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
28 February 2013
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,

keeps the network and computers running, assists in design work with the projects. When not working he likes to cook, play guitar, work with computers, and lead worship with his wife at church.

Jeremy Vlcan,
Trails Assistant ,

assists with conducting UTAP, development of the HETAP program, and advancement of the Trail Gate barrier project. He also enjoys hiking, photography and playing in the yard.

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Seanna Kringen,
Research Associate,
has a background in physiological sciences, and assists on the research components of our projects. She enjoys swimming and hiking with her husband and three children.

Carla Shepard,
Bookkeeper,
is in charge of BD finances. When she is not crunching our numbers, she enjoys four-wheeling, exploring old mines, playing piano, singing, and cross-stitching.

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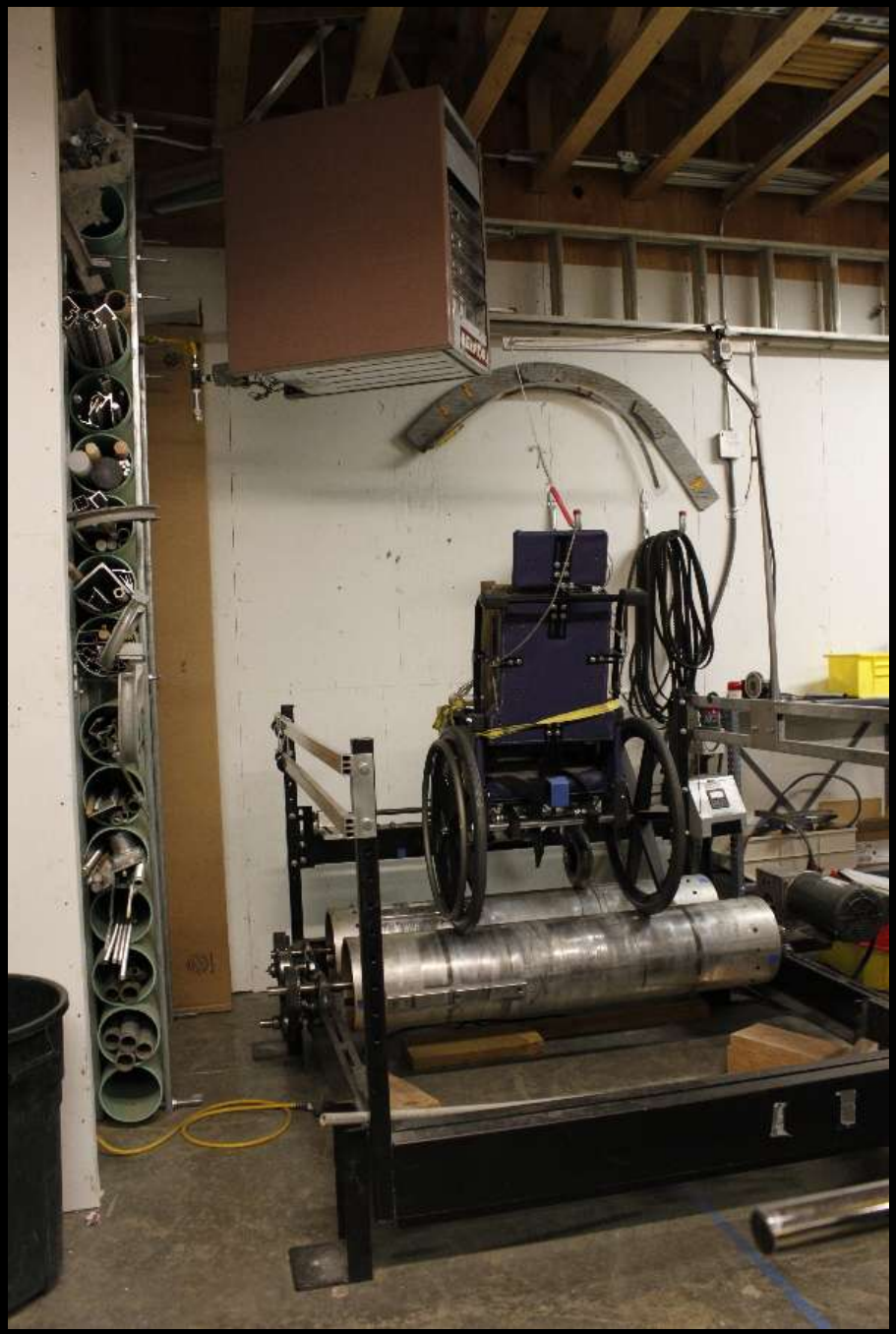
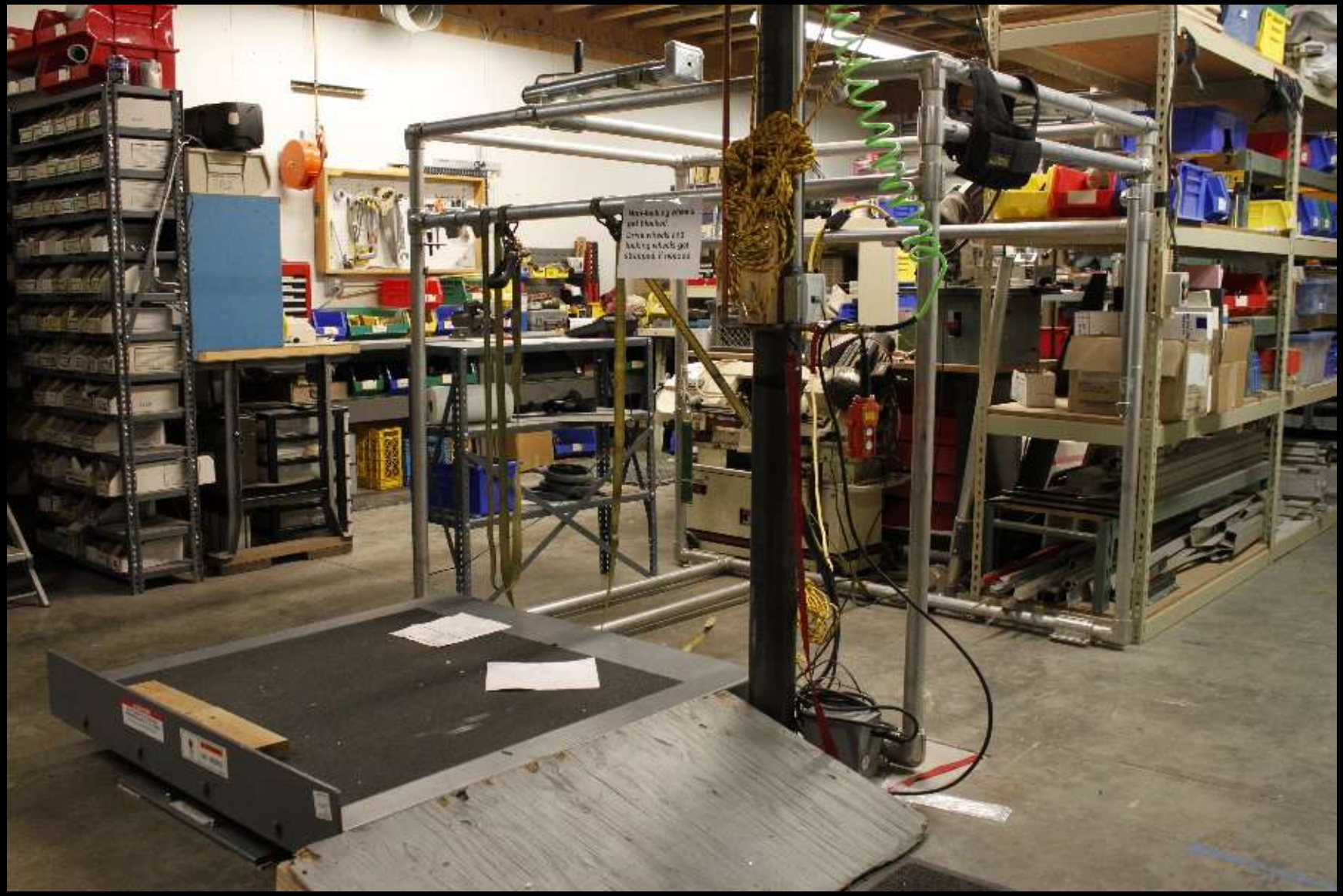
HAAS
KURT


KURT


Washoe Lake
State Park
TRAIL USE
North
LEGEND






595
BALLOTIN


DELTA


HAAS


ENCO

Design of Consumer Products

Product Development

Assessment of Products

Universal Design of Products

Product Development

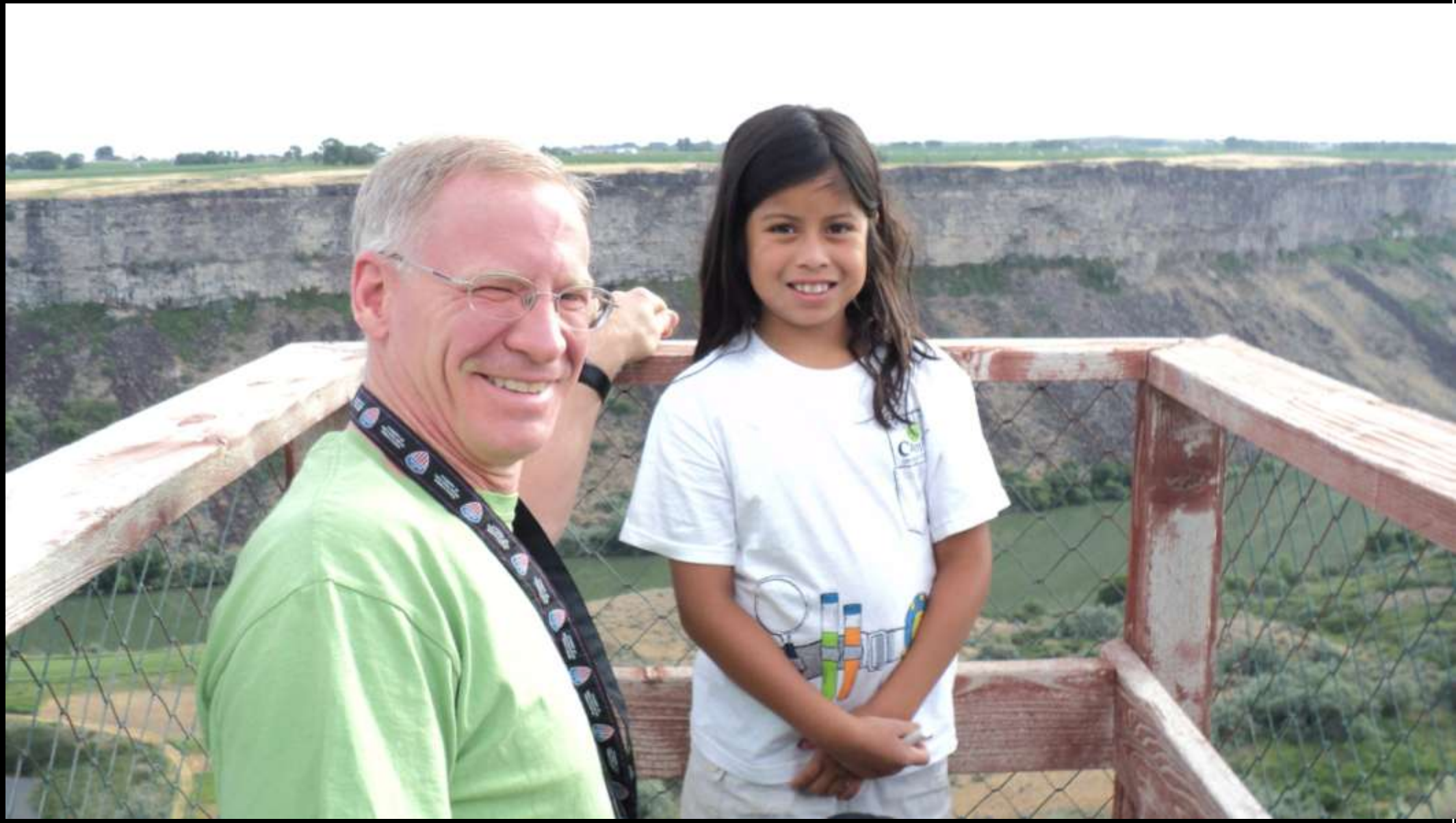
- Mainstream Products
- Opportunity for Universal Design
- Adaptive Products
  - Personal Technologies
  - Activity Specific Technologies

Balance Dimension

Physical

Intellectual

Spiritual




PETZL
PETZL

Sociological Dimension

Dependence

Independence

Interdependence

Personal Technologies
Activity-Specific Technologies
Environmental Technologies

Environmental Technologies

Things that do not move

Activity-Specific Technologies

Arroya Sit Ski

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200
205
AMERICAN EXPRESS
When you ne

Mono Ski

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WINTER PARK
WEST PORTAL
STATION
HEAD


UNIQUE
HEAD

Dynamic Seating Spring Assist

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Cross Country Ski

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4 12'98


FOXSHOX
4 12 '98

Pax Back

Available from

BES Rehab Ltd

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Aircraft Aisle Chair

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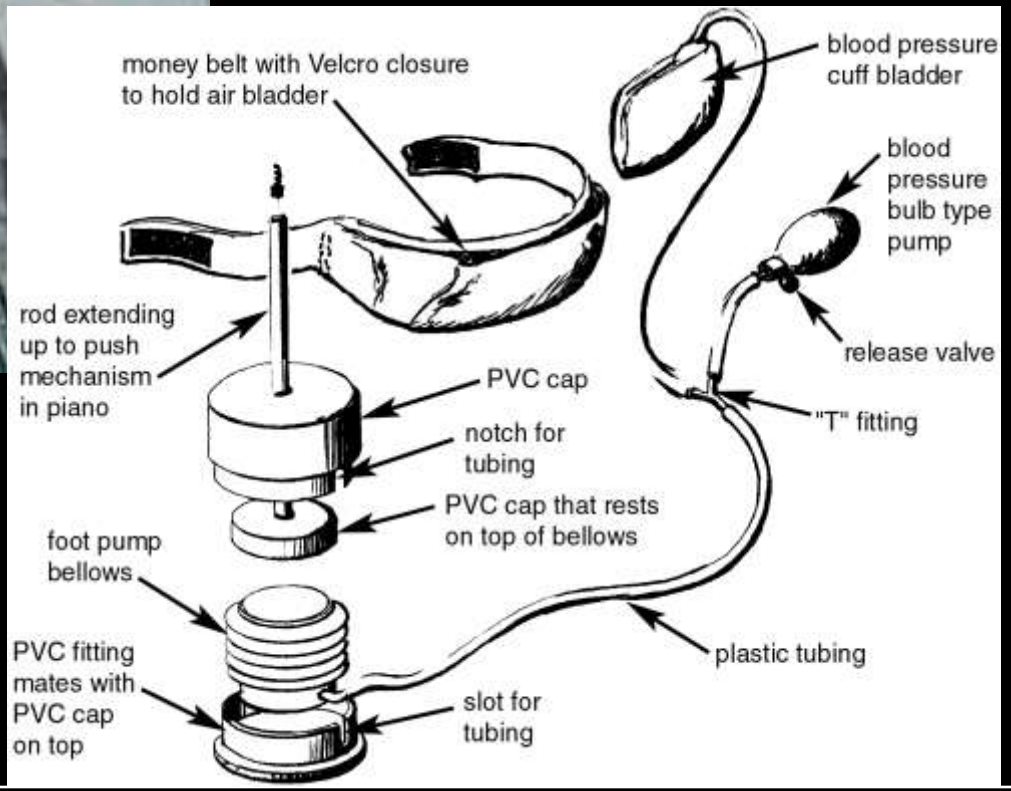
money belt with Velcro closure
to hold air bladder
blood pressure
cuff bladder
blood
pressure
bulb type
pump
rod extending
up to push
mechanism
in piano
release valve
PVC cap
"T" fitting
notch for
tubing
PVC cap that rests
on top of bellows
foot pump
bellows
plastic tubing
PVC fitting
mates with
PVC cap
on top
slot for
tubing

Dynamic Seating

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Dynamic Seating

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Hand Bike

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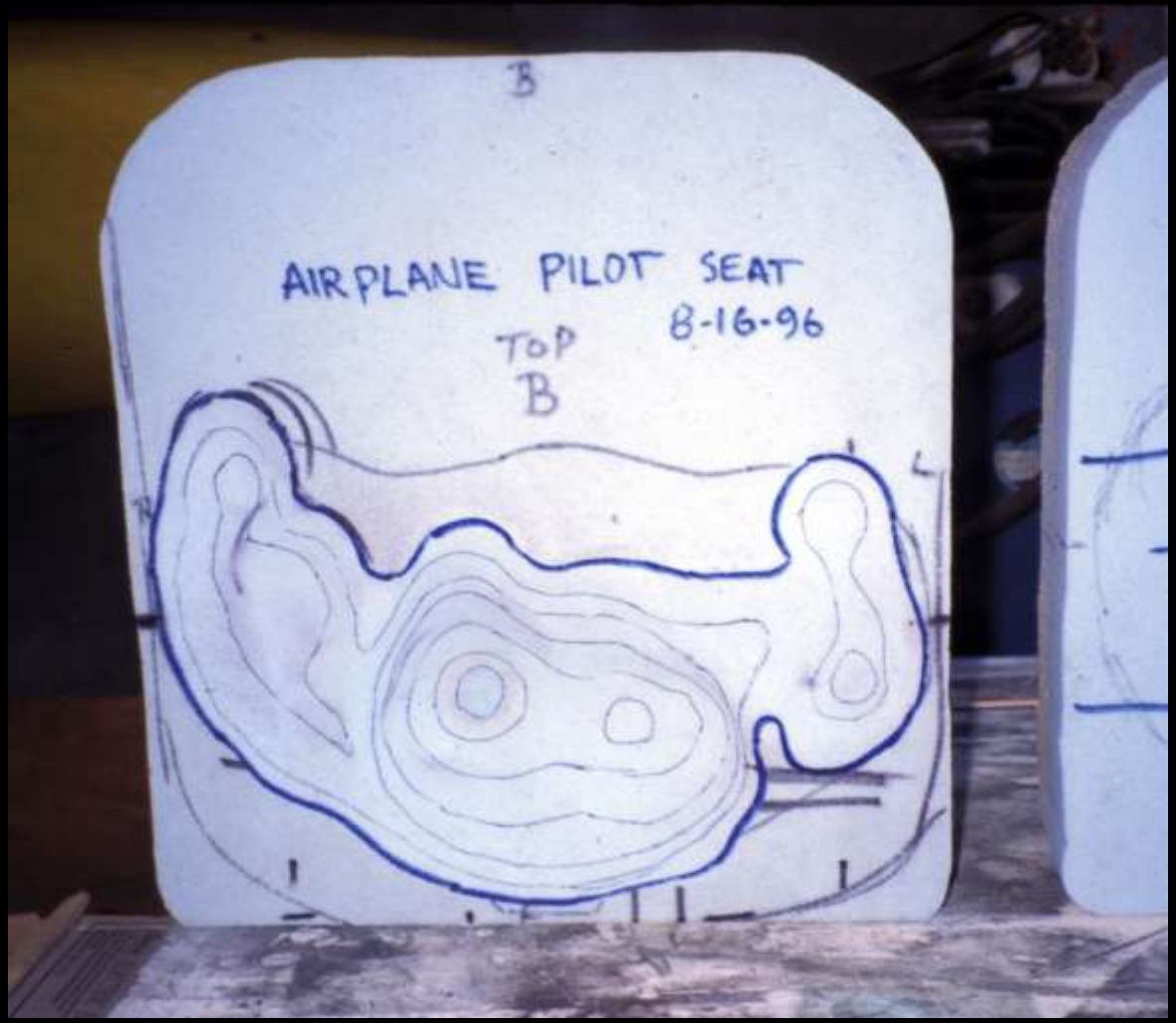

Contoured Seating

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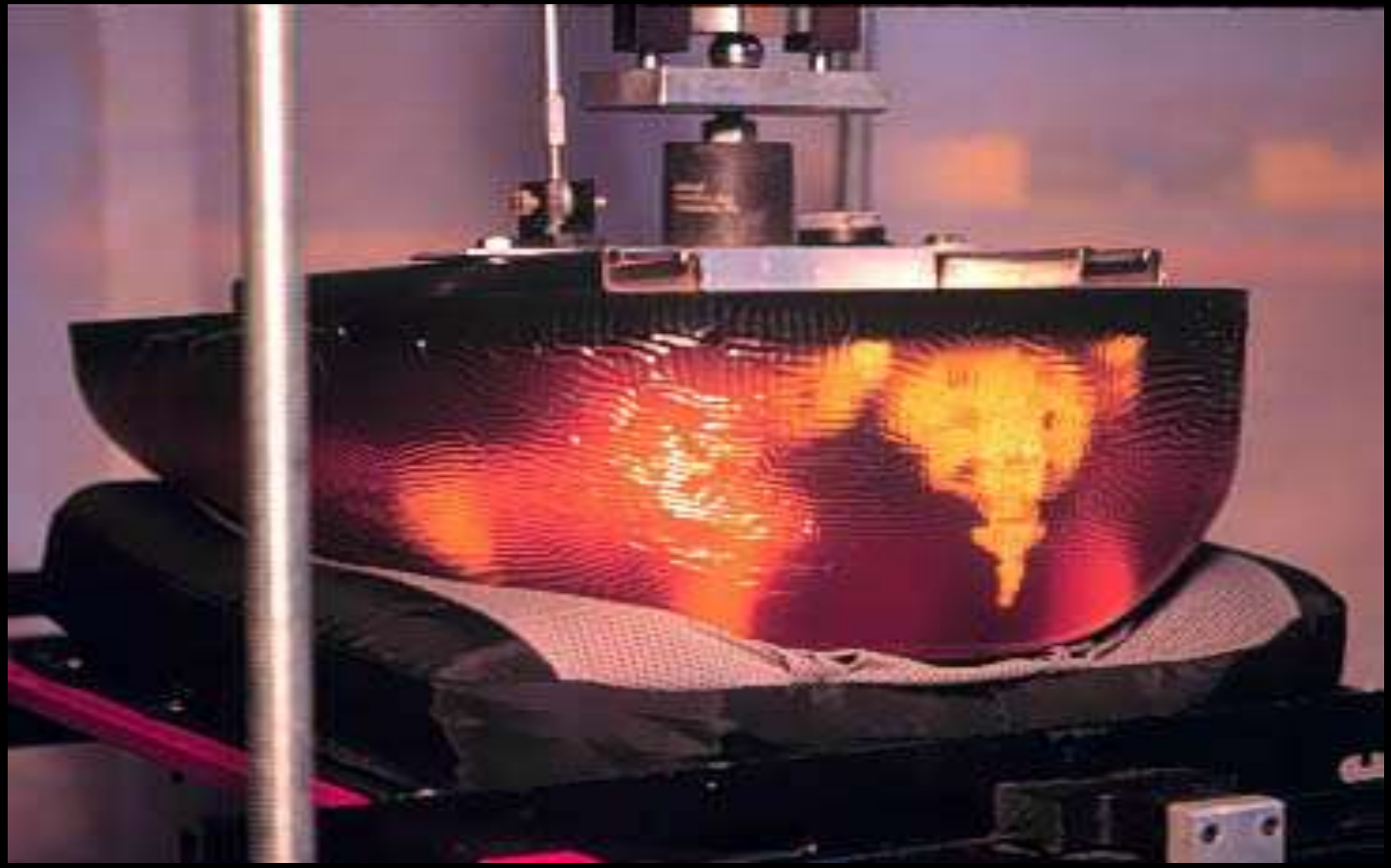
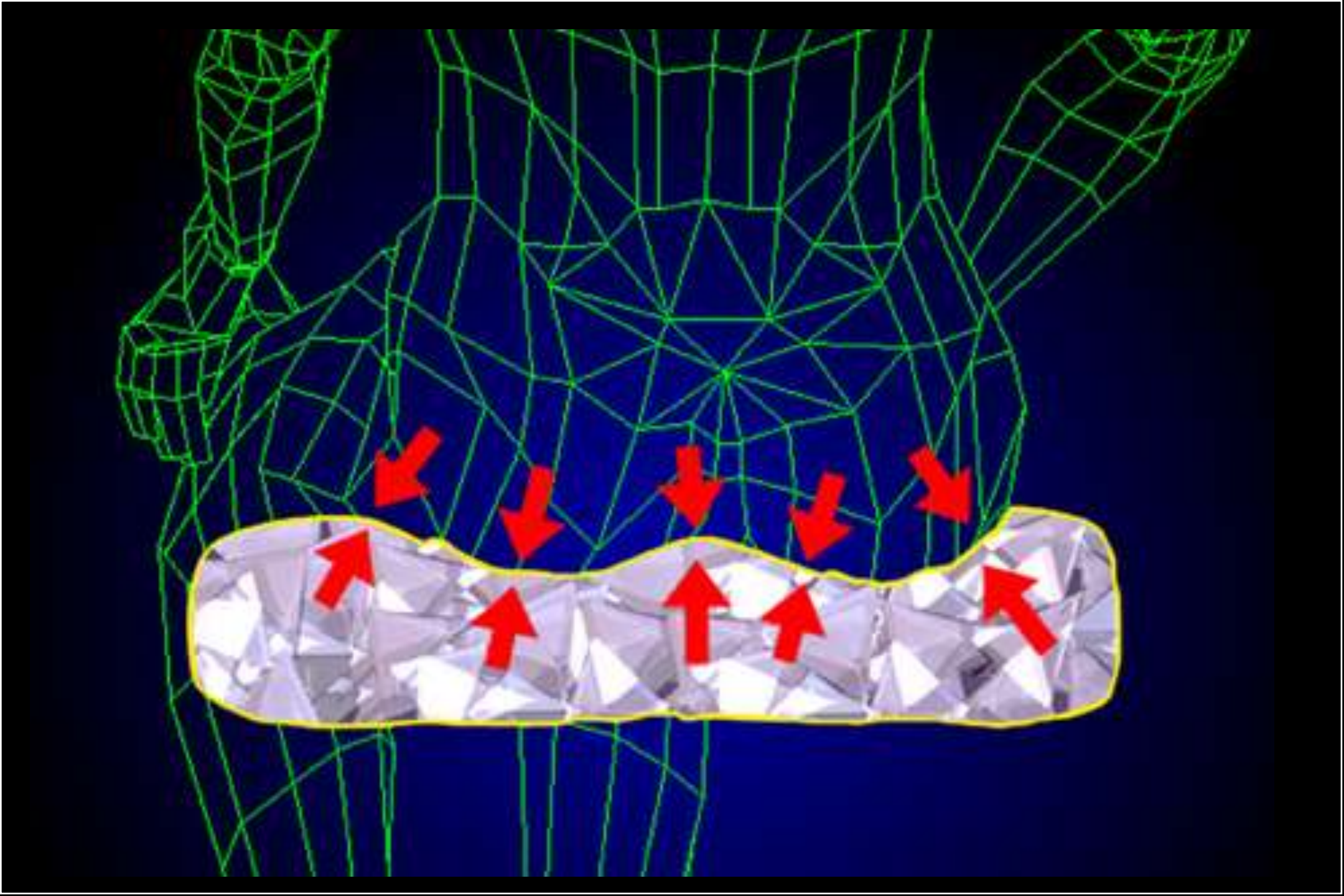
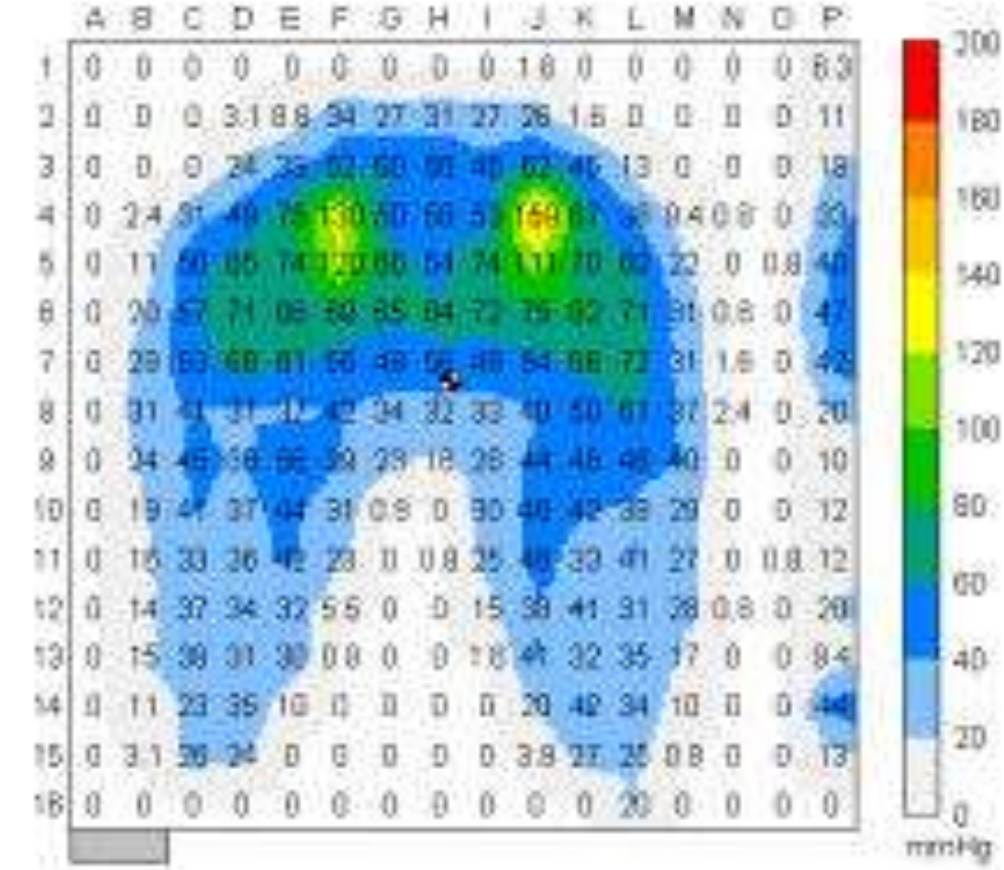
SKELI with Pelvis Model

SKELI from Rear





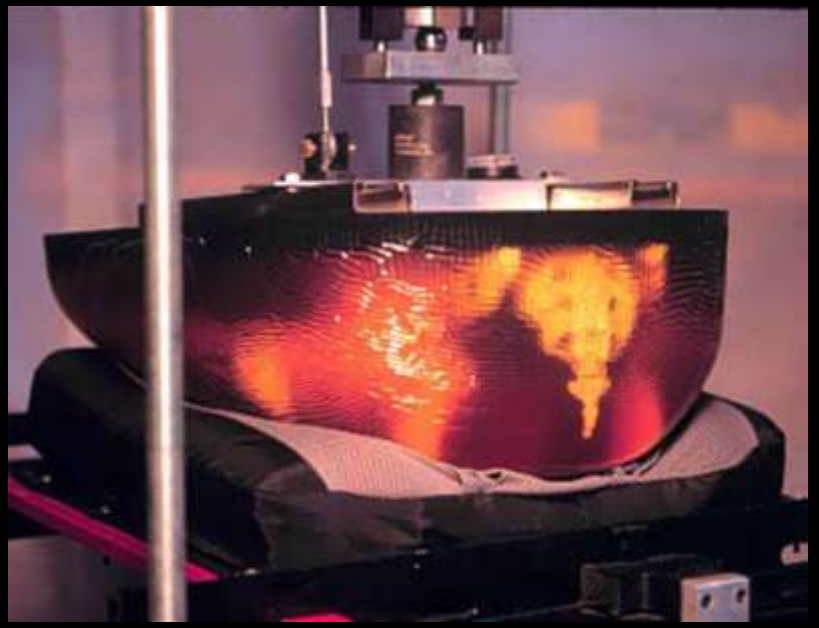
SKELI Used on Foam



2" HR45 Foam Cushion

Seat Cushion Testing

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



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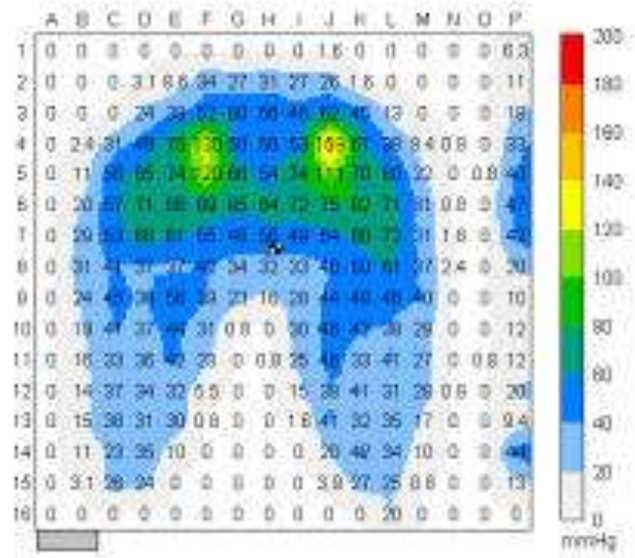
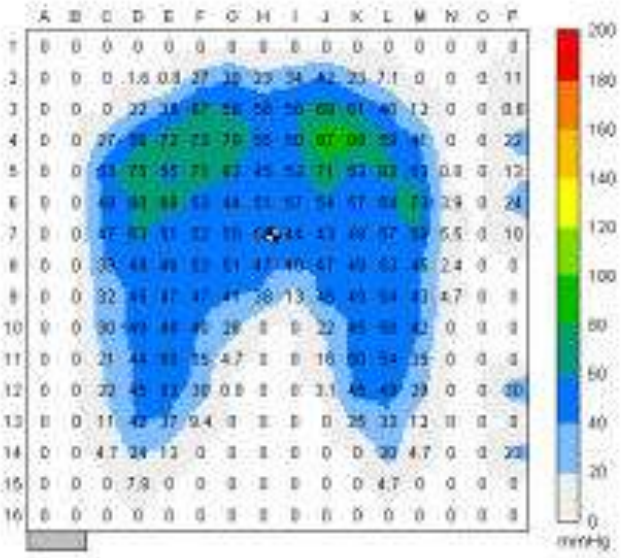
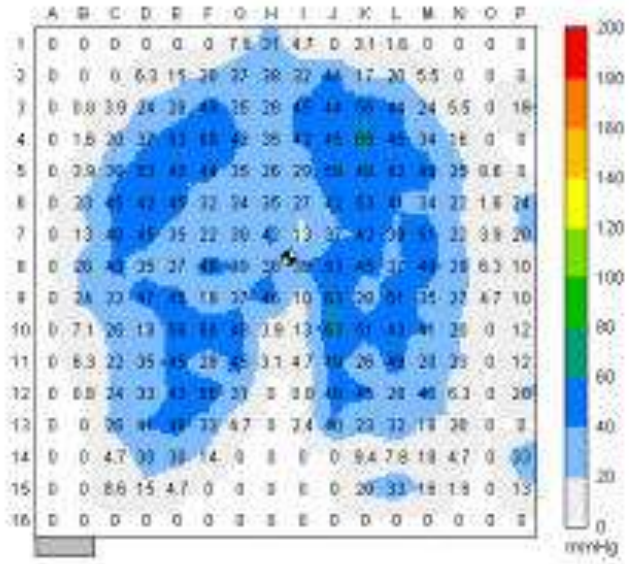


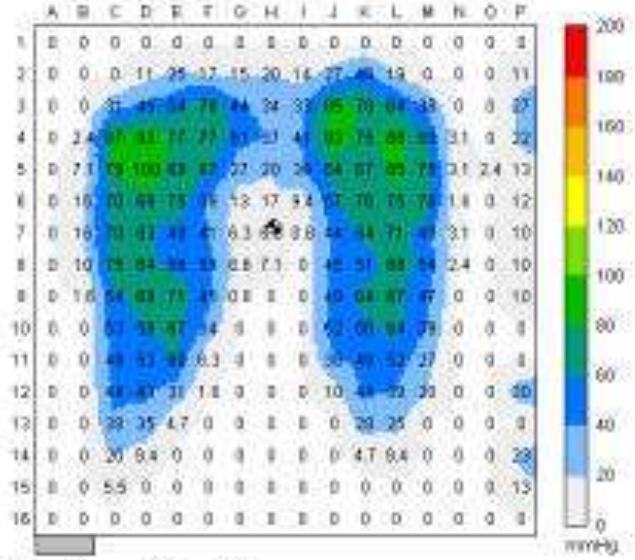
2" HR45 Foam



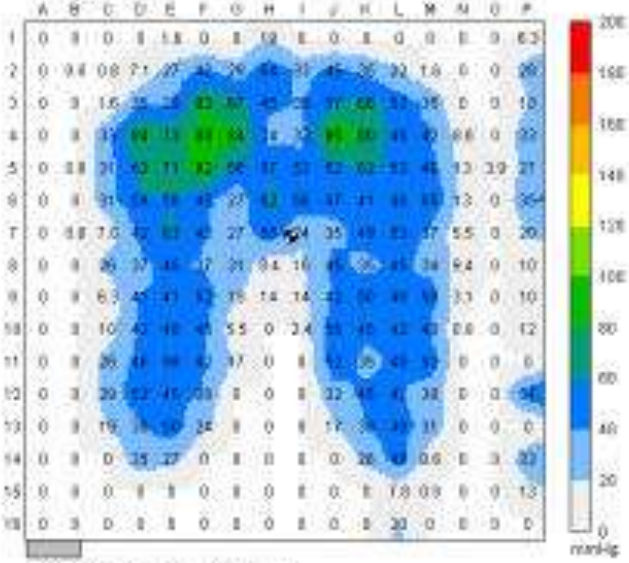
Jay 2 by Sunrise Medical



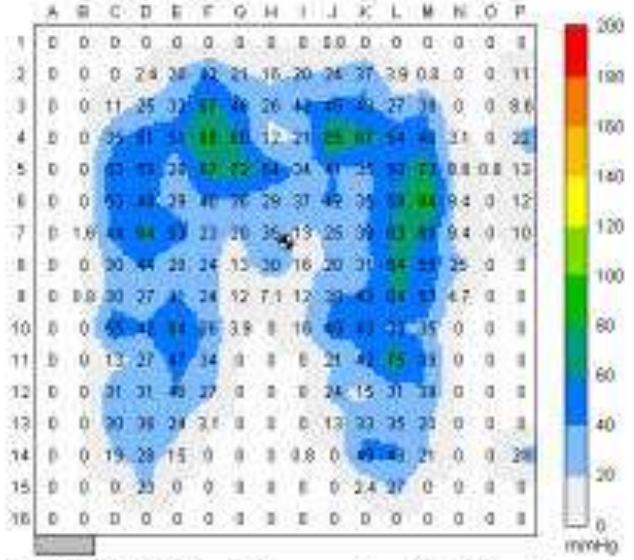
ROHO High Profile by ROHO Inc.



Contoured by Supracor



Model P by Vicair



Model P Deep Immersion by Vicair

ASLI Prototype
ISO Part 2 Shape

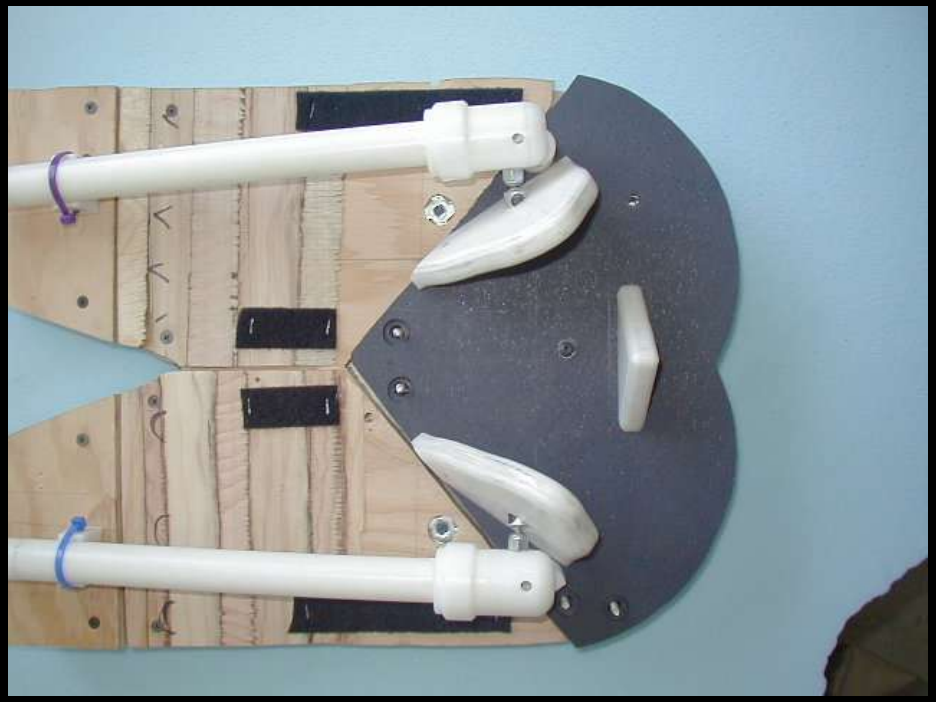
ASLI Prototype V 1.0
with Surrogate Pelvis/Femur
Symmetric loading

ASLI Prototype
10 Pelvic Obliquity

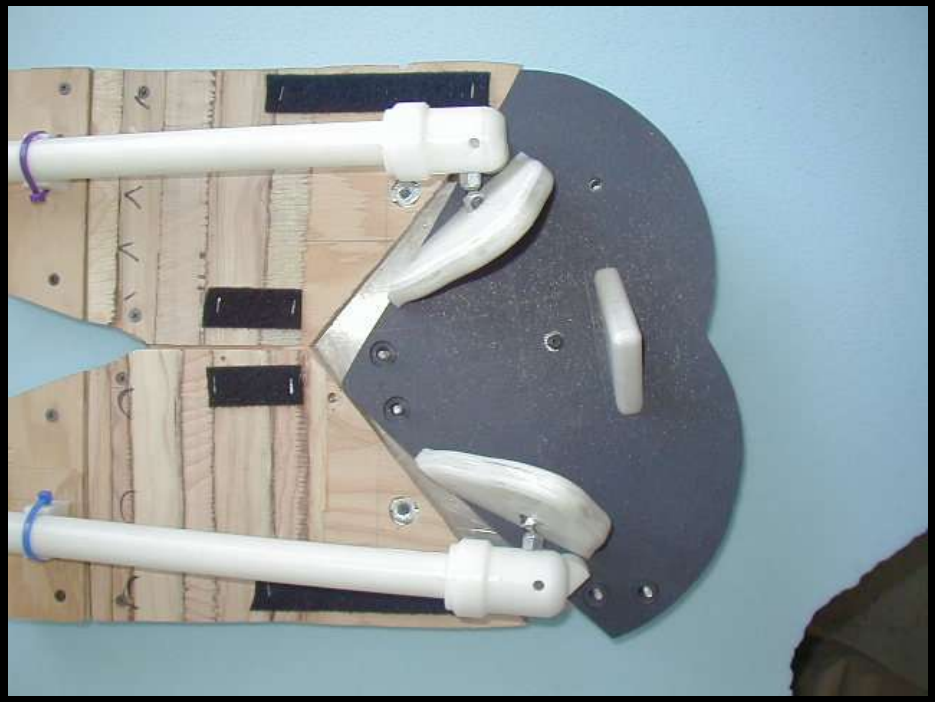
ASLI Prototype
15 Posterior Pelvic Tilt

ASLI Prototype

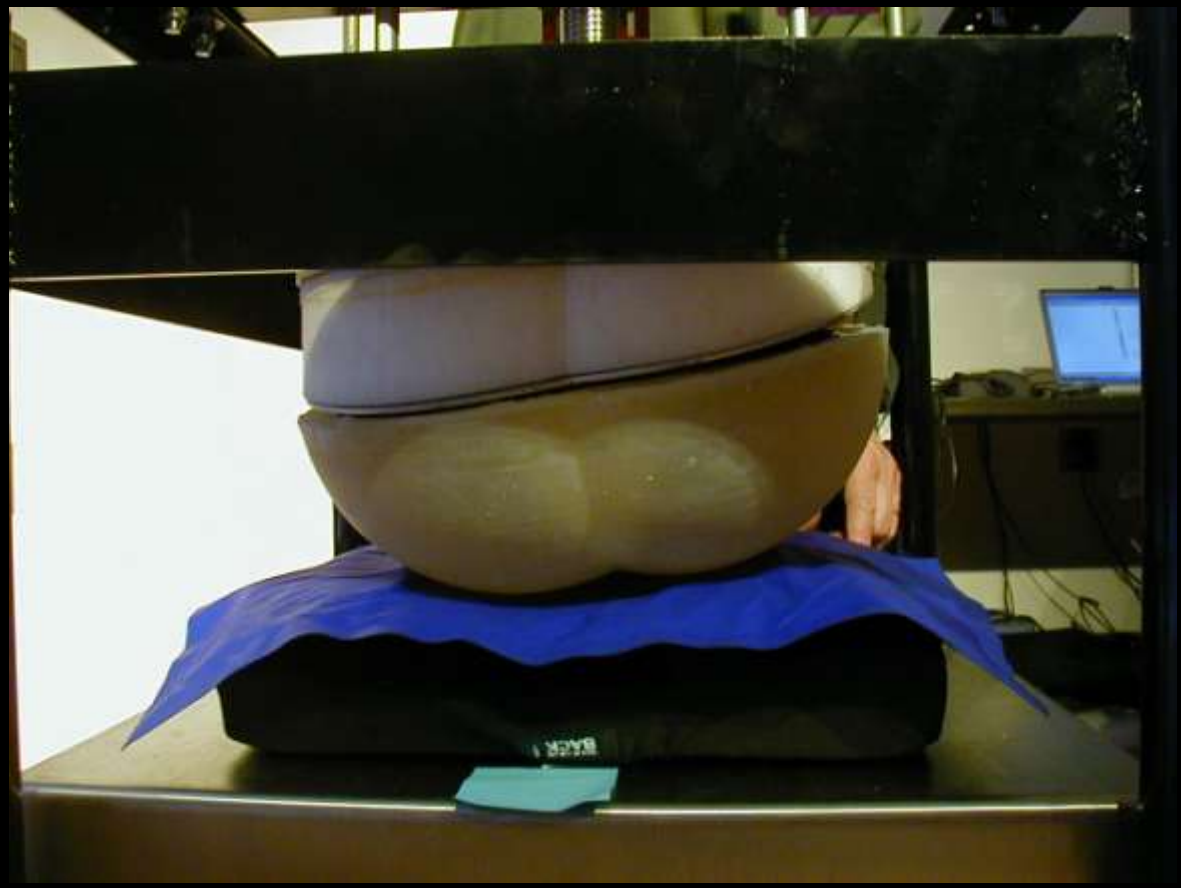
Symmetric loading



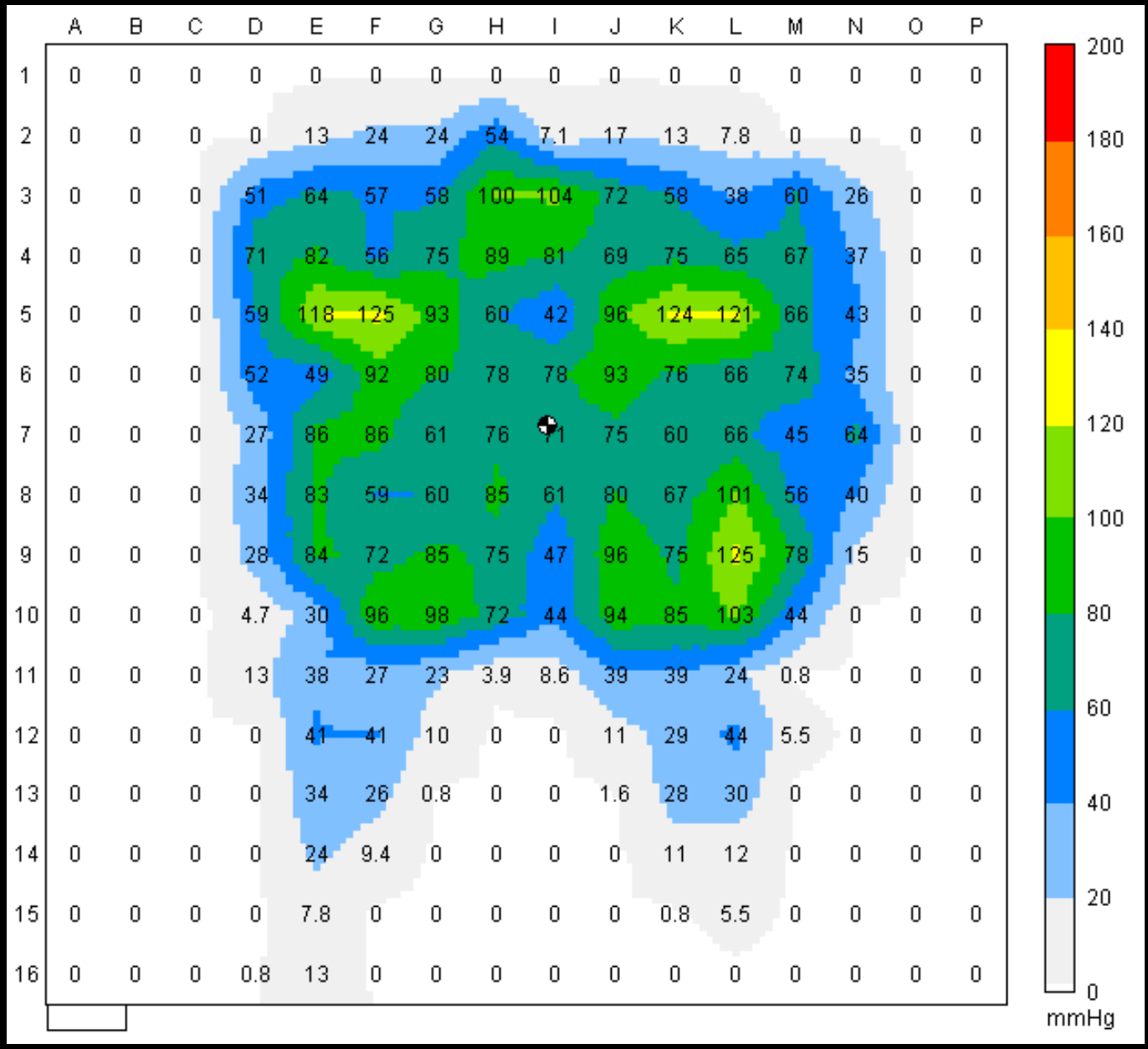
10 Rotation



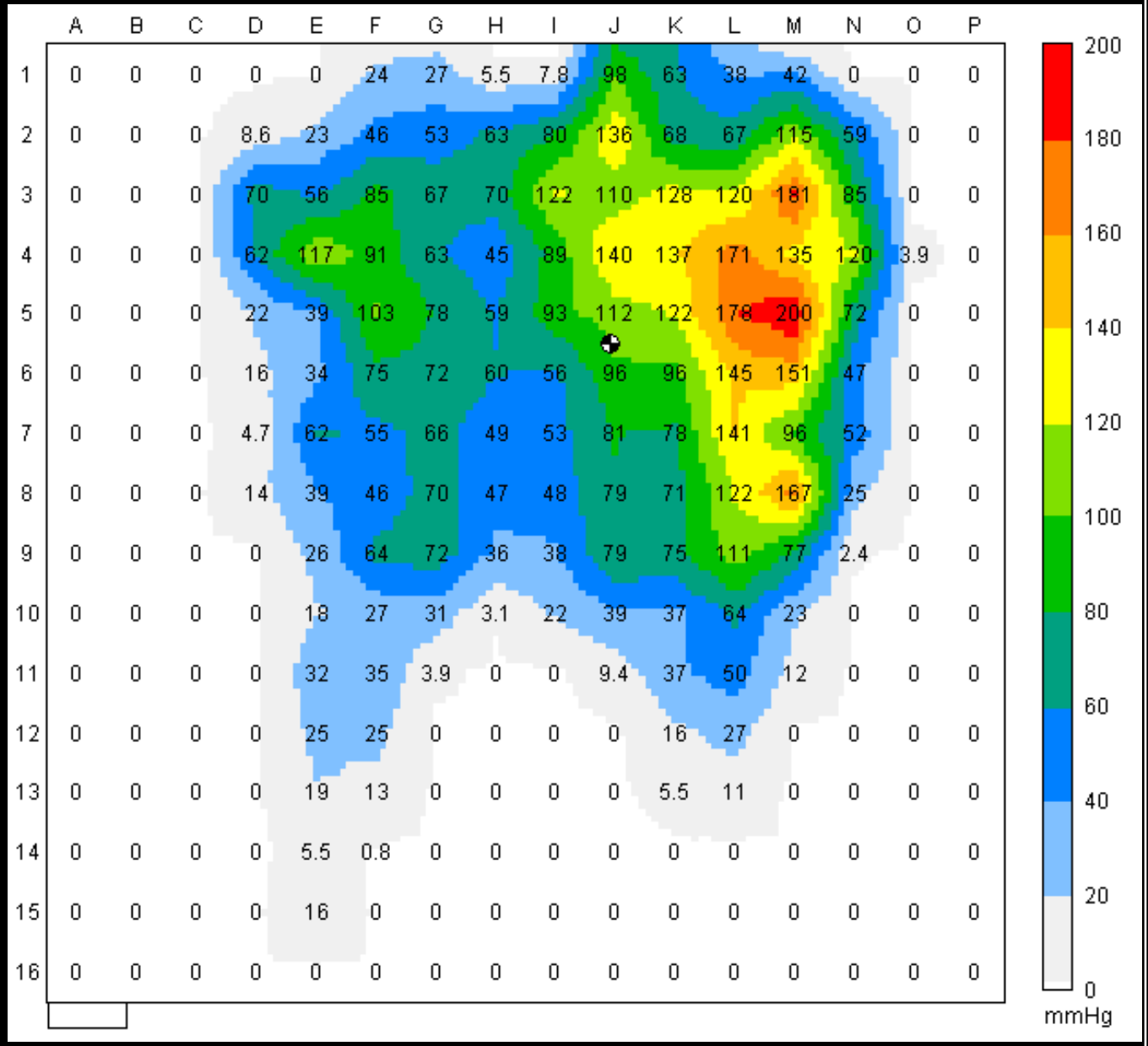
ASLI Prototype V 2.0
with Gel Soft Tissue
10 Pelvic Obliquity and
15 Posterior Pelvic Tilt



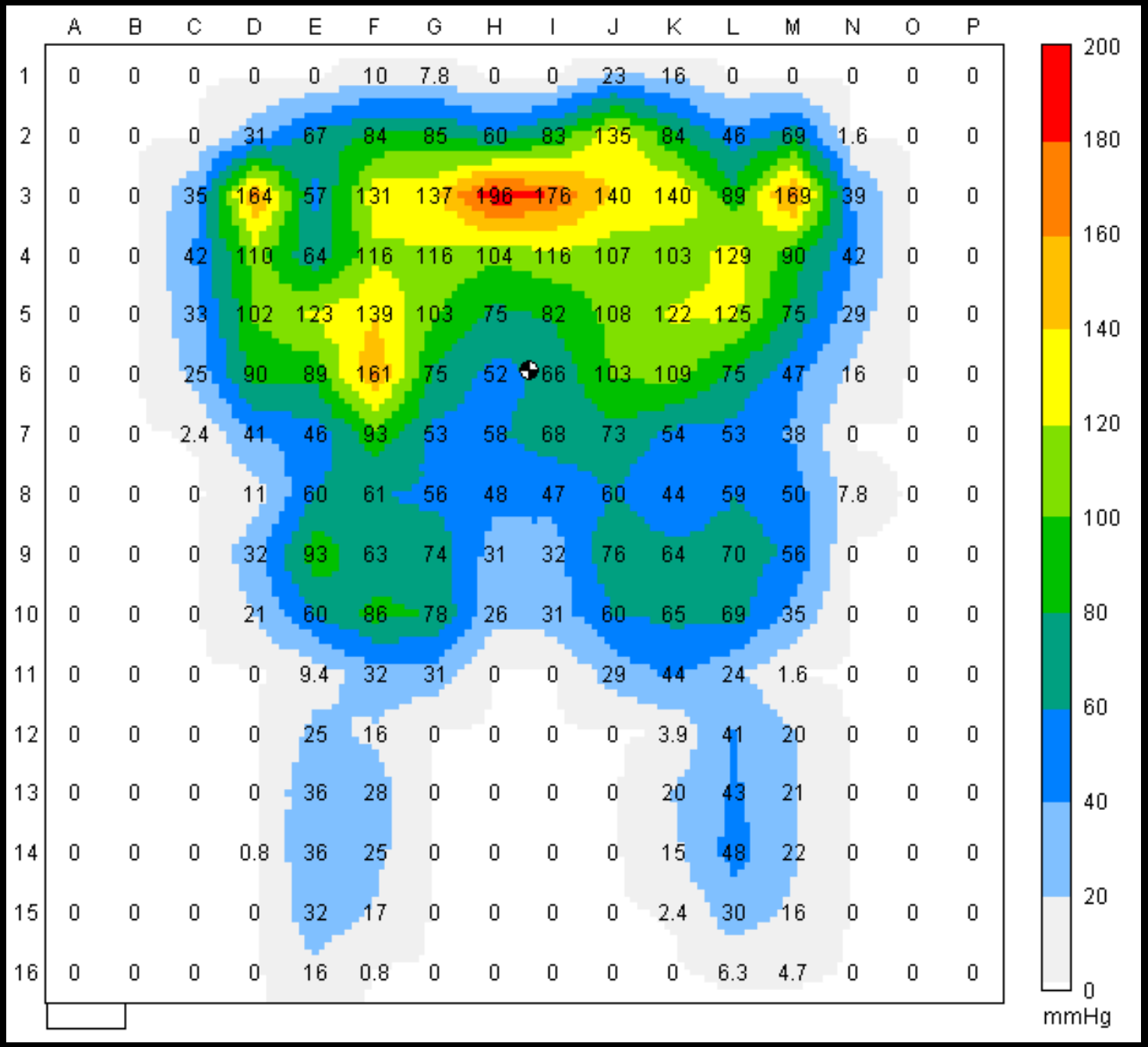
Pressure Measurements Symmetric



Pressure Measurements 10 Pelvic Obliquity



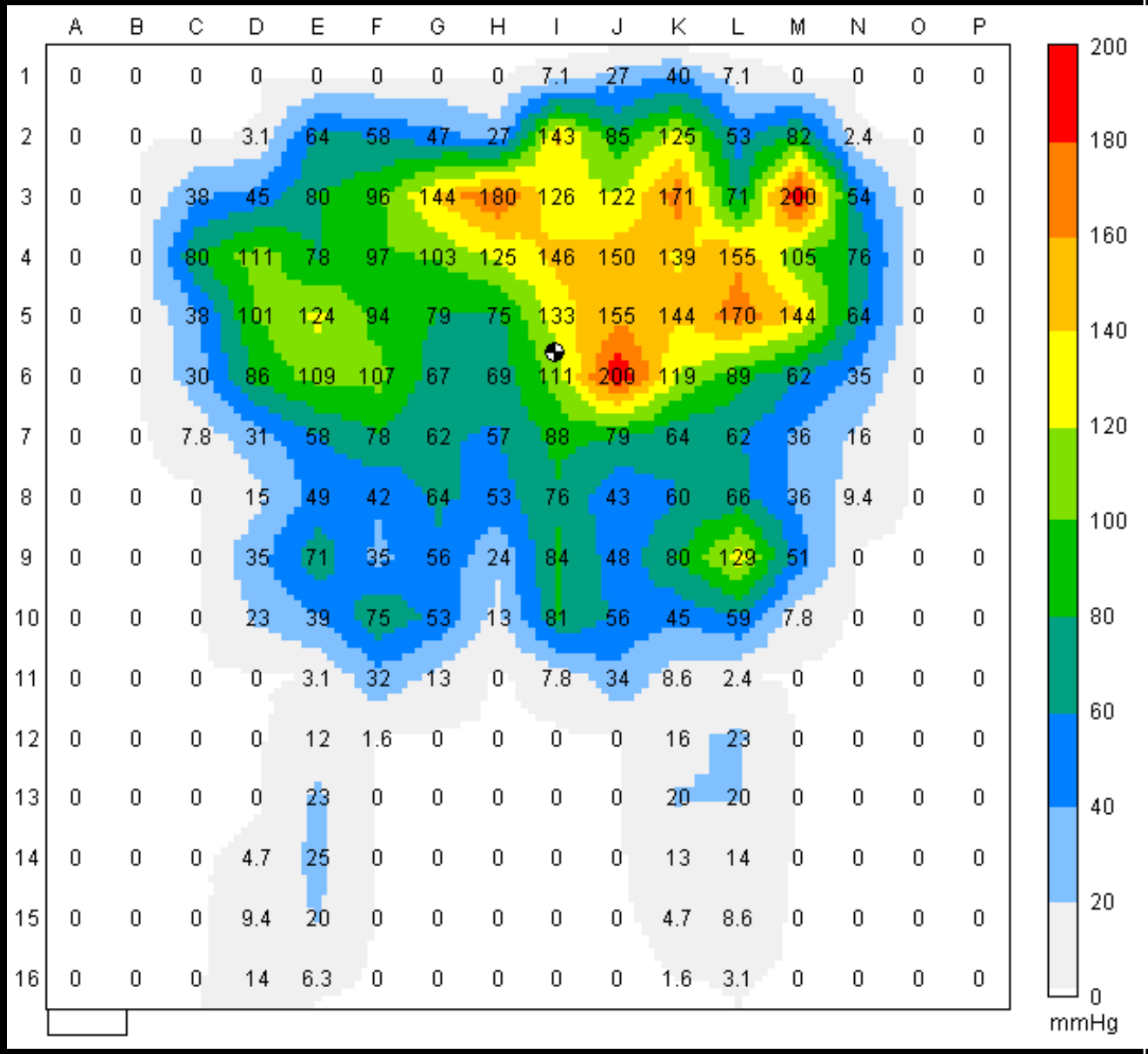
Pressure Measurements 15 Posterior Pelvic Tilt



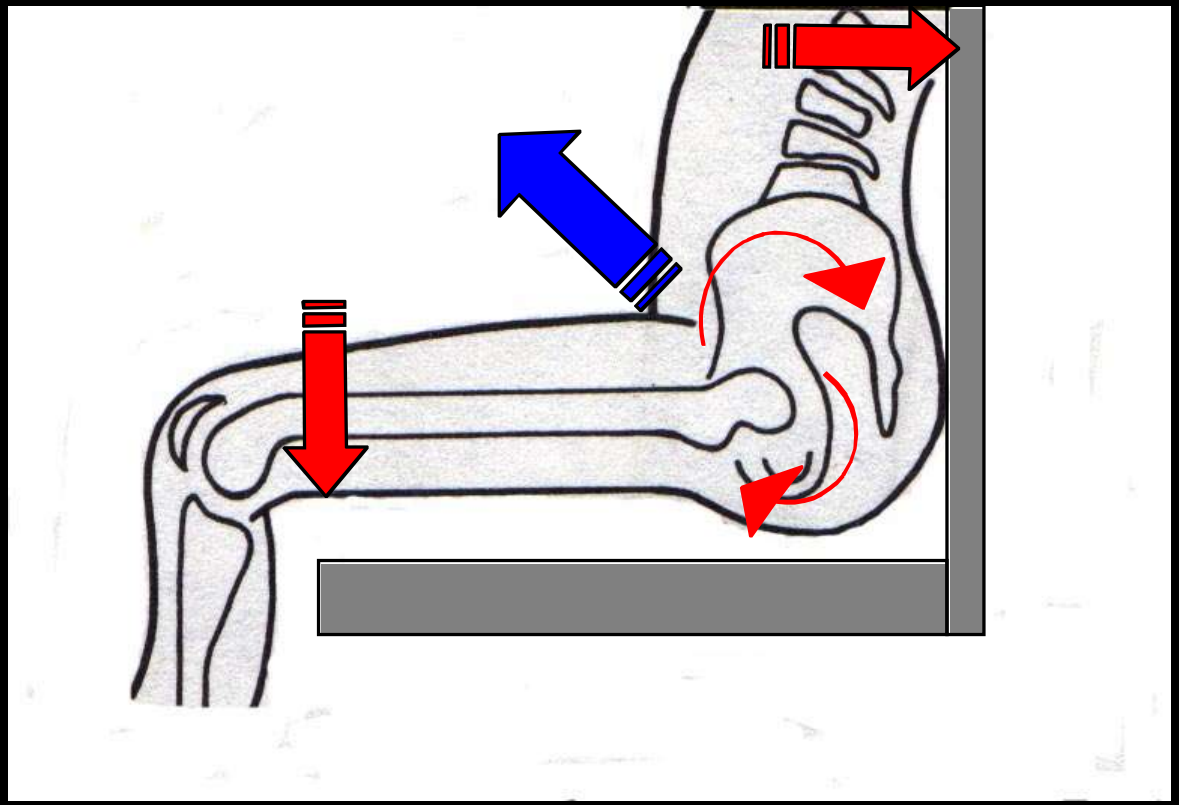
Pressure Measurements

10 Pelvic Obliquity

15 Posterior Pelvic Tilt



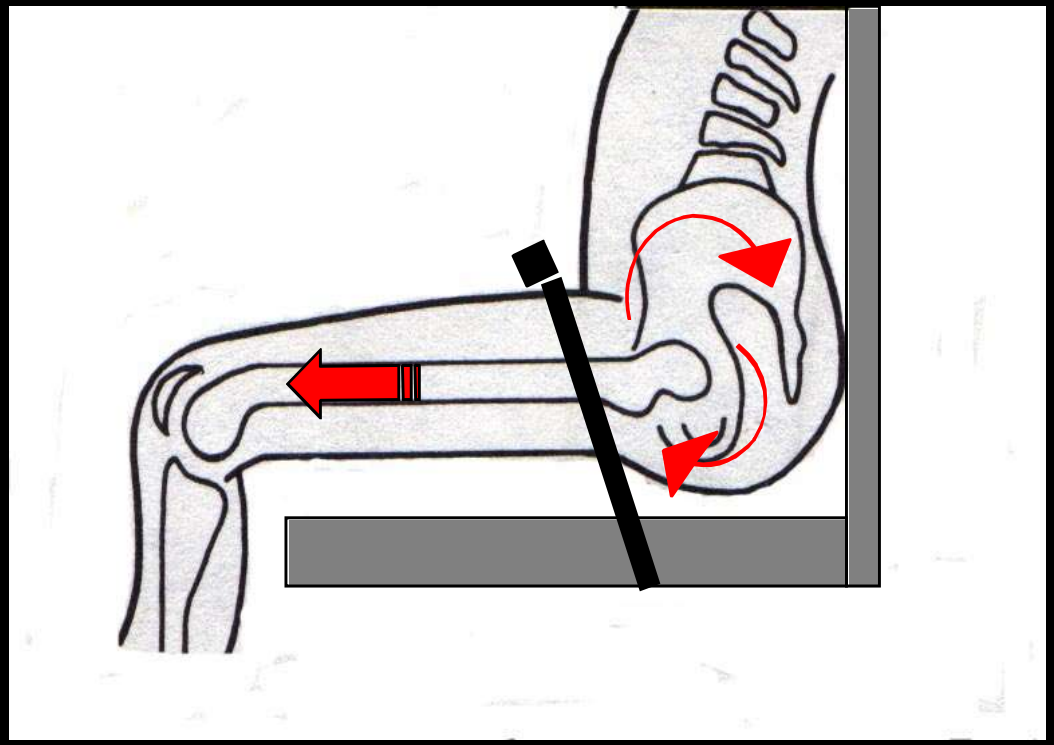
Pelvis Movement During Extensor Thrust Activity



Force at Thigh and Backrest During Extension

Pelvis Moves Up, Out and Rotates

Variations of Belt Angle

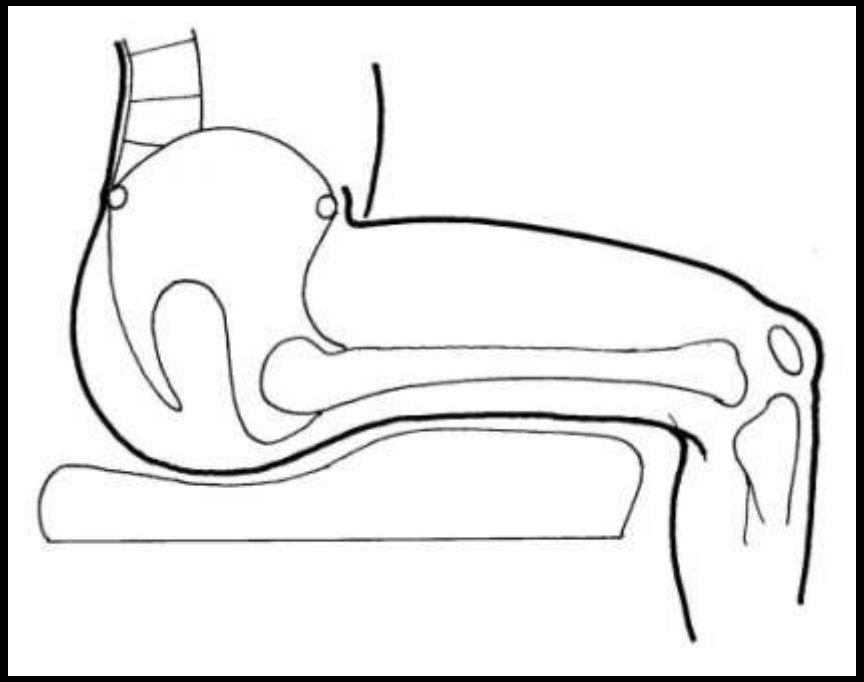


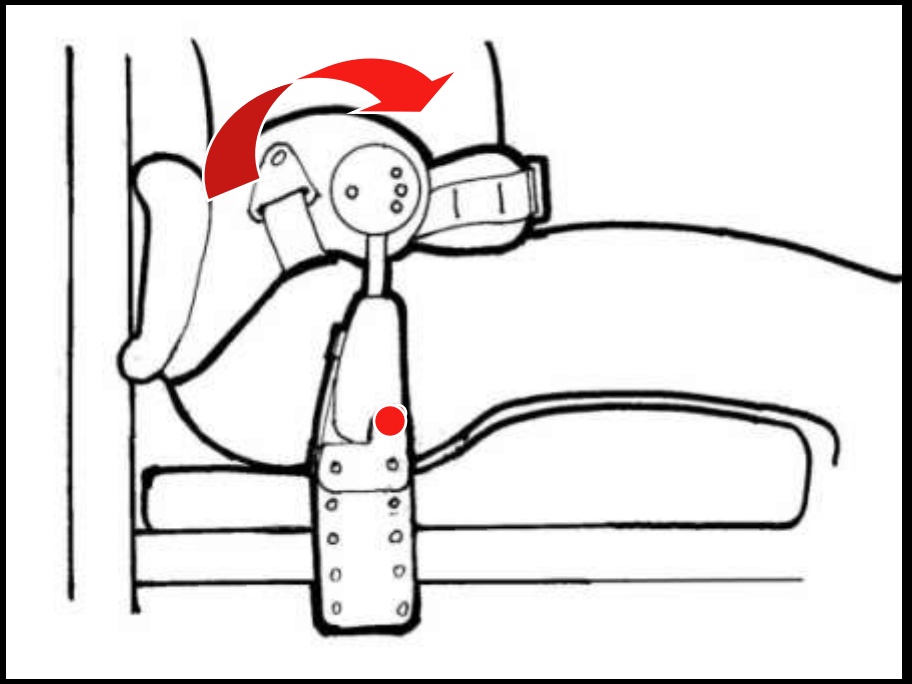
Downward Pull Limits Upward Movement

Allows Posterior Pelvic Rotation

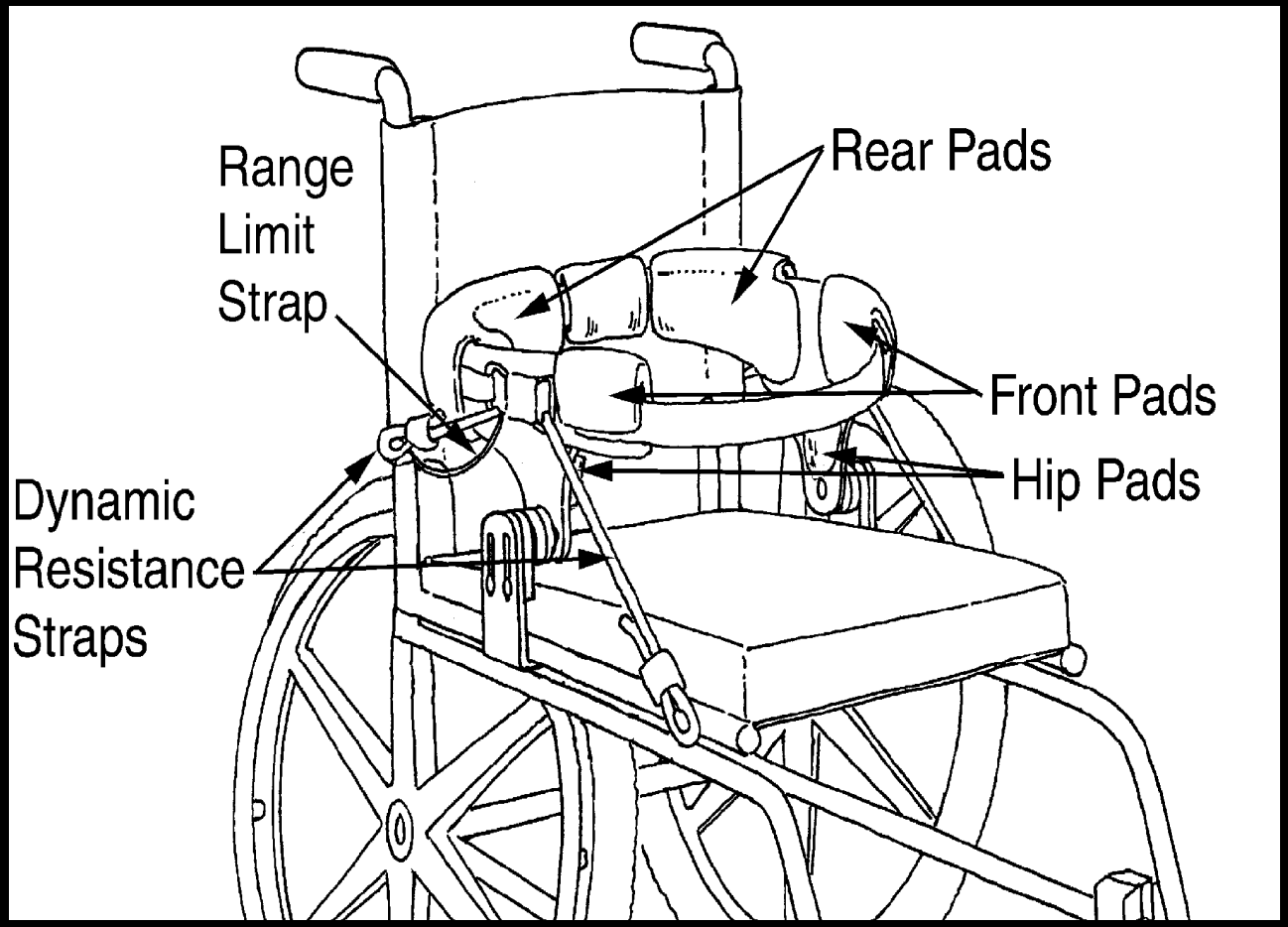
Limits Full Anterior ROM

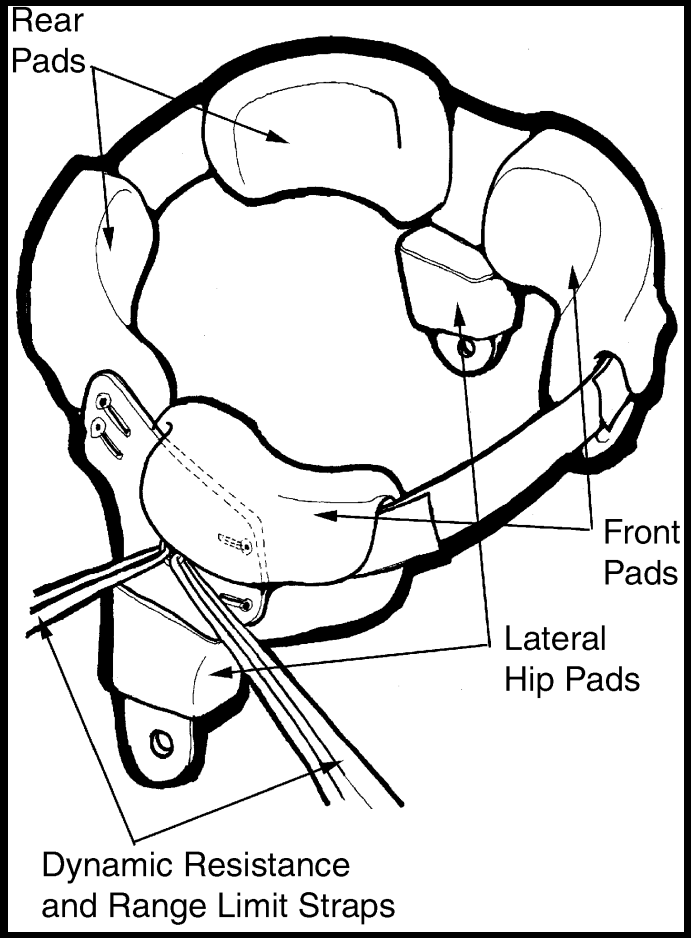
HipGrip Concept





HipGrip Ph1 - Prototype 2





What Is the HipGrip?

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

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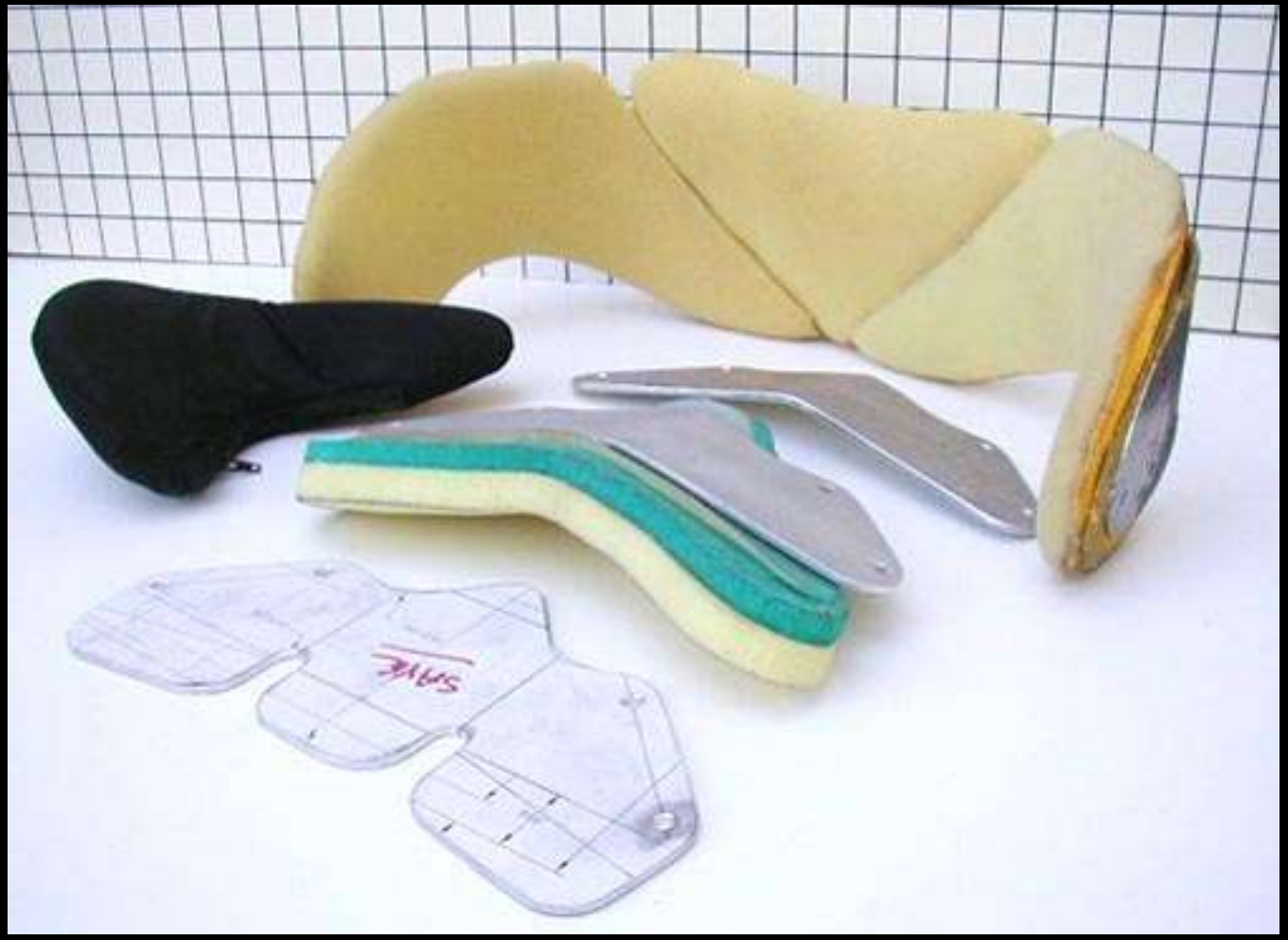
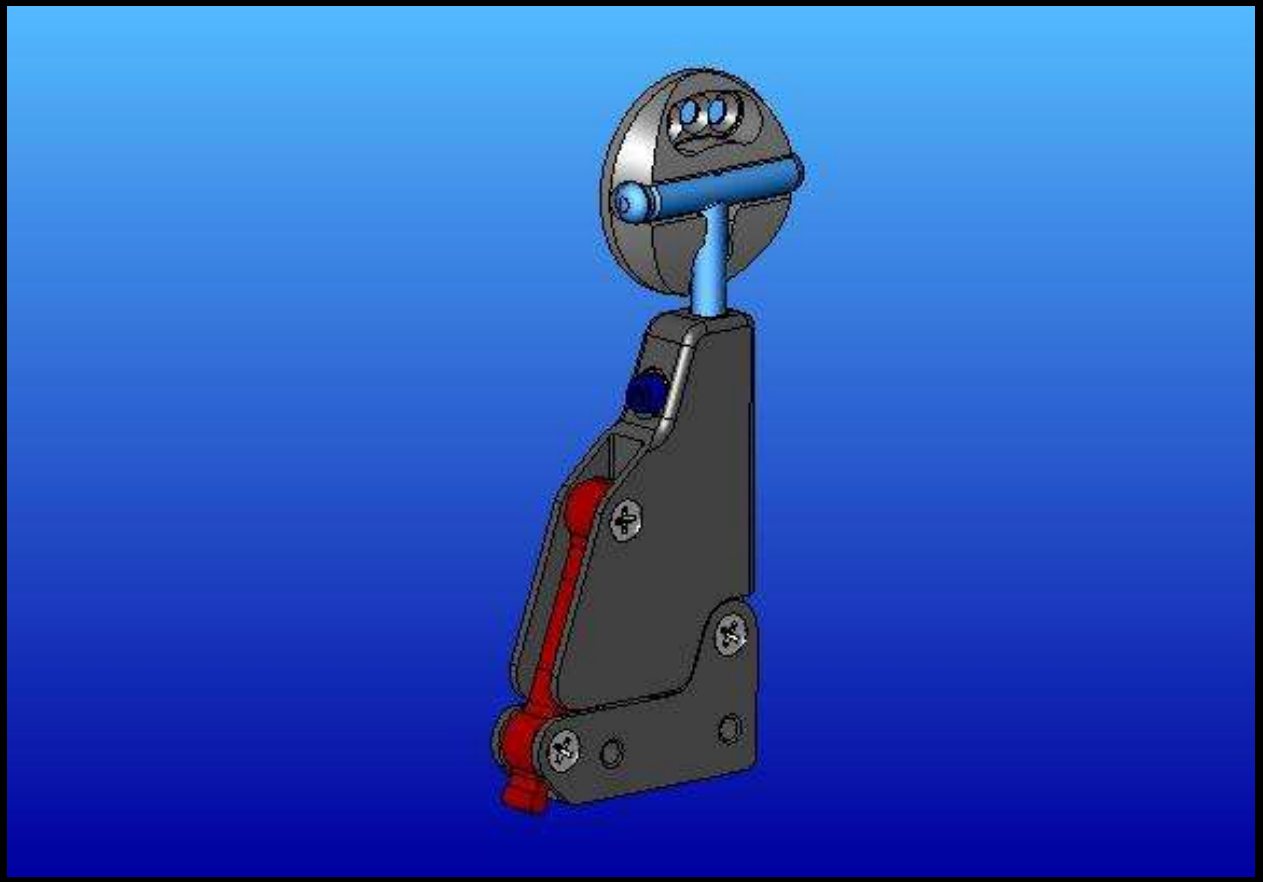
Hip Grip Components

Modular Hardware



Pivot Bracket
Current Design



HipGrip Test Fixture

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

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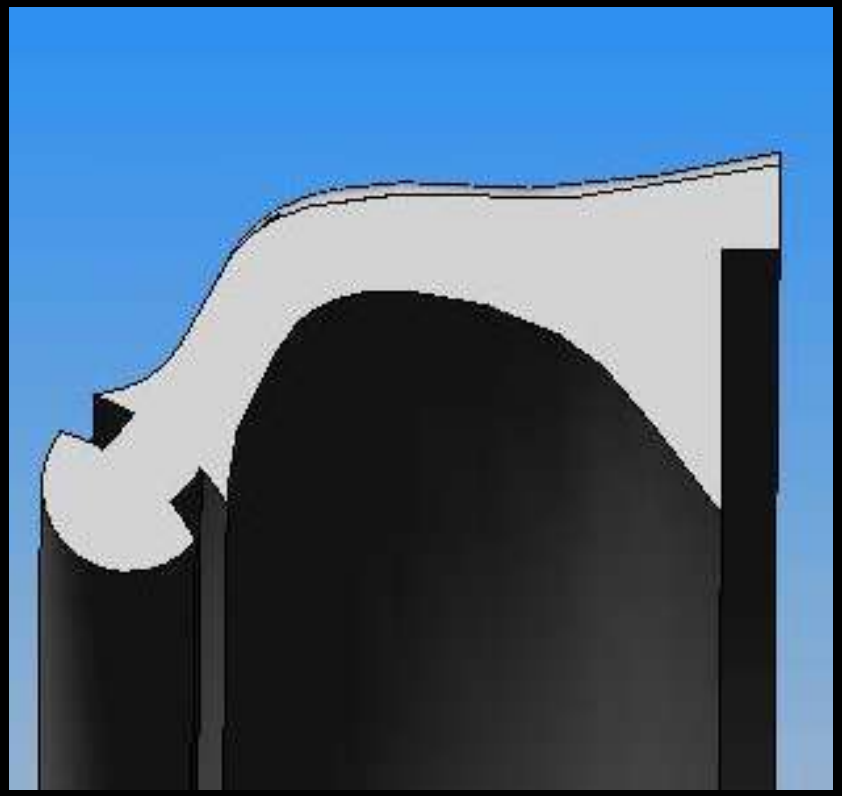
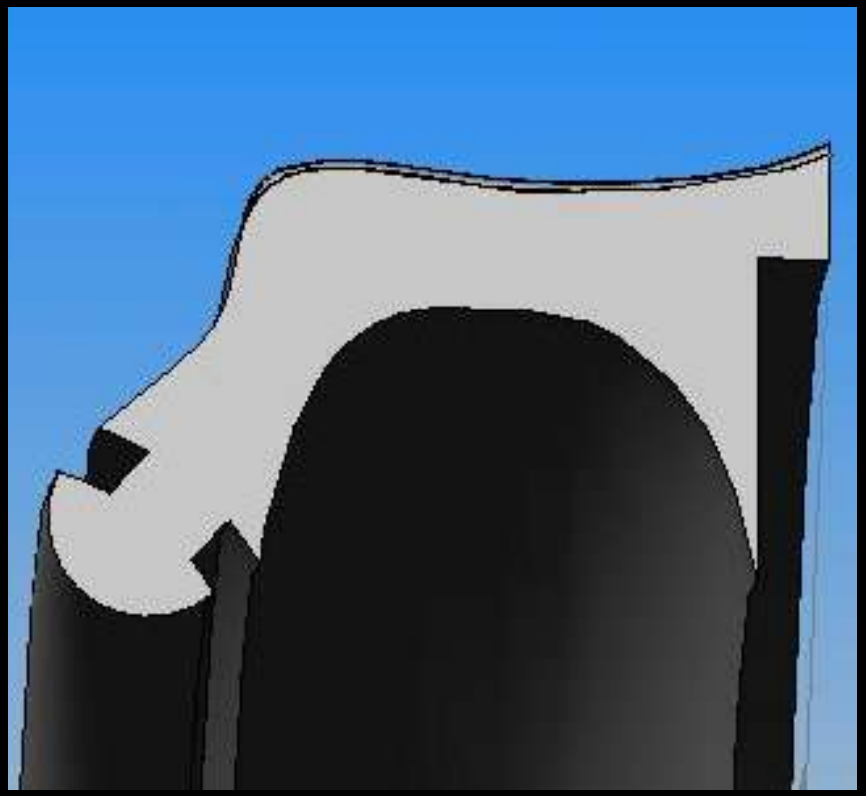
Functional Forward Reach

Functional Reach Downward

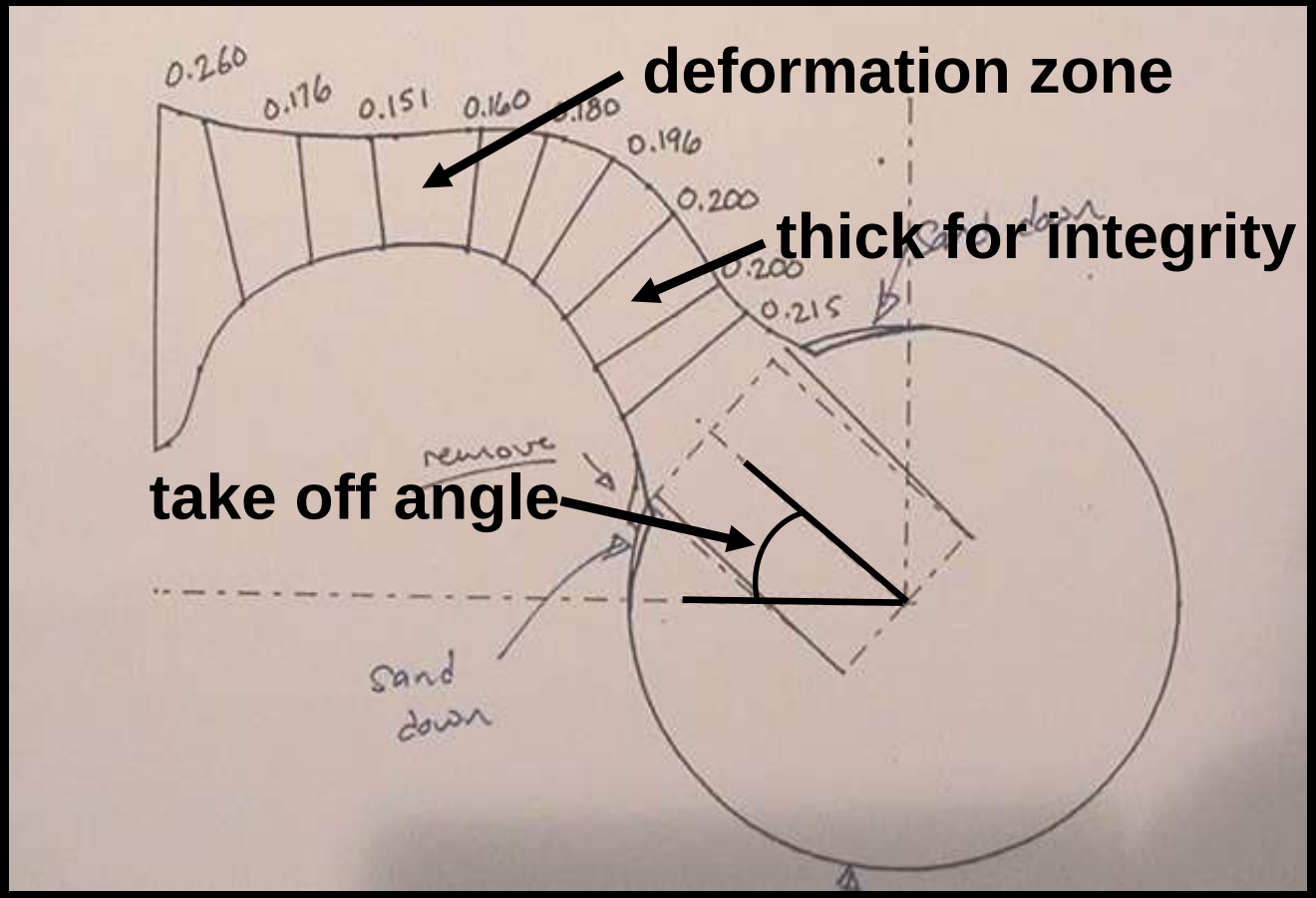
FlexRim – Combining the discrete compliant fasteners into one

The best profiles were fully developed and tested

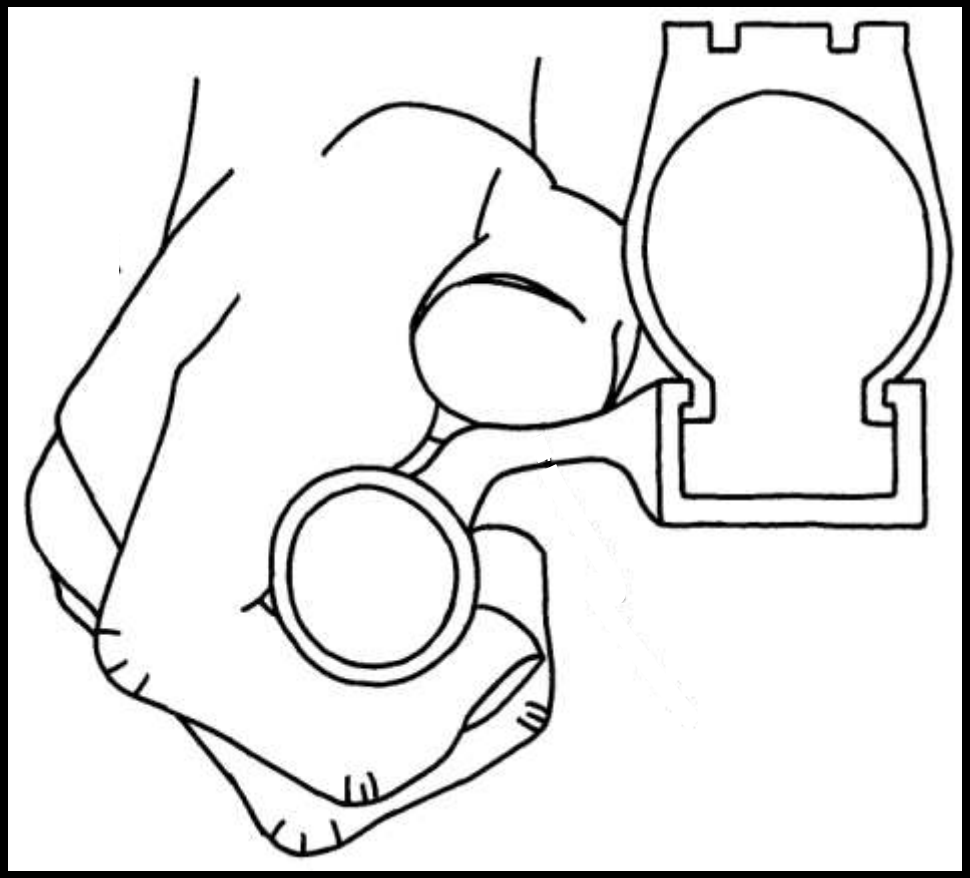




The subtle details of the final profile were refined

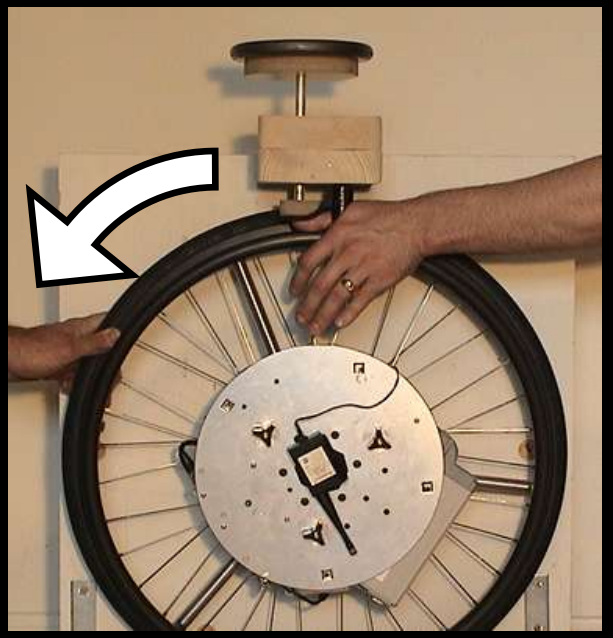


FlexRim Ergonomic Pushrim

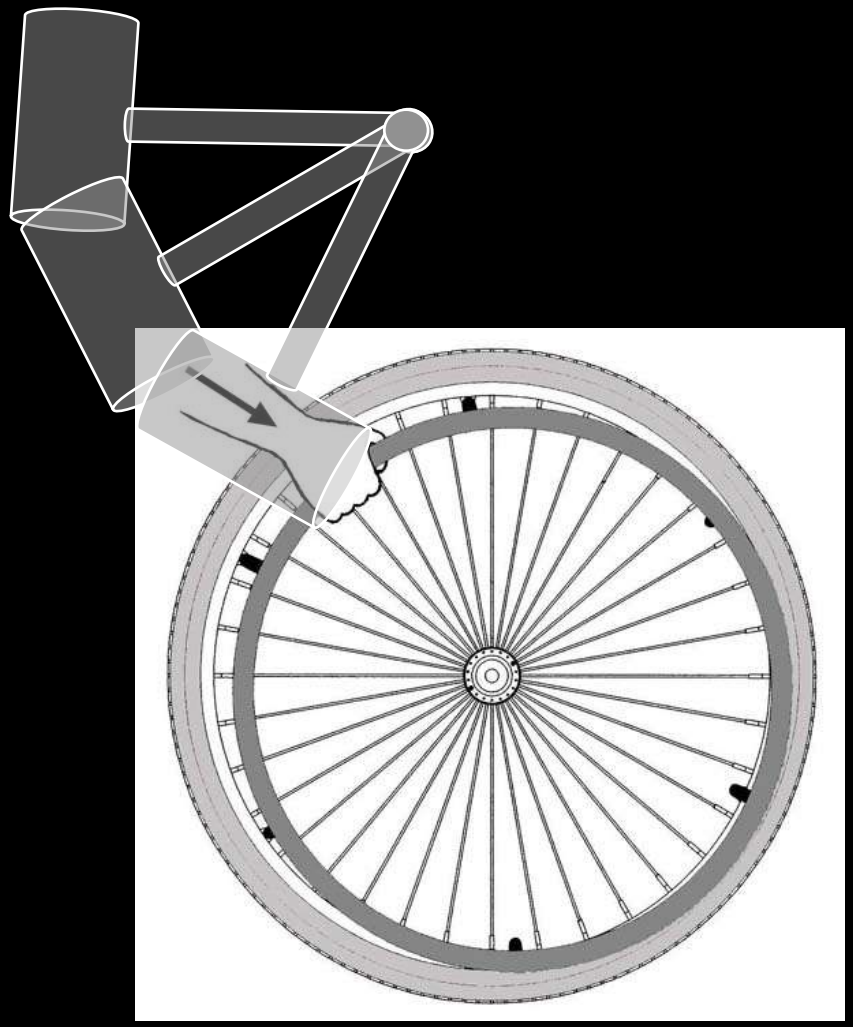


Frictional improvements

Preliminary tests show over a 2x increased frictional coefficient

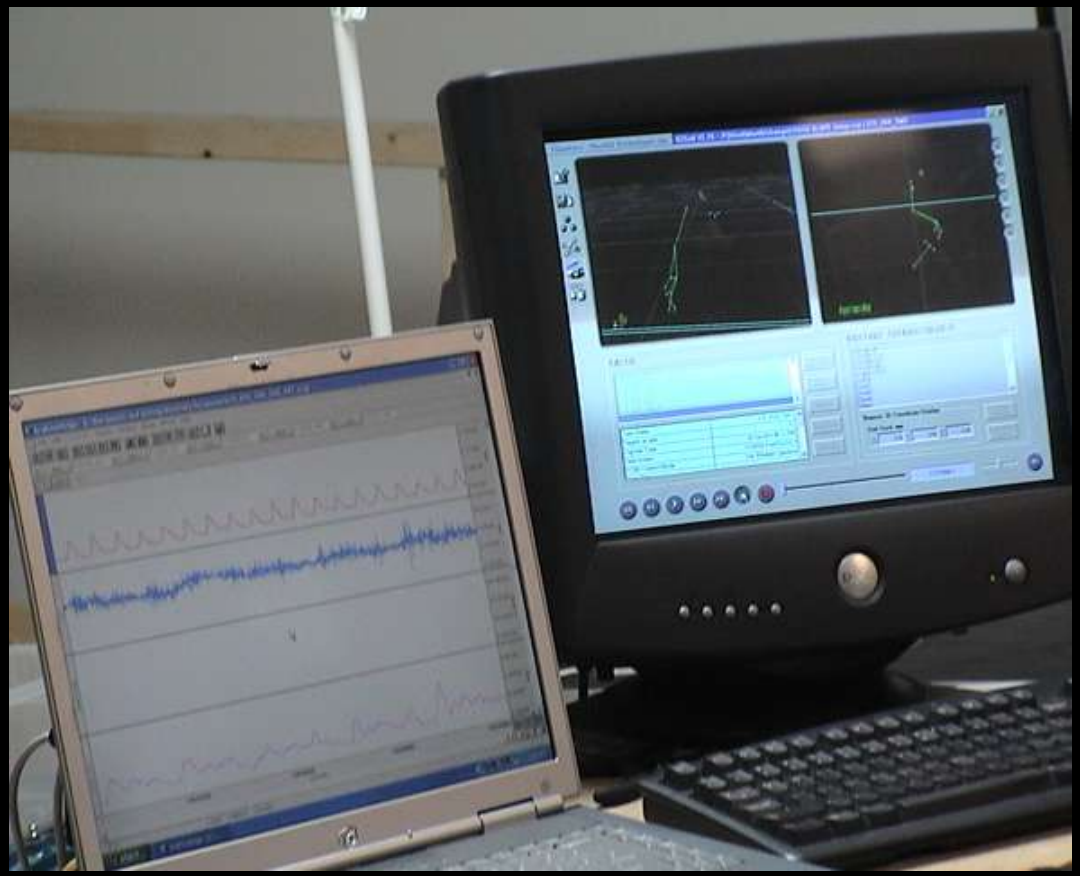


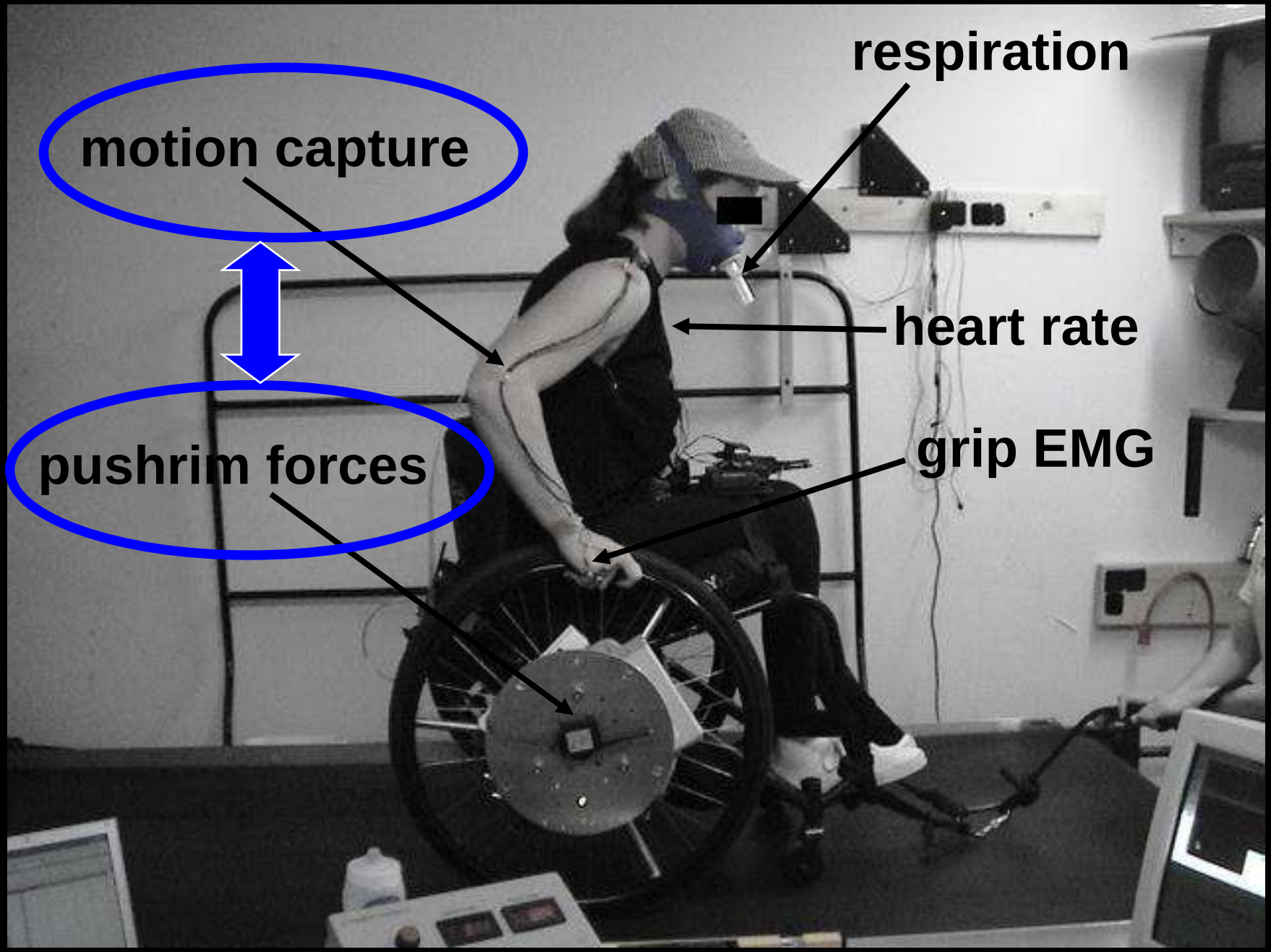
Impact absorption



Applied a 120 lb repetitive load in one place until failure

Subjects are tested over a wide variety of usage environments




respiration
motion capture
heart rate
grip EMG
pushrim forces

Baseline study – FlexRim

FlexRim

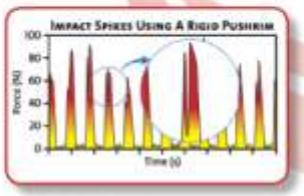
Design

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 ***13% 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 SPINERGY

Advanced Ergonomics

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GripRim

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Benefits of a Universal Design Canoe Seat for Paddler Function

Alida Lindsley, Seanna Kringen,
Peter W. Axelson, Patricia E. Longmuir

Beneficial Designs, Inc., Minden, NV

Greg Lais, Beth Vandehaar,
Michael Passo

Wilderness Inquiry, Minneapolis, MN

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Adaptive Canoe Seating

Available from

Chosen Valley Canoe Accessories

Universal Canoe Seating System Components

Bench Seat with
- Sidewall
- Brackets

Universal Canoe Seating System Components

Pelvic and
Low Back Support

Universal Canoe Seating System Components

- Upper Back and Lateral Thoracic Support

Methods - Endurance

- MedGraphics VO2000 portable metabolic system
- Resting, self-selected paddling, and self-selected pace + 20%

Methods - Strength

- Dynamic power from Concept2 rowing ergometer
- Maximal isometric paddle pull

Lateral Balance Test

Water Egress Testing

Wave Ski

Tools and Technology for Accessible Trails

Beneficial Designs, Inc.
Minden, Nevada

Universal Trail Assessment Process

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.)

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SMARTWHEEL

Key UTAP Information

Length

Grade

Width

Surface

Cross slope

Features & Facilities

UTAP Assessment Team

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UTAP – Implementation Status

- Over 1200 people trained to lead UTAP assessments
- Over 155 trainers to teach UTAP workshops

TrailWare
Station Data Entry

Warning, required station data missing

Park List | Park Info | Trail List | Trail Detail | Segments | Segment Cover | Stations | Features | Reports

Trail Name: Pioneer Segment Name: 1 Seg Pioneer to Mill Date: Apr 22, 2002

Add Station | Finish Entry | Help | Exit TW

Station Distance	Tread Width (in)	X-Slope (pct)	Surface Category	Surface Type	+/- Typ Grade (pct)	Compass Fwd	Compass Back	Max X-Slope Magnitude (pct)	Max X-Slope Length (ft)	Max Grade Magnitude (pct)	Max Grade Length (ft)	MCW (in)	Re-order
0	60	1.9	Firm	Soil	1.5	132	131						
35	60	2.1	Firm	Soil	1.0	146	147						
112	60	1.6	Firm	Soil	1.5	150	151	6.8	8				
149	60	1.4	Firm	Soil	0.0	150	150			9.1			
227	55	1.8	Firm	Soil	-1.0	141	142						
318	55	2.3	Firm	Soil	-1.5	127	127						

2264 **Final Distance**

Blue shading: Fields exported to Trail Explorer or used in Trail Explorer calculations
Yellow shading: Calculated fields, also used in Trail Explorer
Red buttons: Warning - required station data is missing

TrailWare Feature Data Entry

Required feature data omitted

Help | Exit TW

Park List | Park Info | Trail List | Trail Detail | Segments | Segment Cover | Stations | Features | Reports

Trail Name: Pioneer Segment Name: 1 Seg Pioneer to Mill Date: Apr 22, 2002 Re-order

Add Feature

Finish Entry

Feature Distance	T/V Zone	Feature Type	Feature Description	Size L x W x H			U/M	Count/ Qty	End Distance	Remain Tread	Built Feature Access	Action Required	Materials	!!	Addl Info		
0	T	Trailhead	Parking Lot											○	○	go	🗑
0	V	Restroom	Chemical Toilet					1			Yes			○	○	go	🗑
47	V	Picnic Table	Wooden					2						○	○	go	🗑
53	V	Scenic Viewpoint	Mt. Cora						149					○	○	go	🗑
69	T	Root	Multiple Roots	14	5	6	in	5	83	38				○	○	go	🗑
130	V	Bench	Back and armrests	60	18	18	in	1						○	○	go	🗑
199	T	Rock	Small Boulder	13	12	16	in	1		48		Remove		○	○	go	🗑
239	V	Bench	Back and armrests	60	18	18	in	1						○	○	go	🗑
334	T	Waterbar	4 X 4 Plank	4	54	8		1		0				●	○	go	🗑
338	T	Erosion	Center of Trail	10	8	12	in					Monitor		○	○	go	🗑
416	T	Minimum Clearance	Boulder- large, centered in path	40	22	20	in					Remove		○	○	go	🗑
521	V	Bench	Back only	60	18	18	in	1						○	○	go	🗑

Blue shading: Fields exported to Trail Explorer or used in Trail Explorer calculations
Yellow shading: Calculated fields, also used in Trail Explorer
Red buttons: Warning - required station data is missing

High Efficiency Trail Assessment Process

USDA SBIR Phase II

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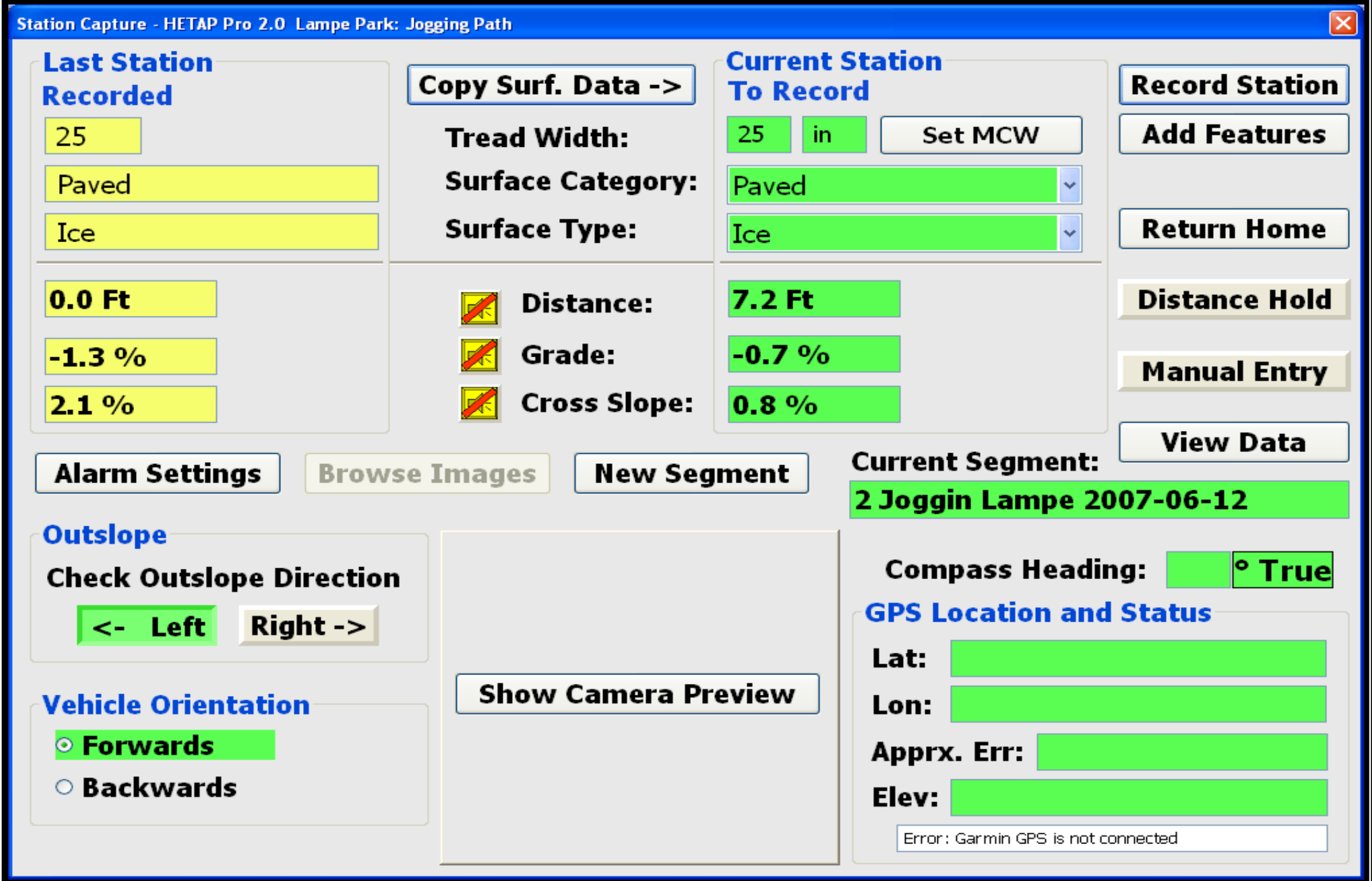
HETAP-Rollawheel


49-K25
MONTANA


Station Capture - HETAP Pro 2.0 Lampe Park: Jogging Path
Last Station Recorded
25
Paved
Ice
0.0 Ft
-1.3 %
2.1 %
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

Feature Capture - HETAP Pro 2.0

Distance: 7.2 Ft

Type:

Description:

Zone

○ Trail Bed ○ Visual

	Distance	Feature Type	E D
1	7.2	Landslide	☐

Record Feature

Stations

Manual Entry

Edit Feature

Copy Feature

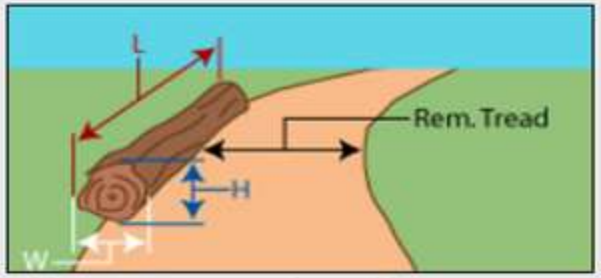
Delete Feature

Dimensions

L W H

Units of Measure: in

Remaining Tread:



Rotational Penetrometer Data

Edit Feature Notes

Quantity: 1

Ending Distance: (to the nearest foot)

☐ End Distance Reminder

Optional Data

Recommended Action:

Materials Needed:

For a Built Feature: Is this feature Accessible?

○ Yes ○ No ◉ This is not a Built Feature

Show Camera Preview

ASTM F 1951–99

- American Society for Testing and Materials (ASTM)
- Standard specification for determination of accessibility of surface systems under and around playground equipment

Rotational Penetrometer

Objective surface measurement device

Draft Standard for firmness with stability measurement under development

Available from Beneficial Designs

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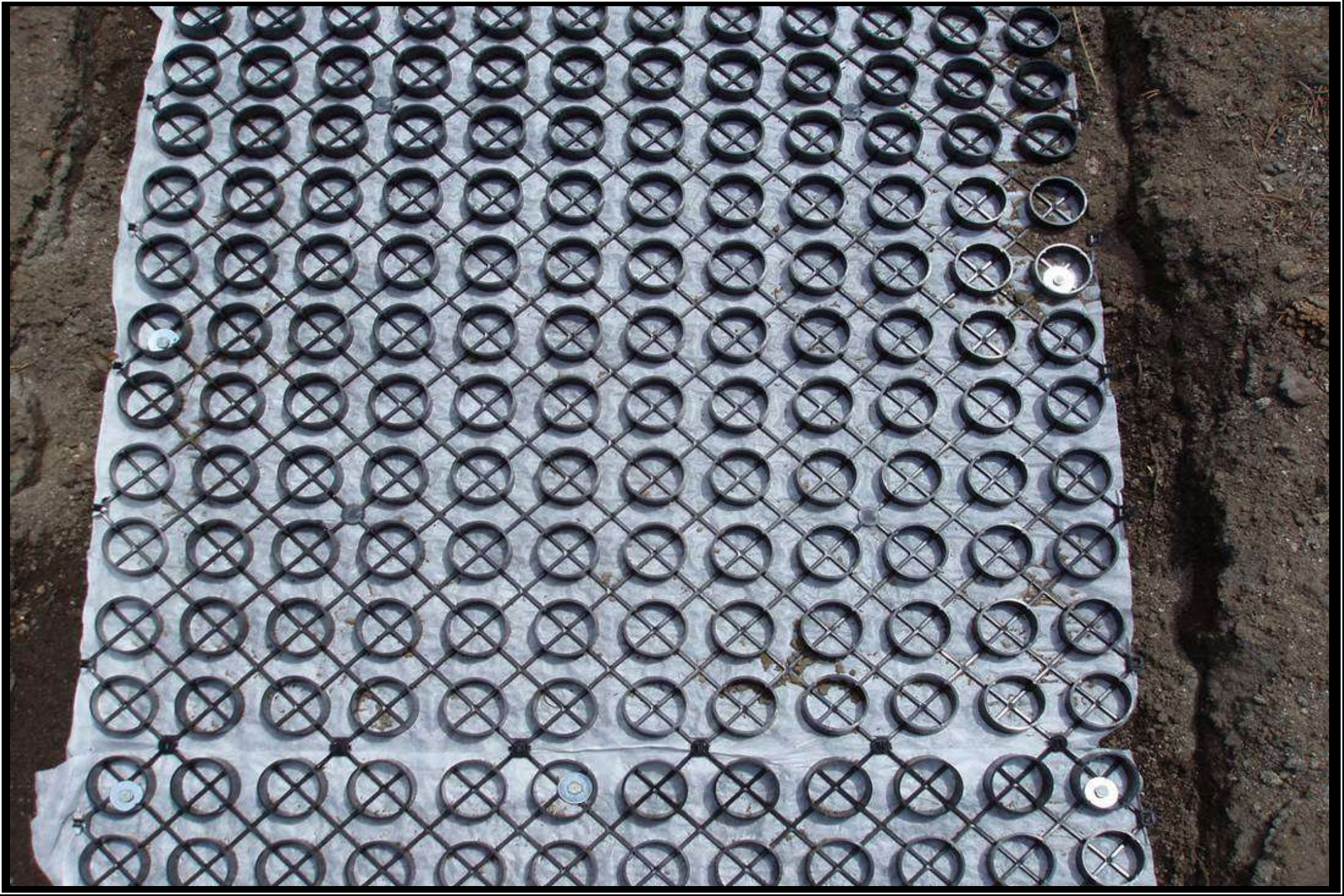
Gravelpave2 Before Installation



Gravelpave2 After Installation

Rotational Penetrometer Readings-Gravelpave 2

Before Application			***After*** Application		
Firmness		Stability	Firmness		Stability
0.18		0.77	0.17		0.37
0.17		0.87	0.17		0.38
0.17		0.77	0.18		0.42
0.18		0.88	0.17		0.35
0.18		0.79	0.18		0.40
0.18	Avg	0.82	0.17	Avg	0.38


Trail Rutting
and Braiding


New Boardwalk
Substructure


Side View


¼ Mile Long


Barrier at
Riverview
Park

Third Inverted Bollard Design

Motorcycle Testing


Electronic
Gate
Barrier

Pedestrian and Motorized Vehicle Trail Traffic Counter

Trail Access Information Sheet

Pioneer

Morgan Grist Mill

Trail Uses


Hiking


No Equestrians


No Bikes

Hazards and Obstructions


Dropoff 10 feet


Vertical Overhanging Rock


Steps 32 Railroad Ties

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

Nevada Recreation Trails (NV NRT)

Beneficial Designs
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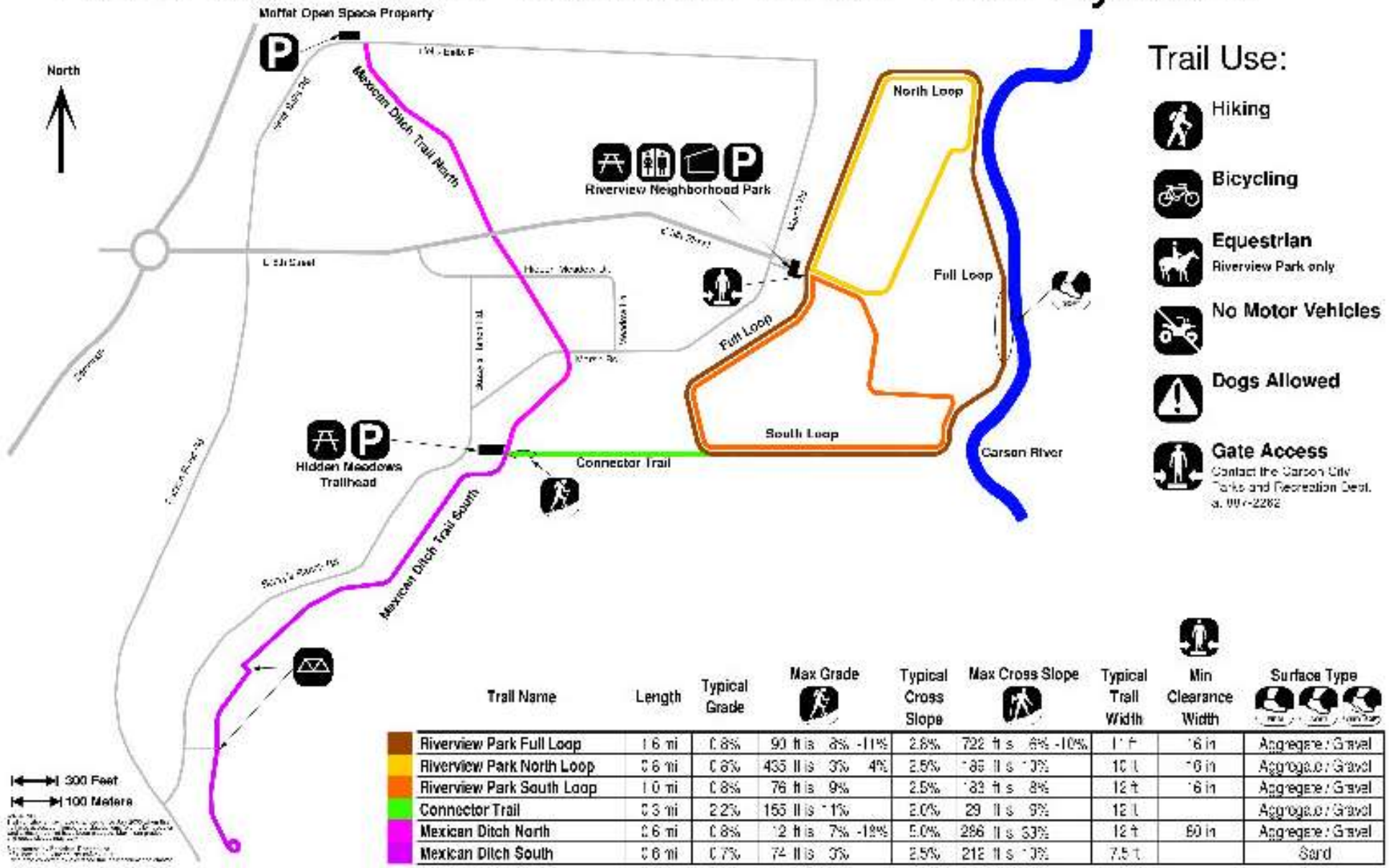
Narrow Trails


Color and Logos

Riverview Park / Mexican Ditch Trail System



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%	10 ft	96 in	Aggregate / Gravel
Riverview Park North Loop	0.6 mi	0.6%	435 ft is 3% 4%	2.5%	185 ft is 3%	10 ft	96 in	Aggregate / Gravel
Riverview Park South Loop	1.0 mi	0.8%	76 ft is 9%	2.5%	182 ft is 8%	12 ft	96 in	Aggregate / Gravel
Connector Trail	0.3 mi	2.2%	155 ft is 11%	2.0%	29 ft is 9%	12 ft		Aggregate / Gravel
Mexican Ditch North	0.6 mi	0.8%	12 ft is 7% -12%	5.0%	286 ft is 33%	12 ft	60 in	Aggregate / Gravel
Mexican Ditch South	0.6 mi	0.7%	74 ft is 3%	2.5%	212 ft is 10%	7.5 ft		Sand


Riverview Park / Mexican Ditch Trail System
Trail Use:
Hiking
Bicycling
Equestrian
Dogs Allowed
No Motor Vehicles
16" Minimum Clearance Width
Trail Access Information
Riverview Park
Full Loop
North Loop
South Loop
Connector Trail
Carson River
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) 1.9 mi 0.8% 30 ft at 8% - 11% 2.5% 722 ft at 6% - 11% 11ft 16 in Aggregate / Gravel
Riverview Park (North Loop) 0.8 mi 0.8% 435 ft at 3% - 4% 2.5 % 189 ft at 10% 10 ft 14 in Aggregate / Gravel
Riverview Park (South Loop) 1.0 mi 0.8% 78 ft at 9% 2.5 % 153 ft at 9% 10 ft 16 in Aggregate / Gravel
Connector Trail 0.3 mi 2.2% 158 ft at 11 % 2.0 % 29 ft at 9% 12 ft 60 in Aggregate / Gravel
Mexican Ditch Trail (North) 0.8 mi 0.8% 12 ft at 7 % - 16 % 5.0% 298 ft at 33% 12 ft 60 in Aggregate / Gravel
Mexican Ditch Trail (South) 0.6 mi 0.7% 74 ft at 3% 2.5% 212 ft at 10% 8 ft 60 in Aggregate / Gravel
Sand


South Fork State Recreation Area
Hastings Trail
Dam Trail
You Are Here
South Fork Reservoir
Scouts Trail
West Shore Trail
Tomera Ranch Trail
Humboldt Trail
No Wake Zone
Hastings Cove
Hamilton Boat Launch
Tomera Cove
Lands Cove
Fisherman's Point
Spider Island
Hunter Island
West Shore Facilities
Coyote Cove
The Willows
Lucky Nugget Road
Lower South Fork Road
North
0 ft
1000 ft
TRAIL USE
Hiking
Bicycles
Equestrians
Dogs on Leash
No Motor Vehicles
LEGEND
Fishing
Parking
Showers
Restroom
Picnic Area
Boat Launch
Amphitheater
Drinking Water
Entrance Station
Tomera Campground
Sanitary Dump Station
Historic Tomera Ranch
West Shore Campground
Road
4WD Road
Secondary Trail
South Fork Reservoir & Ruby Mountains
Dam Trail
West Shore Trail
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
Tomera Ranch Trail 1.3 mi 2.8% 155 ft is 13% - 30% 2.5% 77 ft is 9% - 10% 7 ft 3 ft Soil 0.17 0.17 0.35 0.59
Dam Trail 0.8 mi 1.8% 365 ft is 5% - 9% 1.8% 158 ft is 5% - 7% 10 ft 3 ft Aggregate Rock 0.17 0.17 0.35 0.48
West Shore Trail 1.2 mi 1.1% 97 ft is 3% - 5% 2.4% 506 ft is 6% - 8% 5 ft 2 ft Aggregate Rock 0.17 0.17 0.36 0.45
Scouts Trail 0.1 mi 7.6% 151 ft is 13% - 24% 3.3% 73 ft is 9% - 15% 3 ft 2 ft Soil 0.17 0.18 0.69 1.09
Hastings Trail 1.0 mi 5.2% 129 ft is 25% - 34% 3.6% 232 ft is 10% - 14% 6 ft 2 ft Soil 0.17 0.17 0.35 0.45
Humboldt Trail 2.0 mi 2.0% 24 ft is 15% - 26% 2.7% 251 ft is 8% - 19% 7 ft 3 ft Aggregate Rock 0.19 0.23 0.66 1.01
Round-trip
One-Way
Location of Trail Access Information Signage
WARNING:
Trail conditions may have changed since January 2012 when these trails were assessed. Signage created by Beneficial Designs Inc. using trail data collected by a certified trail assessment coordinator.
Surface Firmness (in)
Surface Stability (in)
Funded by the Nevada Recreational Trails Program


Eisenhower Park
North
0 ft
400 ft
LEGEND
No Bikes
Tower
Bridge
Parking
Restroom
Picnic Area
Bat Houses
Park Entrance
Drinking Water
Shelter/Pavilion
Highest Elev.
Lowest Elev.
Natural Trail
Paved Trail
Road
Red Oak Trail
1233.0 ft
Shady Creek Trail
Hillview Natural Trail
Hillview Paved Trail
Cedar Flats Trail
Live Oak Trail
Yucca Paved Trail
852.6 ft
Milton Dr NW
Trail Access Information
Typical Trail Conditions
Trail Name
Length
Typical Grade
Maximum Grade
Typical Cross Slope
Maximum Cross Slope
Typical Tread Width
Minimum Clearance Width
Surface Type
Red Oak Trail 0.5 mi 7.1% 78 ft is 20% - 29% 5.7% 78 ft is 20% - 22% 48 in 48 in
Shady Creek Trail 0.4 mi 5.4% 86 ft is 10% - 29% 4.4% 145 ft is 12% - 17% 44 in 36 in
Cedar Flats Trail 0.9 mi 4.4% 244 ft is 13% - 21% 3.4% 87 ft is 9% - 10% 86 in 84 in Asphalt
Hillview Natural Trail 2.6 mi 4.8% 353 ft is 21% - 37% 3.5% 231 ft is 15% - 26% 55 in 36 in
Hillview Paved Trail 0.2 mi 4.1% 46 ft is 9% - 14% 3.3% 382 ft is 6% - 10% 96 in 96 in Asphalt
Yucca Natural Trail 0.9 mi 4.6% 160 ft is 15% - 39% 3.7% 150 ft is 13% - 24% 54 in 30 in
Yucca Paved Trail 0.4 mi 2.8% 46 ft is 9% - 11% 2.5% 231 ft is 6% - 8% 96 in 96 in Asphalt
Live Oak Trail 0.1 mi 4.5% 33 ft is 11% - 15% 4.2% 65 ft is 10% - 19% 60 in 60 in
Balance
Metro Health
HDR
WARNING:

McAllister Park

www.trailexplorer.org

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Search Results

TRAIL EXPLORER

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.

home | about us | definitions | trail access information
links | acknowledgments | disclaimer

Develop standards for trail design

- Designing Sidewalks and Trails for Access Part I and Part II
- Access Board Negotiated Rulemaking Committee
- Feedback on US Forest Service guidelines

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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

Surface Transition: Perpendicular Setback Turning Space

Date _____ Data Recorder _____

SURFACE TRANSITION LOCATION

Zone Name: _____ Feature Name: _____

Location Description: _____ Corner of Intersection N S W E NW NE SW SE

GPS - Elevation _____ Lat: _____ Long: _____

Location Category:

- ☐ Corner Diagonal
- ☐ Corner Perpendicular
- ☐ Corner Diag w/out Stop Control
- ☐ Corner Perp w/out Stop Control
- ☐ Midblock
- ☐ Driveway Crossing
- ☐ Alleyway
- ☐ Median Center
- ☐ Median Corner (Porkchop)

SURFACE TRANSITION CHARACTERISTICS/SIDEWALK ELEMENTS

Include all sidewalk elements (i.e. utility pole, sign, etc.) on the drawing to indicate their position.

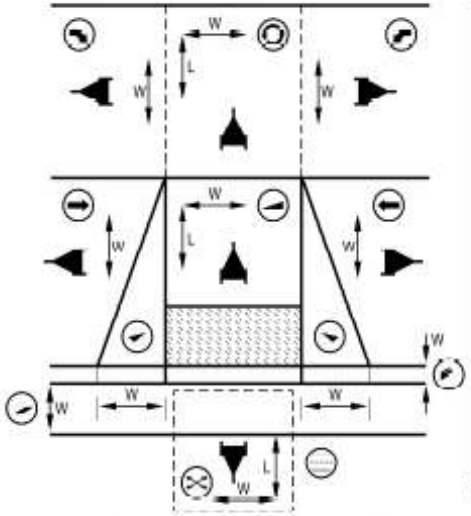
_____ _____ _____

Digital Image taken – frame # and description _____

- ☐ Yes ☐ No Is the Curb Ramps Cross Slope Warped to meet the Roadway Grade?
- ☐ Yes ☐ No Is the Grade of the Curb Ramp Cut through, built up or does it meet the curb at right angles to the curb?
- ☐ Yes ☐ No Are the Grade Breaks at the top and bottom of each surface perpendicular to the direction of Ramp Run?
- ☐ Yes ☐ No Are all surfaces Planar with NO Grade Breaks?
- ☐ Yes ☐ No Are all the surface slopes that meet at grade breaks flush within 1/4 of an inch?

If No, Explain: _____

Note: Record any surface height transitions over 0.25 inches using a profile gauge. Trace the transition on the back of this form, then indicate the location on the drawing.



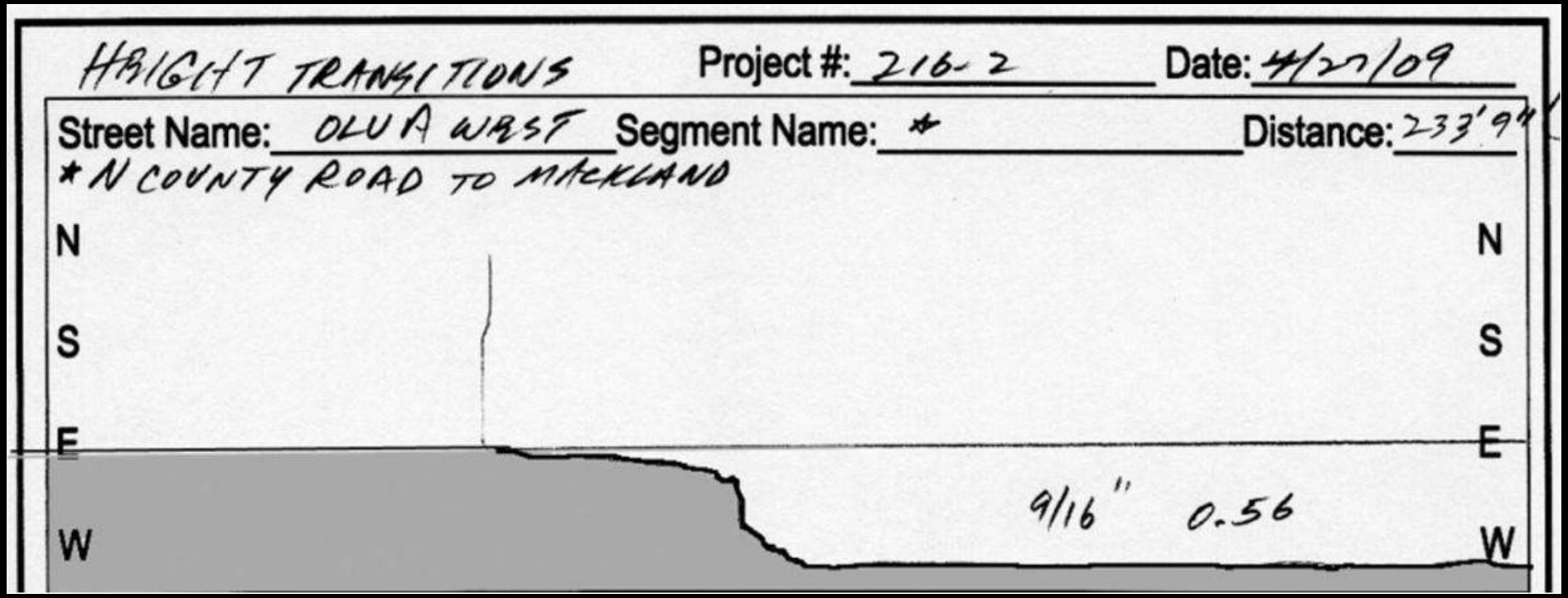
	Length	Width	Grade	X-Slope	Surface
Curb Ramp					
Turning Space					
Is the Turning Space constrained at the Back of the Sidewalk? Y / N					
Setback Approach R					
Direct Approach R					
Flare Right			M		
Flare Left			M		
Direct Approach L					
Setback Approach L					
Detectable Warning					
Curb			M		
Gutter			M		
Roadway					
Clear Space					

Draw a line through the row of any component that does not exist for this feature.

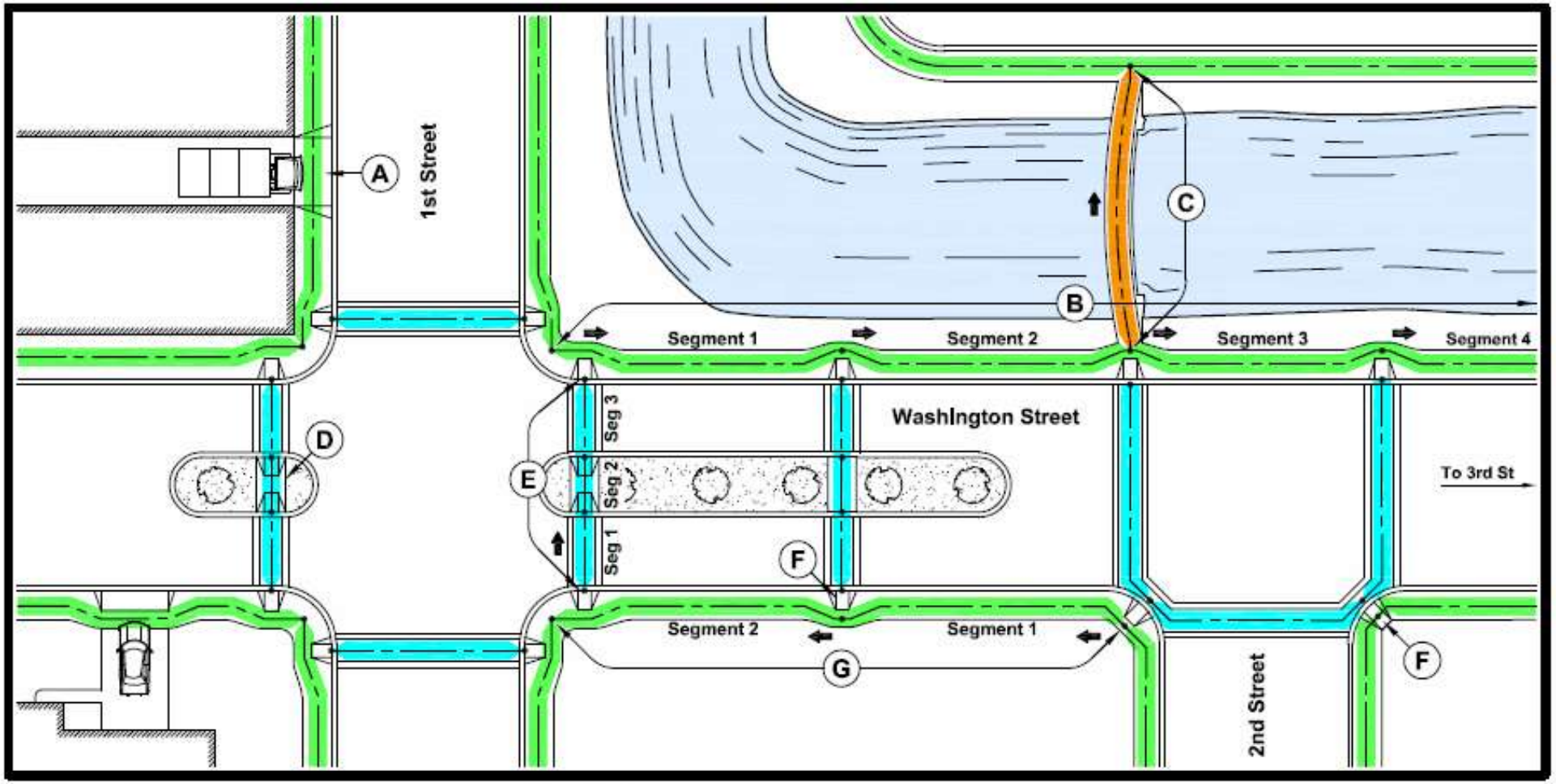
HEIGHT TRANSITIONS Project #: 216-2 Date: 4/27/09

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

*N COUNTY ROAD TO MACKLAND



Pedestrian Zones in the Public Right-of-Way



Legend

- Pedestrian Crossing Zone
- Sidewalk - PCP Zone
- Structure - PCP Zone
- Segment (Best Path of Travel)
- Direction of Assessment Path

Key Notes

A- Driveway/Alley Crossing Associated to Sidewalk Zone
B- Sidewalk Zone: Washington St North side from 1st St to 3rd St
C- Structure Zone; Pedestrian Bridge on West Side of 2nd St 5ft North of Washington St
D- Median Surface Transitions Associated to Pedestrian Crossing Zone
E- Pedestrian Crossing Zone; Crossing Washington St to the North on the East side of 2nd St
F- Surface Transition Associated to Sidewalk Zone
G- Sidewalk Zone; Washington St South Side from 2nd St to 1st St

North

Wheeled Instrument Sensor Package (WISP)

Three wheeled data collection cart

Rear Wheel Distance Encoder with resolution of 0.1 feet

Digital Measuring Wheel

- Wireless Range of 60 meters
- On-Device Field Collection Prompts
- Measurement resolution of 0.1 Inches (1 mm)

Digital Height Measuring Device

- Same Range and similar Automatic population of Data
- Measure vertical distances from Zero to 44 inches
- Measurement resolution of .01 inches (0.1 mm)

Prowap - prowap.sqlite

File Settings Calibration Developer

Stations

Distance	Grade	X-Slope	Tr
159.63 ft	4.1%	4.2%	60
168.47 ft	3.2%	4.1%	60
171.71 ft	3.0%	7.7%	60
176.81 ft	4.2%	2.3%	60
180.45 ft	8.3%	3.7%	60
183.88 ft	7.8%	4.6%	60
188.69 ft	4.5%	6.1%	60

Open Station Grid

Running Features

Start	Length	Type

End Feature

	Previous	Live	Current	
Distance	188.69 ft	192.91 ft		Feet
Grade	4.5%	8.2%		
Cross Slope	6.1%	7.5%		
Tread Width	60.0 in	→		

Previous Surface: Concrete

Current Surface

Previous Image

Vehicle Orientation

Backward Forward

Positive Drainage Direction

← →

Features Segments New Feature Capture Record Close

Grade	X Slope	Latitude	Longitude	Elevation	Satellites	HDOP
Offline	Offline	Offline	Offline	Offline		

High Contrast Tree **Bold** Zoom

PROWAP

Database View Toolbox Calibration Administrator Developer

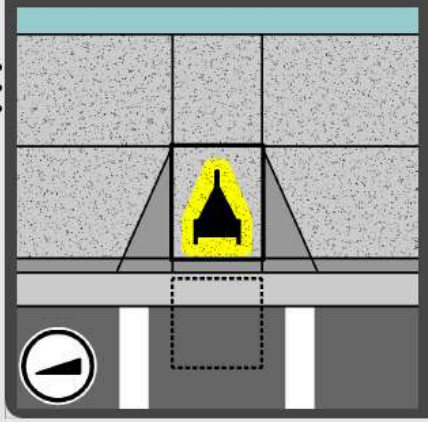
Town of Minden › Esmerelda Ave S Side from 5th St to 6th St › New Segment › 6751 Collection

Data Tree

- ...
- Town of Minden
  - Esmerelda Ave S Side f
  - 6th St E Side from Esm
- Test/Sample Data
- Town of Gardnerville
- Minden BK
- Old Data

Field Collection

Position the cart near the center of the surface and record the Grade and Cross Slope values.



Curb Ramp\Grade

8.3%

PROWAG	Min 5%	Max 8.3%
ADA 2010	Min 5%	Max 8.3%
CBC	Min 5%	Max 8.3%

Curb Ramp\X-Slope

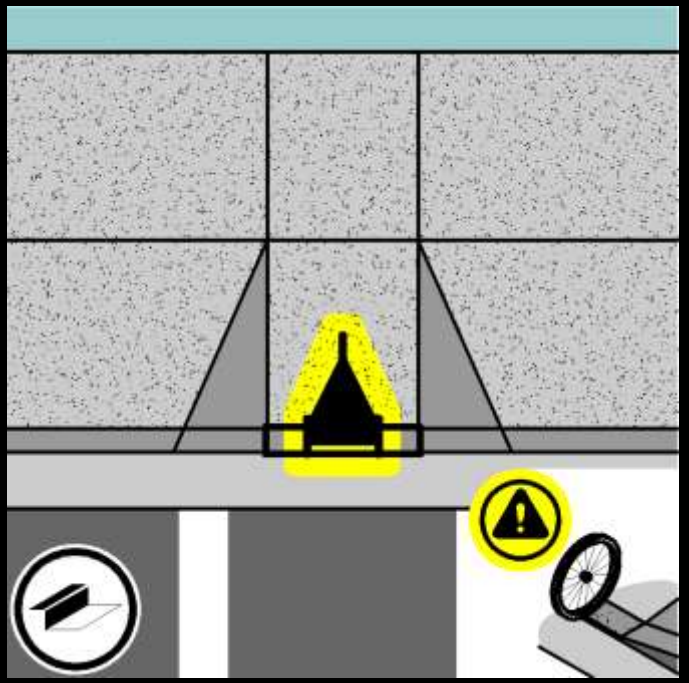
2.0%

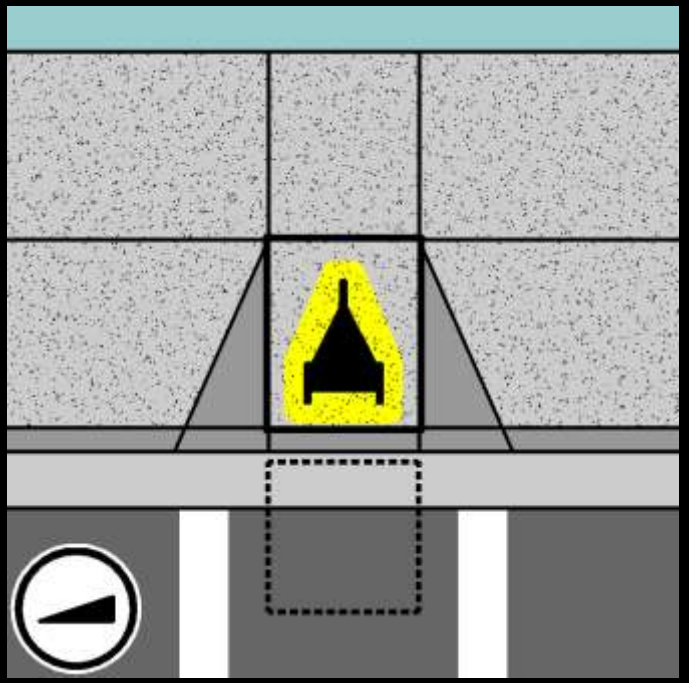
PROWAG	Max 2%
ADA 2010	Max 2%
CBC	Max 2%

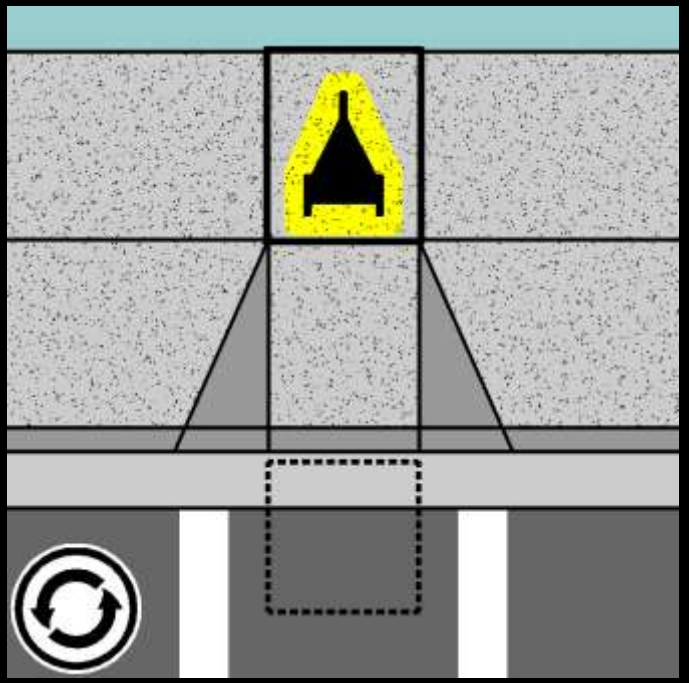
Your Comments

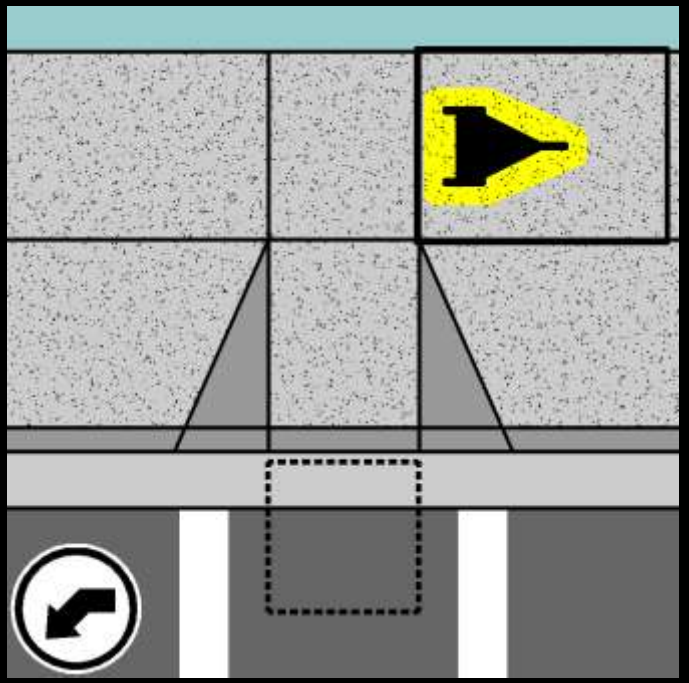
Additional Info | Components | Page 8 of 23 | Close

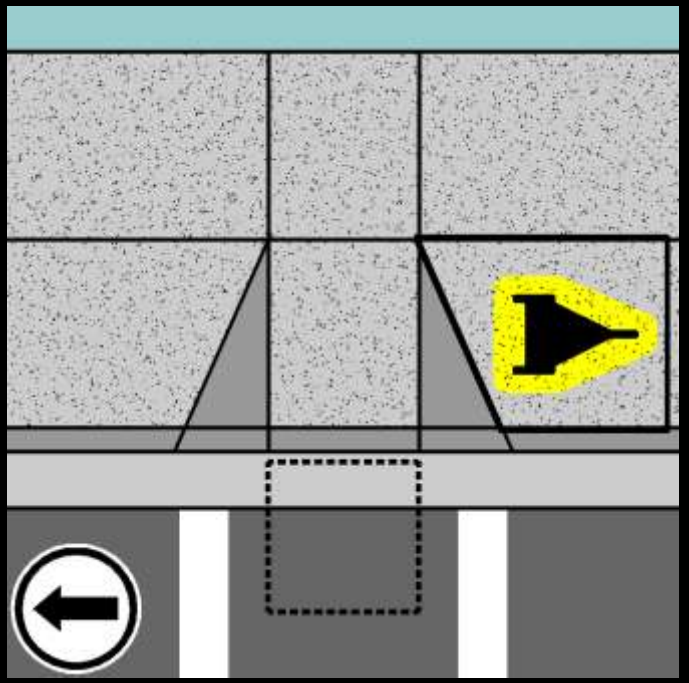
Grade	X-Slope	Latitude	Longitude	Elevation	HDOP	Satellites	WAAS
8.3%	2.0%	Latitude	Longitude	Elevation	HDOP	Satellites	WAAS

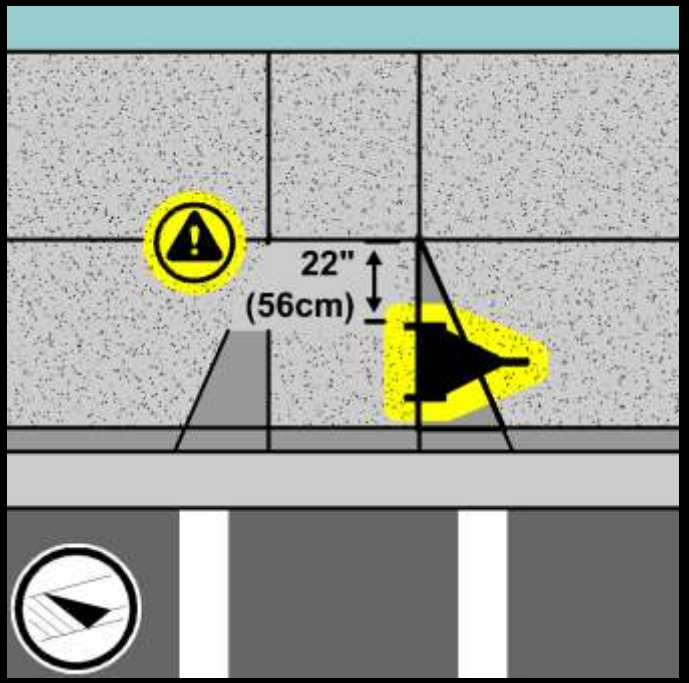


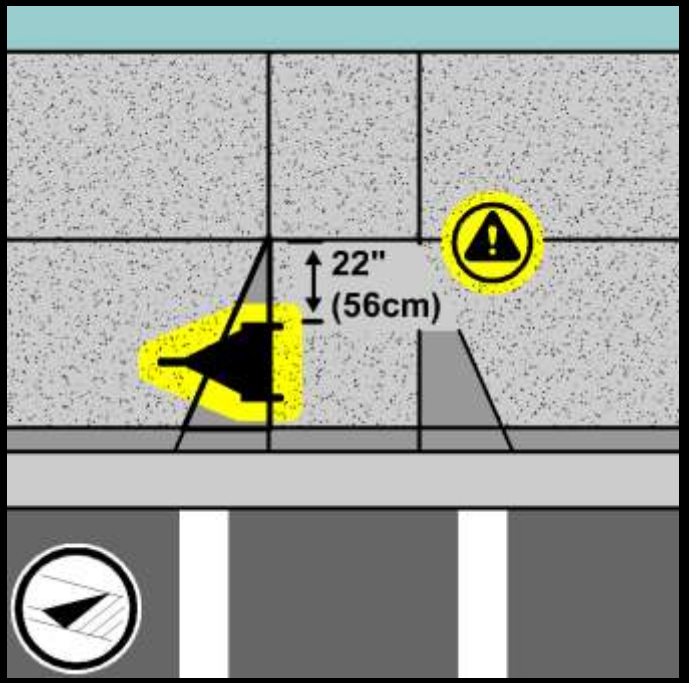


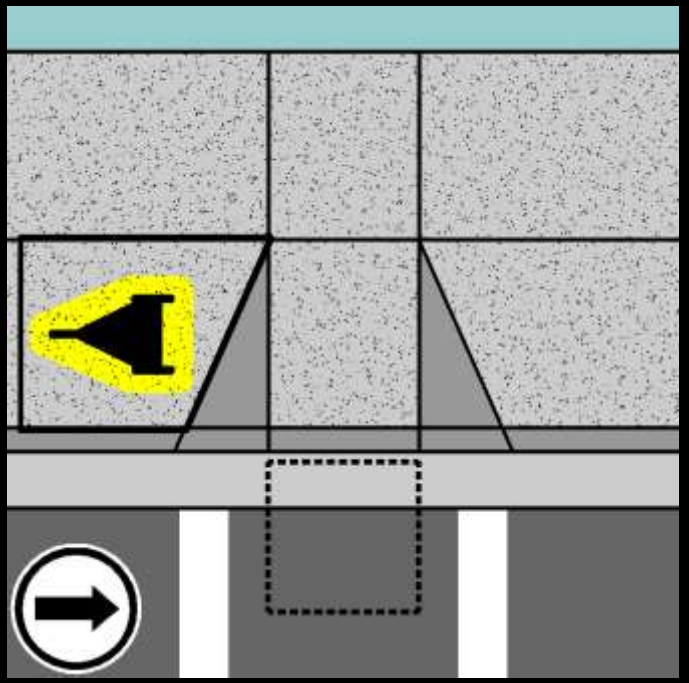


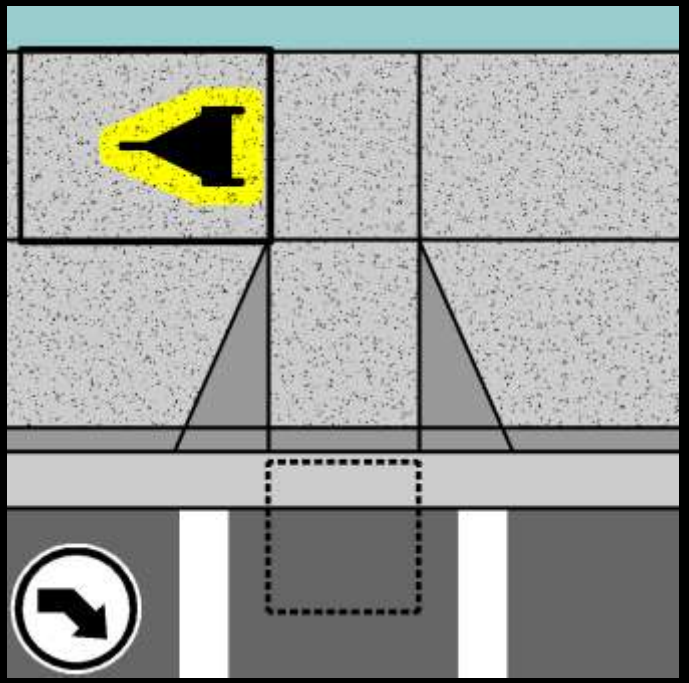


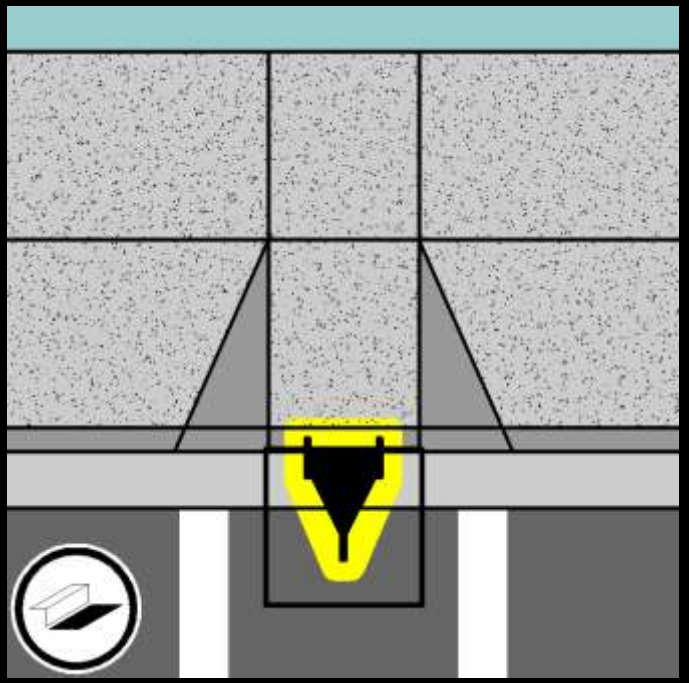


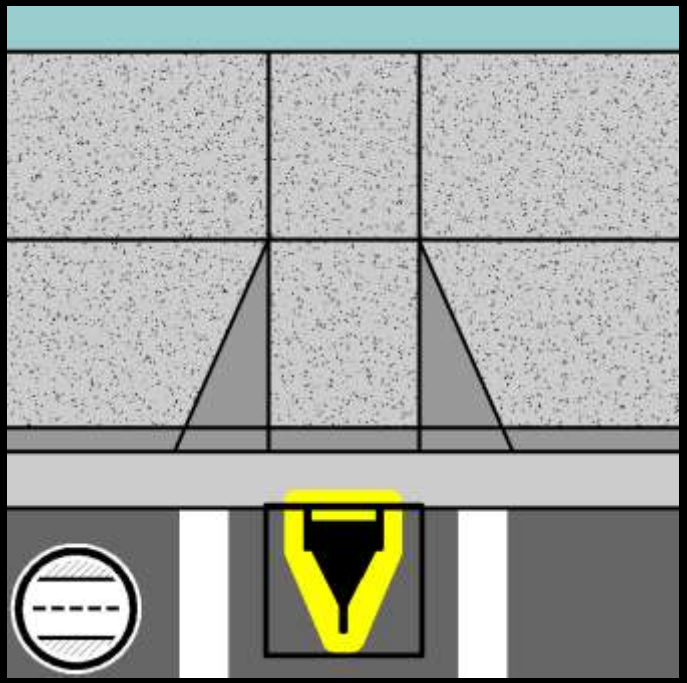

22"
(56cm)


22"
(56cm)





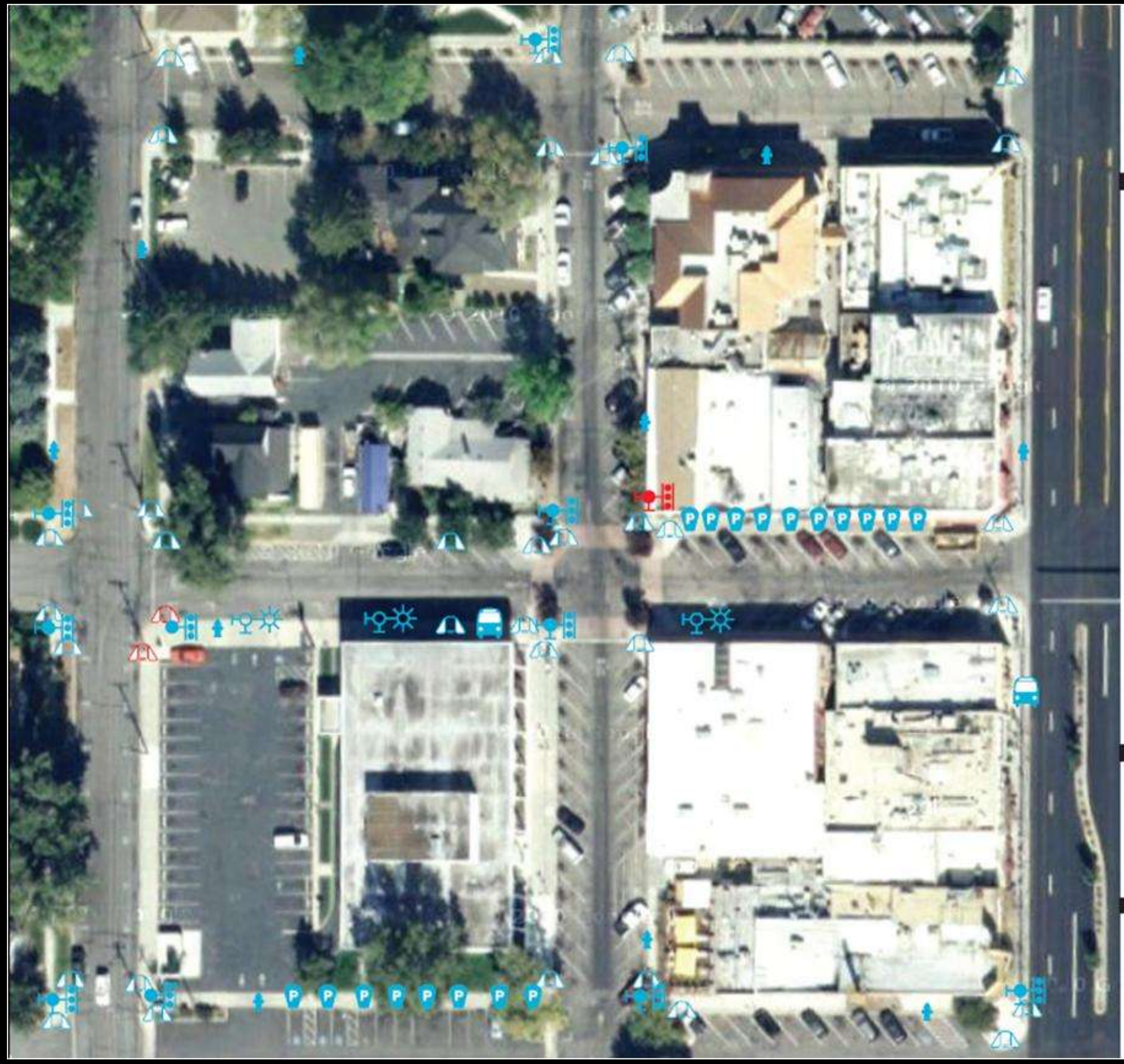




Data Export Formats Supported

SQL data structure
Excel Spreadsheet
Rich Text Format (CSV)
Directly into a Geodatabase

PROWAP Stroll Data 2012-01-04



North

- Parking Meter
- Fire Hydrant
- Bus Stop
- Curb Ramp Perpendicular
- Traffic Light 1 Accessible Signal
- Traffic Light 2 Accessible Signal
- Street Light 2 Accessible Signal
- Feature not in compliance with ADA Draft Guidelines

Image of Carson City for illustrative purposes only. Data does not represent actual collected data.

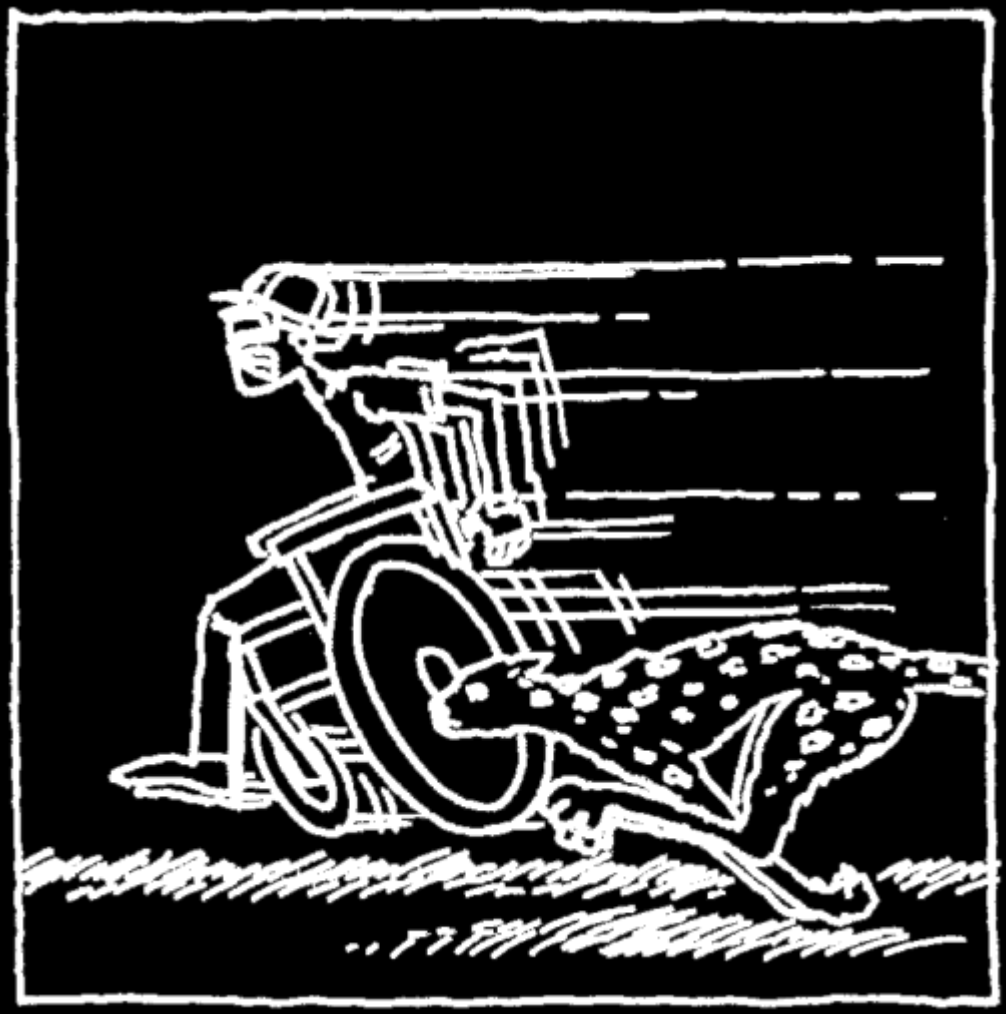
Beneficial Designs Inc.

The Manual Wheelchair Training Guide

1.2 Set Up and Adjustment

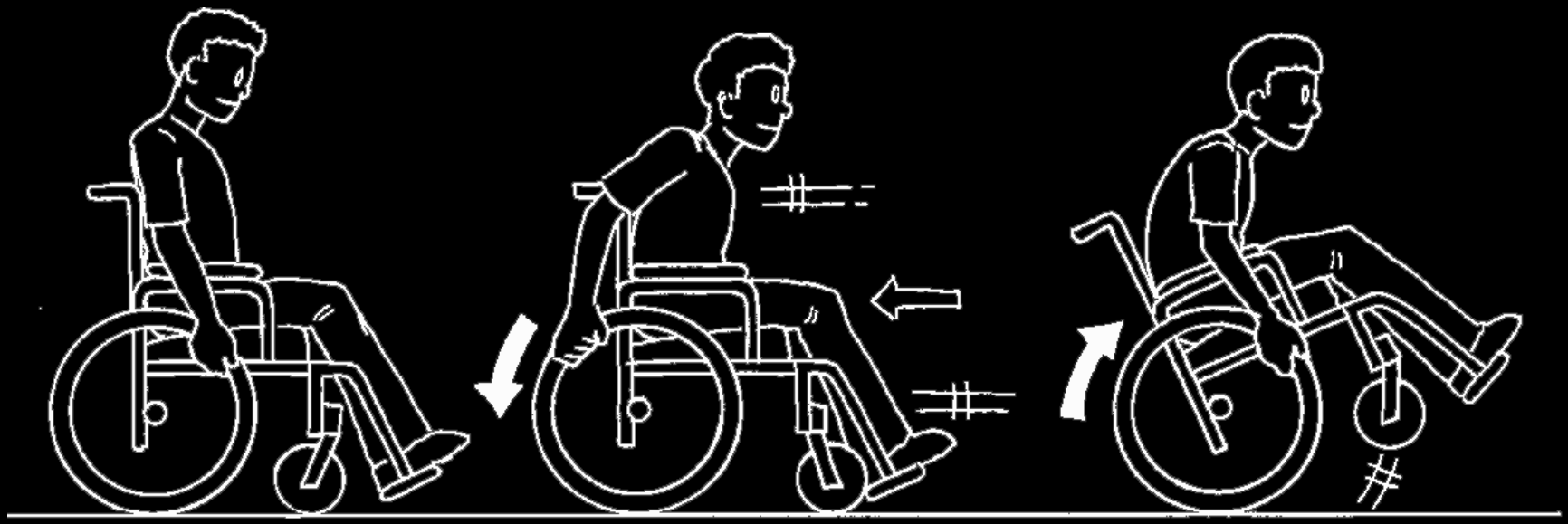
1.4 Learning Your Limits

1.8 Propelling Your Wheelchair

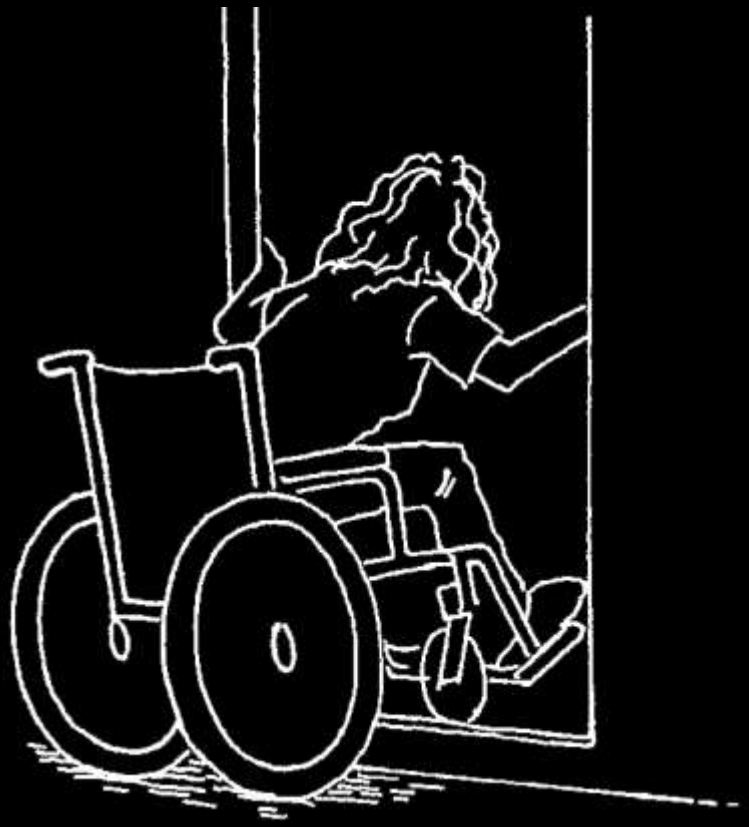


1.9 Wheelies

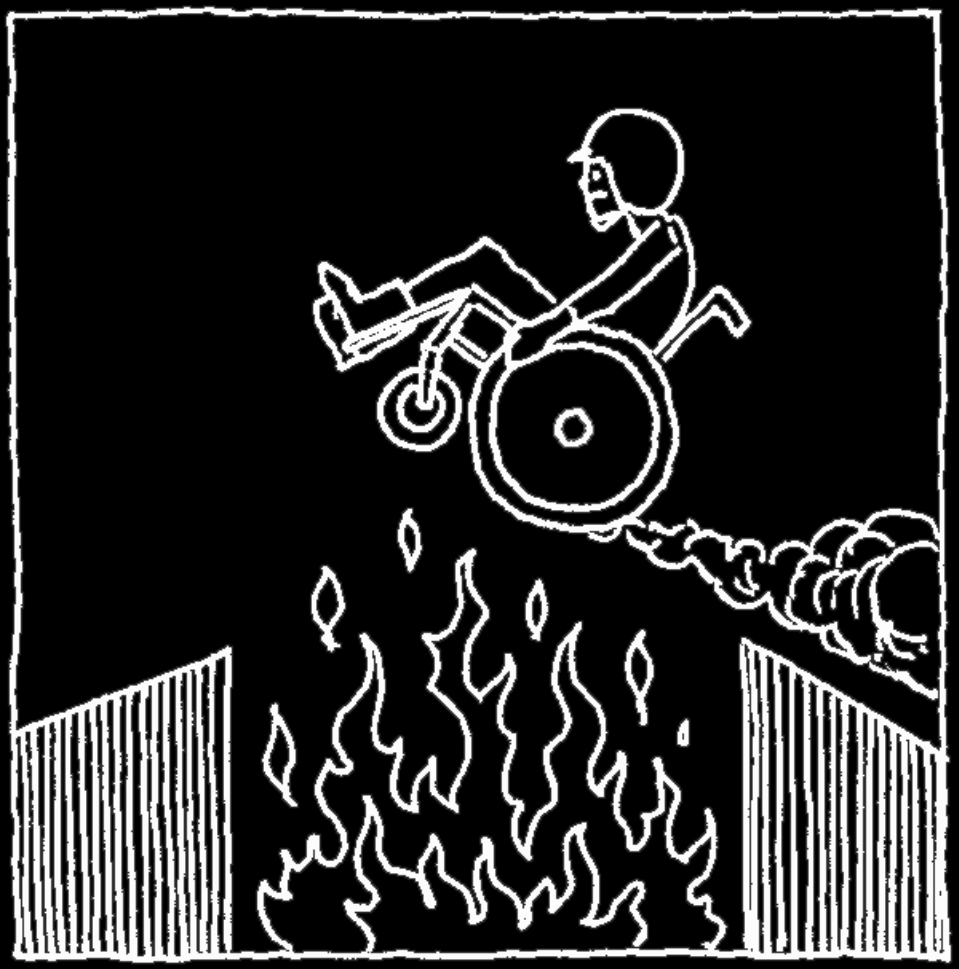
1.9 Wheelies – Popping a Wheelie



2.2 Thresholds and Obstacles



2.5 Ramps

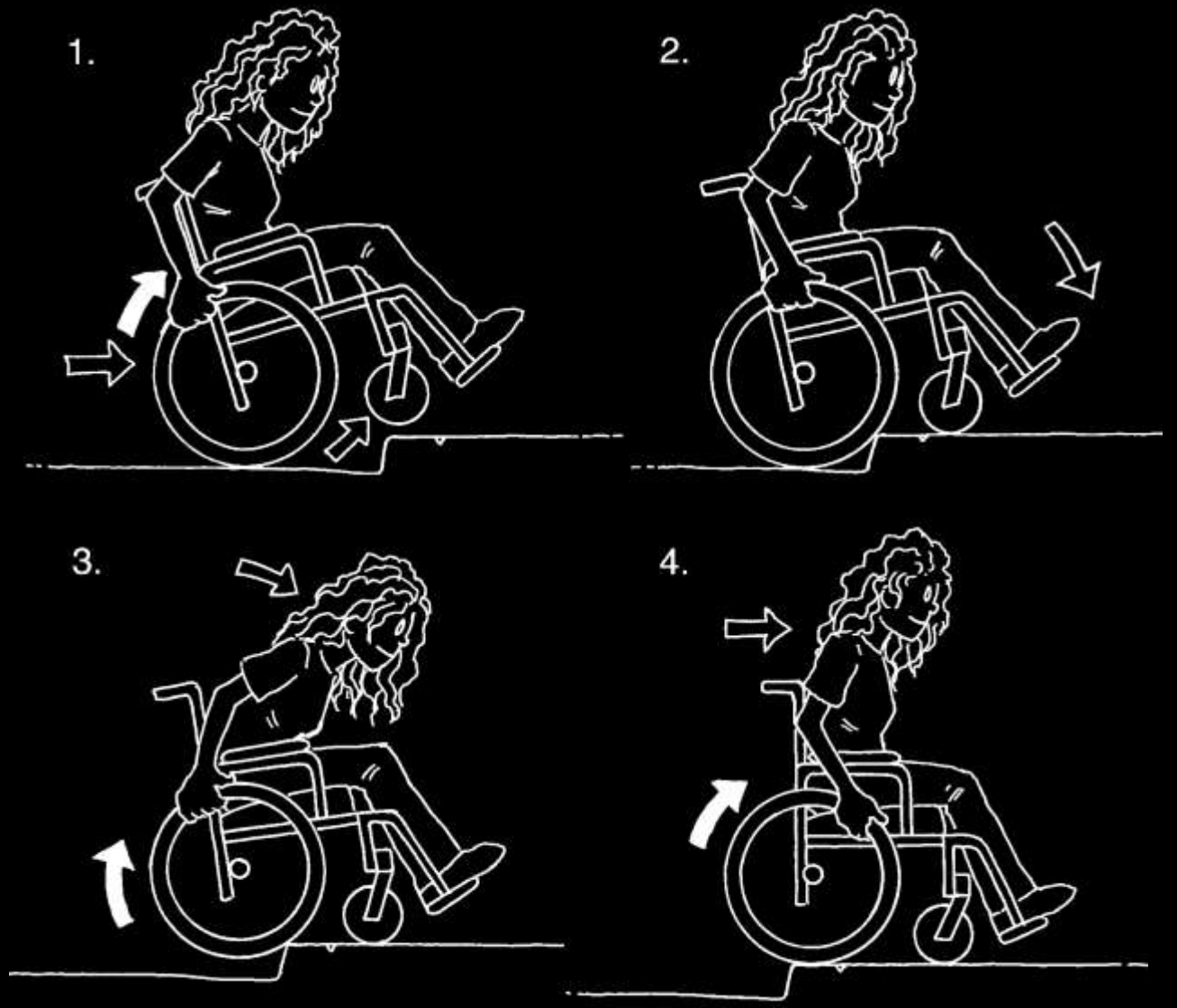


2.7
Curb Cuts

2.8 Curbs

Forward

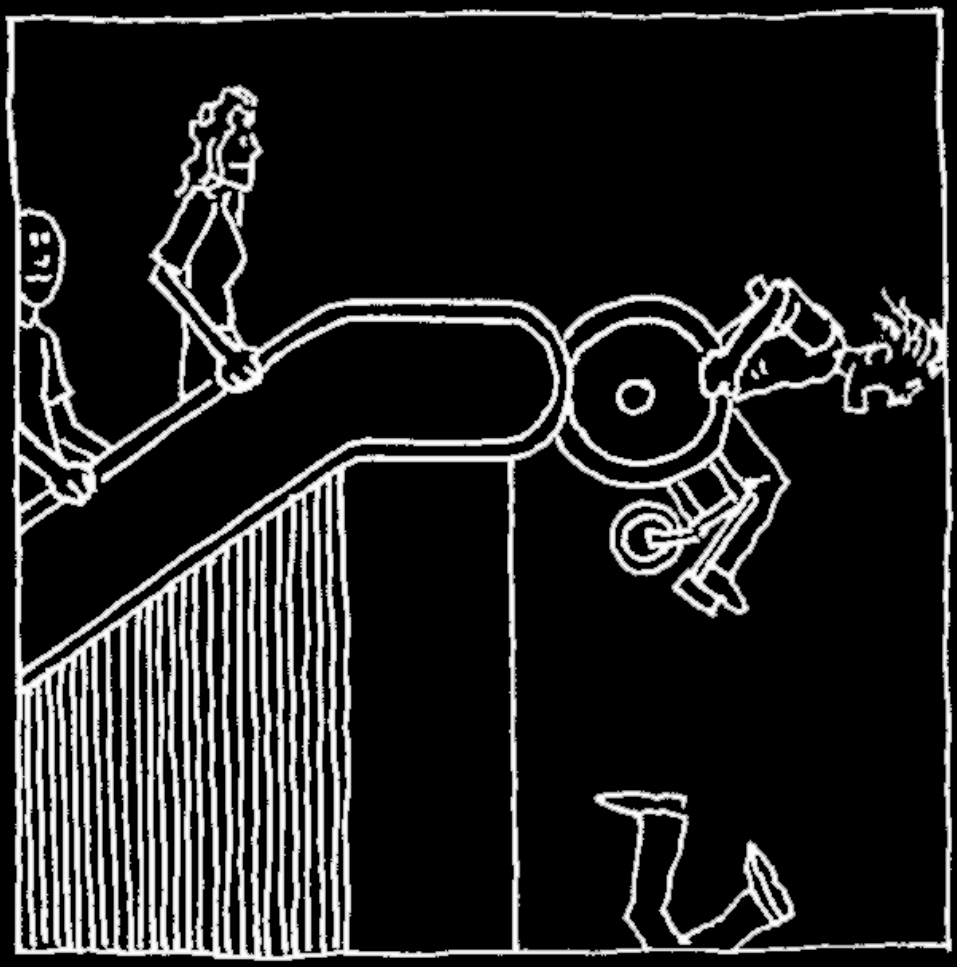
Popping a partial wheelie



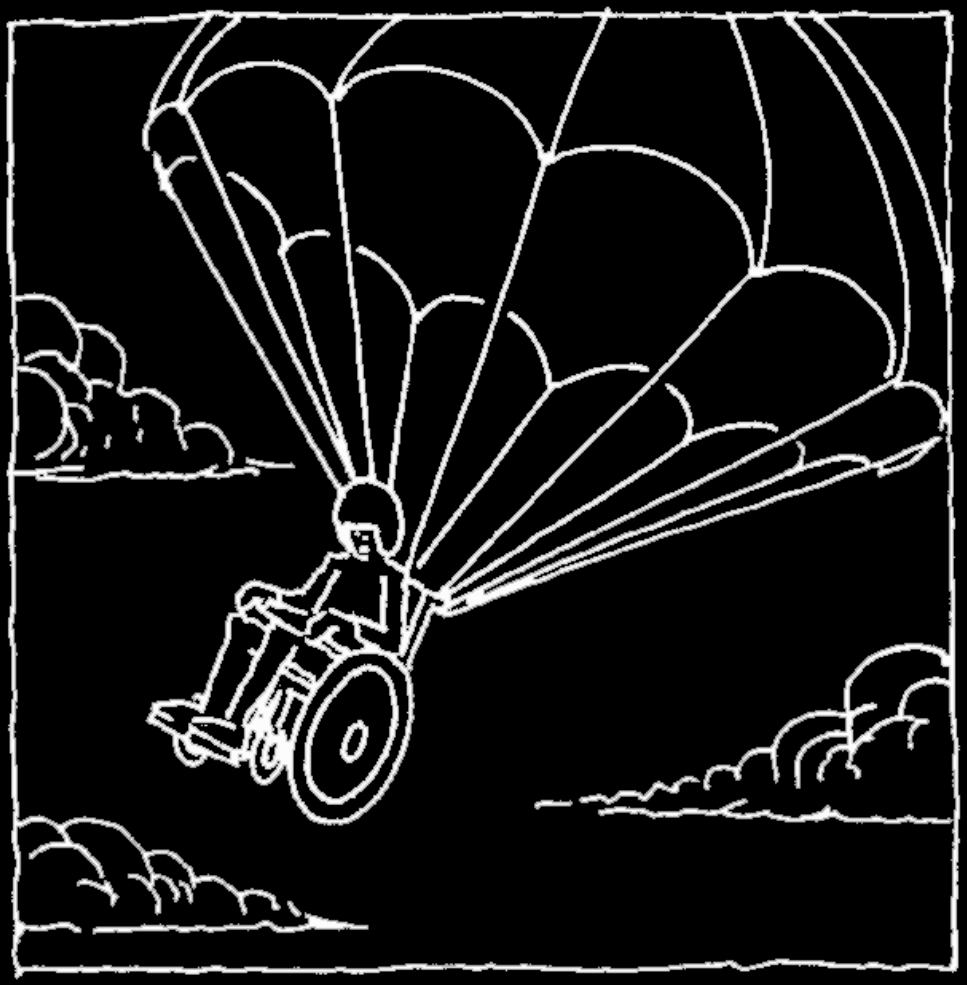
2.8 Curbs

Getting a push from an assistant

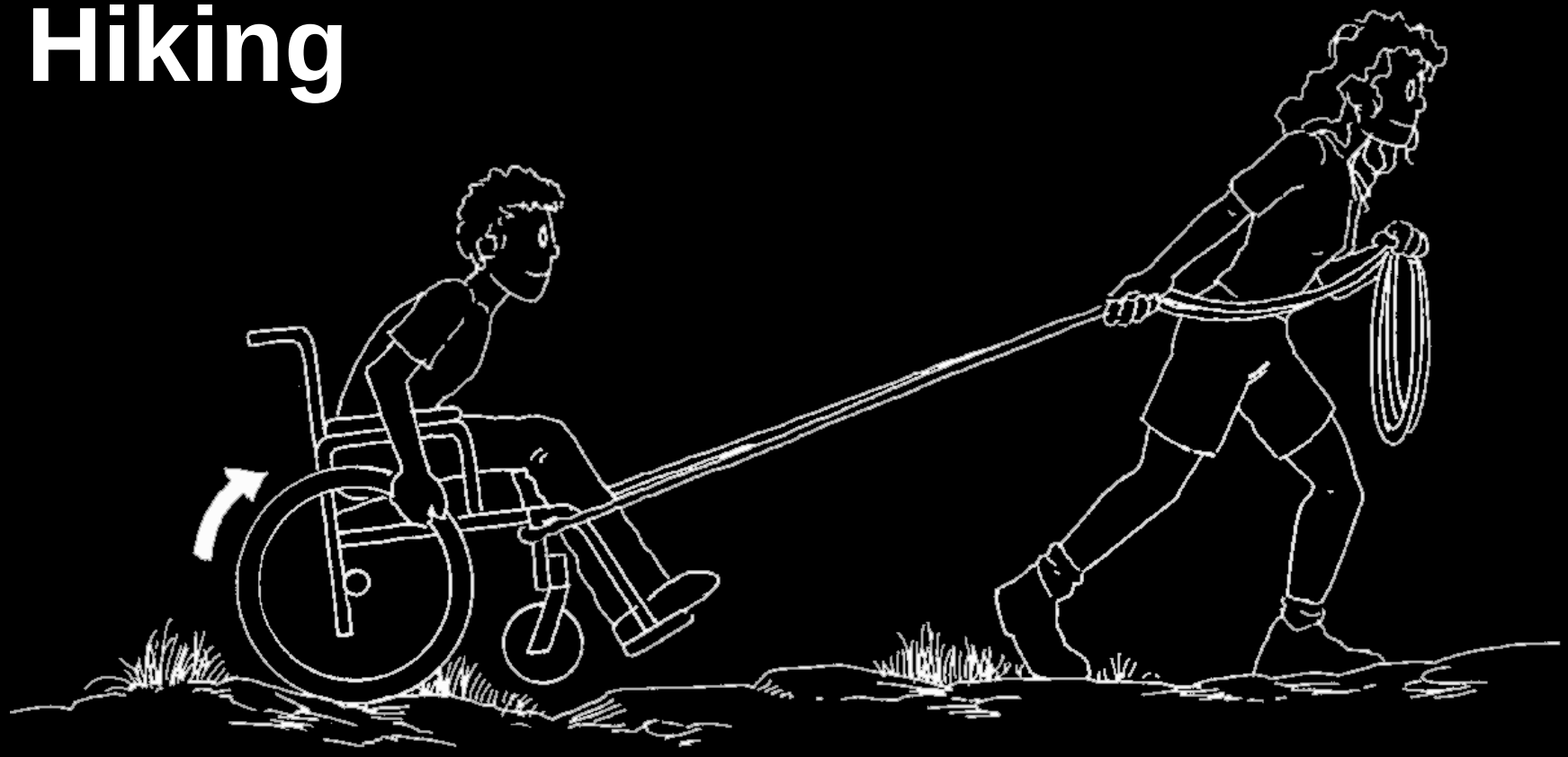
2.11 Escalators



3.2 Evacuation Procedures



4.4
Hiking



Appendix B
Accessories

Wheelchair Standards

Volume 1: Requirements & test methods for wheelchairs

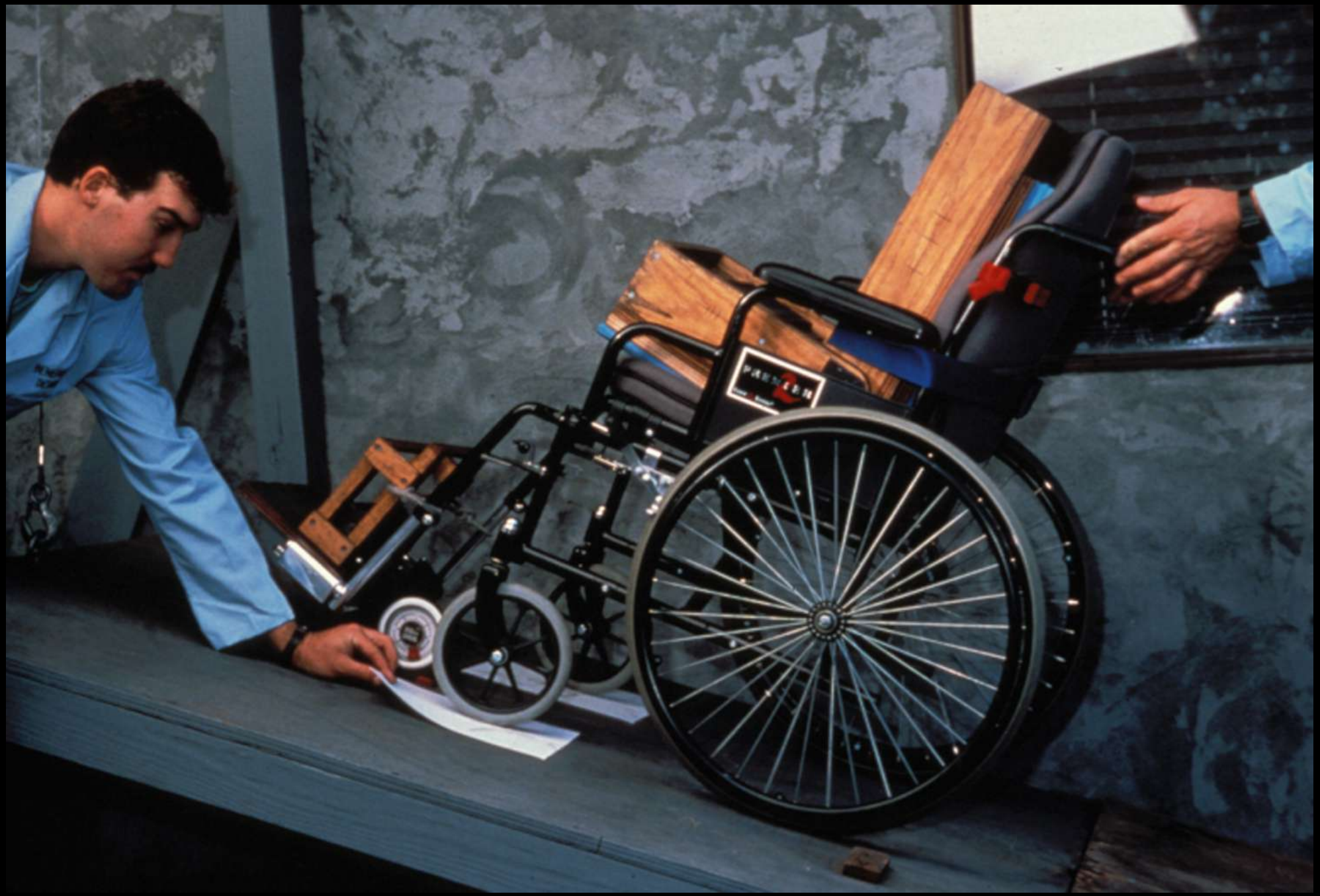
Volume 2: Additional requirements for wheelchairs with electrical systems

Volume 1: Wheelchairs

- Nomenclature, tems & definitions
- Static stability
- Overall dimensions
- Seating dimensions
- Static, impact & fatigue strength
- Test dummies
- Coefficient of friction
- Information disclosure
- Resistance to ignition
- Stand-up type w/c’s
- Set up procedures

Volume 2: Wheelchairs with Electrical Systems

- Dynamic stability
- Effectiveness of brakes
- Energy consumption
- Speed, acceleration, retardation
- Climatic tests
- Obstacle-climbing ability
- Power & controls
- Electromagnetic compatibility

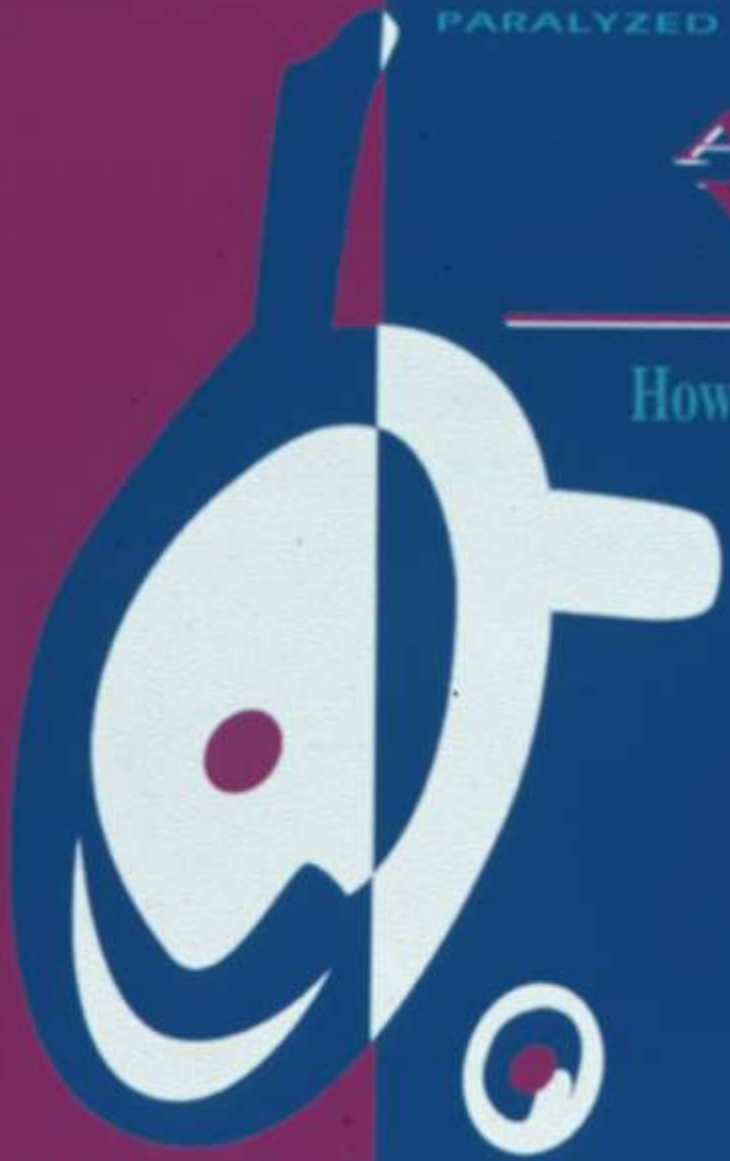


Drum Tester

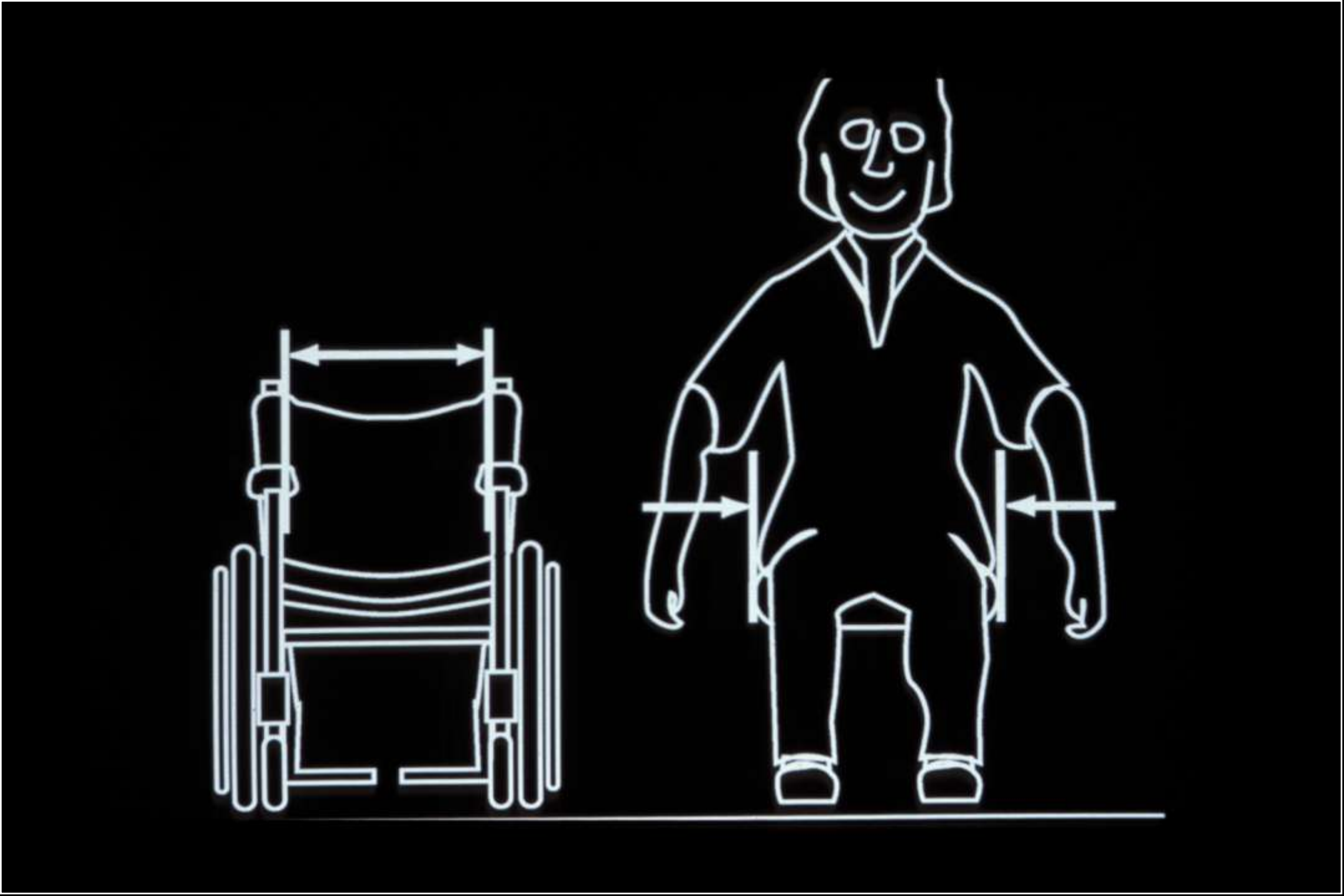
PARALYZED VETERANS OF AMERICA

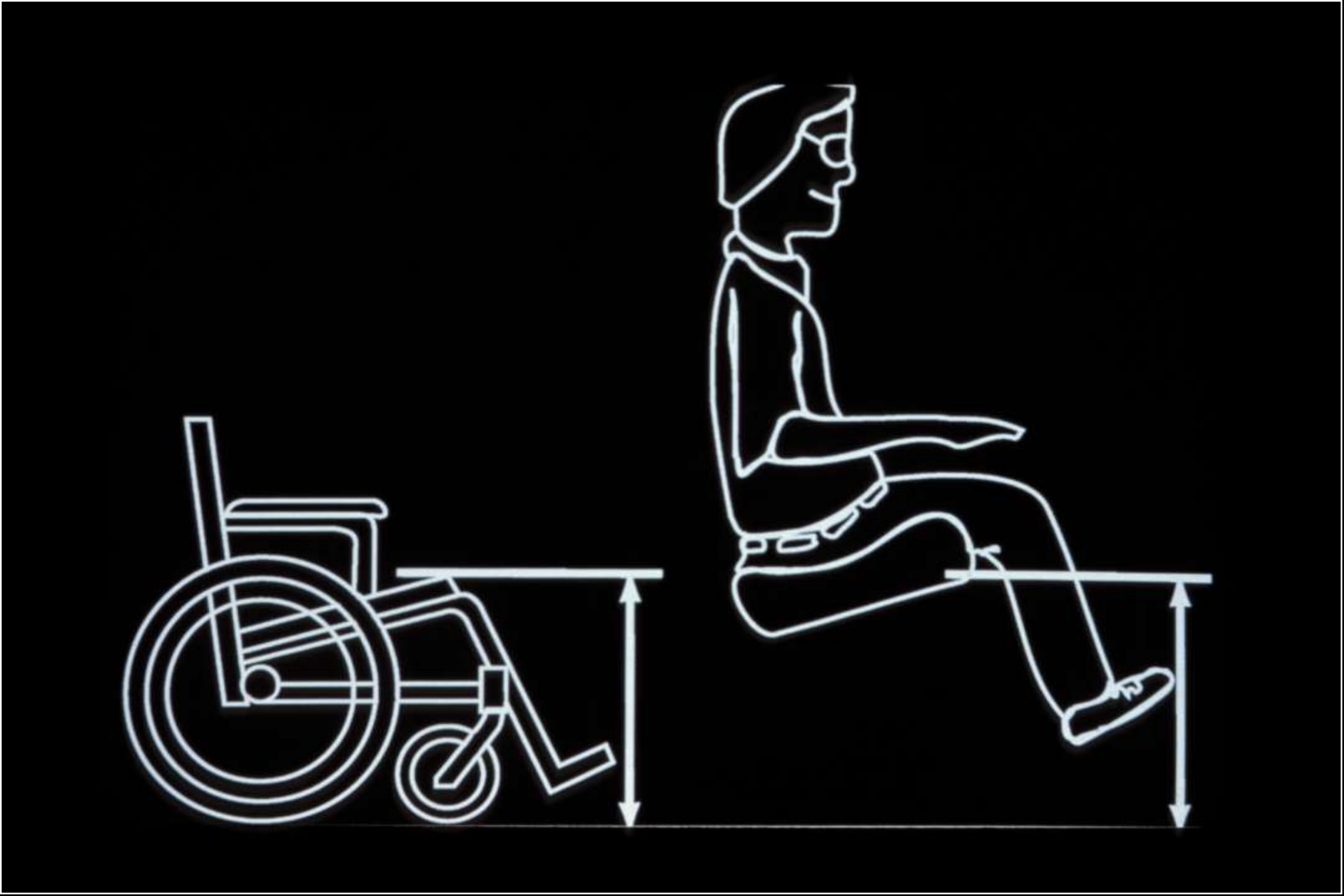
A Guide to Wheelchair Selection

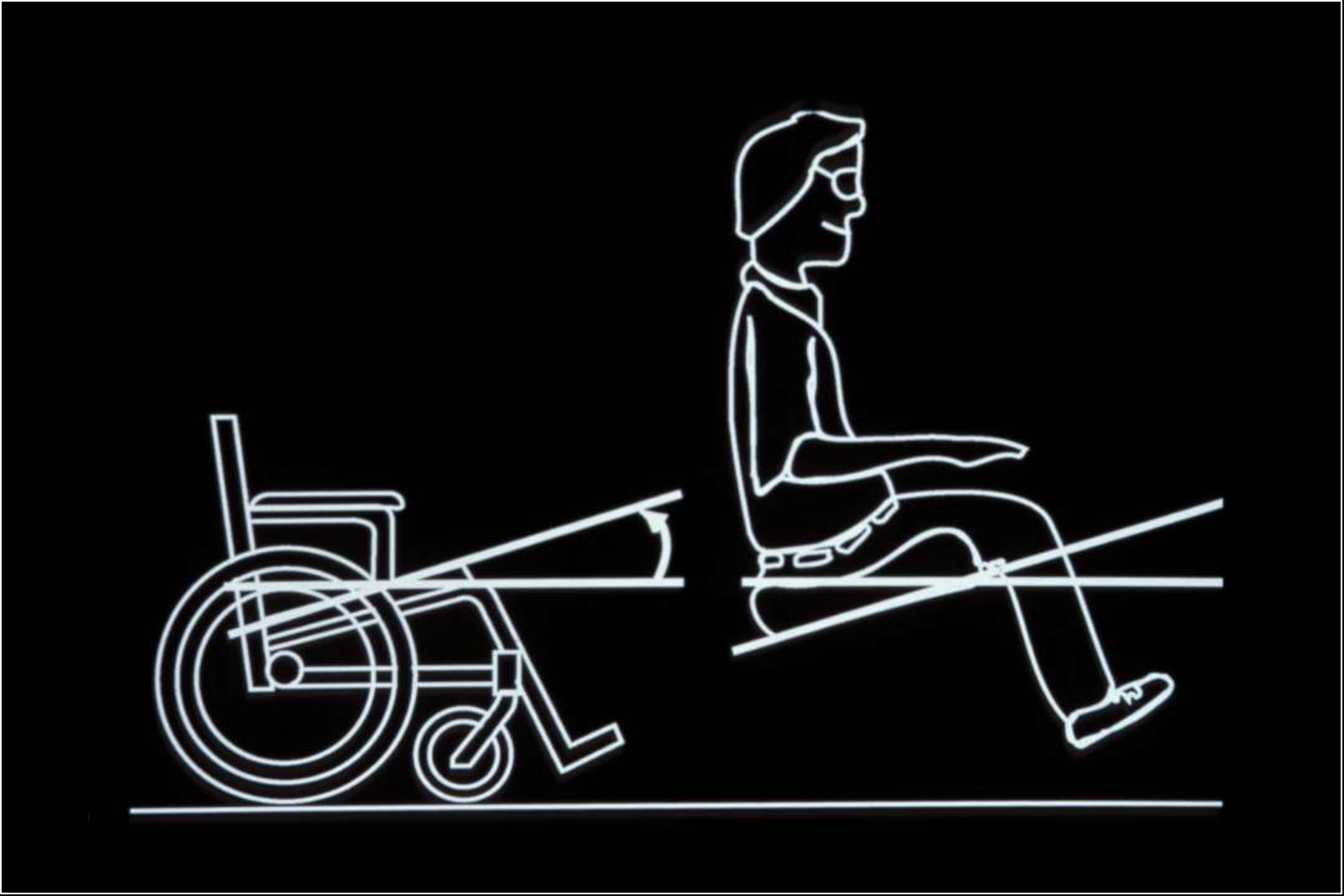
How to Use the ANSI/RESNA Wheelchair Standards to Buy a Wheelchair

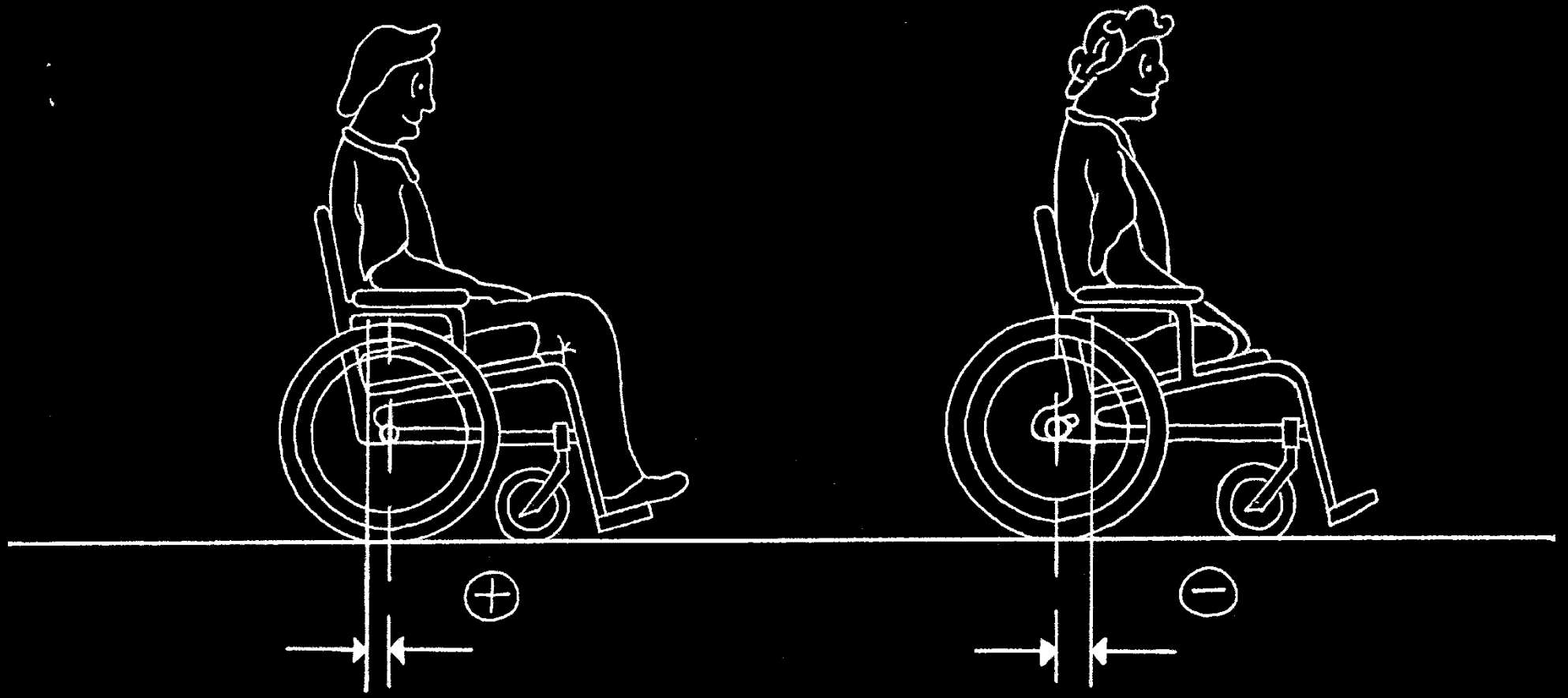


Peter Axelson, MSME
Jean Minkel, MAPT
Denise Chesney, MEBME



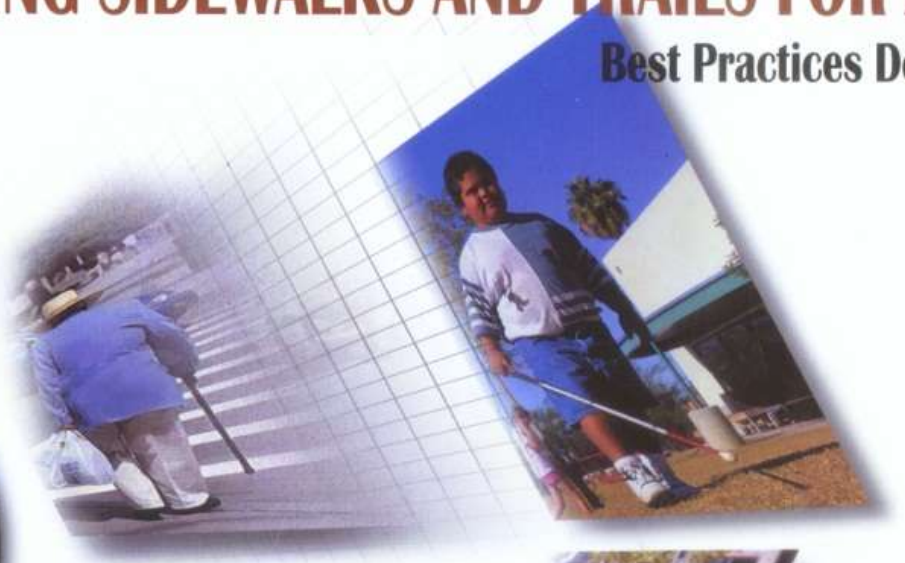






Part 2 DESIGNING SIDEWALKS AND TRAILS FOR ACCESS

Best Practices Design Guide



The Population is Aging

Photo Credits: Dan Burden

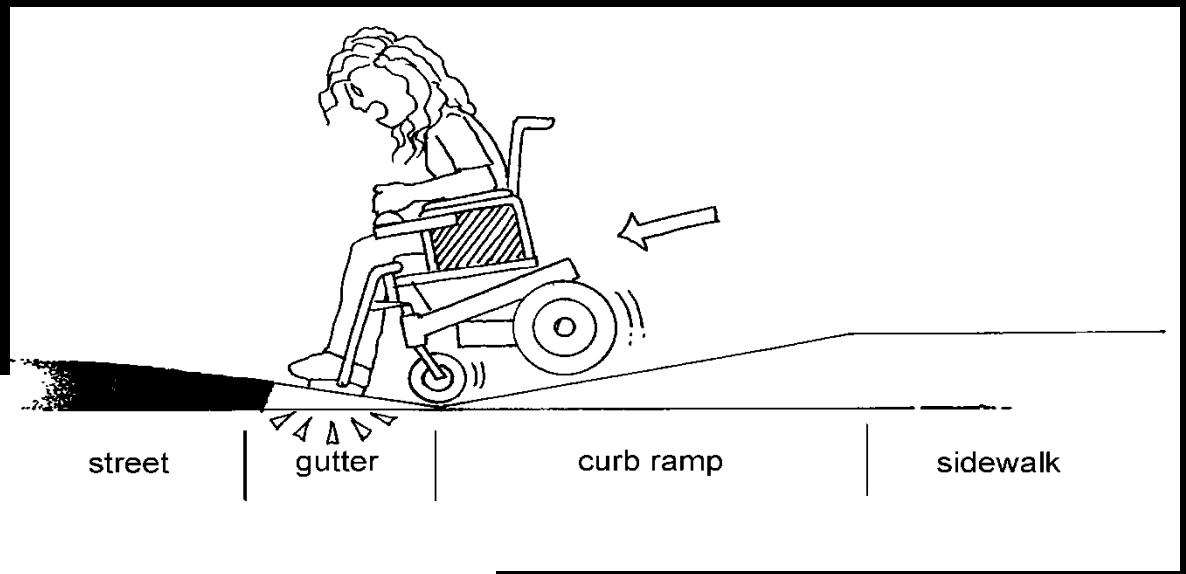
Characteristics of Pedestrians

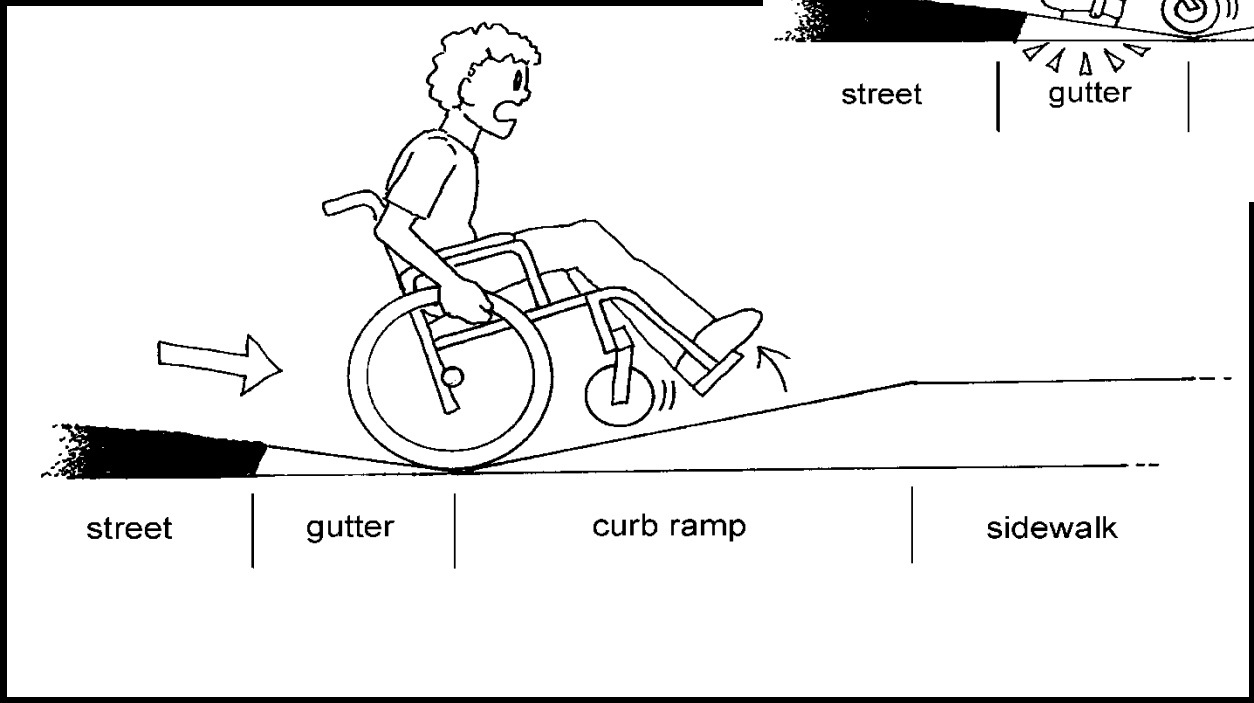
Photo Credit: Dan Burden

Photo Credit: www.guidedogs.com/career-training.html

Designing Sidewalks and Trails for Access, FHWA, 2001

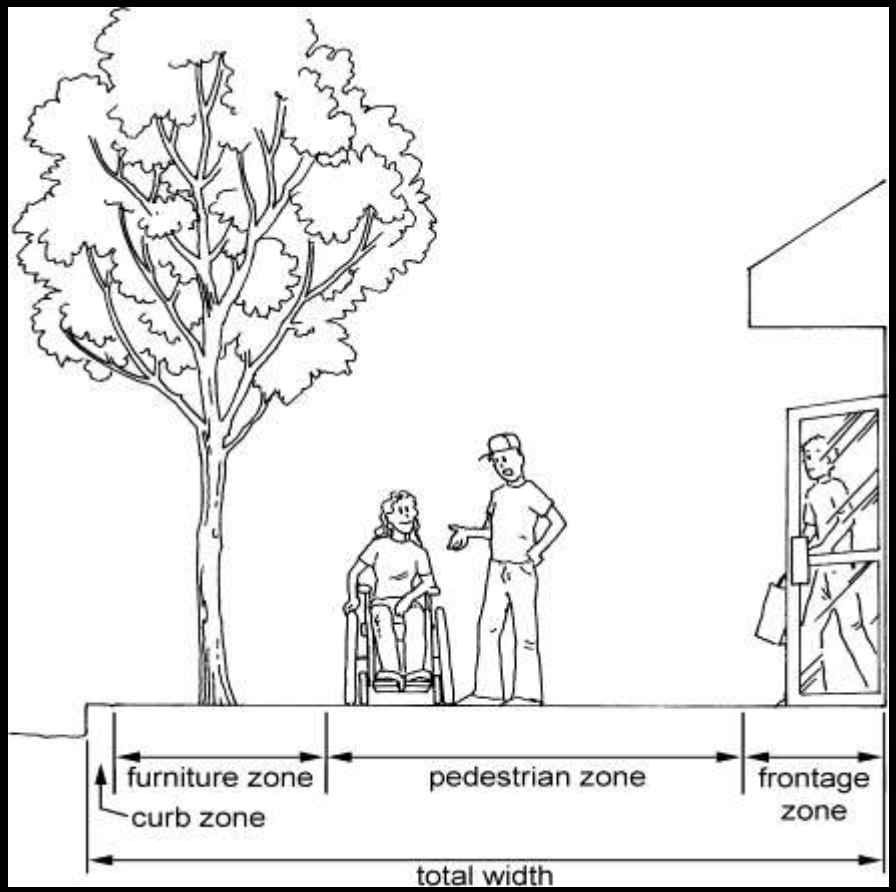
Change of Grade



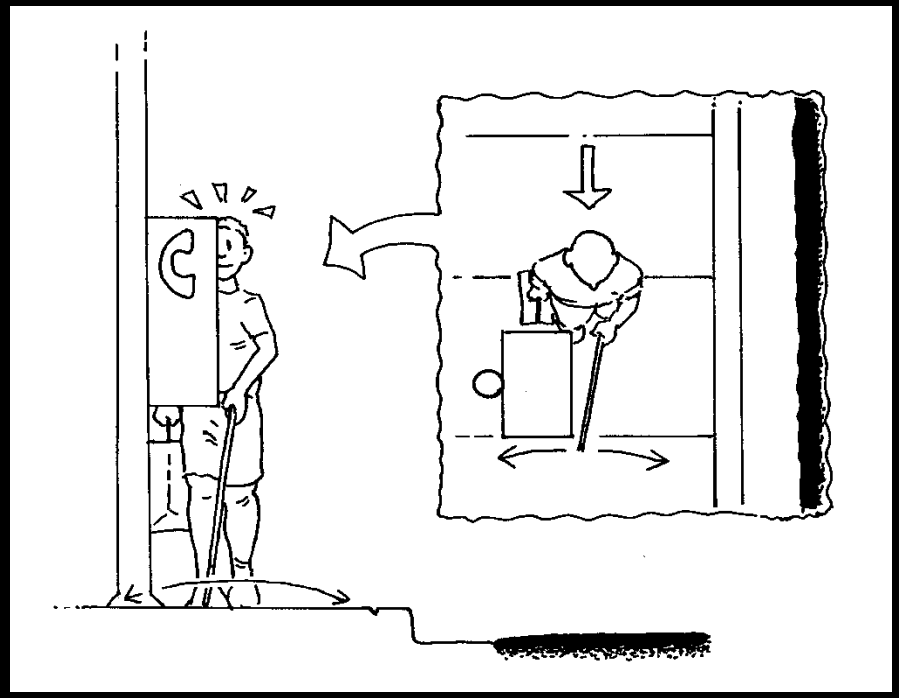


Detectable Warnings

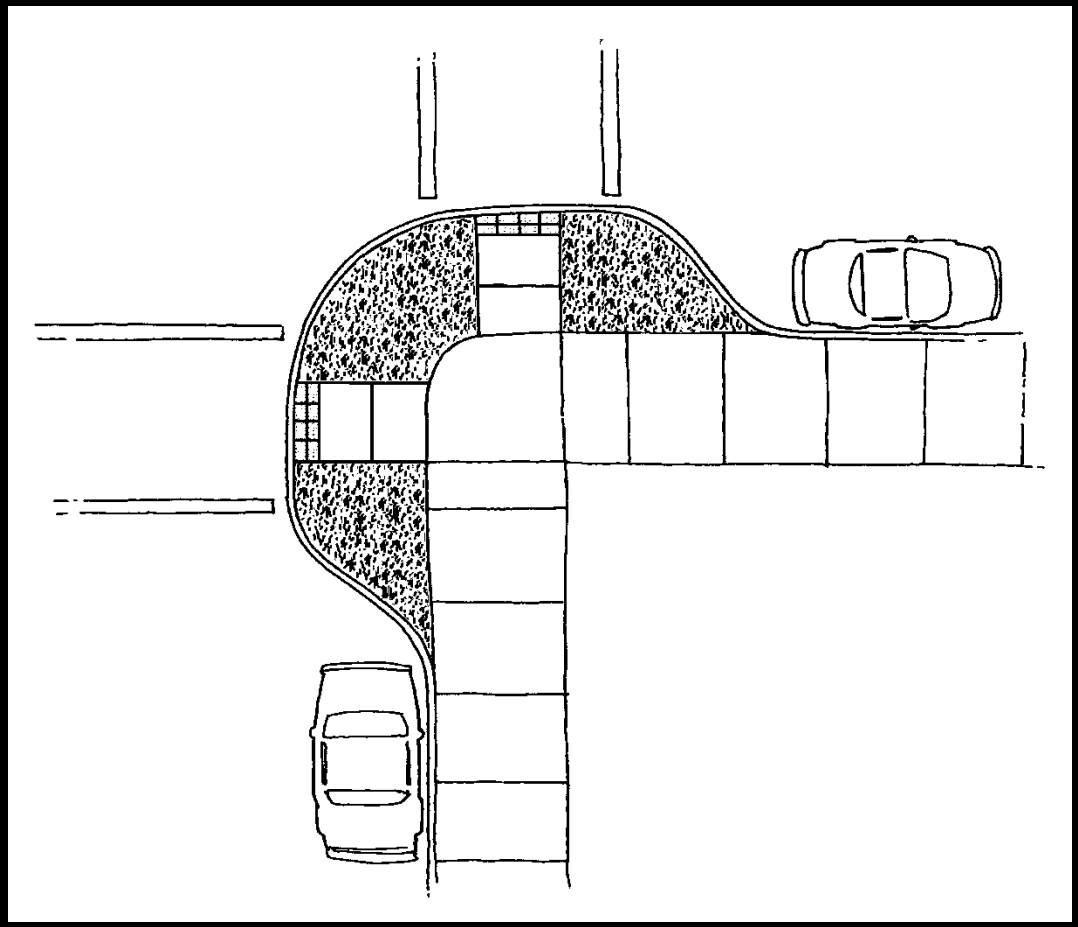
Zone System


furniture zone
curb zone
pedestrian zone
frontage zone
total width

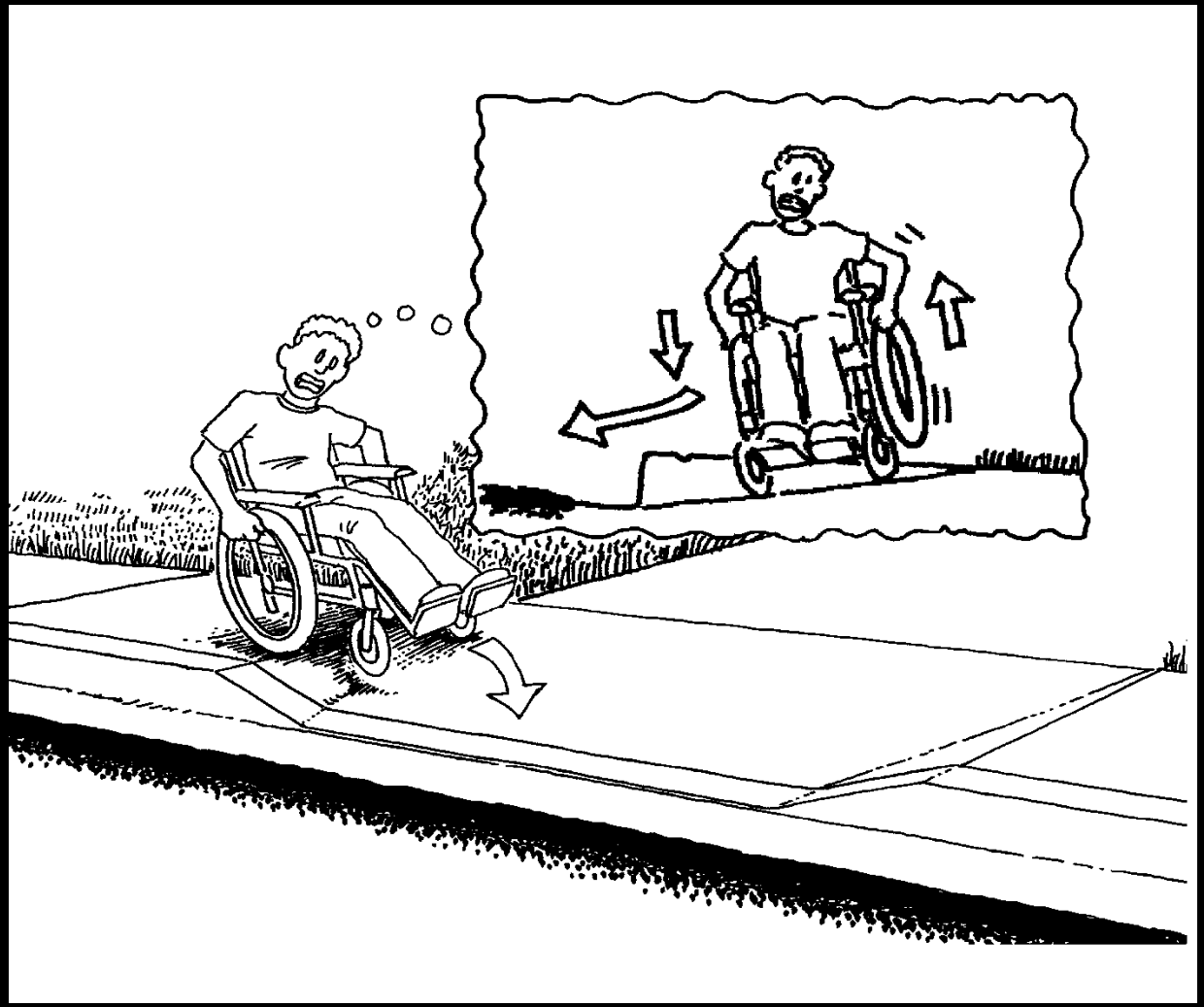
Protruding Objects and Vertical Clearance



Solutions for Narrow Sidewalks



Change in Cross Slope



Gaps, Grates and Openings

Universal Design of Fitness Equipment (UDFE) Standards

- Accessible “mainstream” fitness equipment – user friendly
  - Health benefits for everyone
  - Social benefits for everyone
  - Comply with the Americans with Disabilities Act (ADA)

Low Step-up Height Design


5.0 LB
10 LB
4.5 kg
20 9
35 16
50
65
80 36
95 43
110 50
125 57
140 64
155 71
170 77
185 84
200 91
215 98


LifeFitness
UT OR PRESS QUICK START
Calories
Distance
Time
Incline
Speed
Heart Rate
1 2 3
4 5 6
7 8 9
Clear 0 Enter
Manual
Fat Burn
Cardio
Zone Training
Enter Weight
Random
Hill
Personal Trainer
Fit Test
Speed Interval
Quick Start
Pause
Cool Down
WARNING
POLAR
CAUTION: RISK OF INJURY TO PERSONS - TO AVOID INJURY, STAND ON THE SIDERAILS BEFORE STARTING TREADMILL. READ INSTRUCTION MANUAL BEFORE USING.


LifeFitness
UT OR PRESS QUICK START
Calories
Distance
Time
Incline
Speed
Heart Rate
1 2 3
4 5 6
7 8 9
Clear 0 Enter
Manual
Fat Burn
Cardio
Zone Training
Enter Weight
Random
HIIT
Personal Trainer
Fit Test
Speed Interval
Quick Start
Pause
Cool Down
WARNING
POLAR


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

Development of Uniform Standards for Cognitive Technologies

Goal

Increase Access to Technology for People with Cognitive Impairments


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

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