width
Contact the Carson City Parks and Recreation Dept. at 887-2262 for gate access.
- Trail Access Information

Trail Name	Length	Typical Grade	Max Grade	Typical Cross Slope	Max Cross Slope	Typical Trail Width	Min Clearance Width	Surface Type
Riverview Park (Full Loop)	1.6 mi	0.8%	90 ft is 8% -11%	2.8%	722 ft is 6% -10%	11 ft	16 in	Aggregate / Gravel
Riverview Park (North Loop)	0.8 mi	0.8%	435 ft is 3% - 4%	2.5%	189 ft is 10%	10 ft	16 in	Aggregate / Gravel
Riverview Park (South Loop)	1.0 mi	0.8%	76 ft is 9%	2.5%	183 ft is 8%	12 ft	16 in	Aggregate / Gravel
Connector Trail	0.3 mi	2.2%	155 ft is 11%	2.0%	29 ft is 9%	12 ft	60 in	Aggregate / Gravel
Mexican Ditch Trail (North)	0.6 mi	0.8%	12 ft is 7% -18%	5.0%	286 ft is 33%	12 ft	60 in	Aggregate / Gravel
Mexican Ditch Trail (South)	0.6 mi	0.7%	74 ft is 3%	2.5%	212 ft is 10%	8 ft	60 in	Sand

A standard ramp has an 8% grade.

Washoe Lake State Park

TRAIL USE

- Hiking
- Bicycles
- Equestrian
- Dogs on Leash
- No Motor Vehicles

- No public access beyond viewing tower on Wetlands Loop February 1-July 15 to protect nesting habitat
- No bicycles allowed on Wetlands Loop
- No equestrians allowed on Wetlands Loop and Deadman's Creek Trail

LEGEND

- Bridge
- Parking
- Restroom
- Picnic Area
- Boat Launch
- Drinking Water
- Maximum Grade
- Stair Viewing Tower
- Entrance Fee Station
- Horse Trailer Parking

0 0.5 mi



Trail Access Information										
Trail Name	Length	Typical Grade	Maximum Grade	Typical Cross Slope	Maximum Cross Slope	Typical Tread Width	Minimum Clearance Width	Surface Type	Surface Firmness	Surface Stability
Beach Stroll	2.7 mi	1.6%	220 ft ls 8-9%	2.6%	473 ft ls 6-11%	42 ft	20 ft	Sand	0.98 1.00 2.01 2.03	0.16 0.16 0.18 0.18
Day Use Pathway	0.4 mi	2.2%	9 ft ls 9-15%	2.9%	333 ft ls 5-7%	6 ft	48 in	Asphalt	0.16 0.16 0.18 0.18	
Deadman's Creek Trail	0.6 mi	7.5%	309 ft ls 16-28%	7.8%	296 ft ls 16-26%	26 in	16 in	Soil	0.17 0.18 0.46 0.57	
Dune Trek	2.4 mi	9.2%	175 ft ls 35-49%	4.2%	217 ft ls 16-23%	32 in	18 in	Sand	0.77 0.80 1.93 2.00	
East Loop	3.8 mi	2.0%	106 ft ls 8-15%	1.8%	35 ft ls 8-13%	43 in	18 in	Sand	0.41 0.53 1.06 1.59	
North Loop	3.4 mi	1.8%	173 ft ls 10-27%	2.4%	200 ft ls 7-9%	60 in	24 in	Sand	0.47 0.68 1.14 1.62	
South Loop	2.5 mi	1.6%	316 ft ls 5-6%	2.1%	738 ft ls 5-7%	60 in	24 in	Sand	0.35 0.43 0.71 0.96	
Wetlands Loop	1.1 mi	1.3%	335 ft ls 5-11%	1.6%	28 ft ls 5-11%	7 ft	48 in	Aggregate Gravel	0.23 0.27 0.61 0.67	

WARNING: Trail conditions may have changed since January 2009 when these trails were assessed. Secondary trails are shown in black. Not all trails are mapped. Signage created by Beneficial Designs, Inc. using trail data collected by a certified trail assessment coordinator.



Rough Draft Only
2009-12-24
5 at 20x24 at south equestrian, north equestrian, entrance area, middle, Deadman's



Tahoe Meadows Interpretive Trail

Humboldt-Toiyabe National Forest
Carson Ranger District

FREE COPIES of this map can be downloaded from the Humboldt-Toiyabe National Forest website or by calling the US Forest Service Carson Ranger District at (775) 882-2766



To Mount Rose Wilderness

Mount Rose Summit Trail

Tahoe Rim Trail

Tahoe Rim Trail

To Relay Peak and Brockway Summit

Mount Rose State Scenic Byway
NV Highway 431

To Incline Village

Tahoe Meadows Trailhead
Elevation 8730 ft

Easiest Path of Travel

Vieta

Steep Grades

Tahoe Meadows Interpretive Trail

To Ophir Creek Trail

You Are Here

TRAIL USES PERMITTED

- Hiking
 - Dogs on leash or under control of owner
 - Bikes allowed on dotted trails only
 - Equestrians allowed on dotted trails only
 - No Motor Vehicles
- Please stay on official trails

LEGEND

- Bridge
- Camping
- Parking
- Restroom
- Campground Fee

Trail Name	Tahoe Meadows Interpretive Trail	Mount Rose Summit Trail	Tahoe Rim Trail <small>(From Tahoe Meadows Trailhead to Spooner Summit Trailhead)</small>
Length	1.3 mi	5.0 mi	21.8 mi
Typical Grade	2.5%	10.7%	7.3%
Maximum Grade	1690 ft is 5 - 7%	1003 ft is 25 - 39%	1829 ft is 20 - 29%
Typical Cross Slope	2.1%	4.1%	3.2%
Maximum Cross Slope	304 ft is 5 - 10%	1711 ft is 10 - 20%	2433 ft is 10 - 20%
Typical Tread Width	8 ft	26 in	28 in
Minimum Clearance Width	42 in	12 in	18 in
Surface Type	Decomposed Granite	Soil	Soil
Typical Surface Firmness	0.18 in <small>(Worst 0.22 in)</small>	0.18 in <small>(Worst 0.21 in)</small>	0.17 in <small>(Worst 0.19 in)</small>
Typical Surface Stability	0.54 in <small>(Worst 0.62 in)</small>	0.57 in <small>(Worst 0.74 in)</small>	0.51 in <small>(Worst 0.75 in)</small>



WARNING: Trail conditions may have changed since July 2009 when these trails were assessed. Signage created by Beneficial Designs Inc. using data collected by a certified trail assessment coordinator.

Trail Access Information



Funded by the Nevada Recreational Trails Program

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.

[home](#) | [about us](#) | [definitions](#) | [trail access information](#) | [links](#) | [acknowledgments](#) | [disclaimer](#)

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Trails with desired access features



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.



Develop standards for trail and sidewalk design



Architectural Barriers Act Outdoor
Recreation Access Guidelines
Public Rights of Way Access
Guidelines

ADA Recreation Trail

Grade

up to 30% of length $> 8.33\%$

5% for any distance

8.33% for 200 feet

10% for 30 feet

12.5% for 10 feet

14% for 5 feet in drains if cross slope $< 5\%$

ADA Recreation Trail

Cross Slope

5%

10% in drains if width > 42 inches

Rest Areas

60 inches length, trail width, 5% slope

Edge Protection

3 inches minimum height when provided

ADA Outdoor Access Route

Surface

firm and stable

Width

36 inches

exception 32 inches for up to 24 inches

Openings

< 0.5 inch sphere



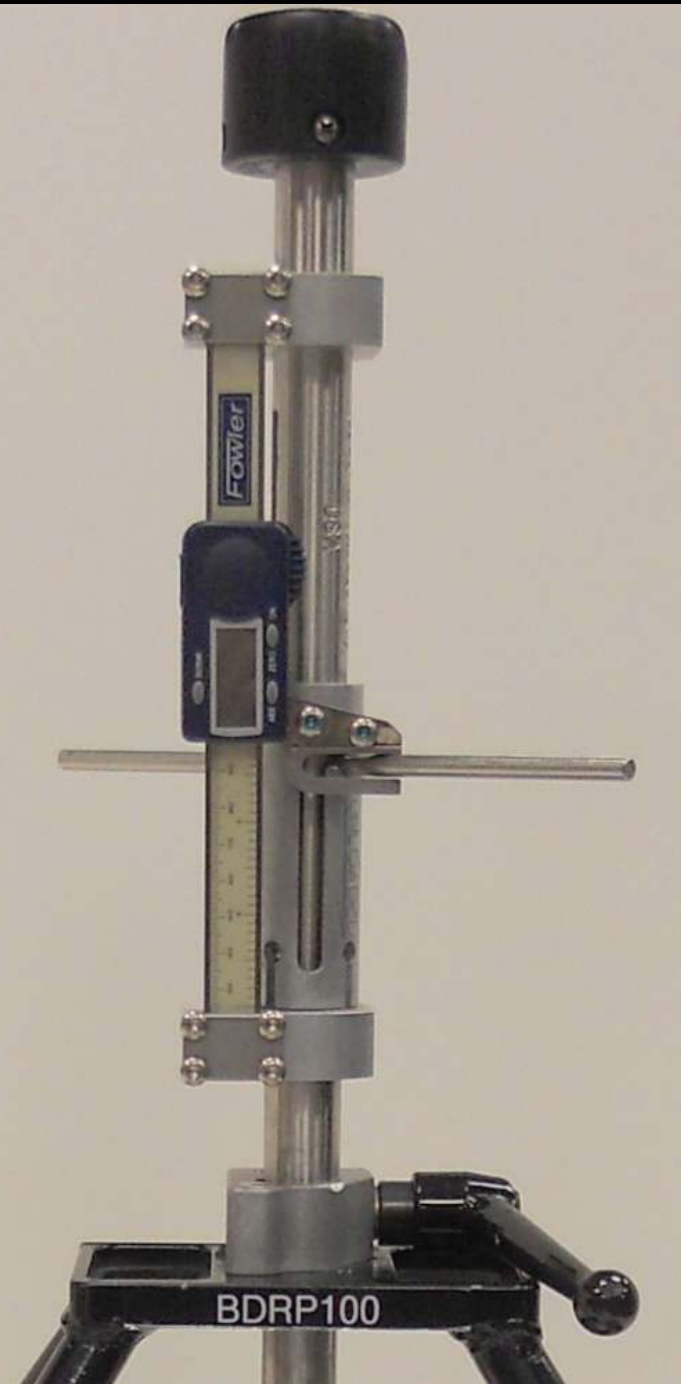
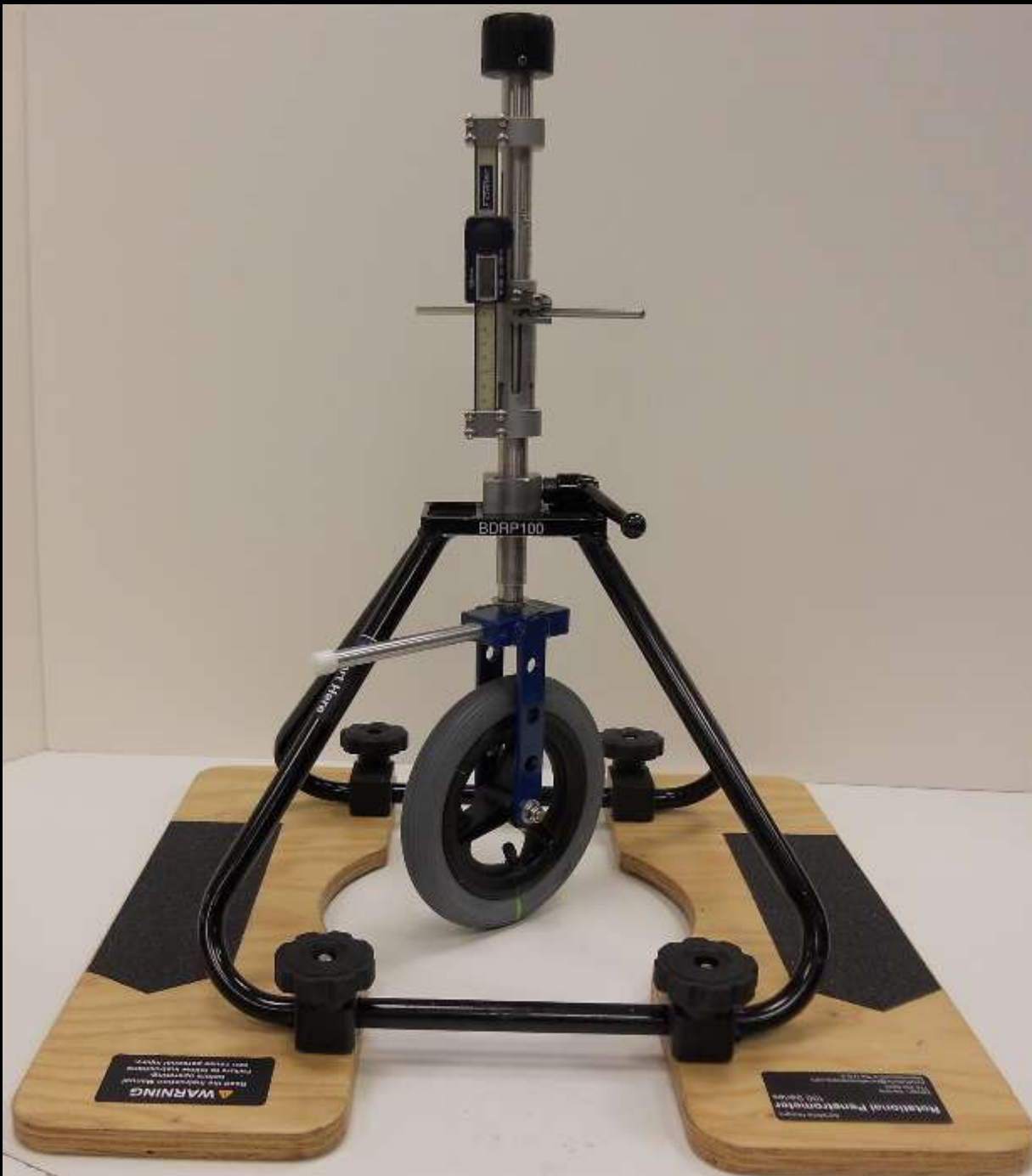


Rotational Penetrometer



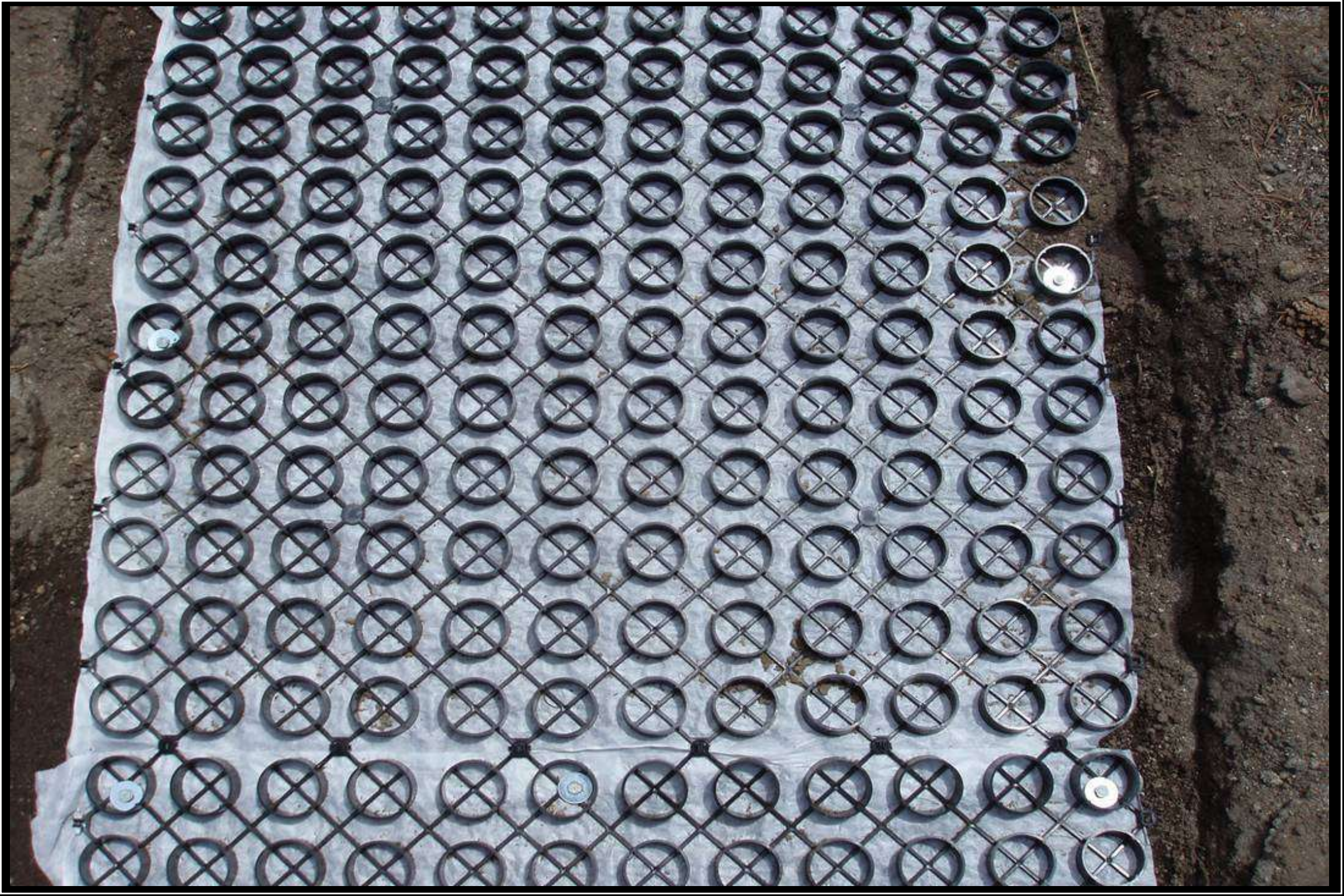
Objective surface
measurement device

Available from
Beneficial Designs



**Trail with firm
but unstable
sandy surface**







**Trail after
Installation
of surface
stabilizer**

Gravelpave2



Rotational Penetrometer Readings-Gravelpave 2

Before Application

Firmness Stability

0.18 0.77

0.17 0.87

0.17 0.77

0.18 0.88

0.18 0.79

0.18 Avg 0.82

After Application

Firmness Stability

0.17 0.37

0.17 0.38

0.18 0.42

0.17 0.35

0.18 0.40

0.17 Avg 0.38





HBRIGHT TRANSITIONS

Project #: 216-2

Date: 4/27/09

Street Name: OLVA WEST Segment Name: * Distance: 233'9"

* N COUNTY ROAD TO MICKLAND

N

N

S

S

E

E

W

W

9/16" 0.56

Sidewalk Assessment Process





Digital Measuring Wheel

Wireless

High accuracy
with resolution of
0.1 Inches (1 mm)



Digital Height Measuring Device

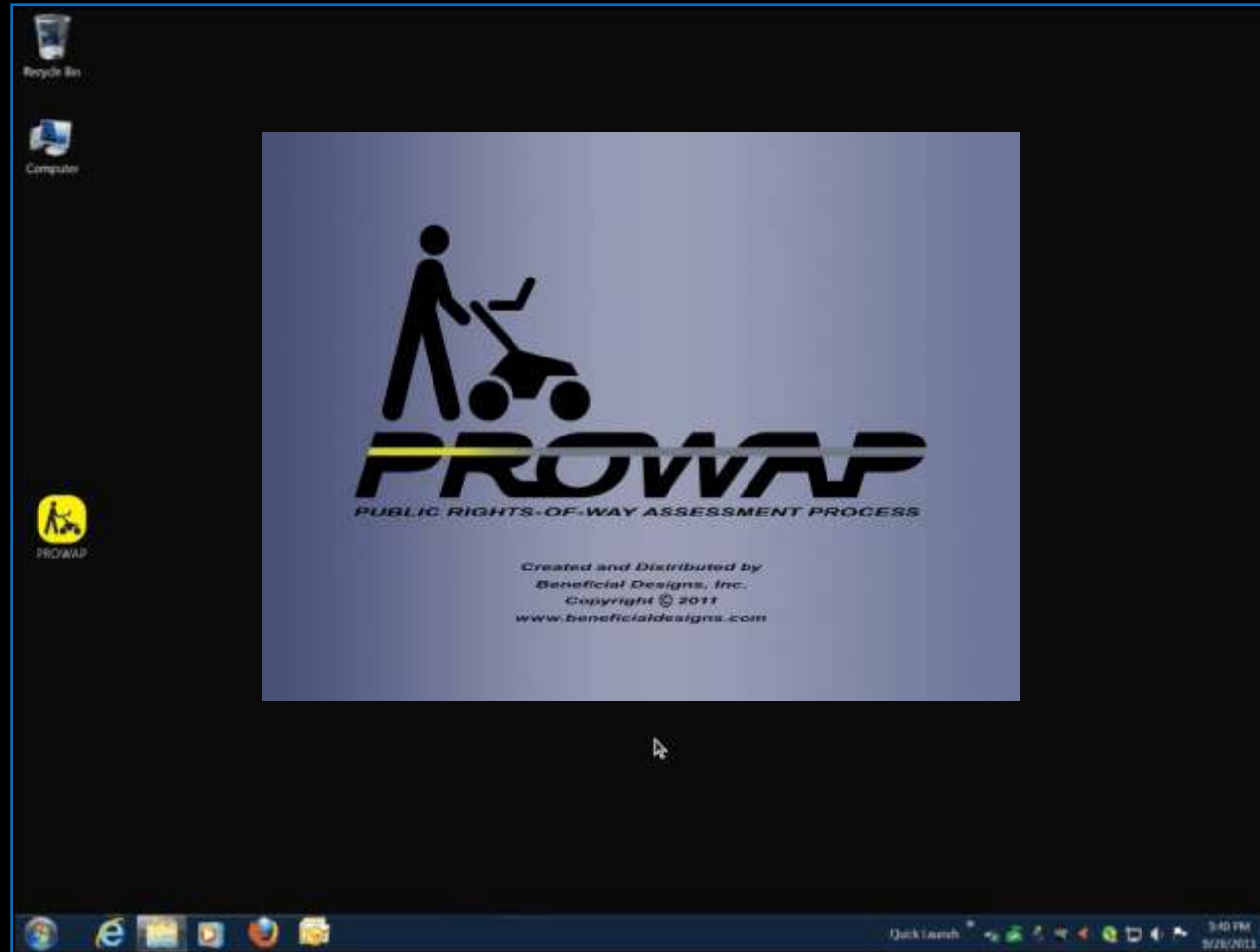
High accuracy

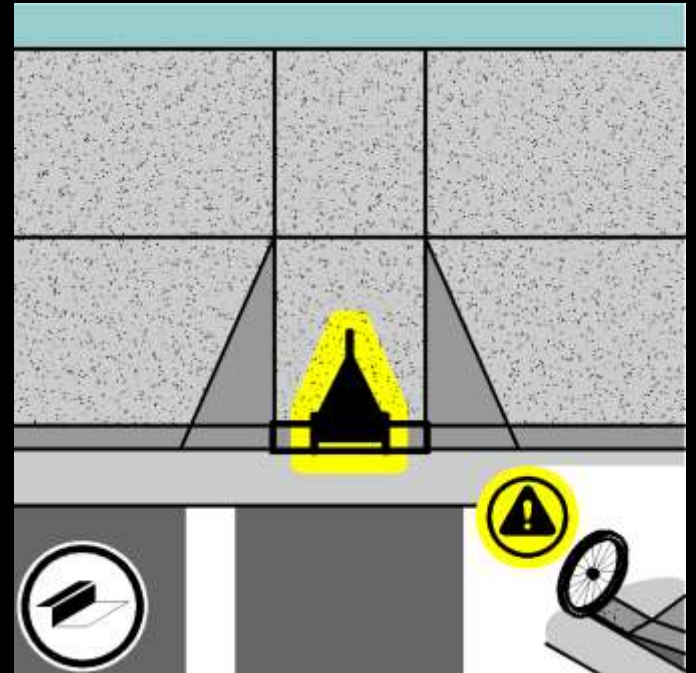
Fast measurement

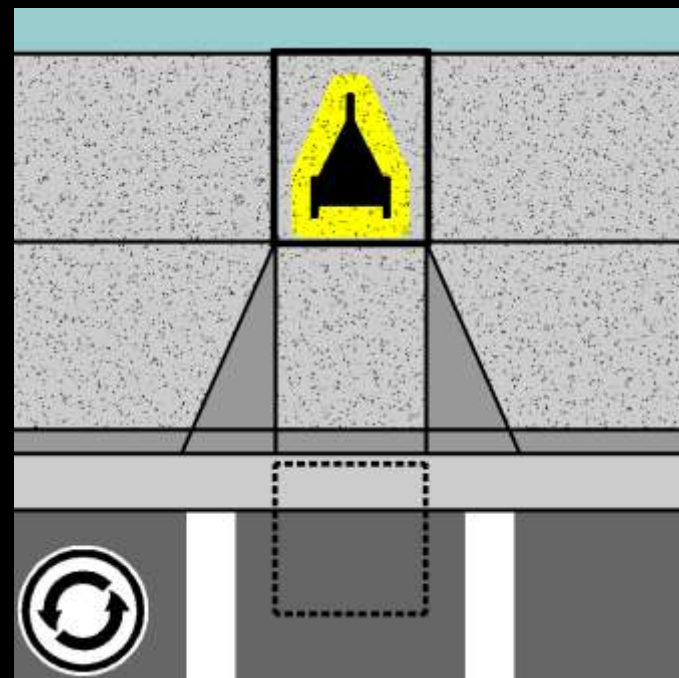
Resolution of
0.01 inches (0.1 mm)

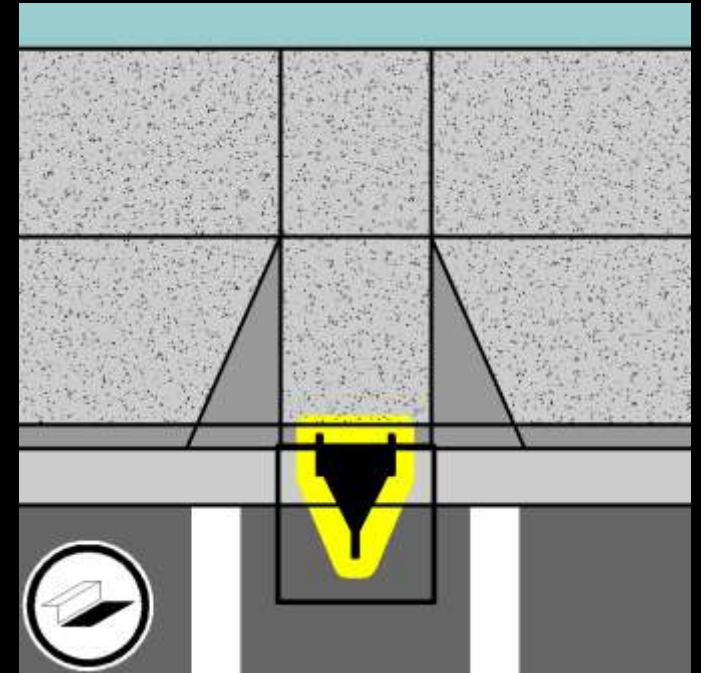


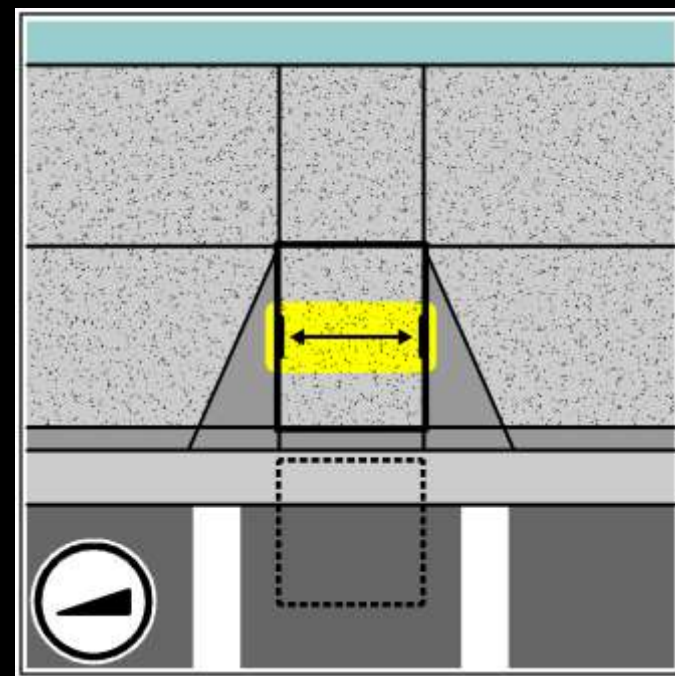
Data Collection Software

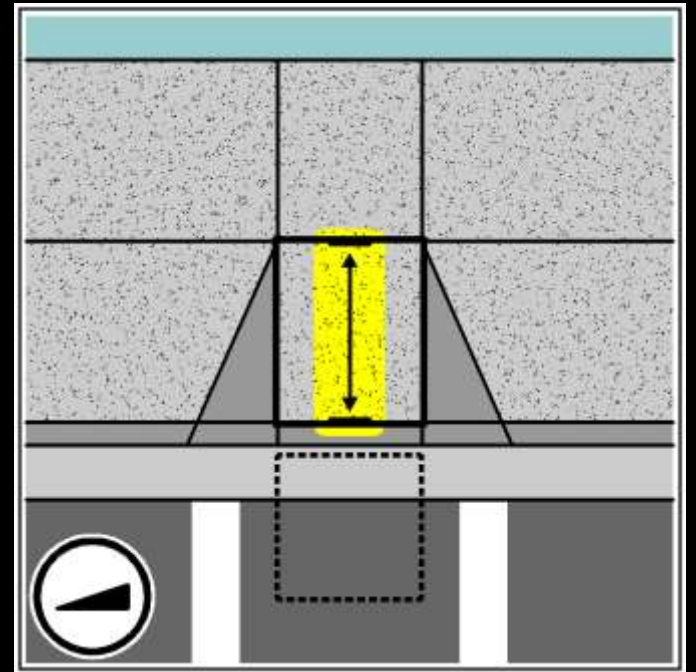




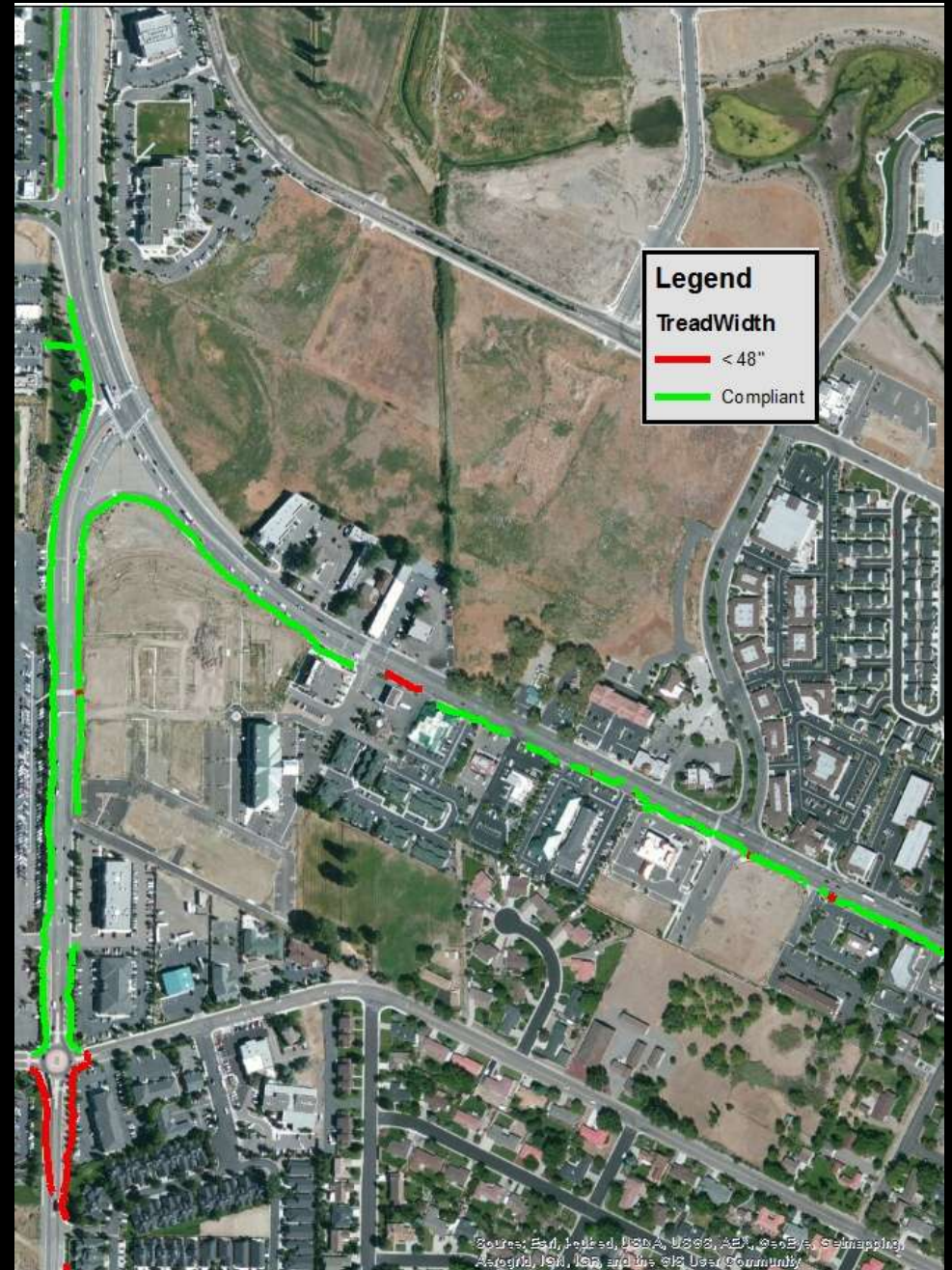




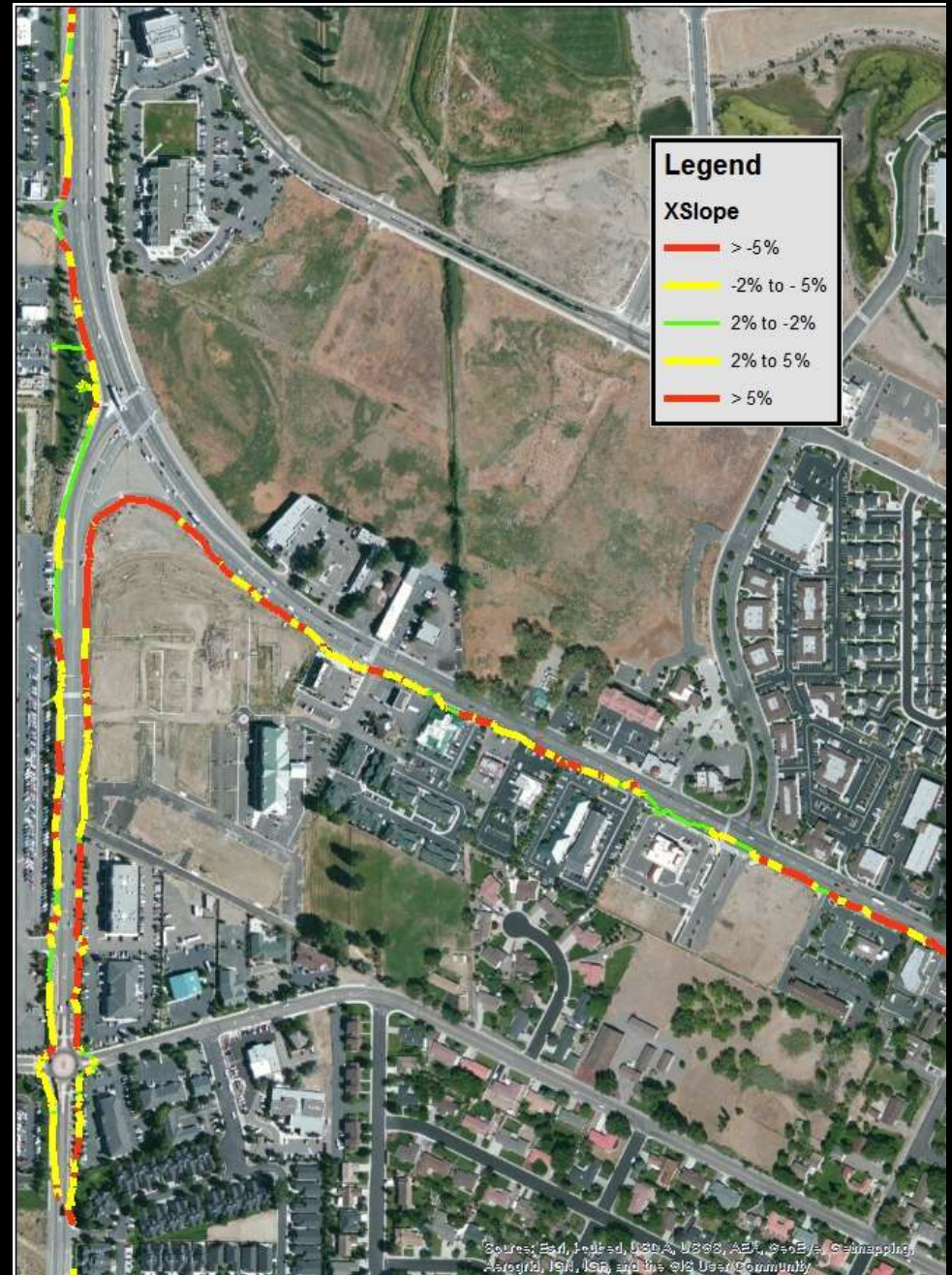




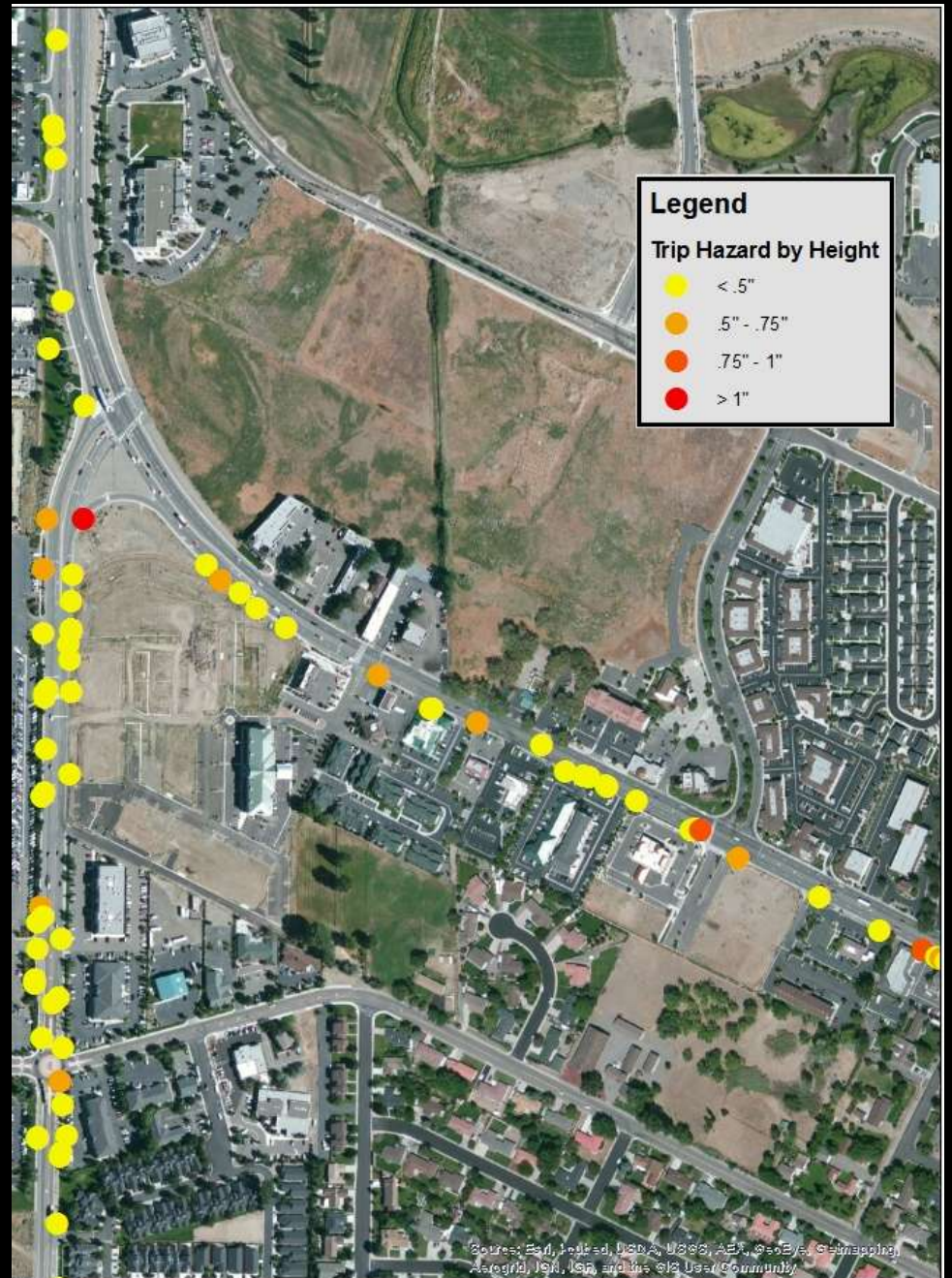
NDOT Right of Way in Minden, NV Tread Width



NDOT Right of Way in Minden, NV Cross Slope



NDOT Right of Way in Minden, NV Tripping hazard height



Universal Design Standards for Products



Universal Design of Fitness Equipment (UDFE) Standards



Low Step-up Height Design









LifeFitness

STOP OR PRESS QUICK START

Calories

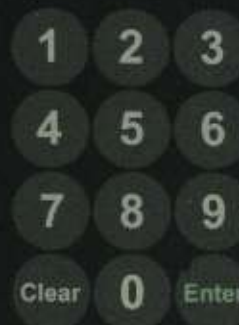
Distance

Time

Incline

Speed

Heart Rate



WARNING

Read and follow all instructions and warnings. Consult your physician prior to using this equipment. Follow the appropriate safety rules when using this equipment. Keep children away from this equipment.

CAUTION: Contact a physician before using this equipment. Stop exercising if you feel pain, dizziness or short of breath.

CAUTION: RISK OF INJURY TO PERSONS - TO AVOID INJURY, STAND ON THE SIDECHAINS BEFORE STARTING TREADMILL. READ INSTRUCTION MANUAL BEFORE USING.

ATTENTION: Consult an instructor about correct use of the equipment. An instructor is not your supervisor and should not wear your safety belt. Always use a seat belt correctly.

When in panic: Hold onto handrails, do not get on the treadmill. Do not touch the emergency stop button. Stop the treadmill. Use the emergency stop button.

POLAR
heart rate watch

Life Fitness USA 1-800-225-3367
Life Fitness UK 01753 603380/2884
Life Fitness AU 01437 576131/576133
Life Fitness Asia Pacific 1-800-225-3367
www.life-fitness.com

LifeFitness

UP OR PRESS QUICK START

Calories

Distance

Time

Incline

Speed

Heart Rate



WARNING



Life Fitness, Inc. • 30225 180
Life Fitness Co. • 107 180-000
Life Fitness Co. • 107 180-000
Life Fitness Co. • 107 180-000
www.life-fitness.com

Read and follow all warnings and cautions. Always use proper technique and avoid over-exercising. Do not use any equipment without proper instruction. Read and follow user manual for all equipment.

CAUTION: RISK OF SLIPPAGE OR FALLING - BE SURE TO WEAR YOUR SHOES AND HOLD ON TO THE HANDLES. ALWAYS WEAR YOUR SEATBELT AND HOLD ON TO THE SEATBELT. ALWAYS WEAR YOUR SEATBELT AND HOLD ON TO THE SEATBELT.

ATTENTION: OPERATOR TO ALWAYS WEAR SEATBELT AND HOLD ON TO THE SEATBELT. ALWAYS WEAR YOUR SEATBELT AND HOLD ON TO THE SEATBELT. ALWAYS WEAR YOUR SEATBELT AND HOLD ON TO THE SEATBELT.

CLIMBING

Display

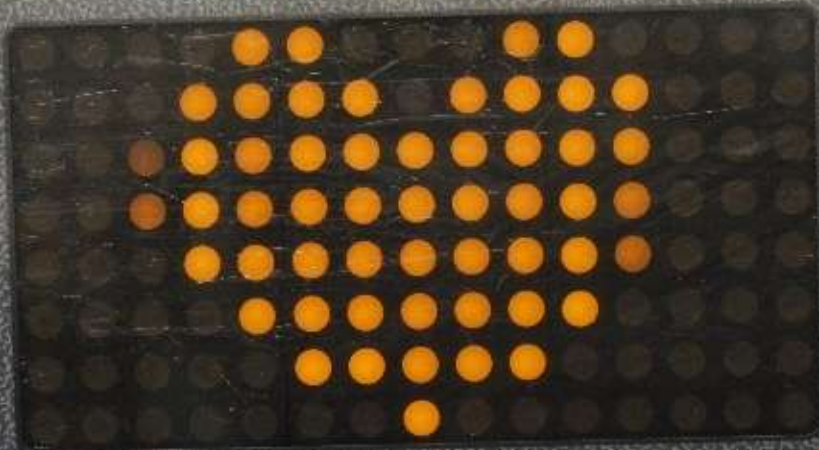
Time Remaining

Calories/Hour

Floors Climbed

Level

Climb Max



Speed

Programs

Manual



Fat Burning



Strength



Endurance



HR Control

Advanced Options



1 2 3

4 5 6

7 8 9

0 Clear

Start Enter

▲

▼

CLIMBING

Display

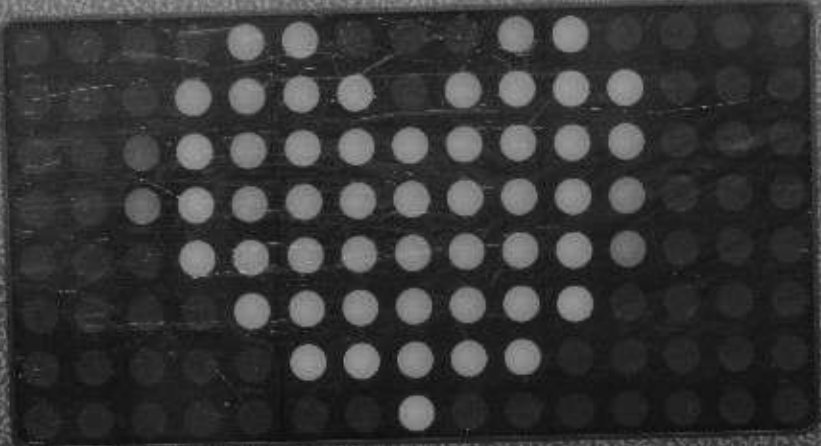
Time Remaining

Calories/Hour

Floors Climbed

Level

Climb
Max



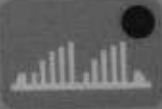
Speed

Programs

Manual



Fat Burning



Strength



Endurance



HR Control

Advanced
Options



1

2

3



4

5

6



7

8

9

0

Clear

Start
Enter

Universal Design of Products used by persons with Cognitive Impairments

**Goal – To increase Access to
Technology for People with
Cognitive Impairments**

A word cloud featuring various technology-related terms. The words are arranged in a roughly triangular shape, with the largest words at the top and smaller words at the bottom. The colors of the words range from dark green to light yellow. The most prominent words are 'email', 'smoke.alarms', 'cell.phones', and 'calendars'. Other visible words include 'cell', 'DVD', 'phones', 'ear.buds', 'screen.readers', 'social.networking', 'TV', 'stoves', 'music.players', 'headphones', 'laptop', 'toaster.ovens', 'internet', 'camera', 'audio.books', 'Internet', and 'video'.

cell email ear.buds
DVD phones smoke.alarms
cell.phones screen.readers TV
calendars social.networking
stoves music.players
laptop toaster.ovens headphones
internet camera audio.books
video Internet

Universal Design of Amusement Park Rides for Persons with Mobility and Sensory Impairments





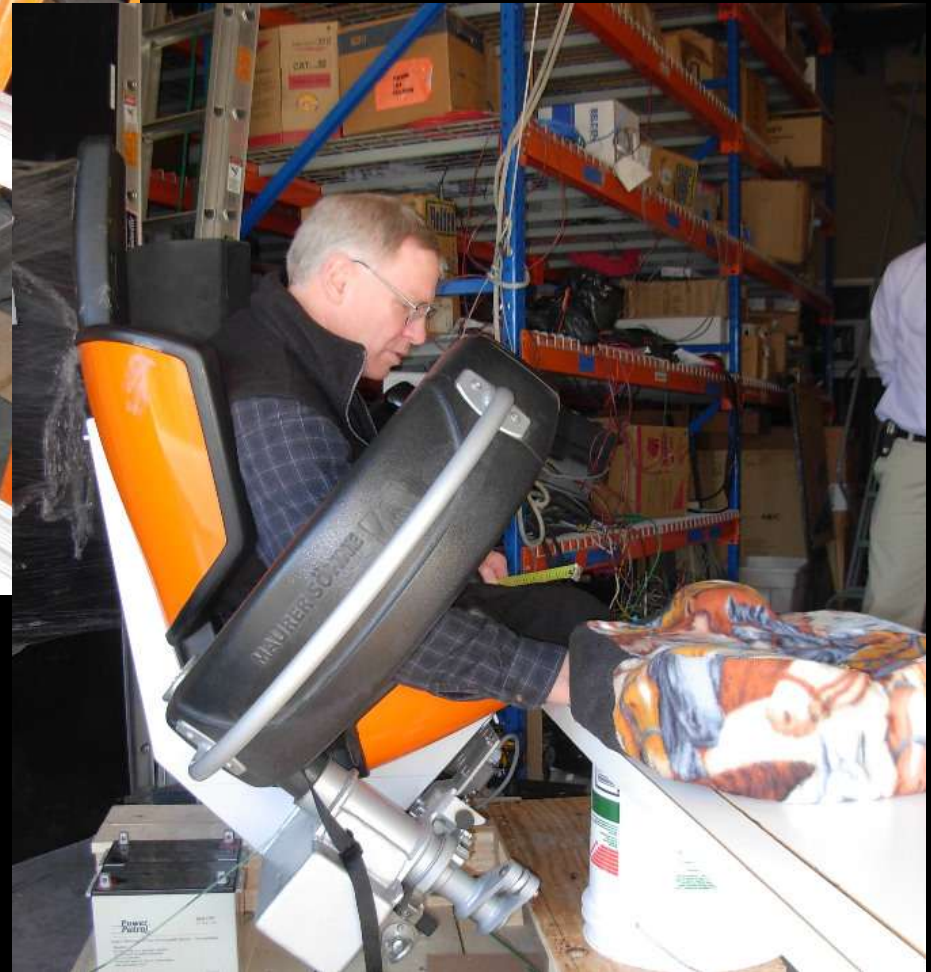
















Aircraft Boarding and Seating



Aircraft Access Using a Boarding Chair



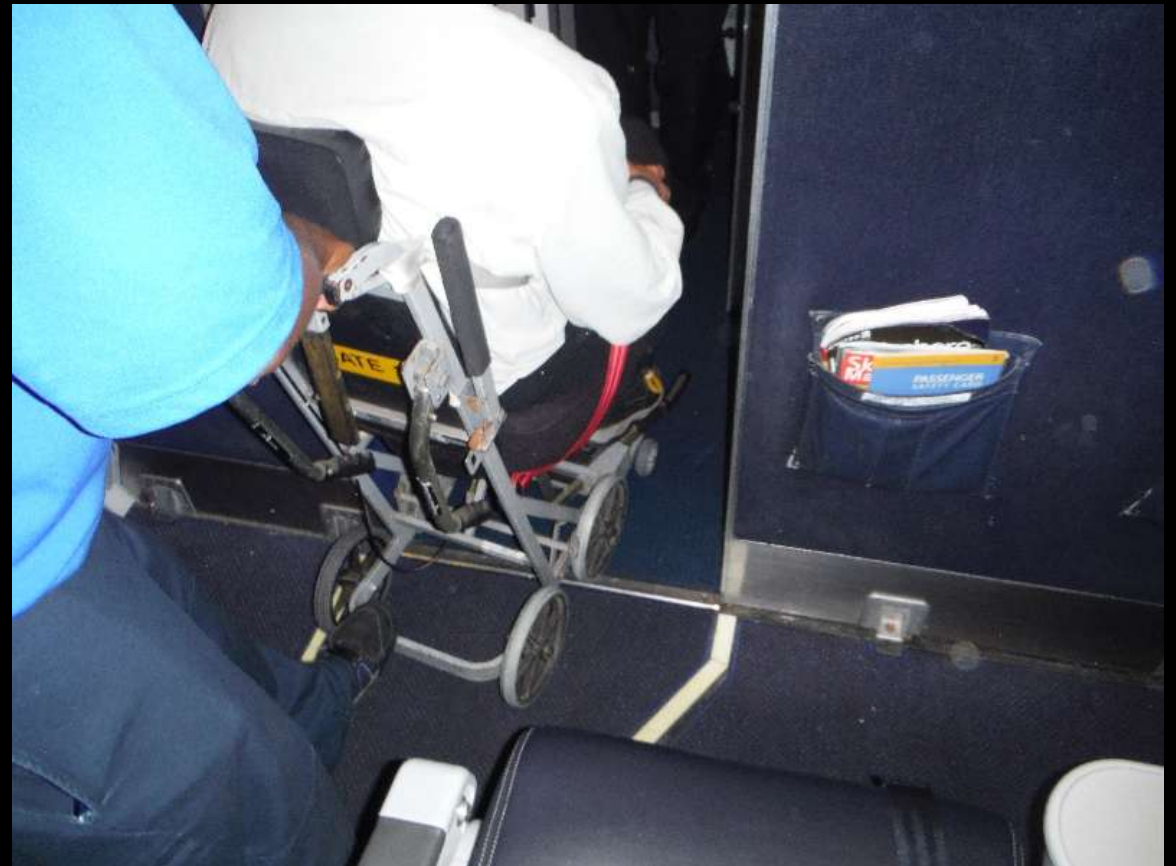
**Requires a
transfer to an
aircraft
boarding chair**



**Boarding chairs
have inadequate
seating and
foot support**



**Attendant
operated
boarding chairs
require
dependence
on airport
attendants**





Aircraft Compatible Wheelchair

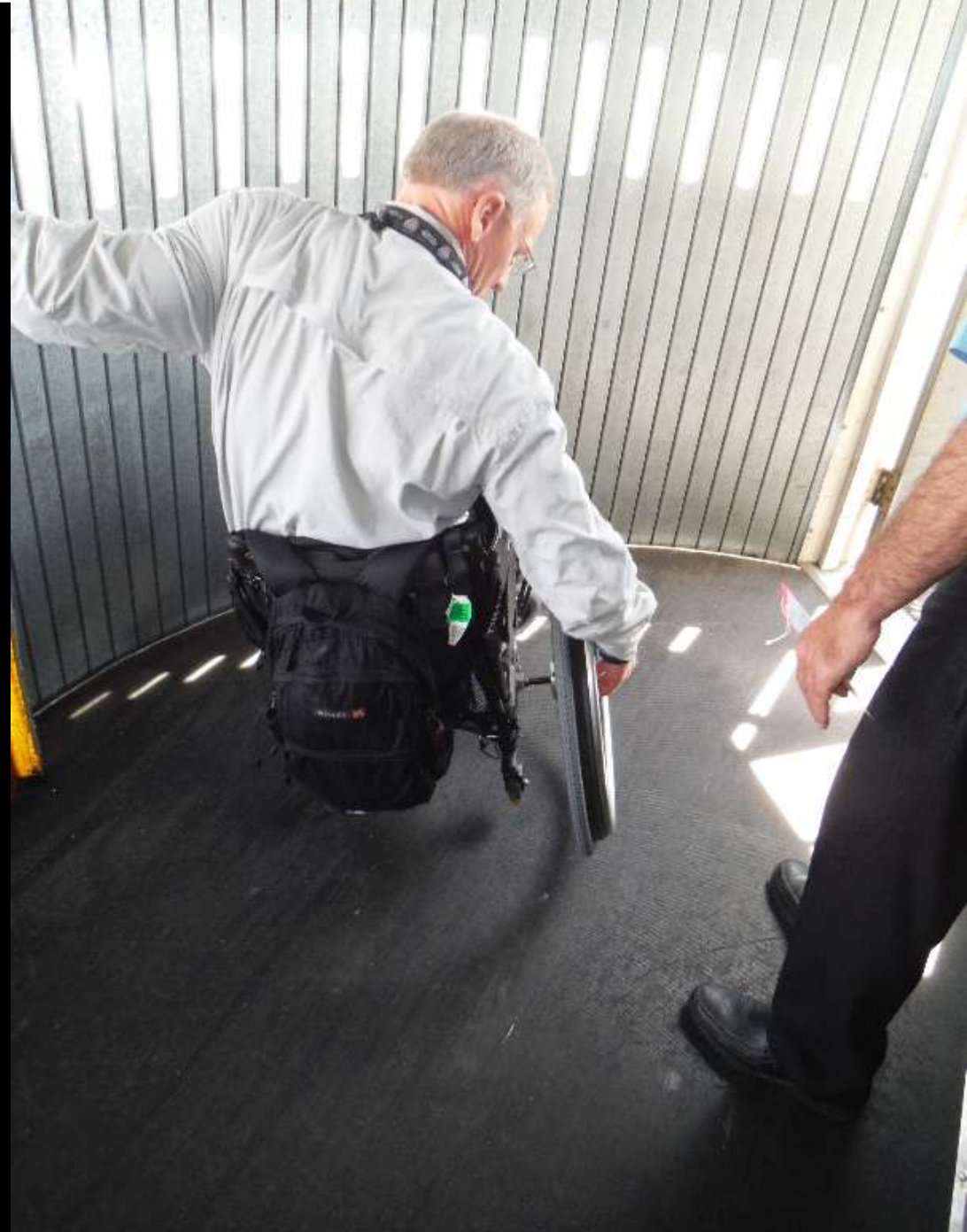
**Aircraft Boarding
Using a
Personal
Aisle Chair

Removable
Wheels**



**Aircraft Boarding
Using a
wheelchair with
narrow accessory
wheels**

**Fewer
Transfers**



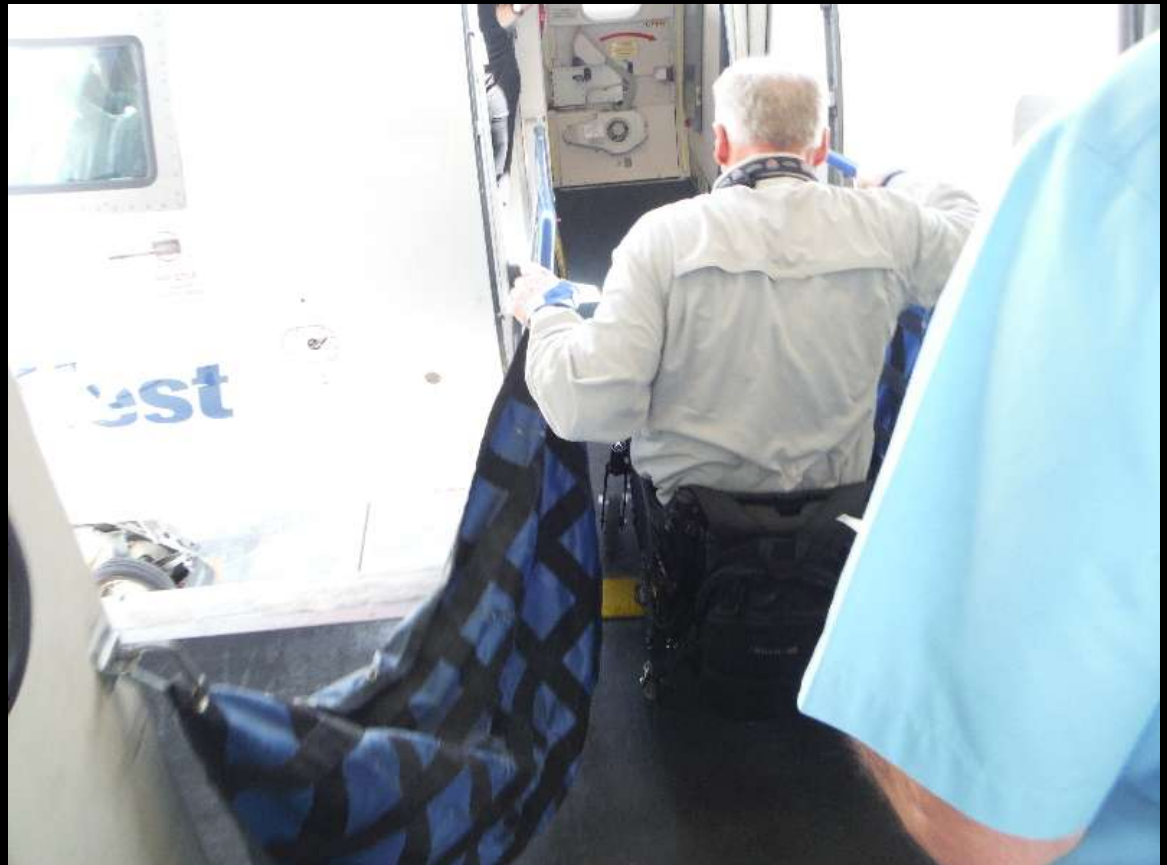
Aircraft Seating Using a Personal Aisle Chair

Feet Remain
Secure



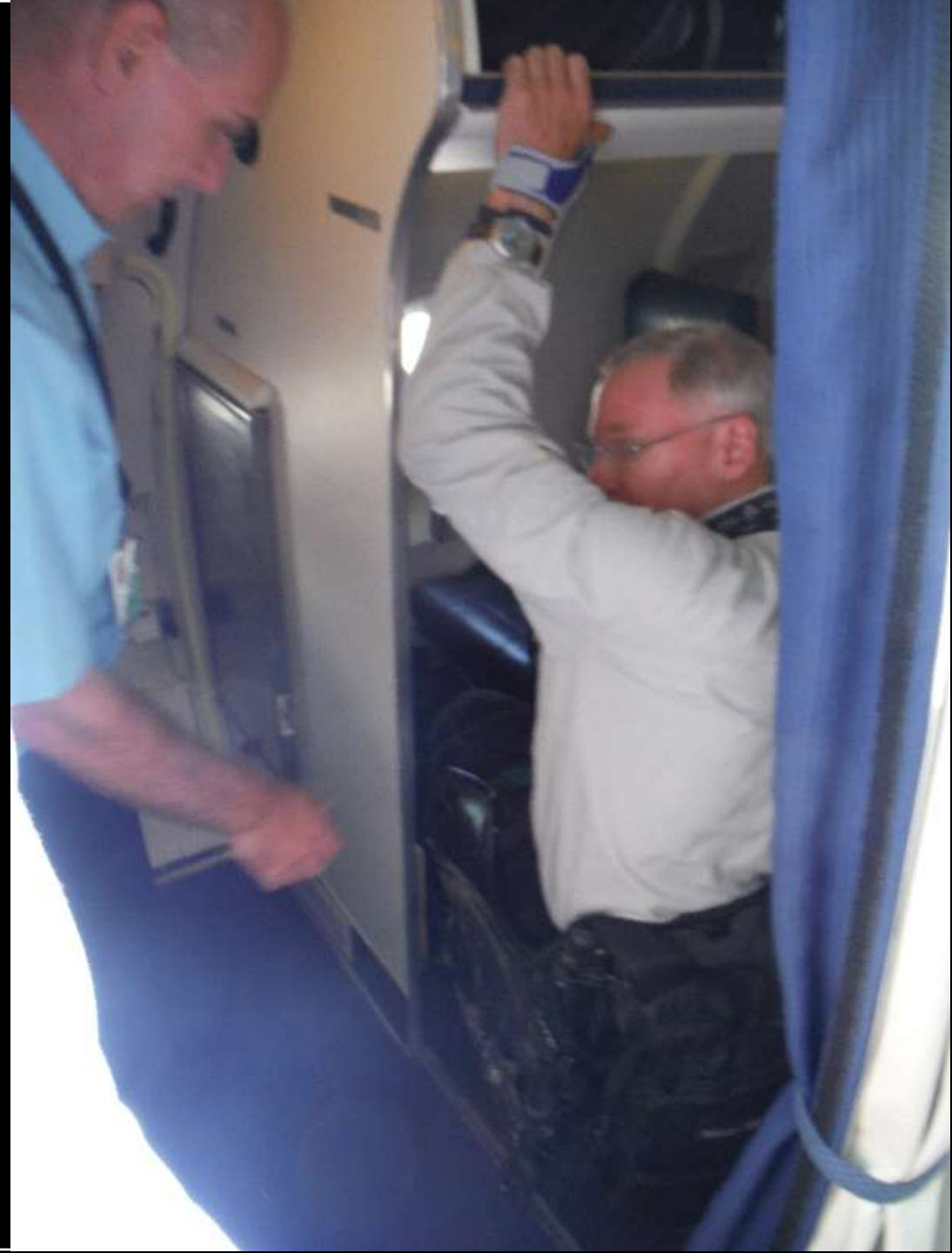
Aircraft Seating Using a Personal Aisle Chair

Allows for
More
Independent
Boarding



Aircraft Seating Using a Personal Aisle Chair

A Single
Transfer using
overhead shelf
to assist transfer

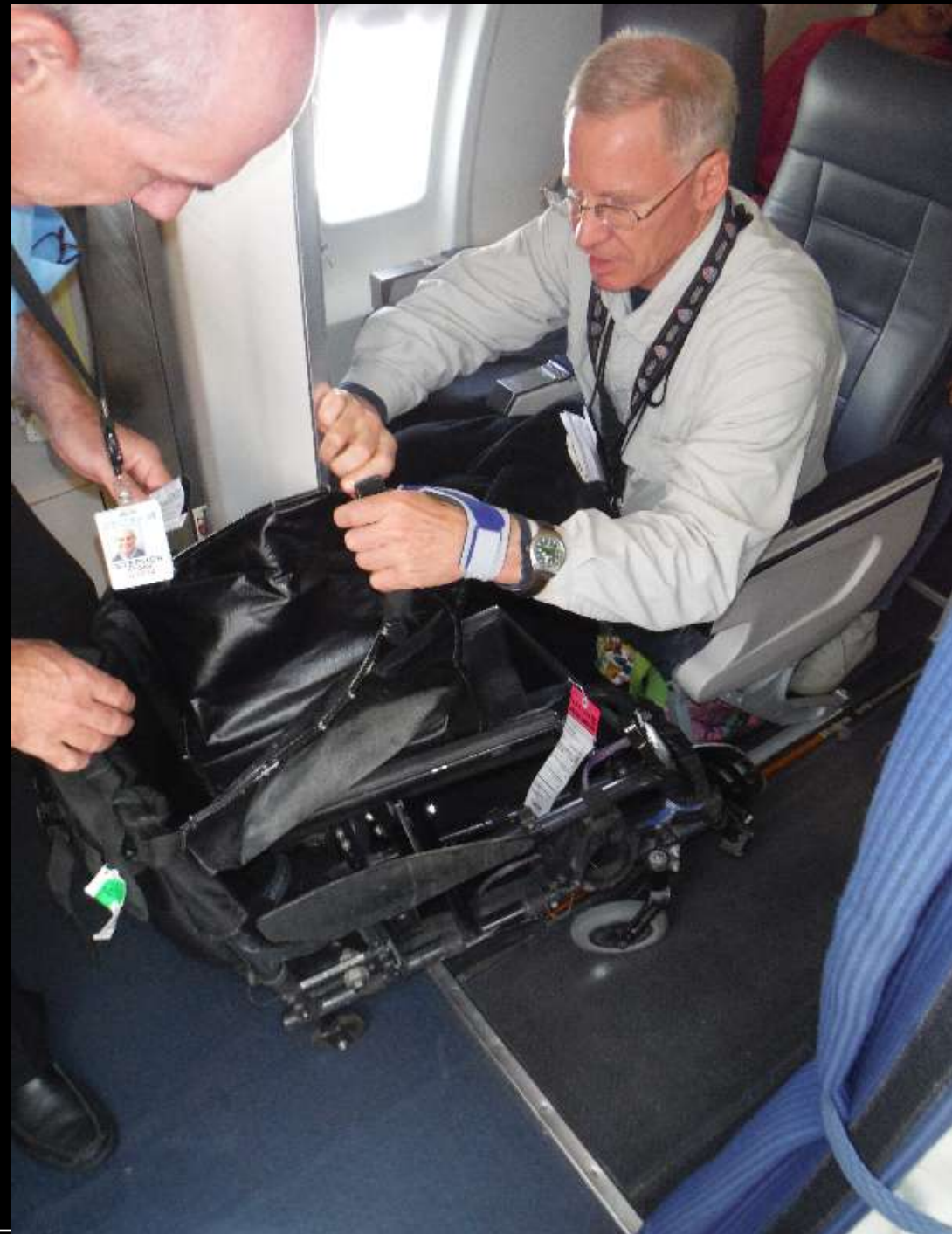


Aircraft Seating Using a Personal Aisle Chair

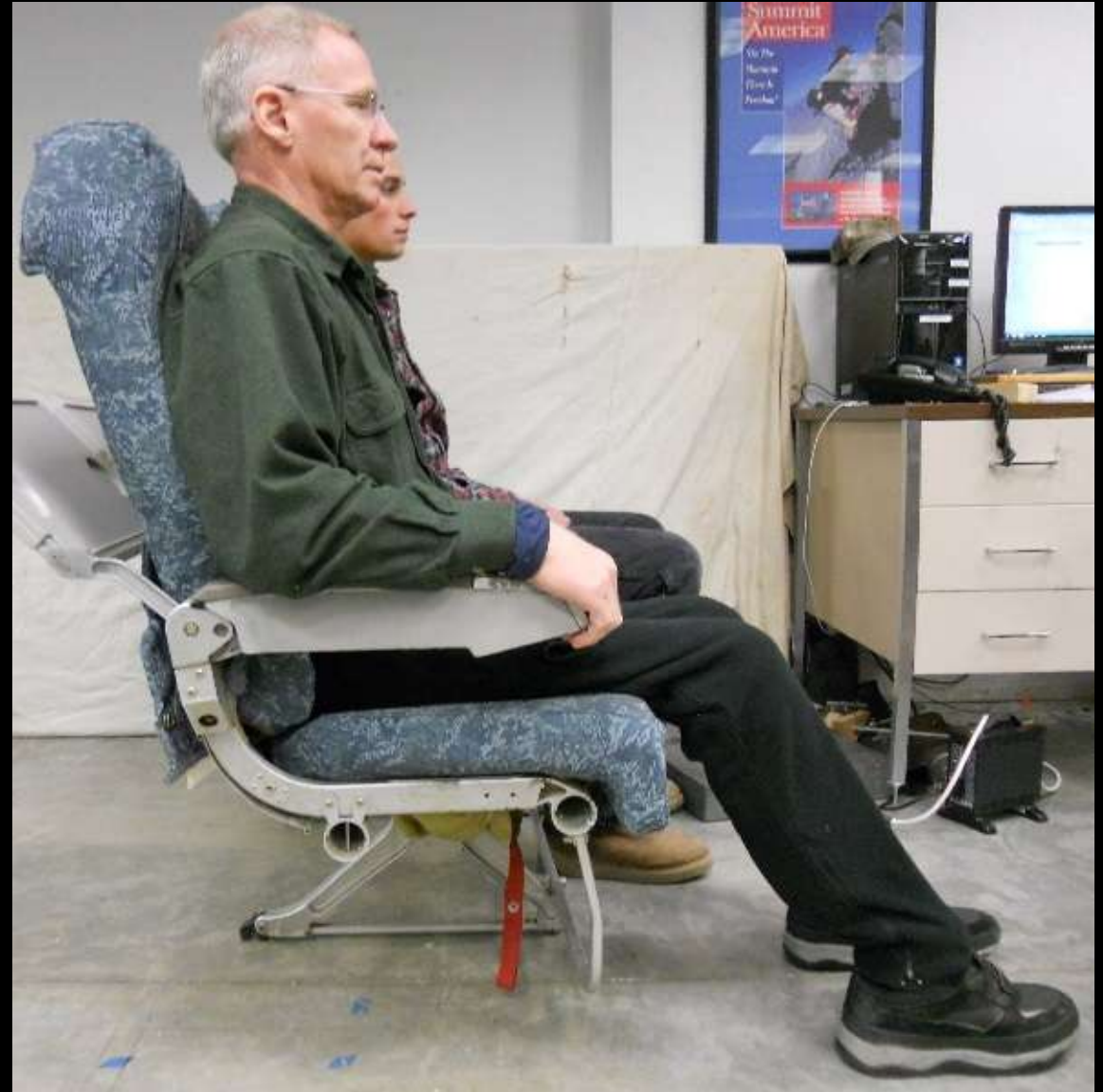


Aircraft Seating Using a Personal Aisle Chair

Fold and store
wheelchair on
board aircraft



Aircraft seating without pressure relief Cushion



**Aircraft seating
with
pressure relief
cushion from
wheelchair**

**legs hanging
shoulders forward
neck extended
arm not supported**



**Aircraft seating
with
pressure relief
cushion and
“accessories”**

**feet supported
lumbar and spine
supported
neck/head support
arm supported**



Aircraft seating with pressure relief cushion and “accessories”

foot support
lumbar and spine
support
neck/head support
arm support





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