beneficial designs

designing beyond the norm to meet the needs of all people

Stanford University

Peter Axelson

2023-02-23

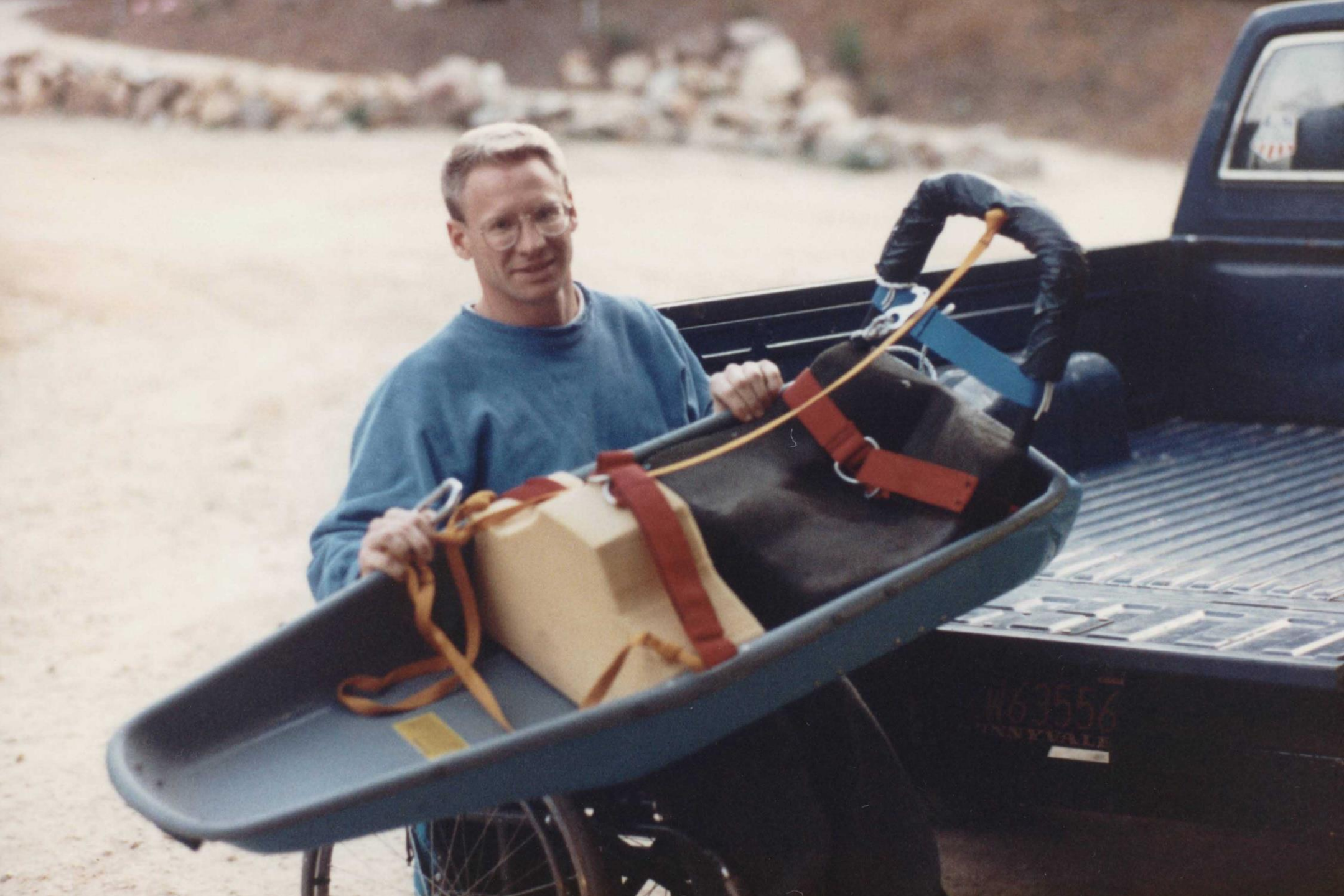

BRING ME MEN
STOP

The need:

To get back out on the snow


2W63556


2W63556
SUNNYVALE



The Mono Ski

Now a Paralympic sport


200
205
AMERICAN EXPRESS
When you

How I got to where I am…

Initial intentions and objectives

Redirected with a new purpose

Found another great place to grow

Personal needs directed my designs

Focused on AT and access for life

beneficial designs

designing beyond the norm to meet the needs of all people

research

design

education

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.

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.

beneficial designs

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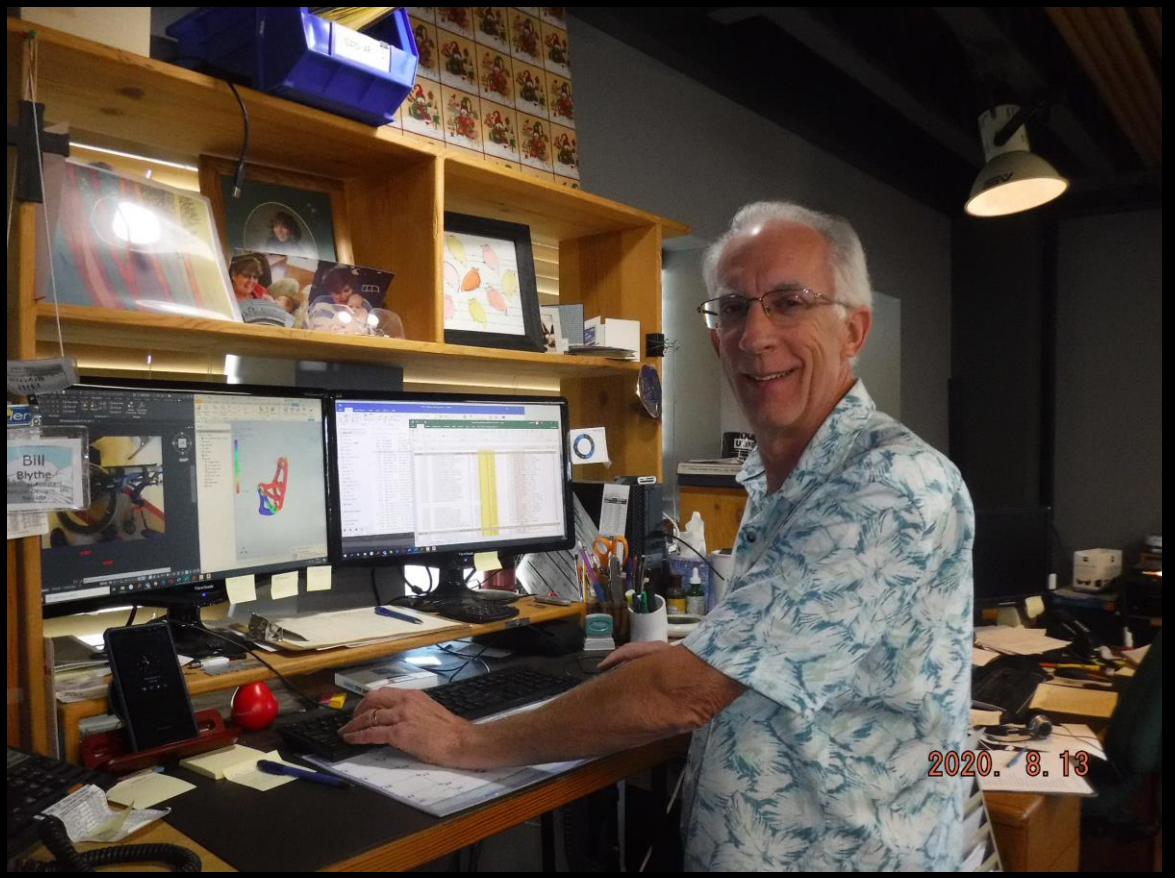
It takes a team of people…

to design, test and assess

to write, map and build

to plan, support and present



Bill Blythe

it and facility manager

Stephanie Stephens

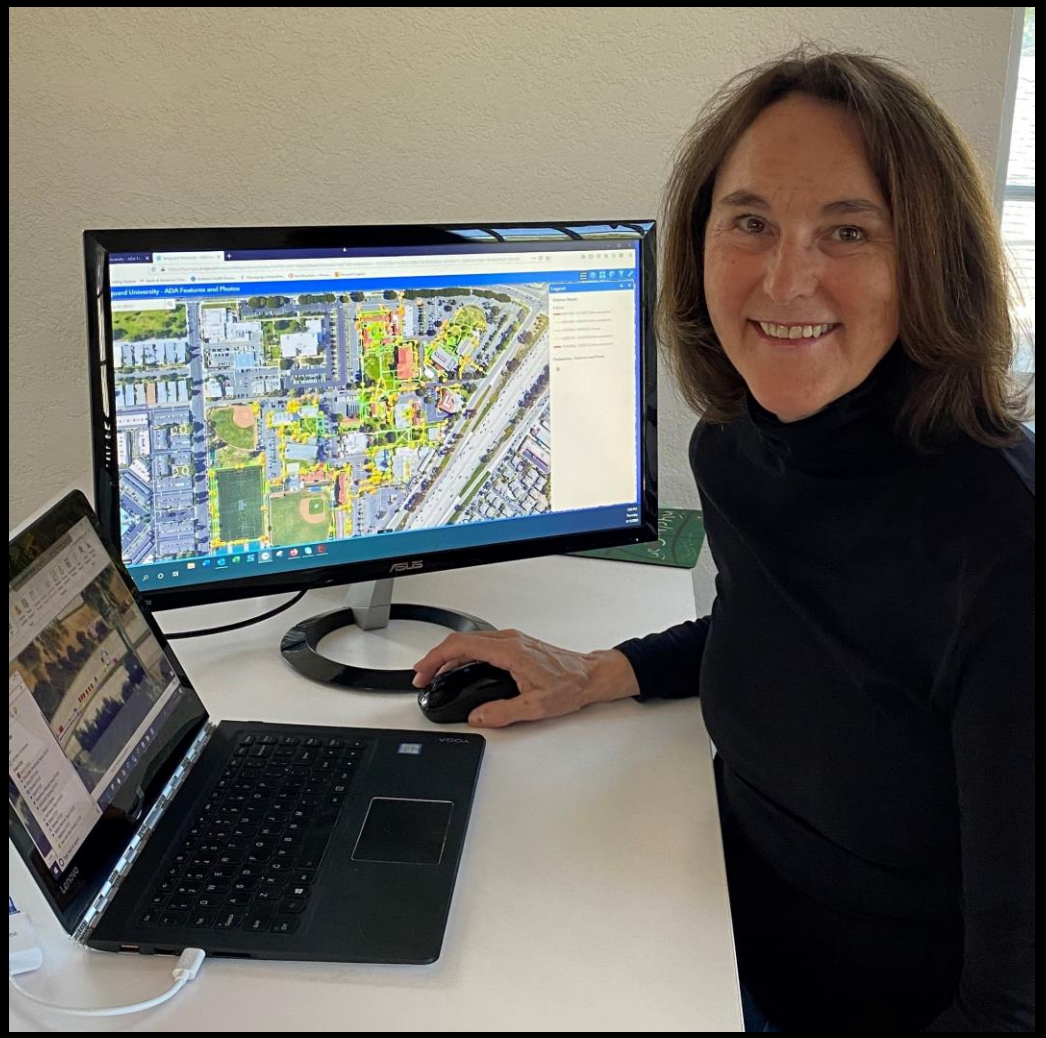
research assistant – remote from India

Stephen Pieters

wheelchair test lab leader

Ben Hubbard

graphic artist GIS map designer



Debbie Hester

GIS technician

Ria Axelson

office manager and welder

Paul Schnorbus

machinist

Todd Ackerman

sidewalk assessment coordinator

Travis McDonald

assessment technician

Rob Palmer

assessment technician

Colin Greening

assessment technician

Jonathan Miller

assessment technician

Wiu Wiu

test lab assistant

Joshua Wetmore

test lab assistant

Maegan Elkaraki

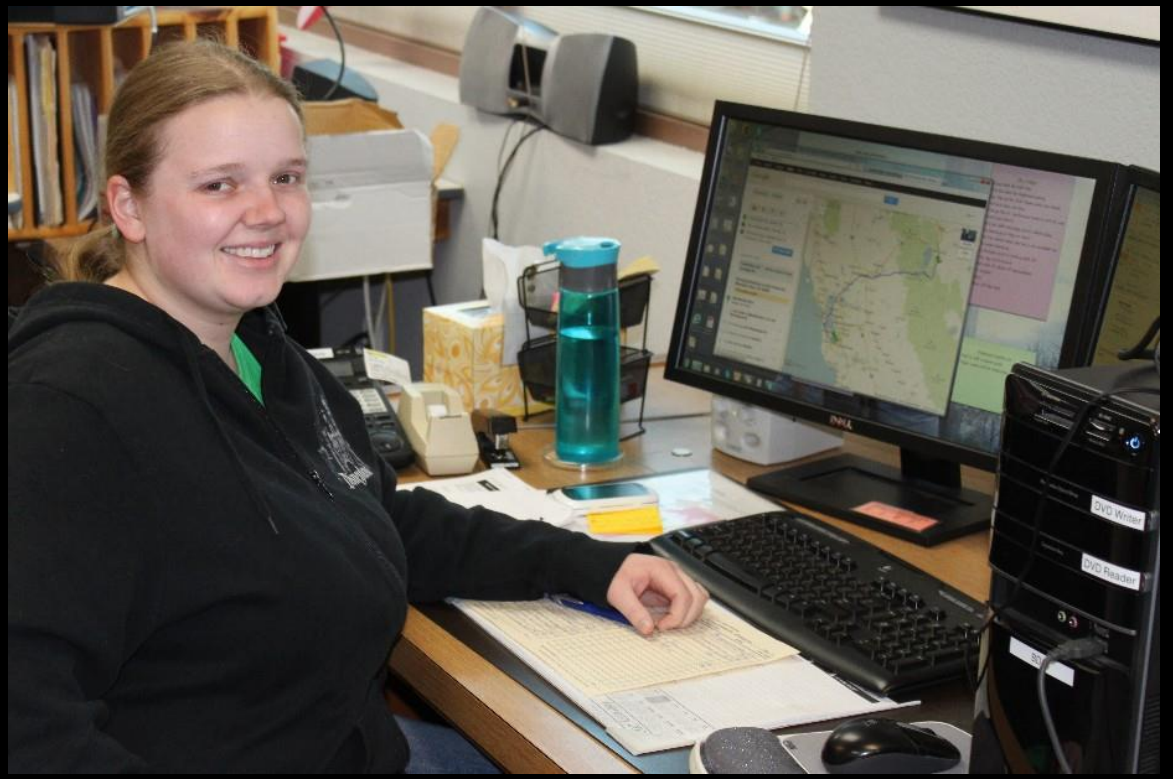
bookkeeping and financial

Annabeth Johnson

administrative assistant

Paola Vazquez

office assistant



Sharon Vazquez

office assistant – remote

Julia Woodruff

office assistant

Peter Axelson

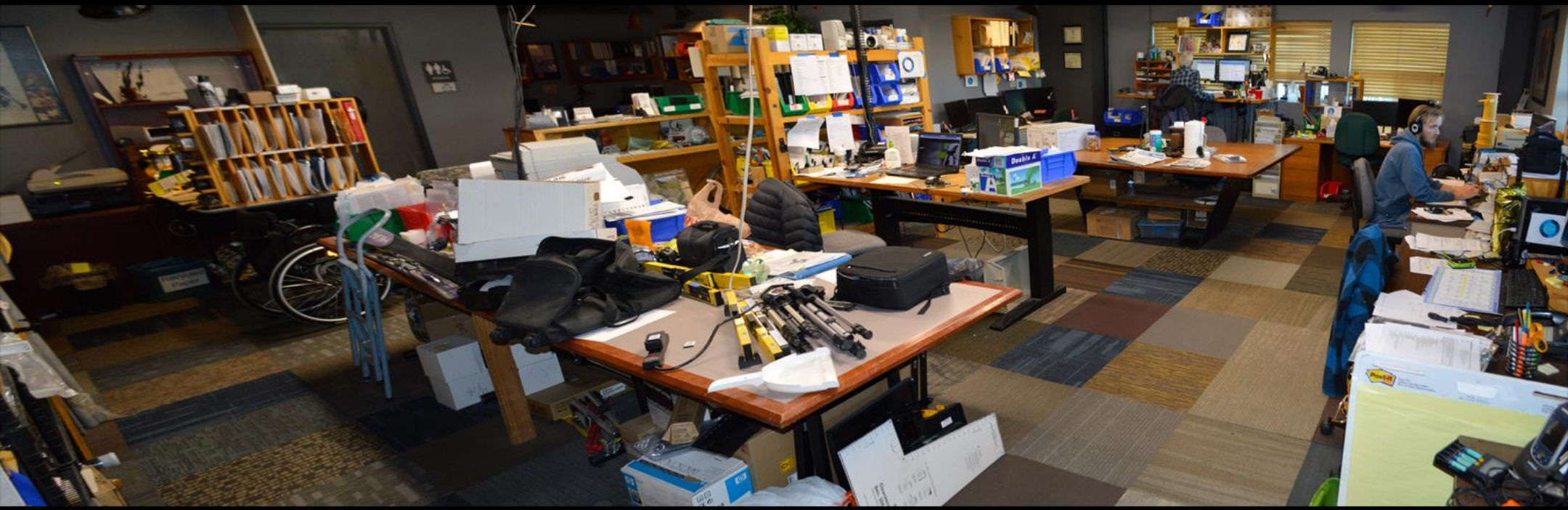
Director of R&D

A working space with tools…

to design and create

to build, test and break

with material and stuff to assemble

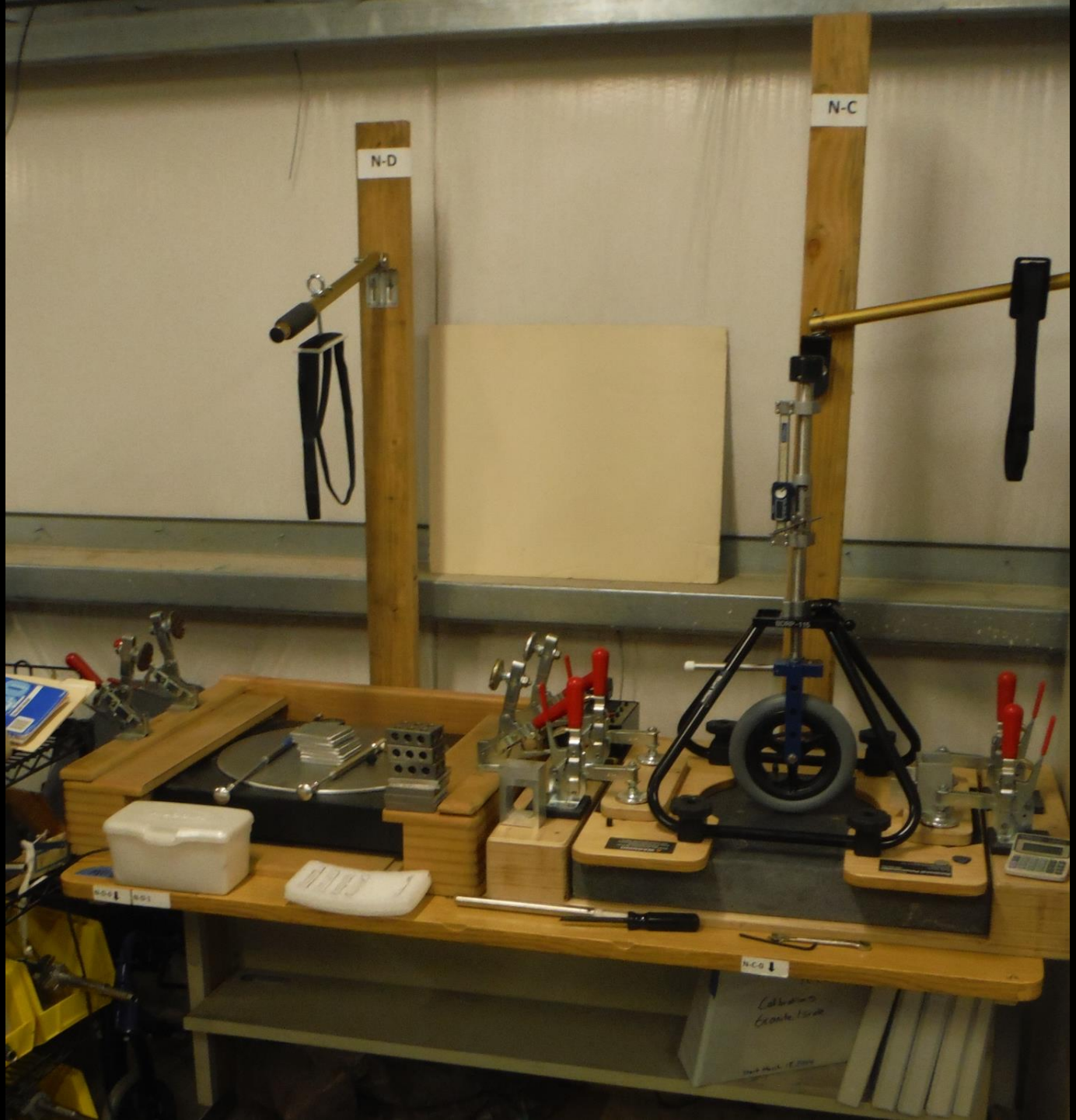

Double A


N20K


Mobil


R2-A
JC Metal Fabrication Inc.
21831 9 Mile Rd.,Reed City, MI 49677
231-832-3551
MADE IN
U S A
FAN
LIGHT


N-C
N-B


N-D
N-C

Testing

- Wheelchairs
- Surfacing
- Adaptive sports equipment
- Forensics

Wheelchair testing

- People get hurt using them
- Design and manufacturing defects
- Making sure the product is safe
- Determine the performance of the product
  - How fast will it go?
  - How far it will go?
  - How high it can climb?

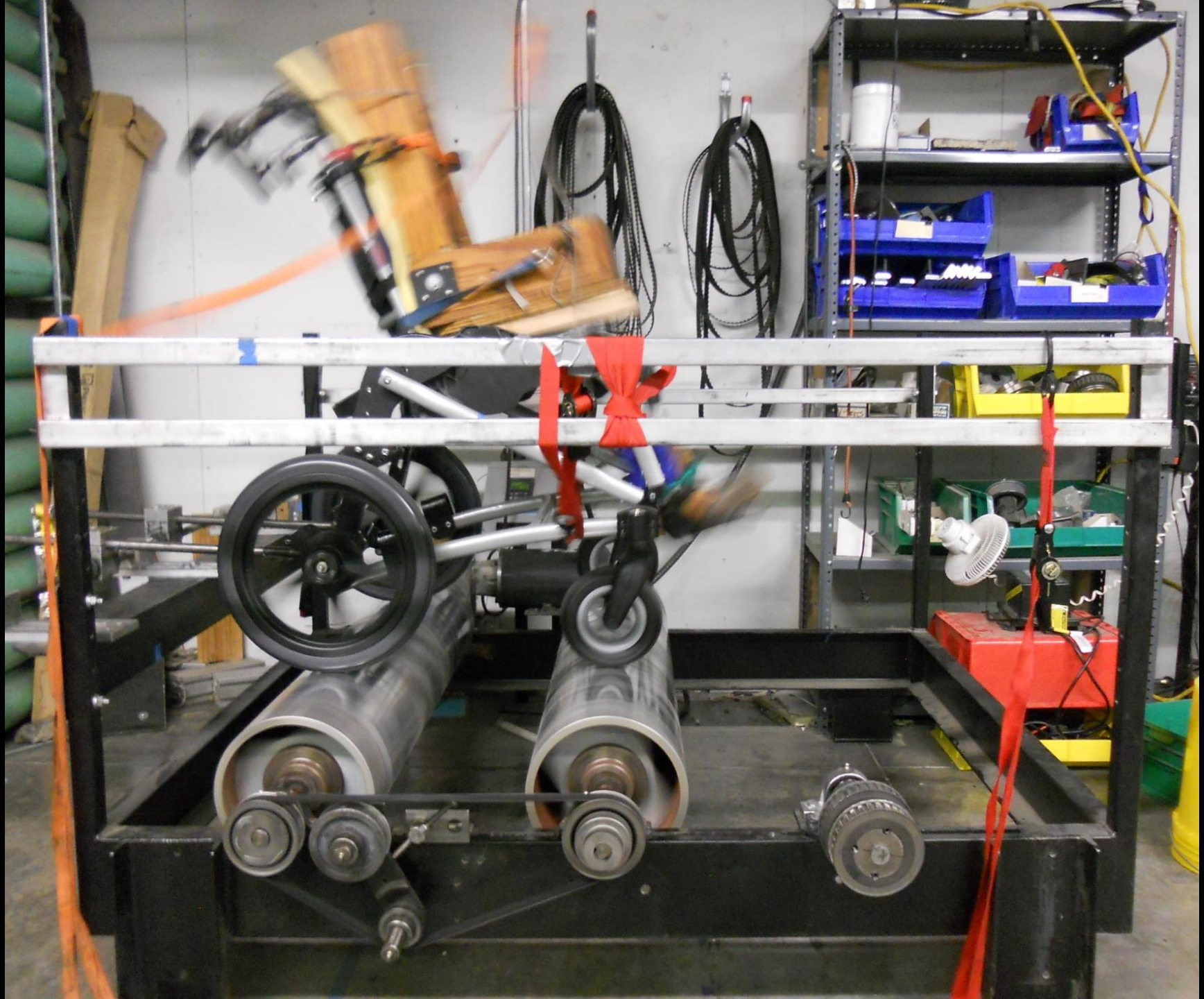
Wheelchair testing

American RESNA Vol. 1 & 2 test procedures

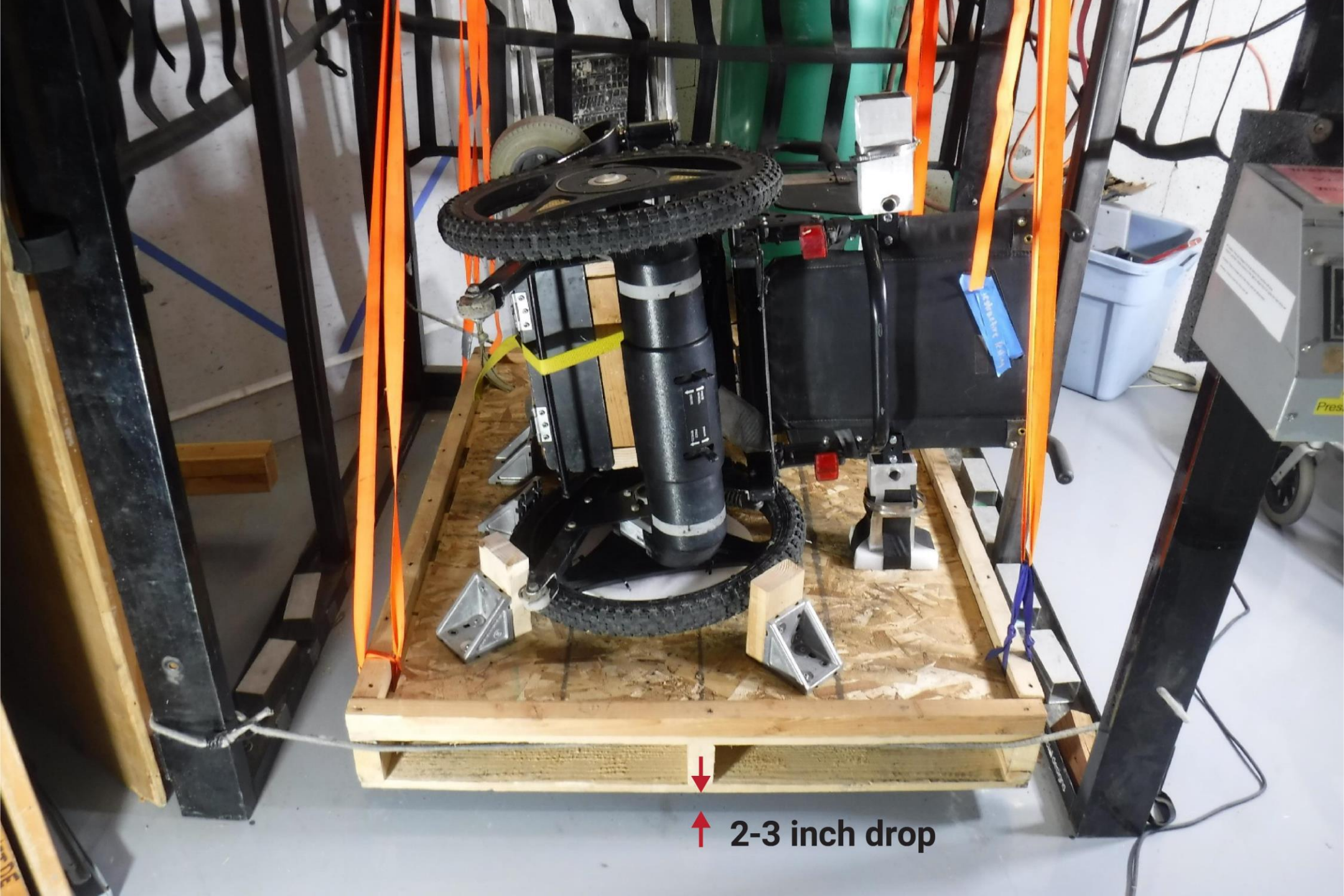
International Standards Organization ISO testing procedures Sections 1 through 30

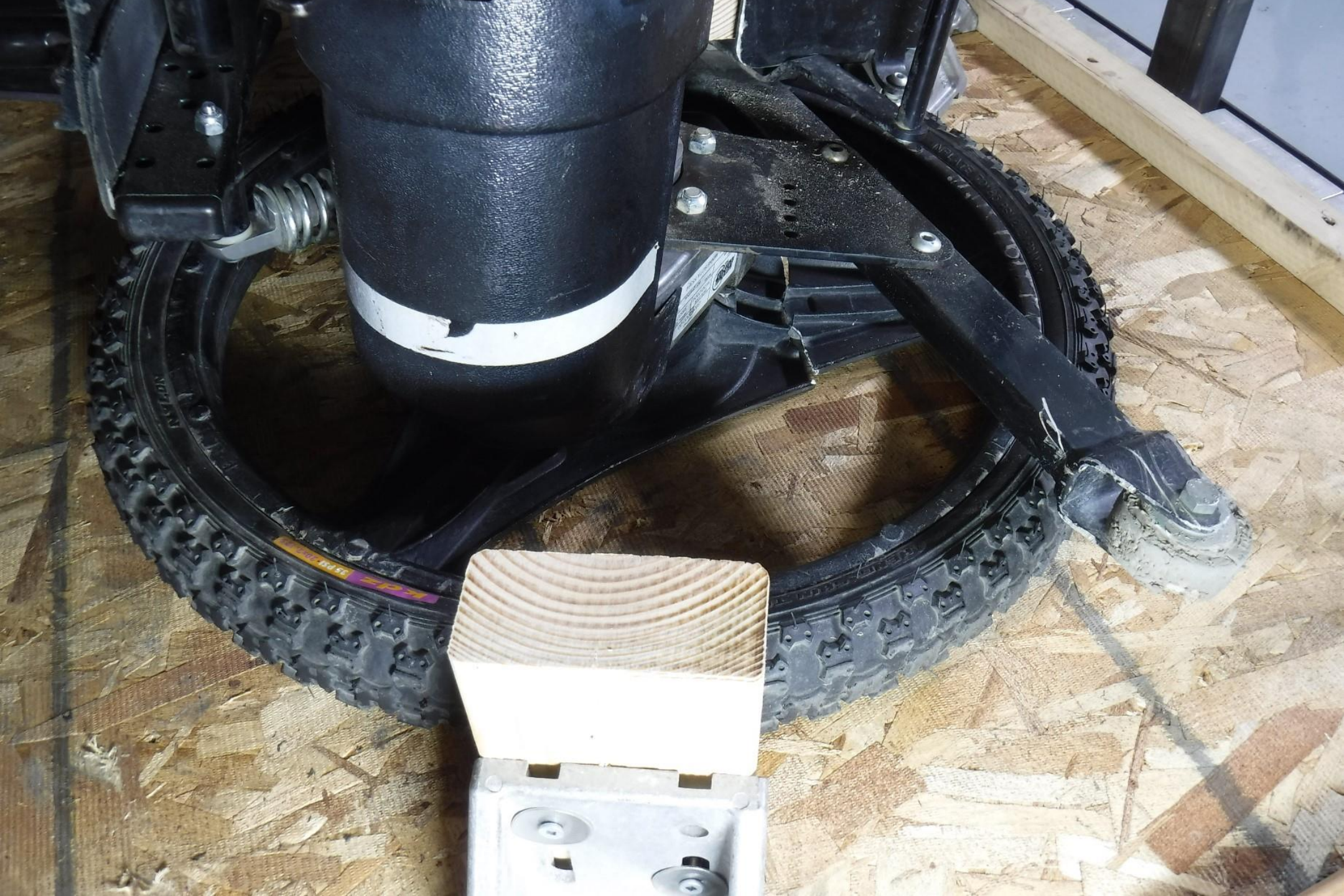
European National EN12183 and 12184 testing requirements and test methods

ANAB
ANSI National Accreditation Board
ACCREDITED
ISO/IEC 17025
CALIBRATION AND TESTING LABORATORY



Damage


2-3 inch drop

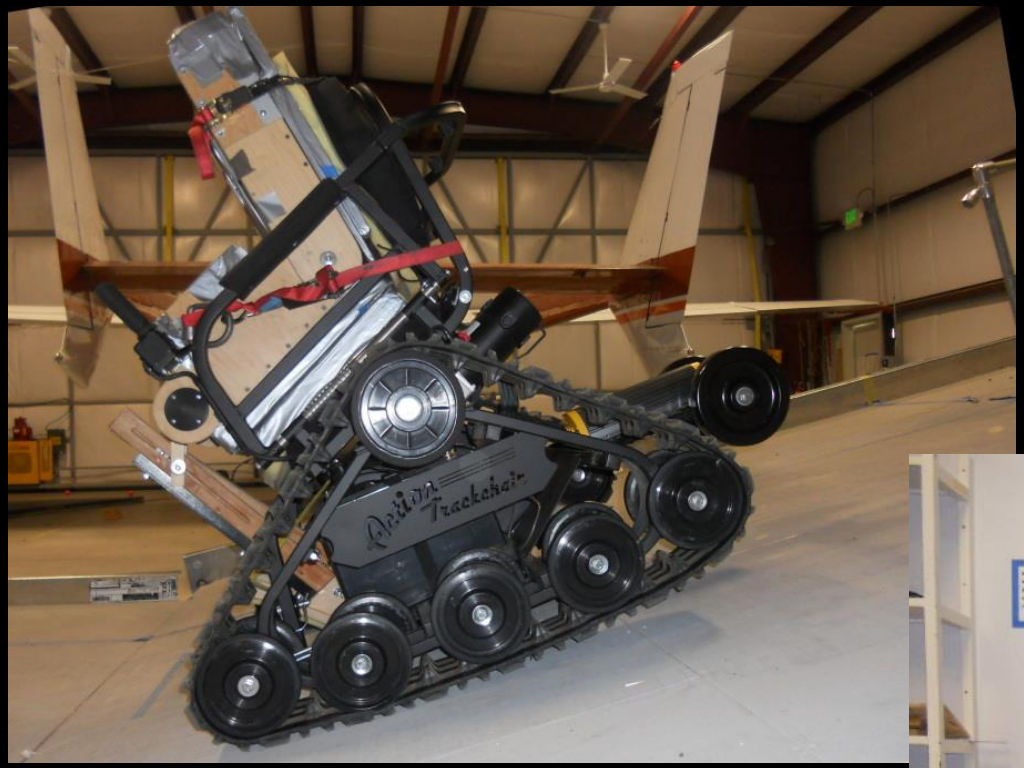


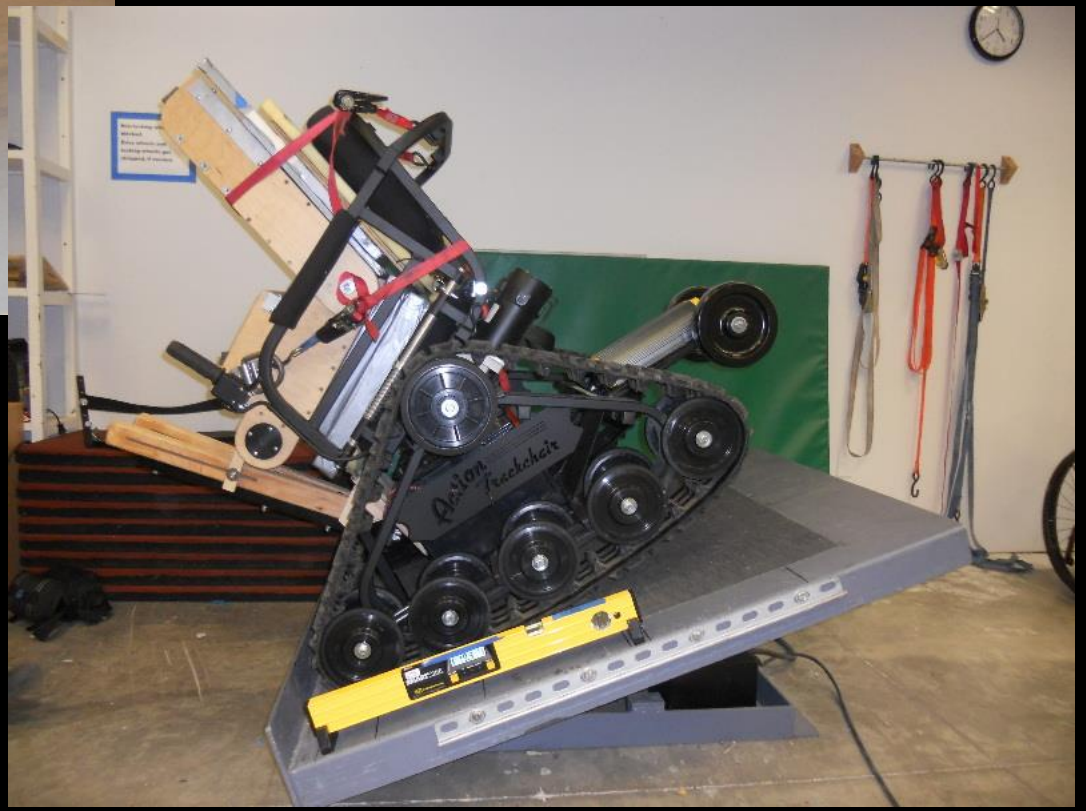

10°


10°

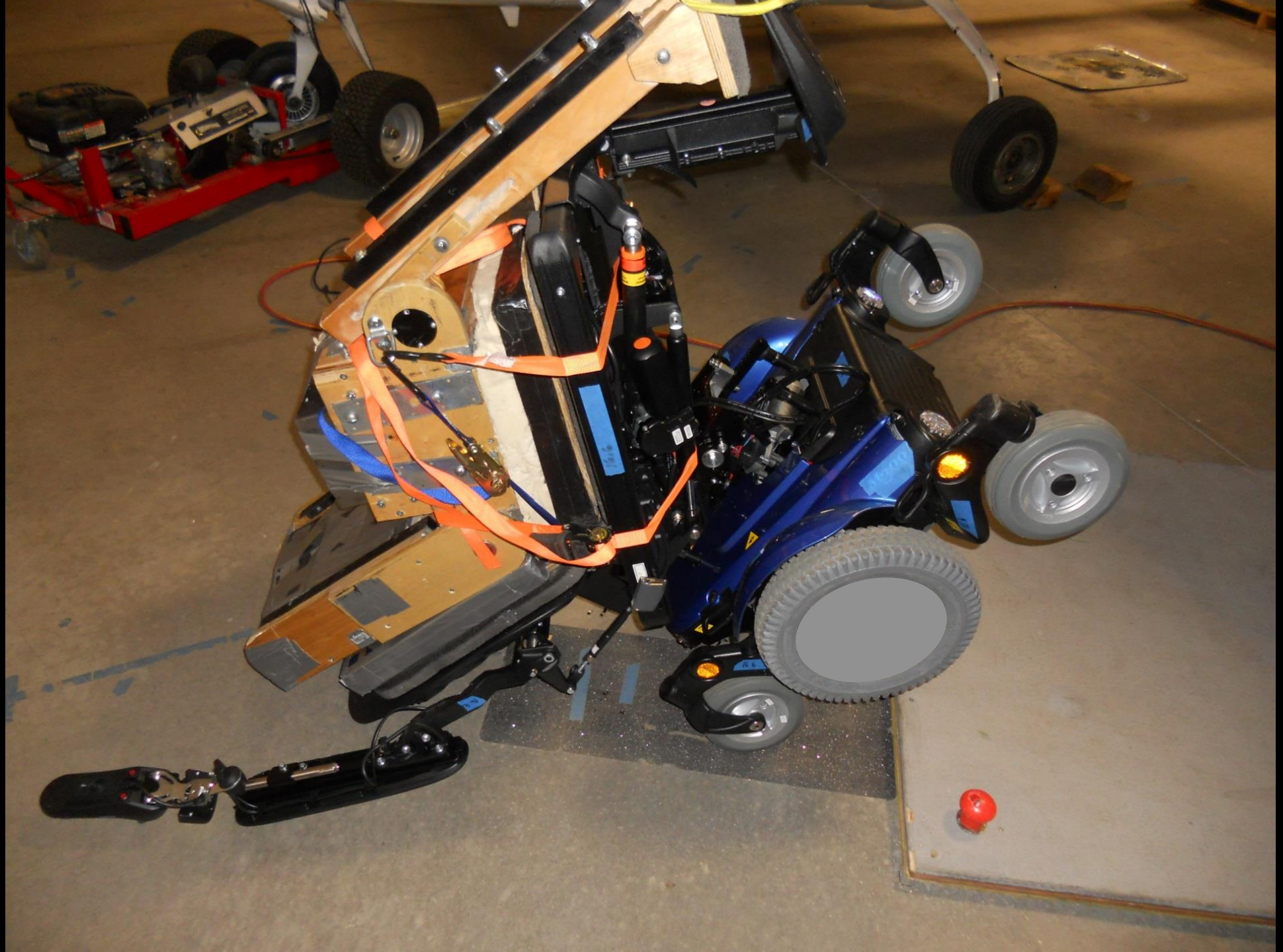

2014-2


N2QK Tools
Action Trackstander


Action Trackchair


Action Trackchair


7.5°



Surface testing

- People get hurt using playgrounds
- Soft but firm and stable
- Making sure the product is safe
- Making sure I don’t get stuck in them
  - How firm is the surface?
  - How stable is the surface?

Firmness and stability testing

ASTM F1951 Playground testing

Instrumented Surface Indenter ISI

Calibration laboratory for ISI

ANAB
ANSI National Accreditation Board
ACCREDITED
ISO/IEC 17025
CALIBRATION AND TESTING LABORATORY

Rotational Penetrometer

objective surface measurement device


BDRP100


BDRP100
Start Here

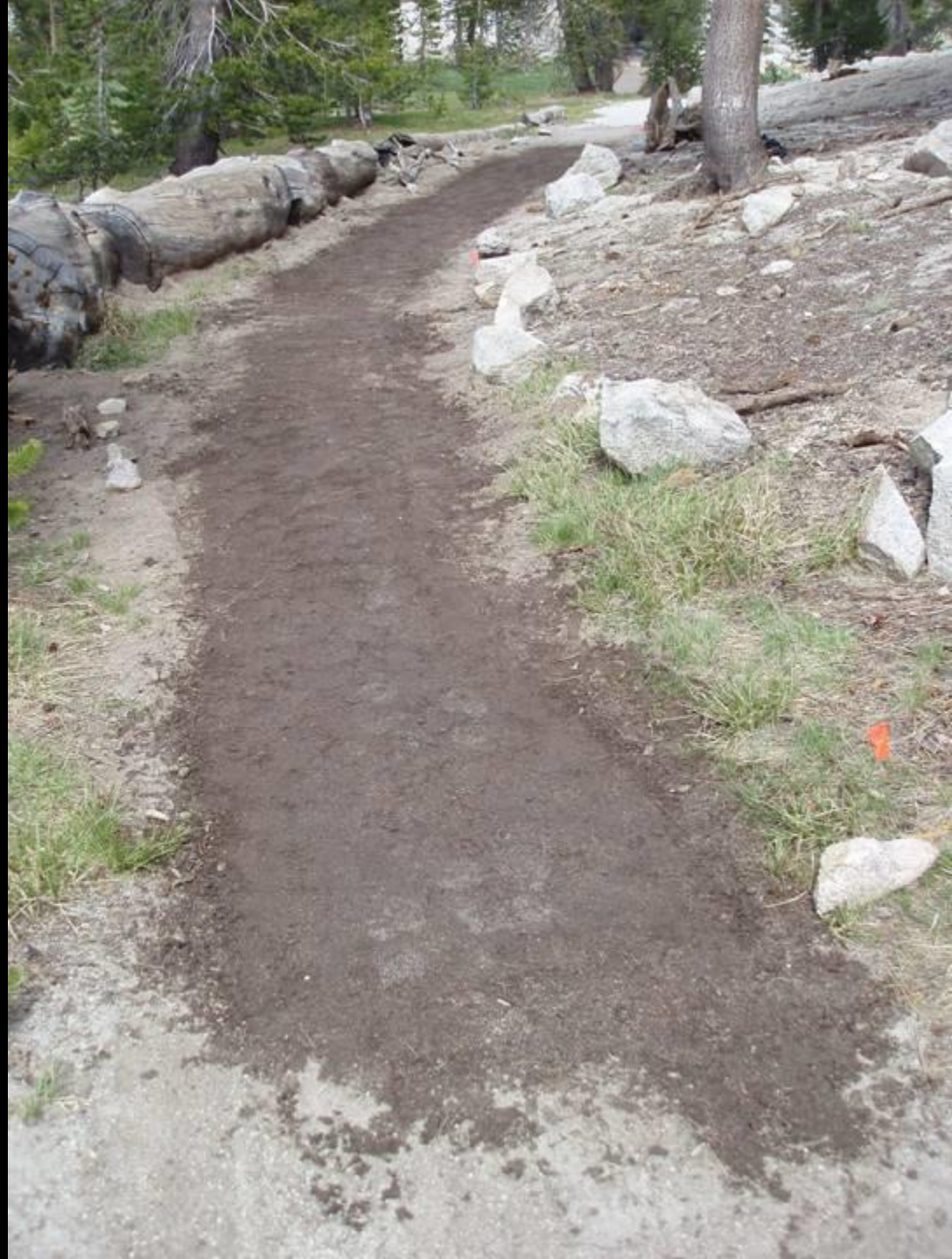
USA
in/mm
ON
ZERO
ABS
UNLOADED

Trail surface

Trail with firm but unstable sandy surface

Trail surface

Trail after installation of surface stabilizer



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

Seat cushion testing

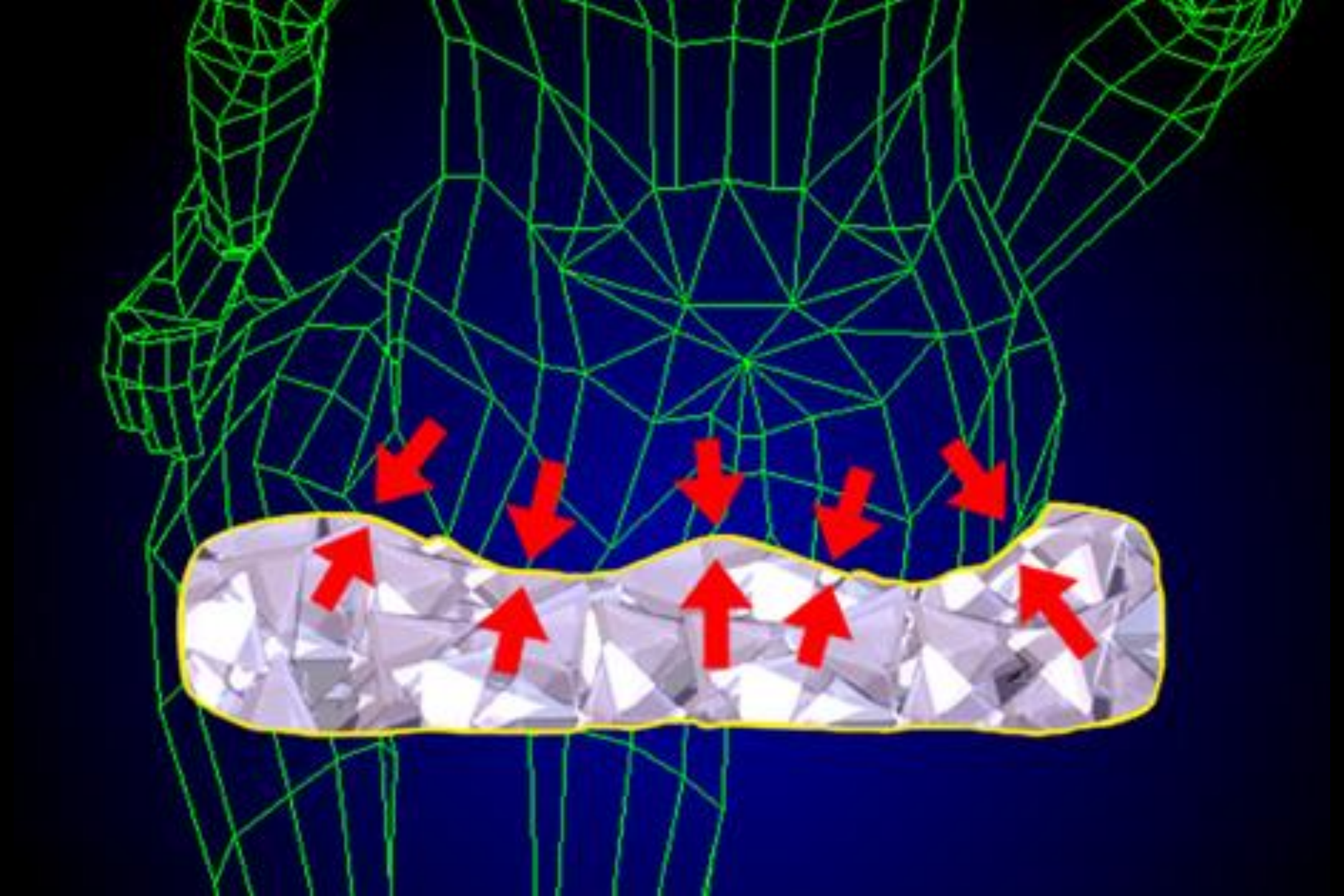
People die from pressure sores

Soft but firm and stable

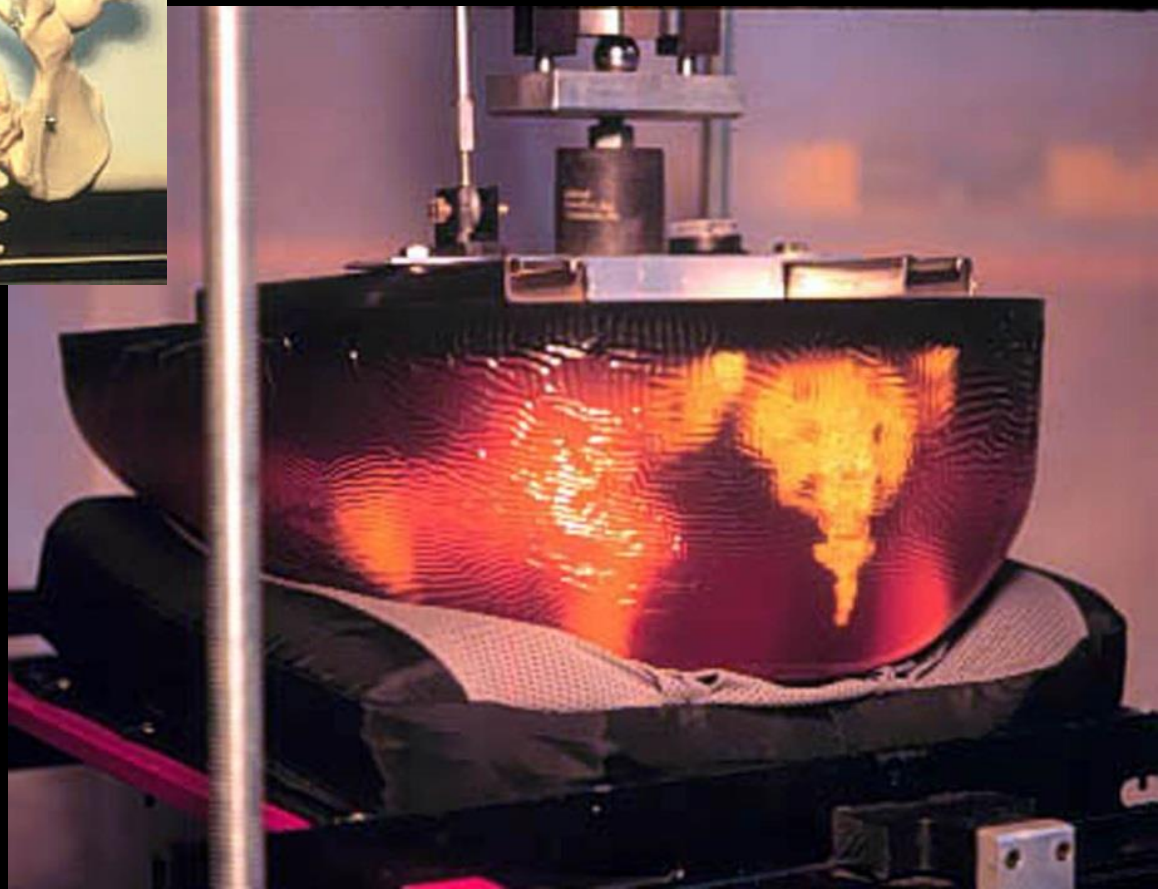
Making sure the product is safe

Making sure I don’t get a pressure sore

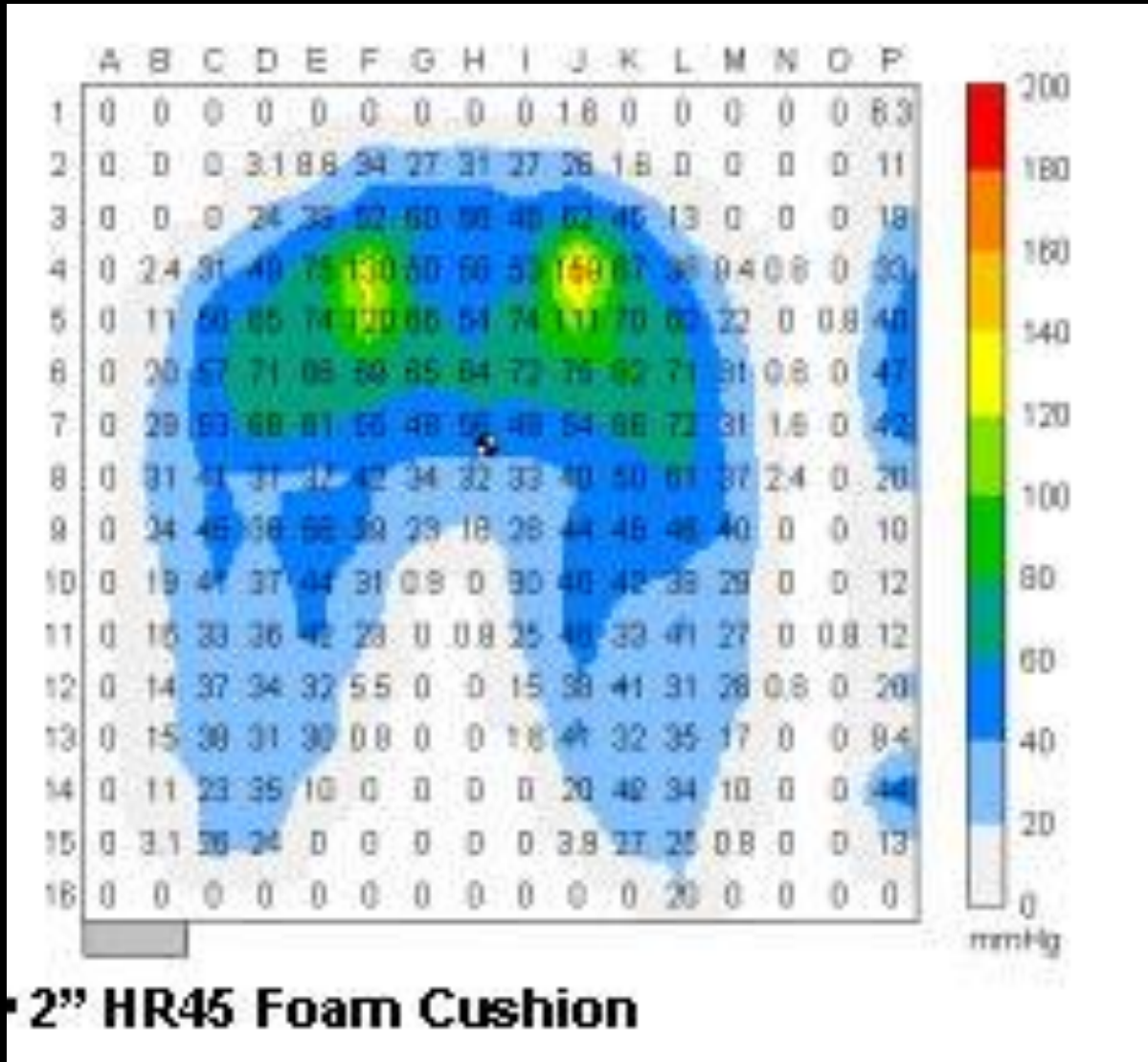
- How high are the sitting pressures?
- How long can I sit on it?



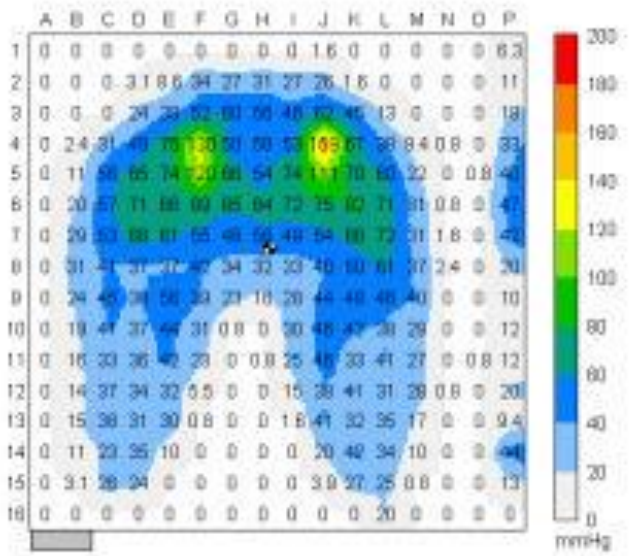
Seat cushion testing



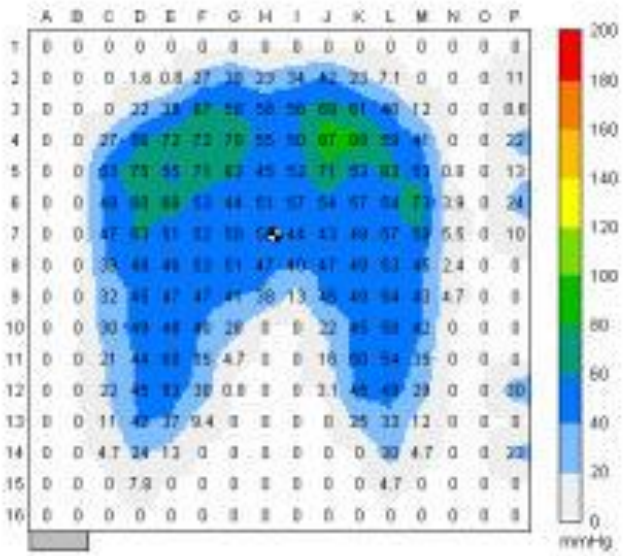
SKELI used on foam



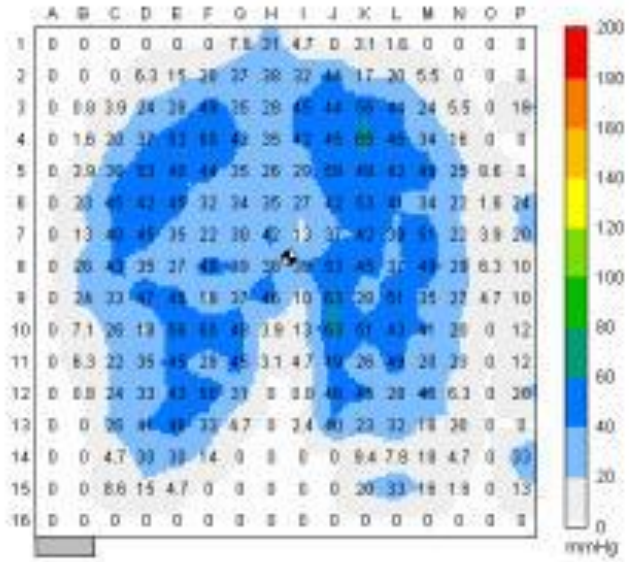
2" HR45 Foam Cushion



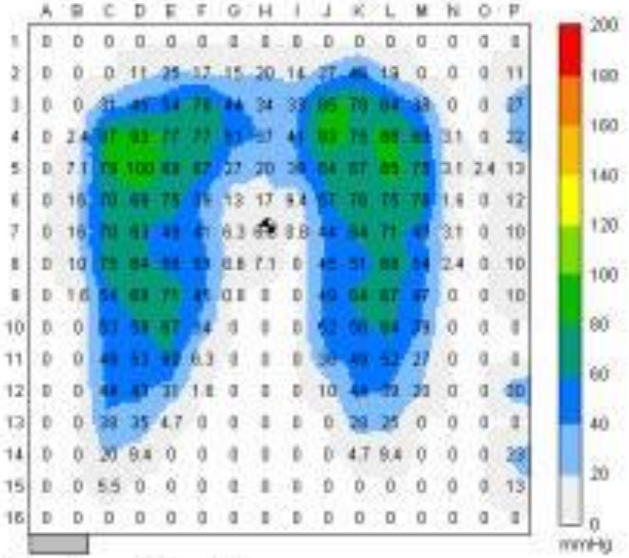
2" HR45 Foam



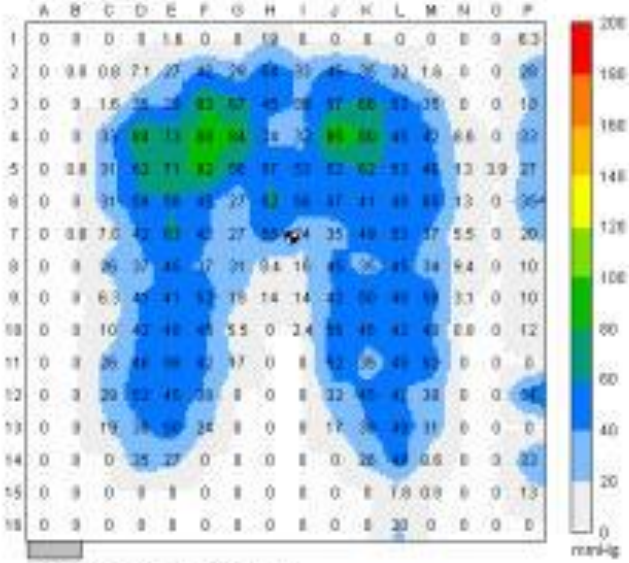
Jay 2 by Sunrise Medical



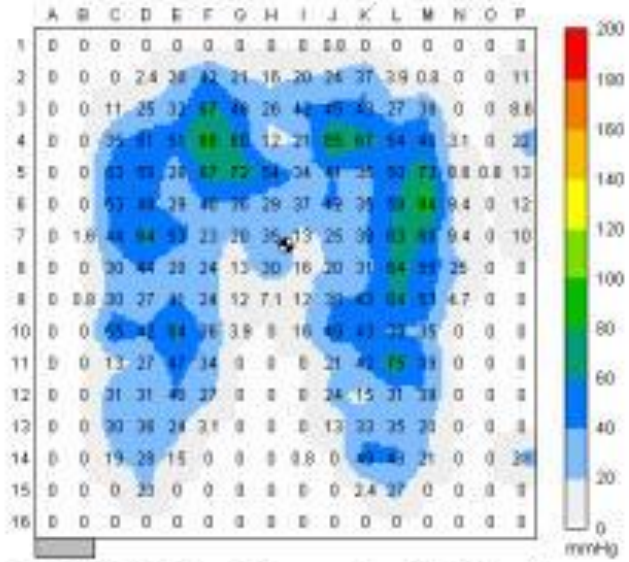
ROHO High Profile by ROHO Inc.



Contoured by Supracor



Model P by Vicair



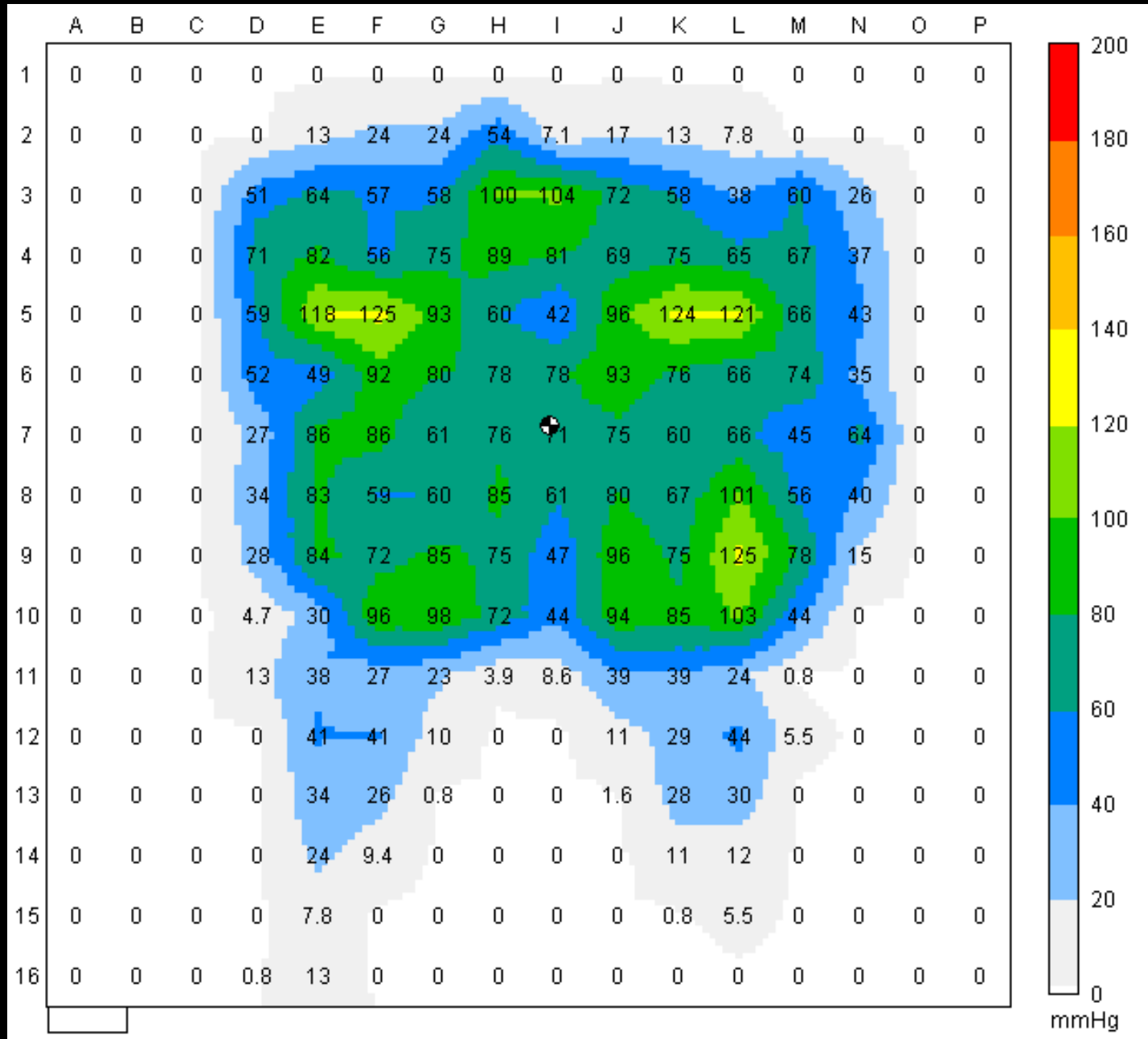
Model P Deep Immersion by Vicair

ASLI prototype

became an ISO shape

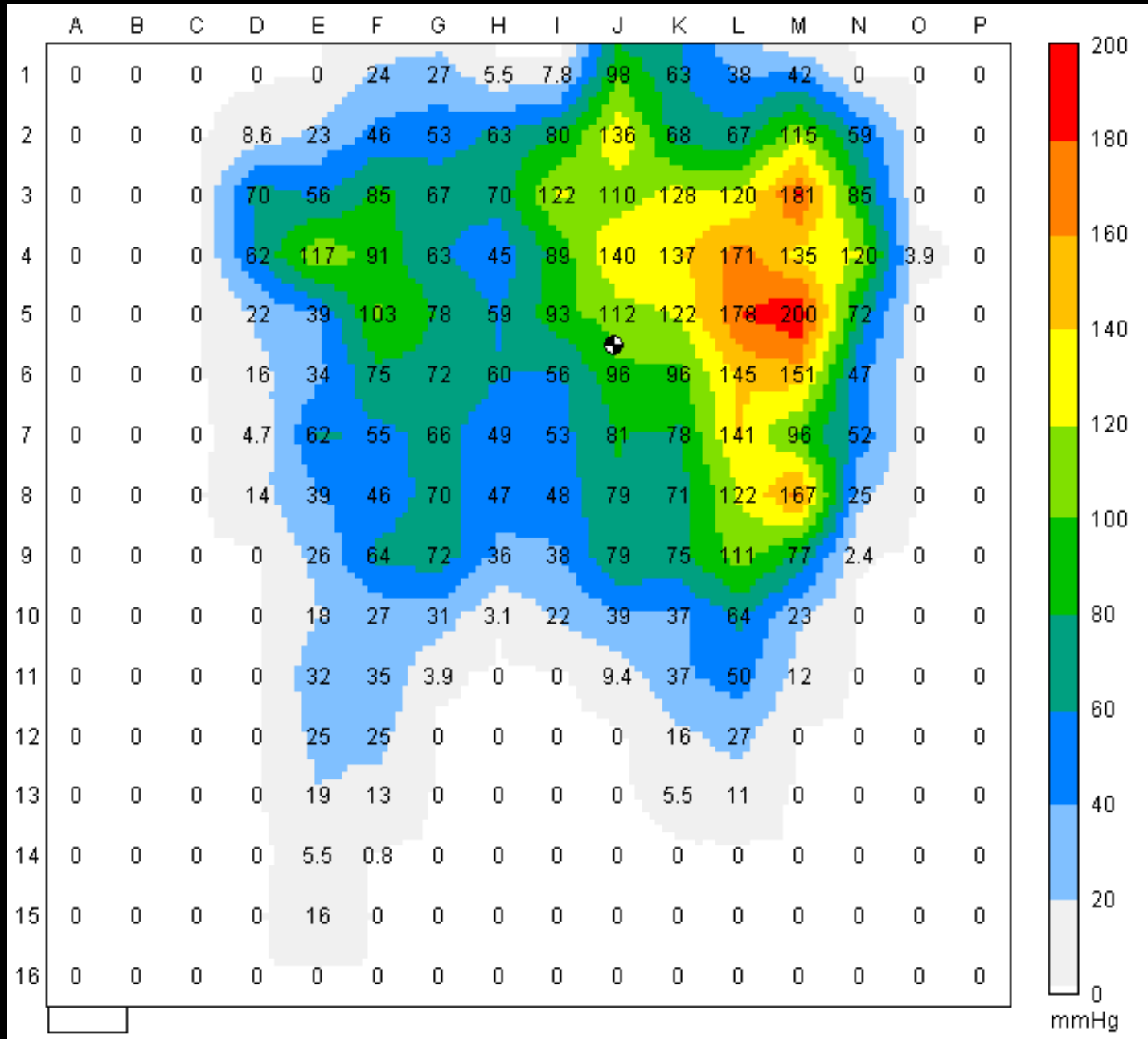
Pressure measurements

symmetric



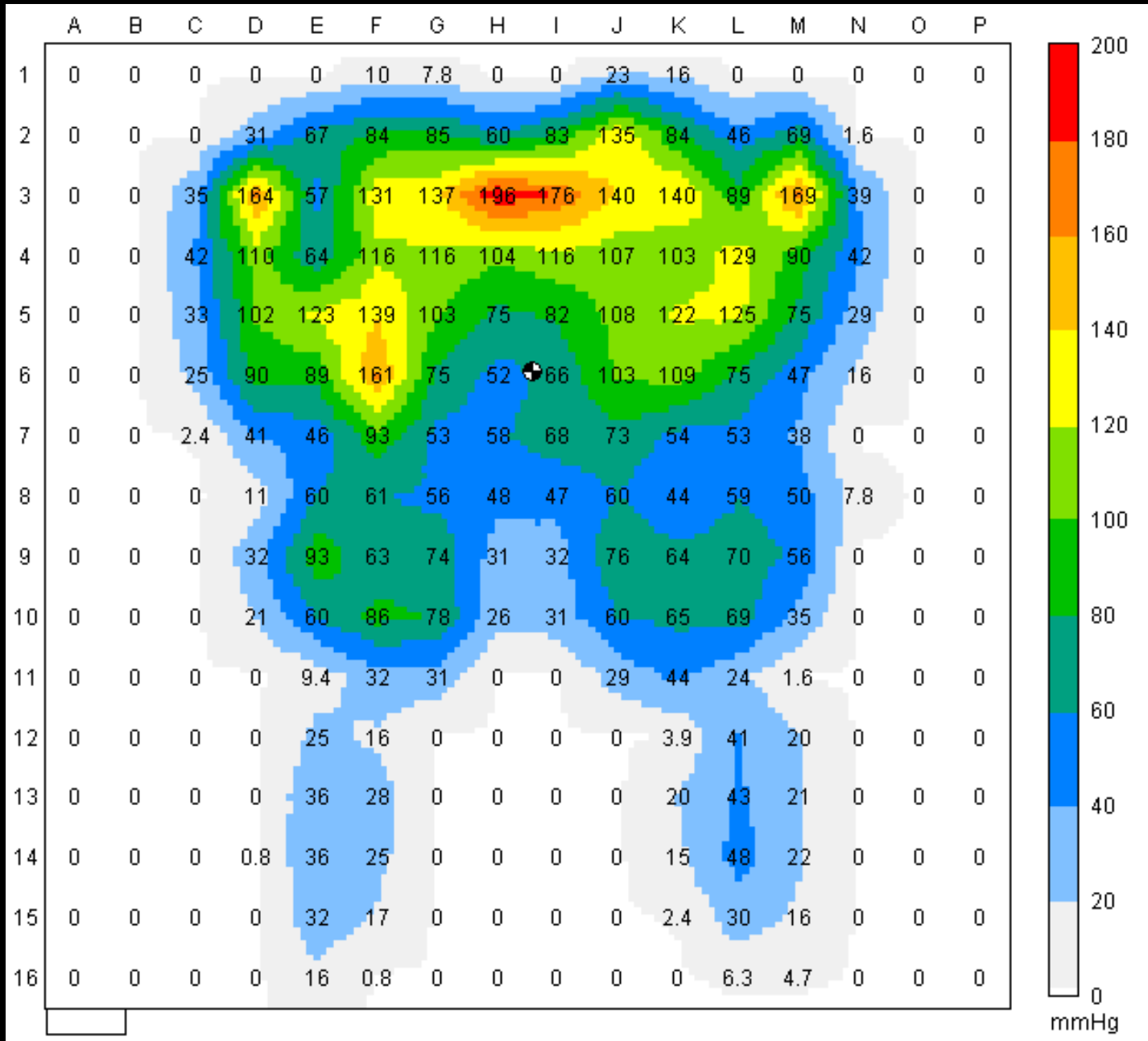
Pressure measurements

10° pelvic obliquity



Pressure measurements

15° posterior pelvic tilt



Personal technologies

Activity-specific technologies

Environmental technologies

Personal technologies

Things that you wear

My personal wheelchair

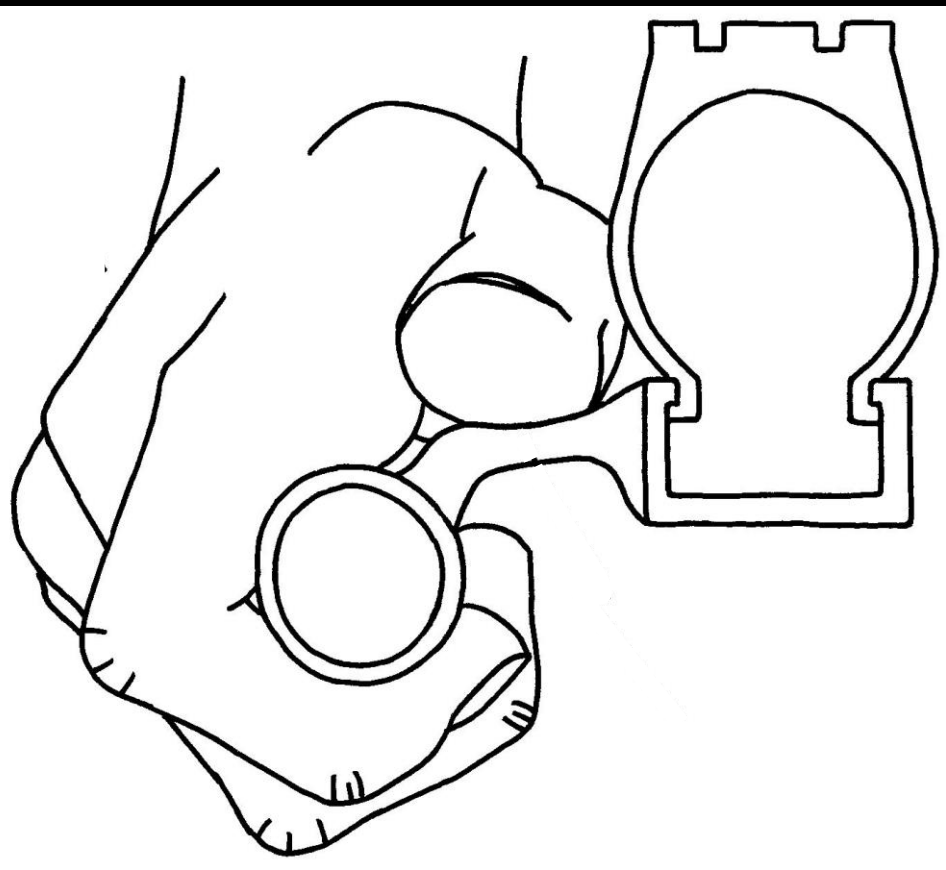
The need:

More comfort sitting

The need:

A better grip

Solution: an ergonomic pushrim

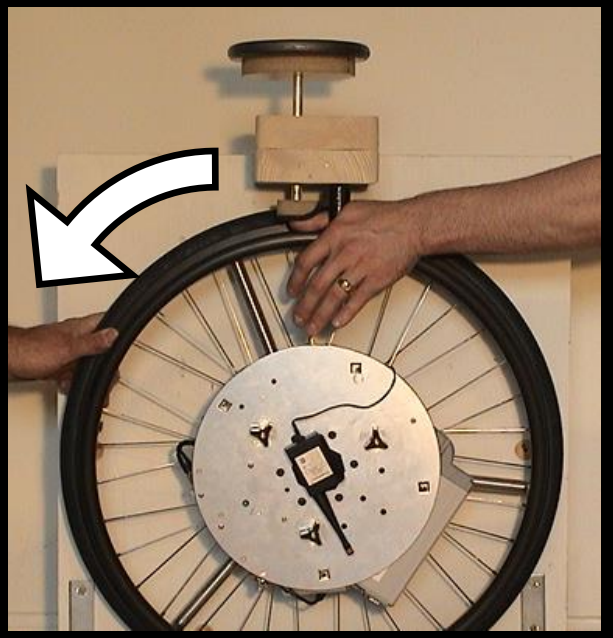


FlexRim

Combining the discrete compliant fasteners into one

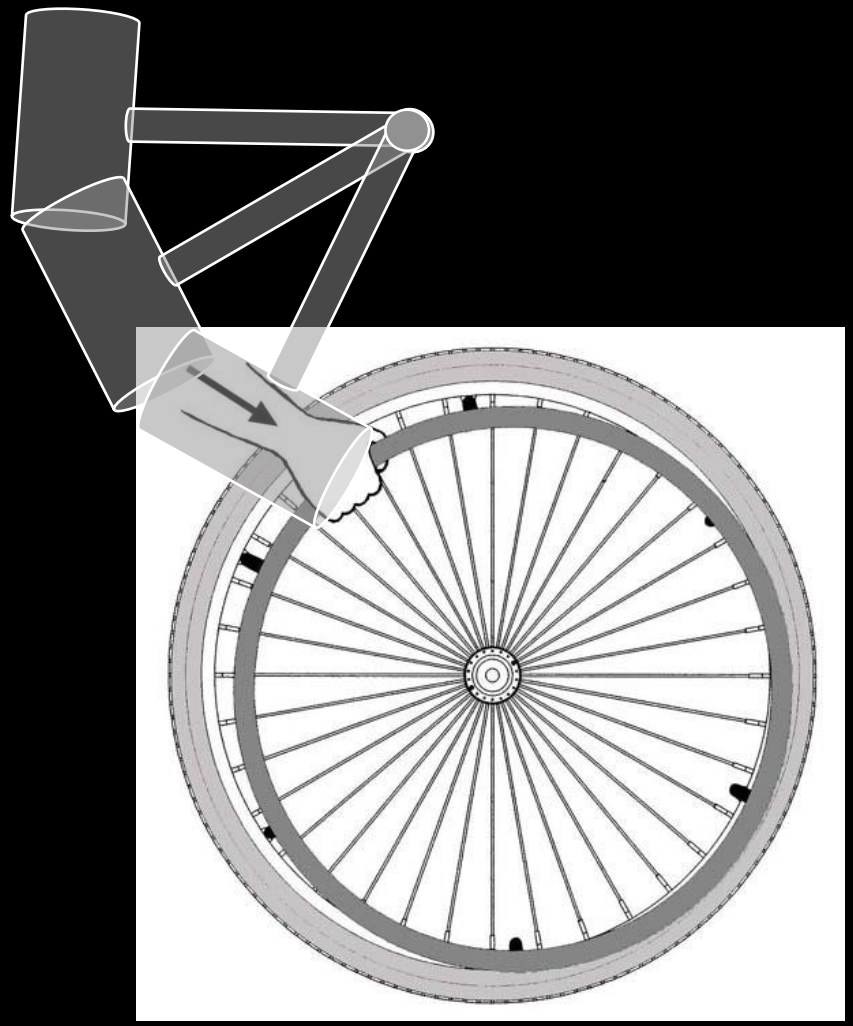
Frictional improvements

To reduce the grip force required to push



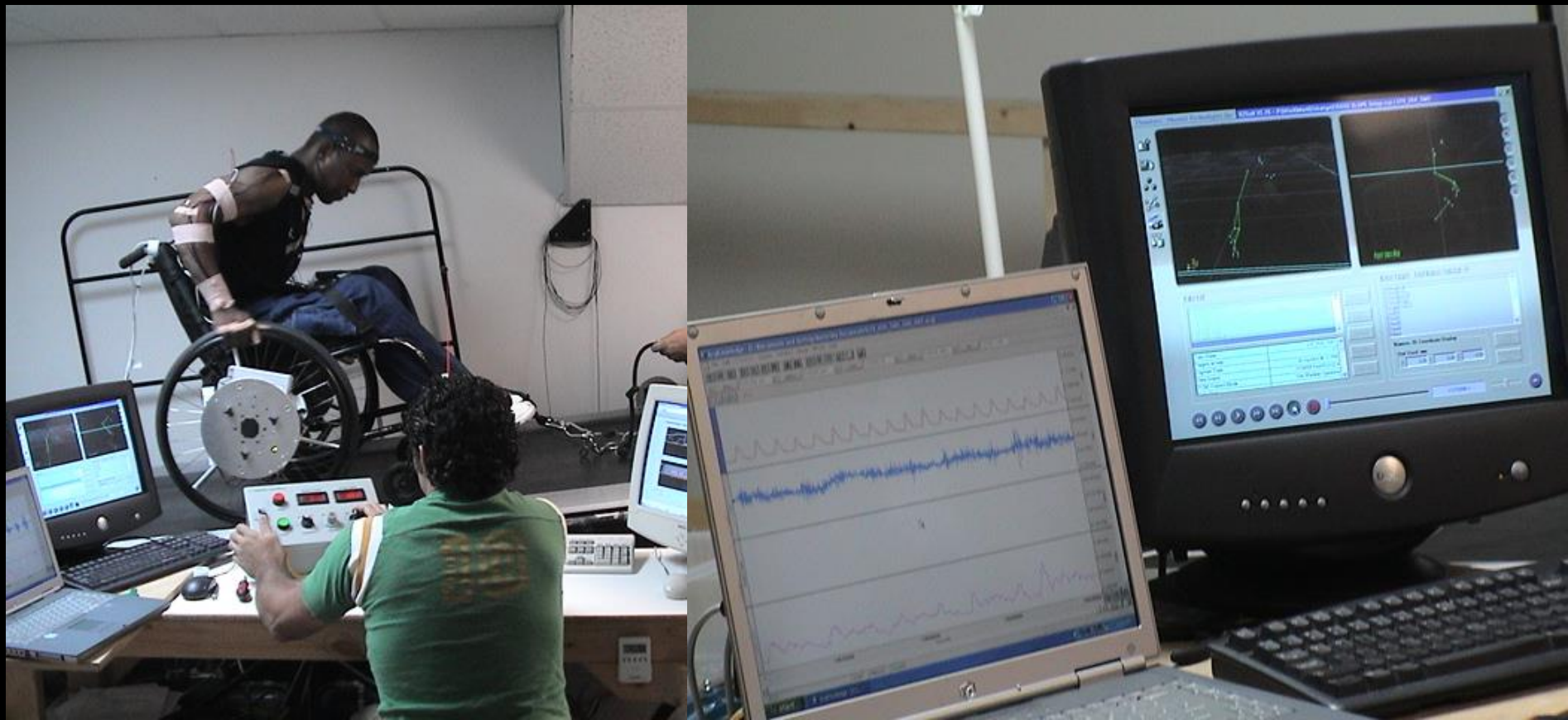
Impact absorbtion

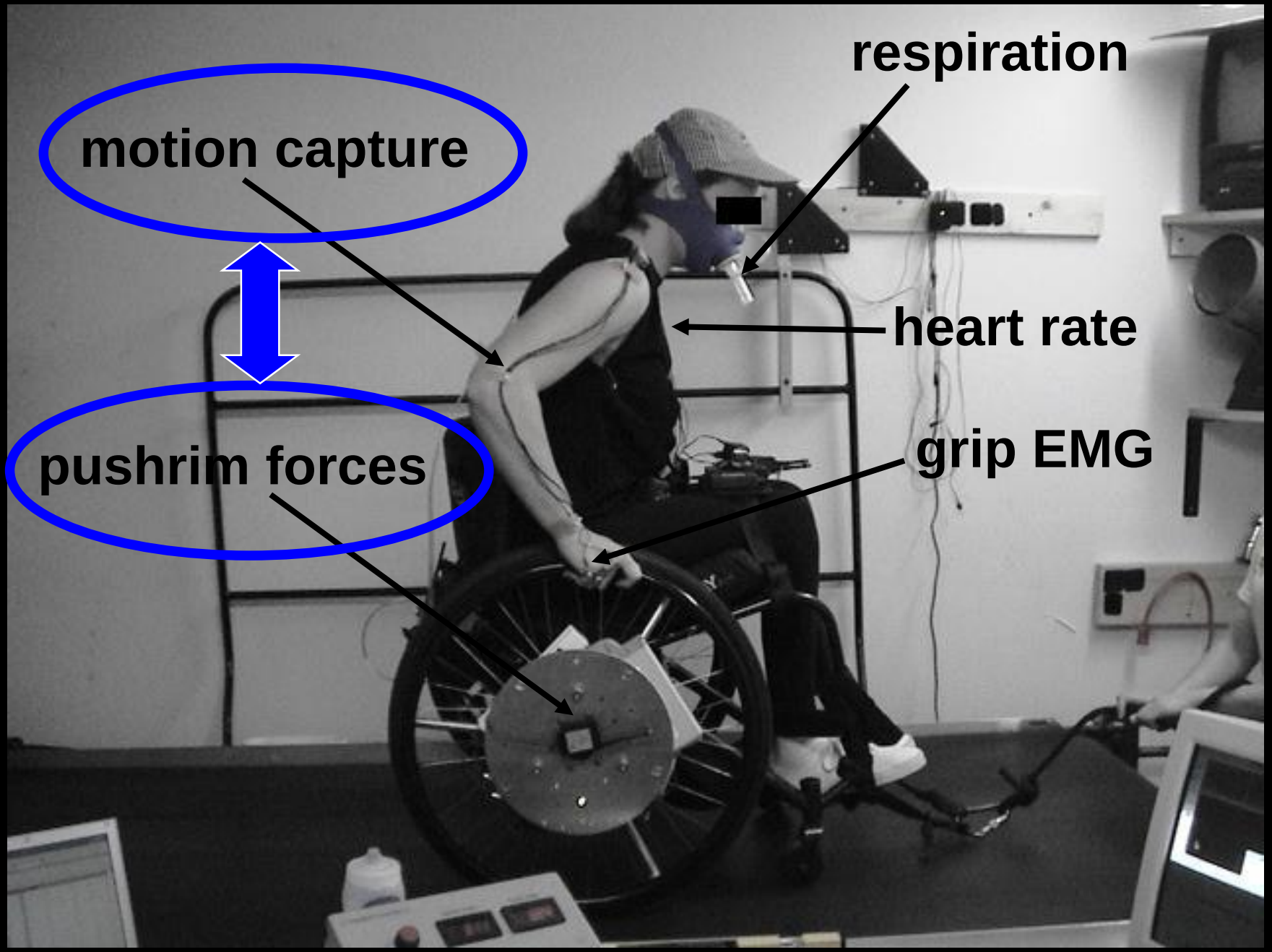
Like running shoes



Subjects are tested

over a wide variety of usage environments




respiration
motion capture
heart rate
grip EMG
pushrim forces

End product – the FlexRim

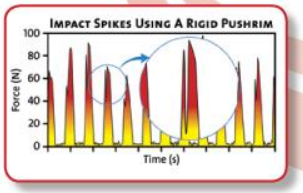
Design

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

Activity-specific technologies

And the desire to recreate


9.8
ON/OFF
HOLD
MODE
MIZUNO

seat angle

10 degrees from horizontal

seat angle

19–20 degrees from horizontal

MONIQUE

Dynamic seating spring assist


celebrating
Poker

The desire:

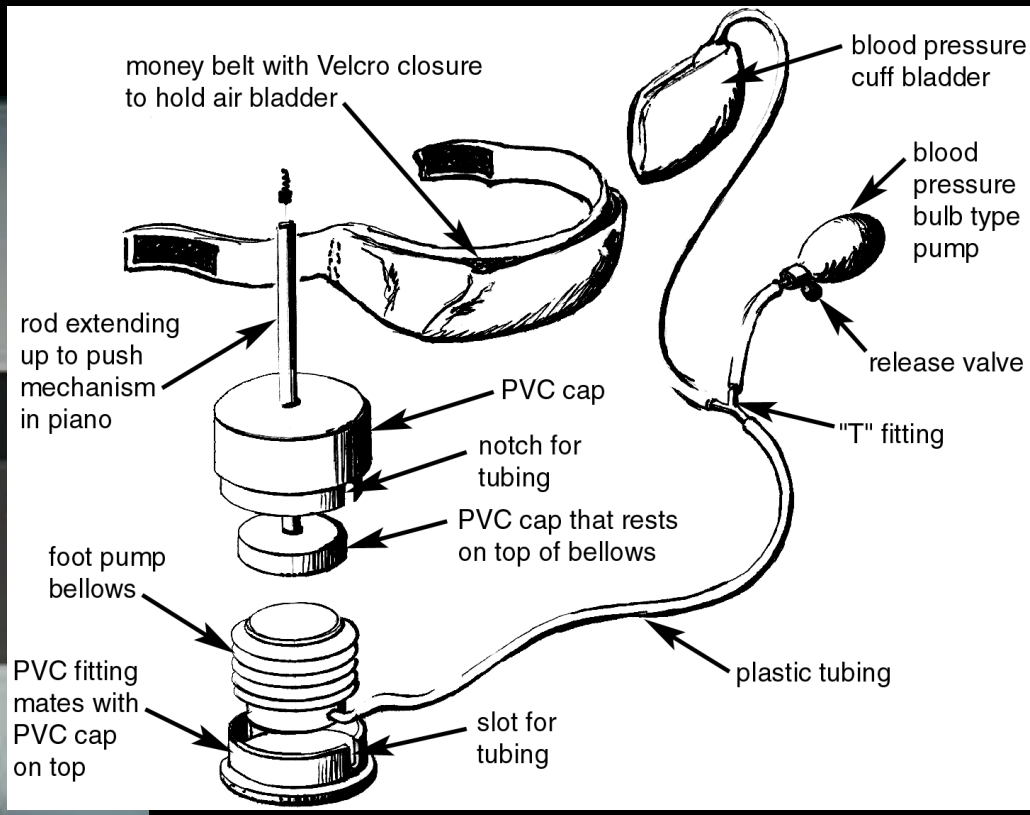
Get back into the backcountry


4 12'98


FOX SHOX
4 12 '98

The need:

Use the pedal again to play the piano



The desire:

Drive a manual shift vehicle

The desire:

Balance and ride a bike again

The desire:

Ride a tandem bike with a friend

The desire:

Paddle a canoe again without the required balance


NIMBUS
KANADIER

lateral balance test

water egress testing

Creating Ability

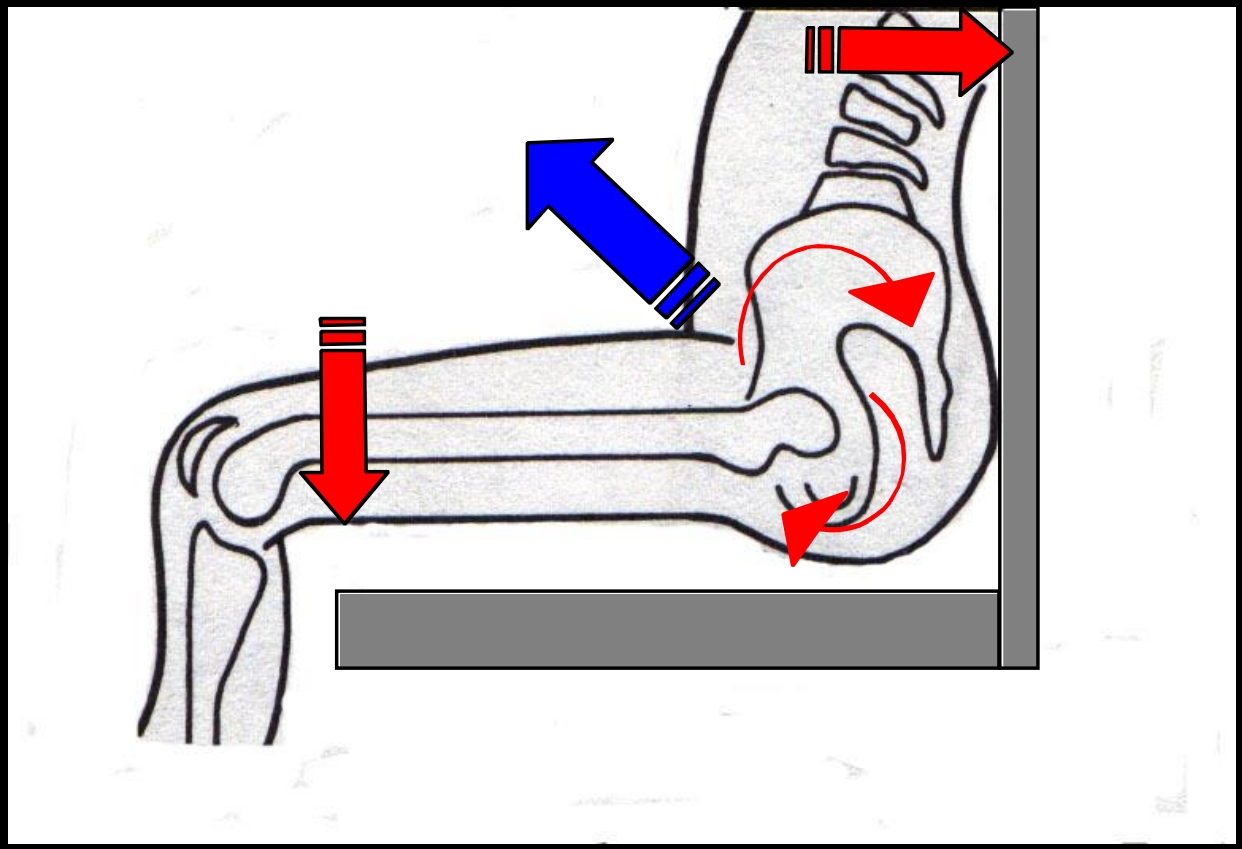
Canoe and Kayak Seating

The desire:

Surf again

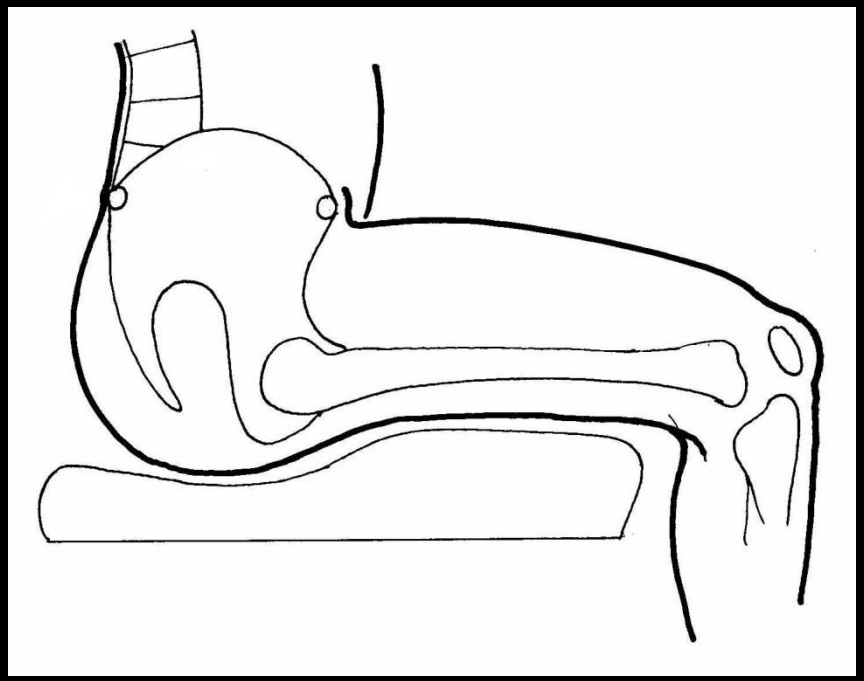
The problem:

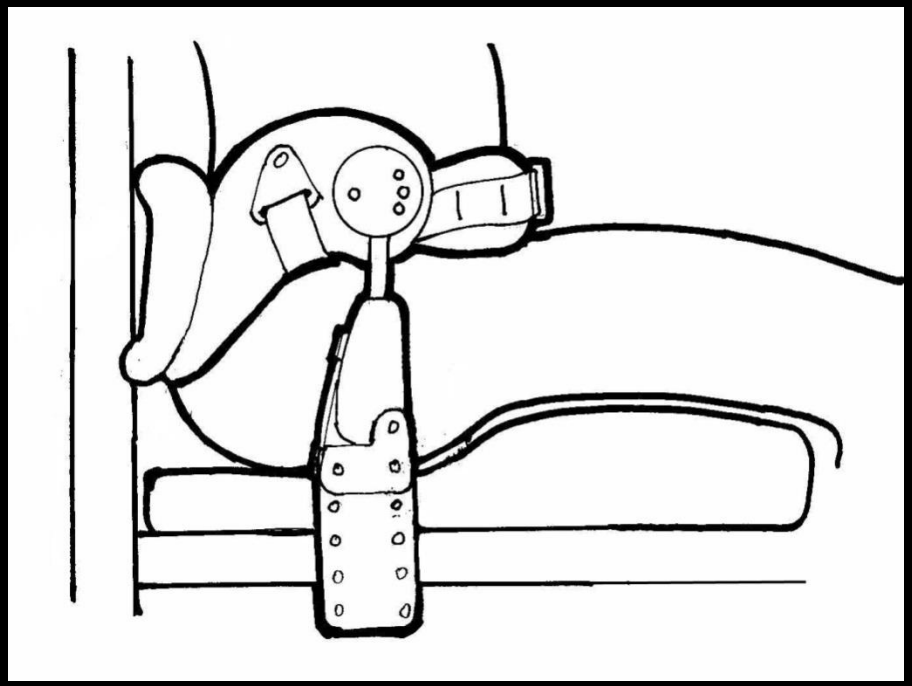
Unwanted pelvic movement due to spasticity



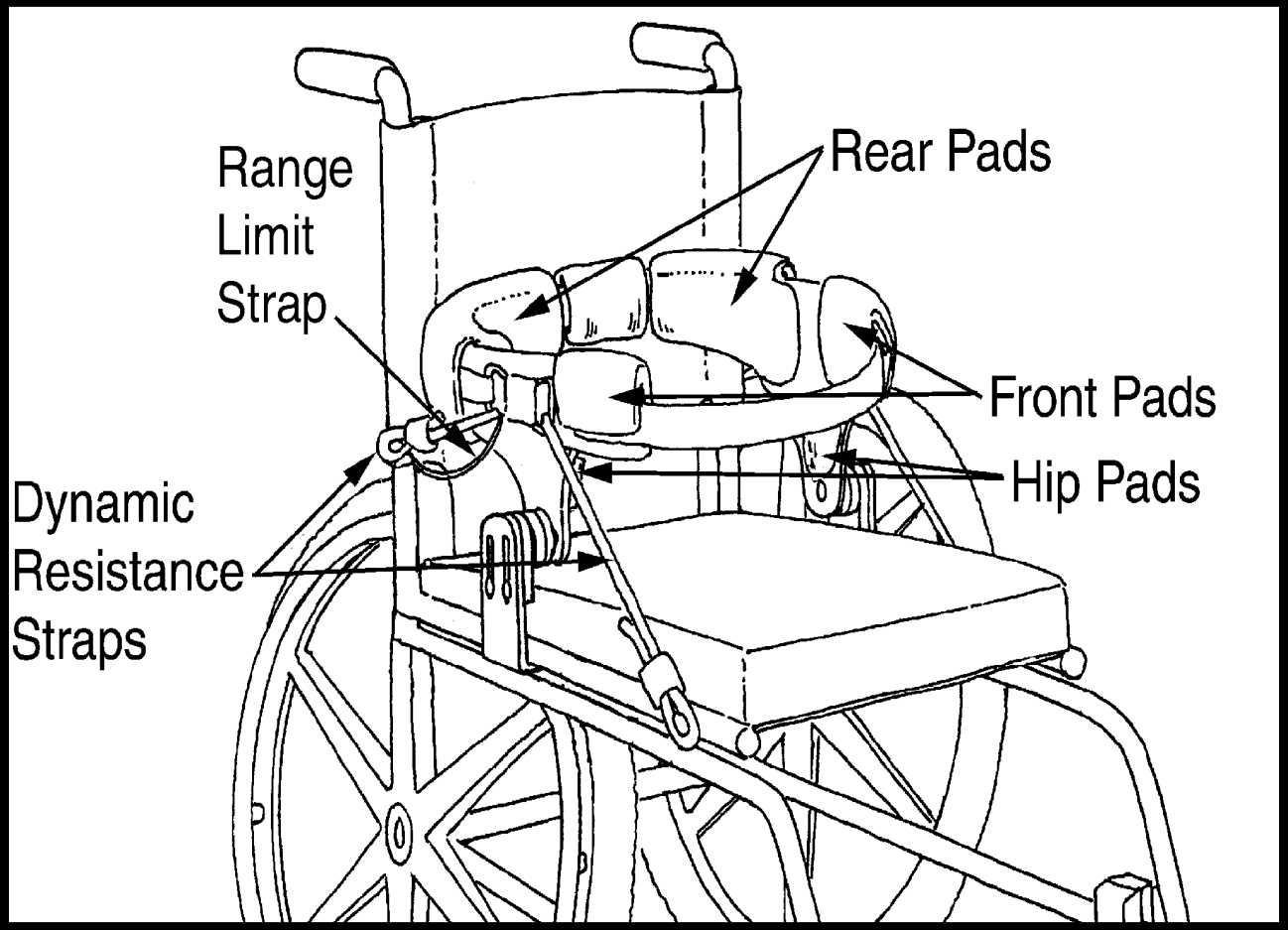
Concepts developed

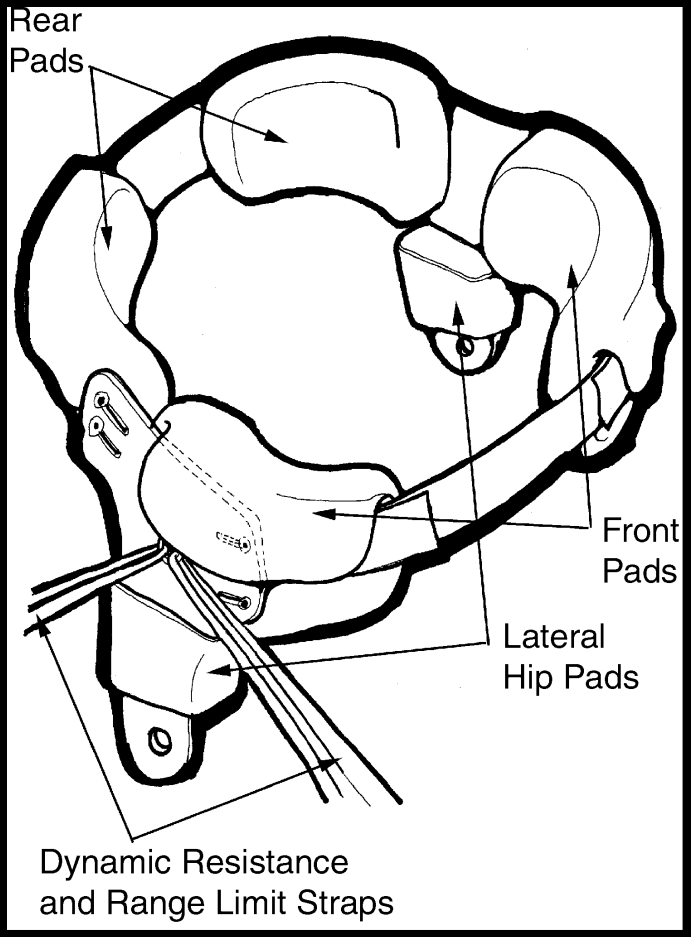
to allow the movement, but return to the desired position





Early prototypes





Fatigue testing of concept

The finished product

Environmental technologies

Things that do not move

ADA recreation trail

grade

> 8.33%	up to 30% of length
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

Universal Trail Assessment Process (UTAP)

Key UTAP information

length

grade

width

surface

cross slope

features & facilities

UTAP assessment team


SMARTTOOL

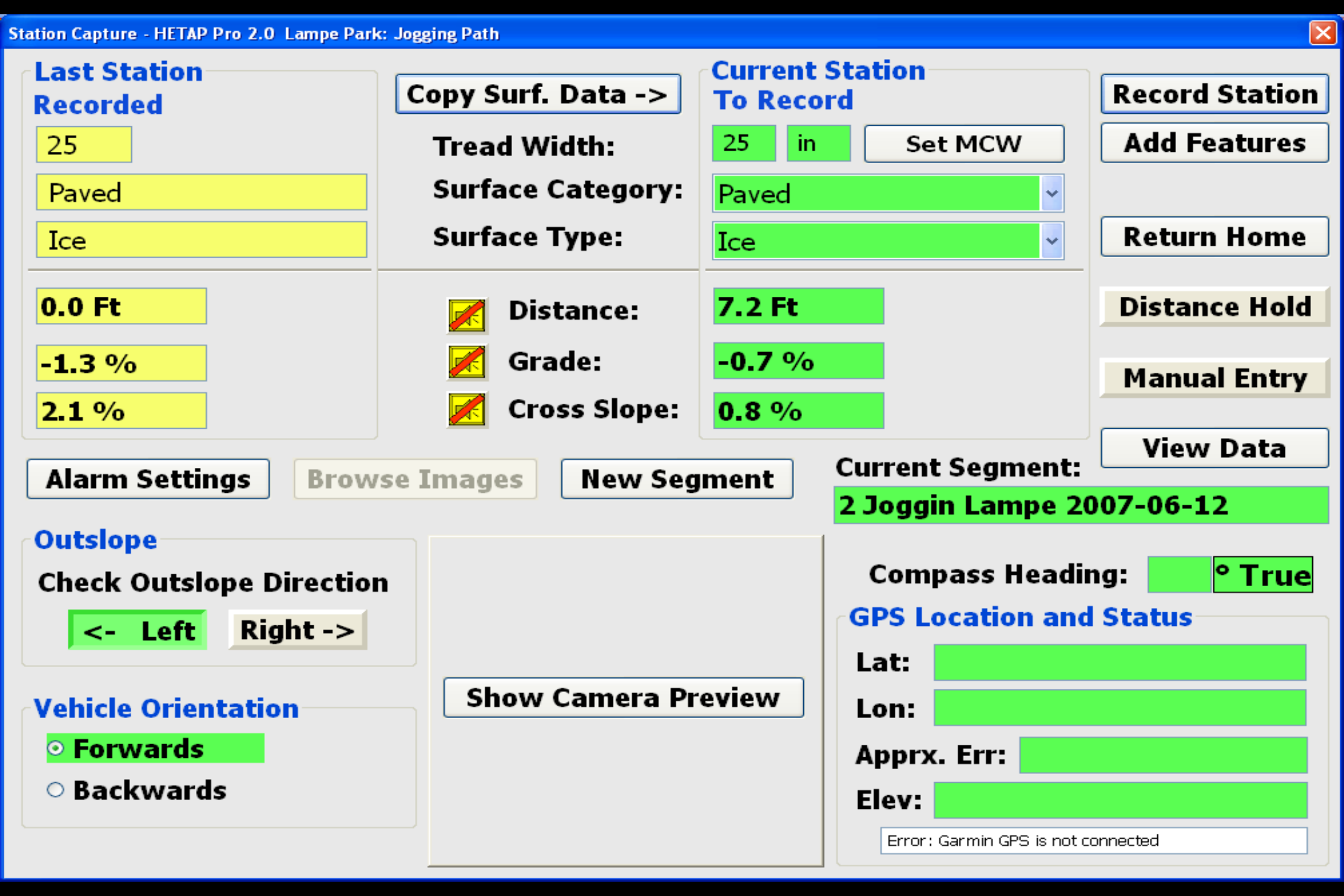
UTAP implementation status

Over 1900 people
trained to lead UTAP assessments

Over 155 trainers
to teach UTAP workshops

High-Efficiency Trail Assessment Process (HETAP)

HETAP wheel

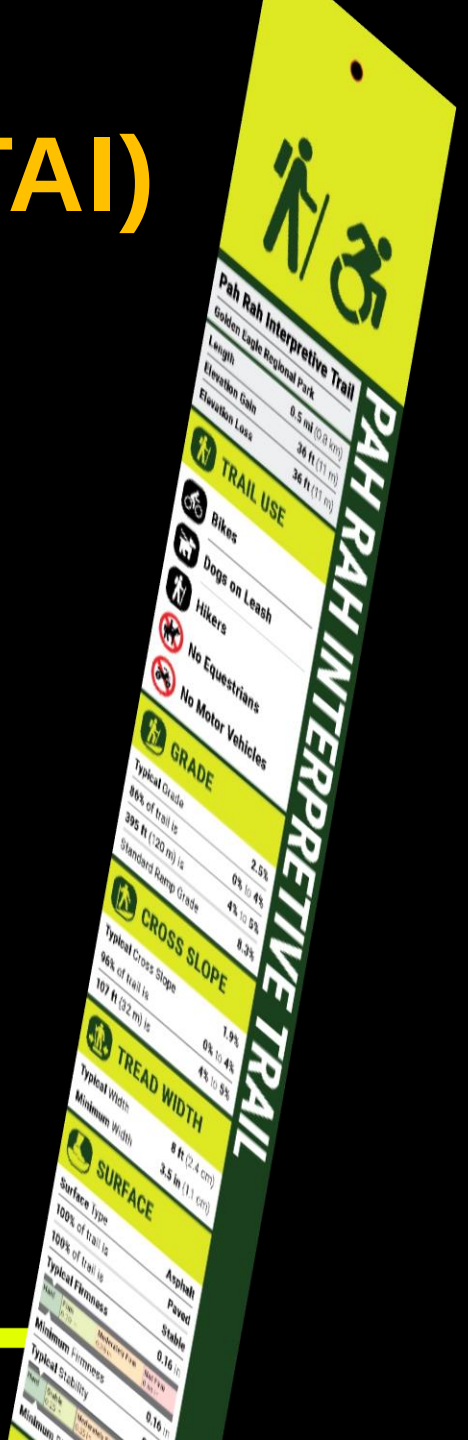

Station Capture - HETAP Pro 2.0 Lampe Park: Jogging Path
Last Station Recorded
25
Paved
Ice
0.0 Ft
-1.3 %
2.1 %
Copy Surf. Data ->
Tread Width:
Surface Category:
Surface Type:
Current Station To Record
25
in
Set MCW
Paved
Ice
Distance:
Grade:
Cross Slope:
7.2 Ft
-0.7 %
0.8 %
Record Station
Add Features
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


Red
Road
To Peavine Falls Road
Length 5.5 mi (8.9 km)
Elev Gain 787 ft (240 m)
Elev Loss 420 ft (128 m)
Hikers
Bikes
Dogs on Leash
No Motorized Vehicles
No Equestrians

Trail Access Information (TAI)

TAI SignPosts to convey to users in a Nutrition Facts label format:

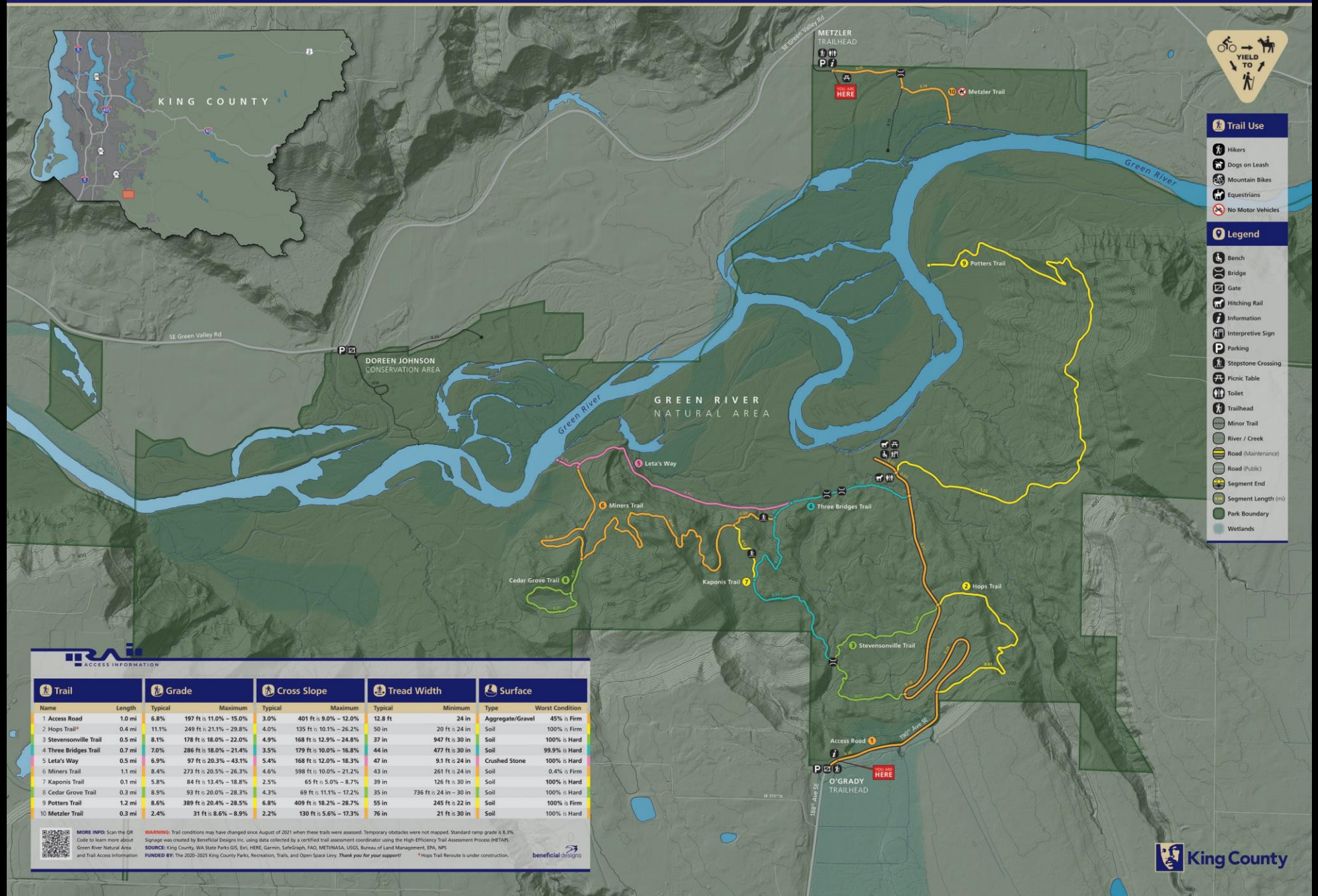
- Grade
- Cross Slope
- Tread Width
- Surface
- Obstructions



TRAIL ACCESS INFORMATION


OAK MOUNTAIN STATE PARK
North
TRAIL USE
LEGEND
WHITE TRAIL
YELLOW TRAIL
ORANGE TRAIL
RED ROAD
TREETOP NATURE TRAIL
BLUE TRAIL
GREEN TRAIL
RED TRAILS
Peavine Falls Trailhead
MOUNTAIN BIKE TRAILS
RED TRAIL SYSTEM
TRAIL
Trail Name
Length
Typical Grade
Maximum Grade
Typical Cross Slope
Maximum Cross Slope
Typical Tread Width
Minimum Tread Width
Surface Type
Red Road
Red-White Connector
Red-Blue Connector North
Red-Blue Connector South
Orange Connector
Yellow Trail
Yellow-Red Connector
Yellow-White Connector
White Trail
White-Blue Connector
Green Trail
Green-Red Connector
Green-Yellow Connector
Green-Yellow Ridge Trail
Green-White Connector
Blue Trail
Eagle's Nest Overlook
Falls Creek Trail
King's Chair Overlook
Peavine Falls Trail
Rim Shelter Trail
Treetop Nature Trail
Alabama STATE PARKS
Alabama Trails Commission
LAKESHORE

Green River Natural Area



TRAIL ACCESS INFORMATION

Trail		Grade		Cross Slope		Tread Width		Surface	
Name	Length	Typical	Maximum	Typical	Maximum	Typical	Minimum	Type	Worst Condition
1 Access Road	1.0 mi	6.8%	197 ft is 11.0% – 15.0%	3.0%	401 ft is 9.0% – 12.0%	12.8 ft	24 in	Aggregate/Gravel	45% is Firm
2 Hops Trail*	0.4 mi	11.1%	249 ft is 21.1% – 29.8%	4.0%	135 ft is 10.1% – 26.2%	50 in	20 ft is 24 in	Soil	100% is Firm
3 Stevensonville Trail	0.5 mi	8.1%	178 ft is 18.0% – 22.0%	4.9%	168 ft is 12.9% – 24.8%	37 in	947 ft is 30 in	Soil	100% is Hard
4 Three Bridges Trail	0.7 mi	7.0%	286 ft is 18.0% – 21.4%	3.5%	179 ft is 10.0% – 16.8%	44 in	477 ft is 30 in	Soil	99.9% is Hard
5 Leta's Way	0.5 mi	6.9%	97 ft is 20.3% – 43.1%	5.4%	168 ft is 12.0% – 18.3%	47 in	9.1 ft is 24 in	Crushed Stone	100% is Hard
6 Miners Trail	1.1 mi	8.4%	273 ft is 20.5% – 26.3%	4.6%	598 ft is 10.0% – 21.2%	43 in	261 ft is 24 in	Soil	0.4% is Firm
7 Kaponis Trail	0.1 mi	5.8%	84 ft is 13.4% – 18.8%	2.5%	65 ft is 5.0% – 8.7%	39 in	126 ft is 30 in	Soil	100% is Hard
8 Cedar Grove Trail	0.3 mi	8.9%	93 ft is 20.0% – 28.3%	4.3%	69 ft is 11.1% – 17.2%	35 in	736 ft is 24 in – 30 in	Soil	100% is Hard
9 Potters Trail	1.2 mi	8.6%	389 ft is 20.4% – 28.5%	6.8%	409 ft is 18.2% – 28.7%	55 in	245 ft is 22 in	Soil	100% is Firm
10 Metzler Trail	0.3 mi	2.4%	31 ft is 8.6% – 8.9%	2.2%	130 ft is 5.6% – 17.3%	76 in	21 ft is 30 in	Soil	100% is Hard

MORE INFO: Scan the QR Code to learn more about Green River Natural Area and Trail Access Information

WARNING: Trail conditions may have changed since August of 2021 when these trails were assessed. Temporary obstacles were not mapped. Standard ramp grade is 8.3%. Signage was created by Beneficial Designs Inc. using data collected by a certified trail assesment coordinator using the High-Efficiency Trail Assessment Process (HETAP).

SOURCE: King County, WA State Parks GIS, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, Bureau of Land Management, EPA, NPS

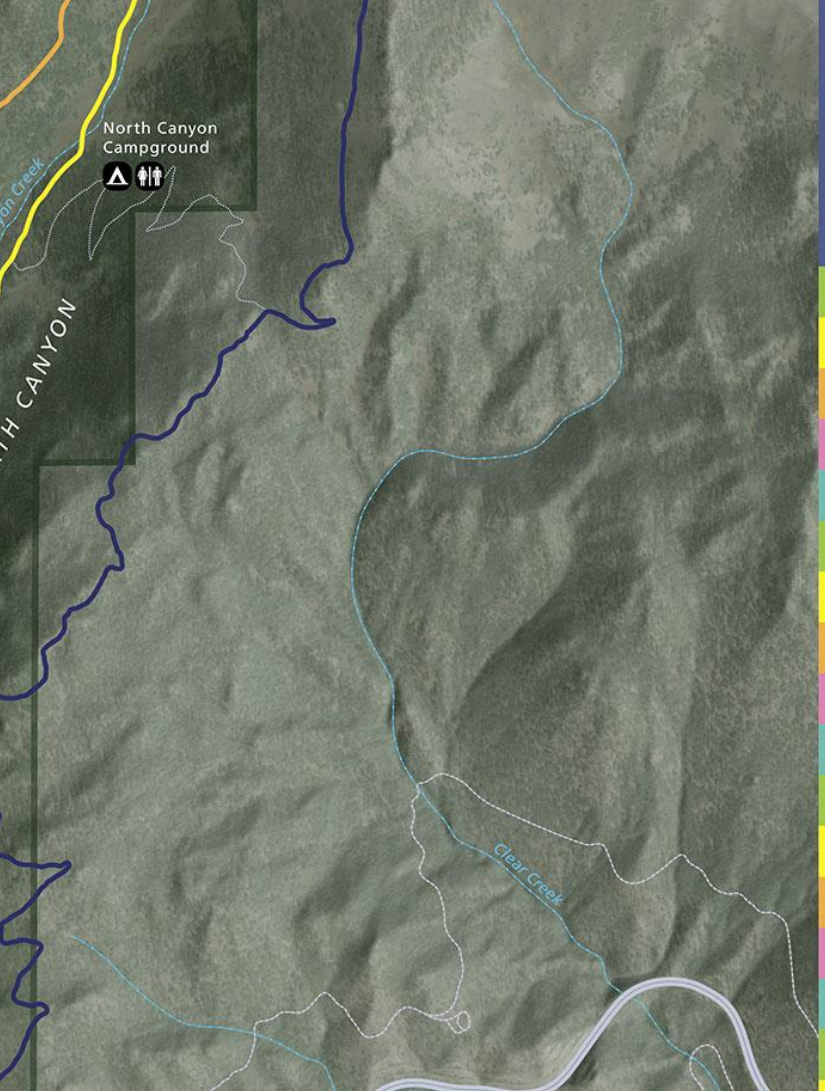
FUNDED BY: The 2020–2025 King County Parks, Recreation, Trails, and Open Space Levy. ***Thank you for your support!***

*Hops Trail Reroute is under construction.

beneficial designs

King County

TRAIL ACCESS INFORMATION



Trail		Grade		Cross Sl	
Name	Length	Typical	Maximum	Typical	
1 Spooner Lake Loop Trail	2.5 mi	5.0%	1254 ft is 11% - 25%	5.4%	9
2 North Canyon Road	4.5 mi	7.4%	3098 ft is 13% - 23%	3.2%	120
3 Marlette Lake Trail	3.8 mi	8.2%	2831 ft is 14% - 28%	4.5%	12
4 Marlette Lake Road	1.3 mi	3.2%	712 ft is 7% - 21%	2.5%	
5 Marlette Creek Trail	NA	NA	NA	NA	
6 Hobart Road	3.3 mi	8.3%	1750 ft is 17% - 24%	4.4%	15
7 Sunflower Hill Trail	2.8 mi	8.4%	1641 ft is 15% - 33%	3.9%	1
8 Franktown Road	1.9 mi	5.8%	816 ft is 15% - 25%	3.9%	5
9 Red House Flume Road	2.3 mi	3.6%	916 ft is 8% - 38%	3.7%	1
10 Franktown Connector	0.8 mi	7.8%	326 ft is 20% - 29%	3.5%	
11 Pipeline Road	2.9 mi	2.1%	394 ft is 6% - 11%	3.6%	1
12 Lakeview Road	3.6 mi	9.2%	1523 ft is 20% - 30%	5.3%	21
13 Muskgrove Road	1.0 mi	7.6%	528 ft is 18% - 26%	5.1%	3
14 Little Valley Road	NA	NA	NA	NA	
15 Hannah's Cabin Trail	0.2 mi	5.5%	153 ft is 8% - 14%	4.5%	
16 Snapdragon Trail	1.0 mi	10.4%	631 ft is 21% - 46%	7.6%	5


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

Table

ABA/FSORAG

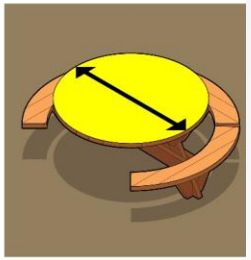
What type of assessment?

ABA FSO

REQUIRED SPACES

Is the table Circular?

Table Diameter



Measure the height from the
to the table top

Table

Table

Measure the height from the gro
to the table top

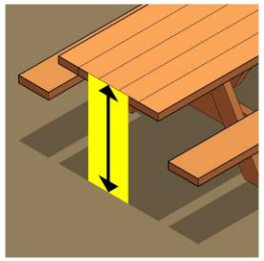


Table surface height (min 28 in
- max 34 in)

Compliant

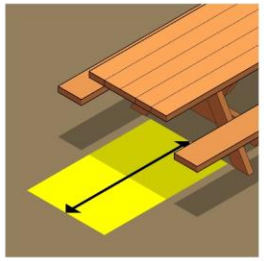
CLEAR SPACE

Does one full unobstructed side
clear ground space around the t
adjoin or overlap an ORAR trail

Table

WHEELCHAIR CLEAR SPACE

Measure the Wheelchair clear s
length. The length may extend a
maximum of 25 inches beneath
the table.



WC Clear space length (min 48 i

Not compliant

Measure the Wheelchair clear

Table

Table

Suggested maintenance

Notes

Optional photos

MANUFACTURER INFO

Manufacturer and Model

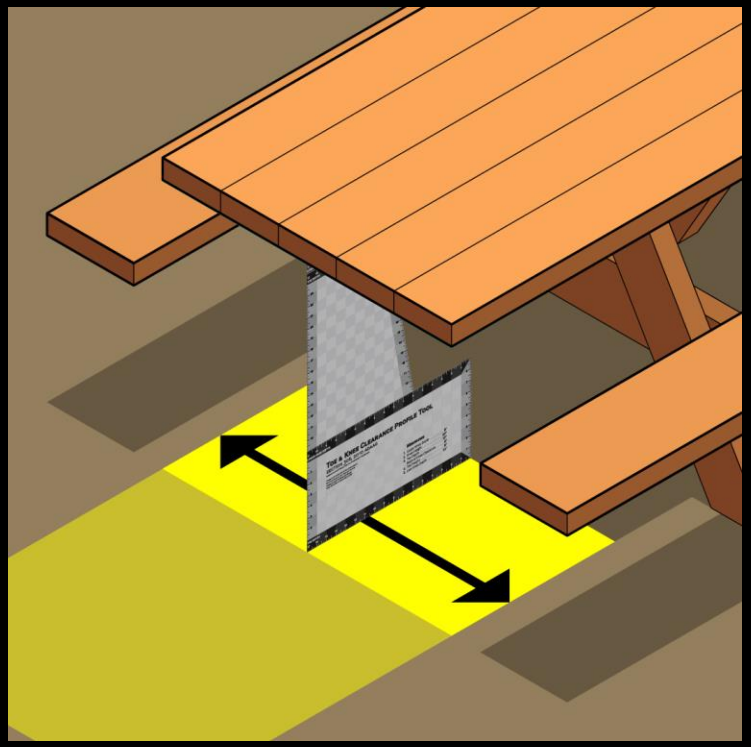
If available, enter the model and manufacturer of the feature.

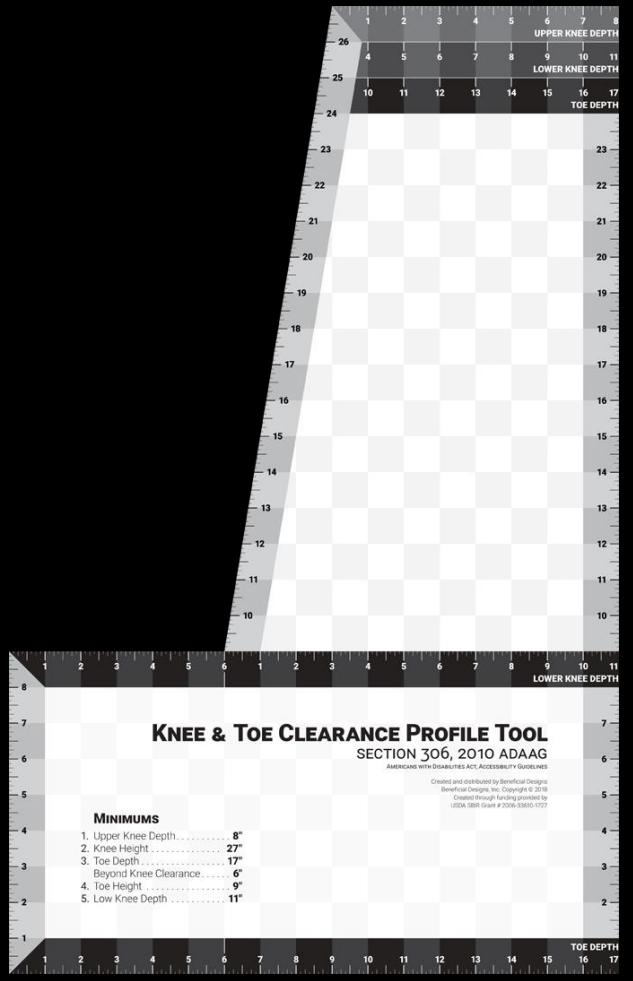
Manufacturer

Model

Knee & Toe Clearance Profile Tool

unobstructed knee & toe space





Adjustable height cooking grill

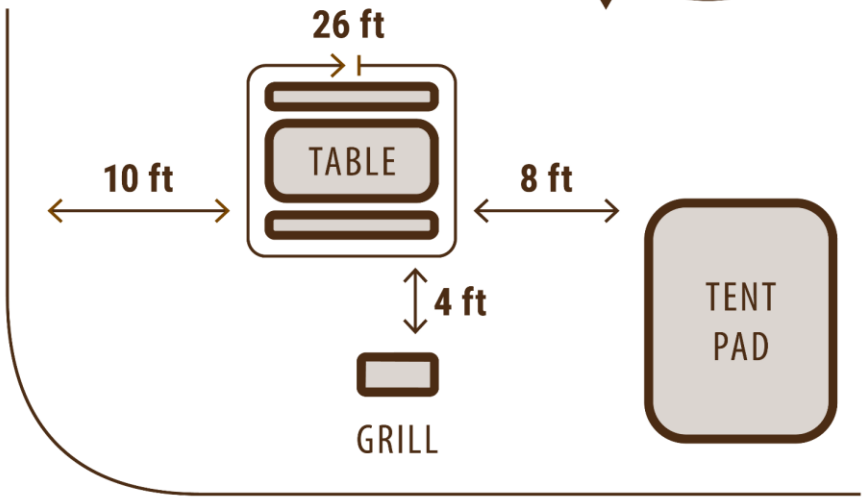
Water pump

Actuation force

Campsite

Access Information

RESET
BEFORE YOU GO



Please return elements so that this campsite remains **accessible**

If you do not require access and mobility features, please do not use this site between **11AM and 6PM**

Site 18

Single Site

PRIORITY USAGE

If you **DO NOT** require access and mobility features, please **DO NOT** use this site between:

11AM **6PM**

Accessible Elements

Tent Pad

Size	11.6 ft x 16.0 ft
Accommodates	4 Persons

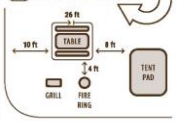
Table

Pivot Grill

Fire Ring

Hydrant

RESET *BEFORE YOU GO*



Please return elements so this campsite remains **accessible**

WARNING: Campsite conditions may have changed since March 2011 when this campsite was assessed. Temporary obstructions were not recorded.

Phase I & II funding for the Developed Outdoor Recreation Assessment Process is provided by the **U.S. Department of Agriculture** through the Small Business Innovation and Research Program Grant number 2003-33610-21051

CAMPSITE ACCESS INFORMATION

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

Develop standards for

Trail and sidewalk design

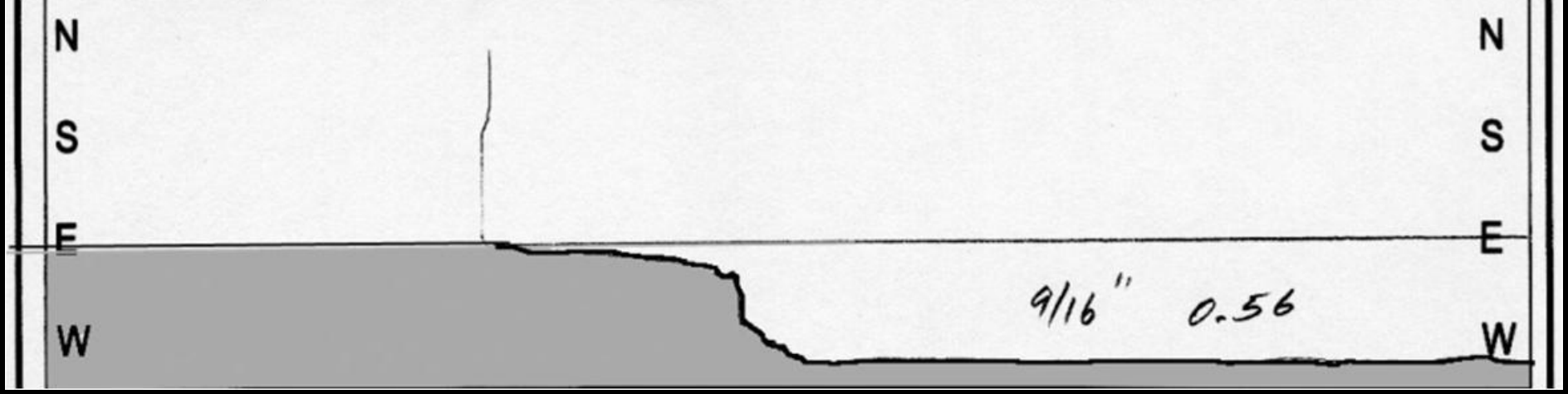
Architectural Barriers Act (ABA)
Outdoor Recreation Access Guidelines

Public Rights of Way Access Guidelines (PROWAG)

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

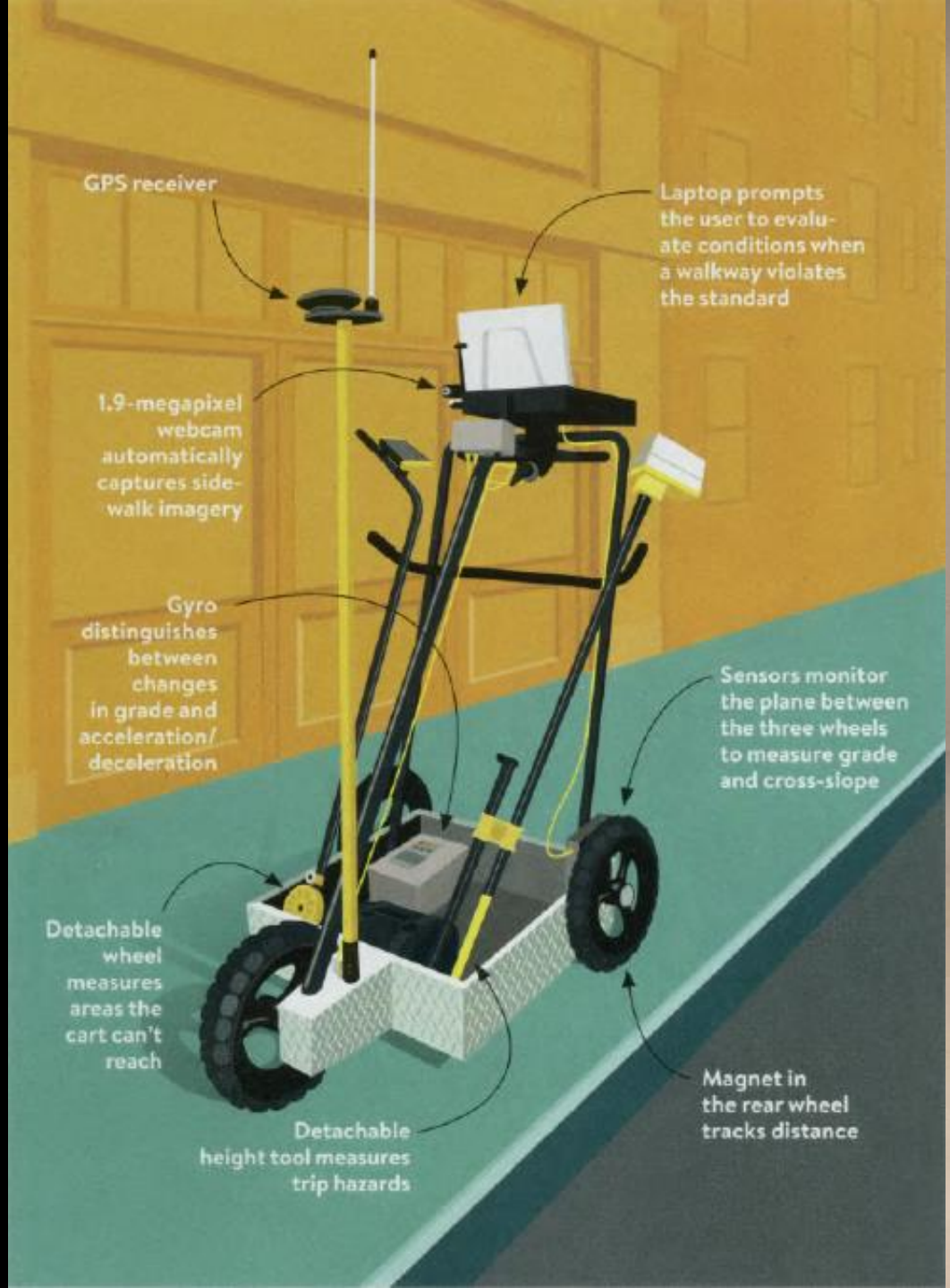
Street Name: OLIVA WEST Segment Name: * Distance: 233'9"

*N COUNTY ROAD TO MACKLAND



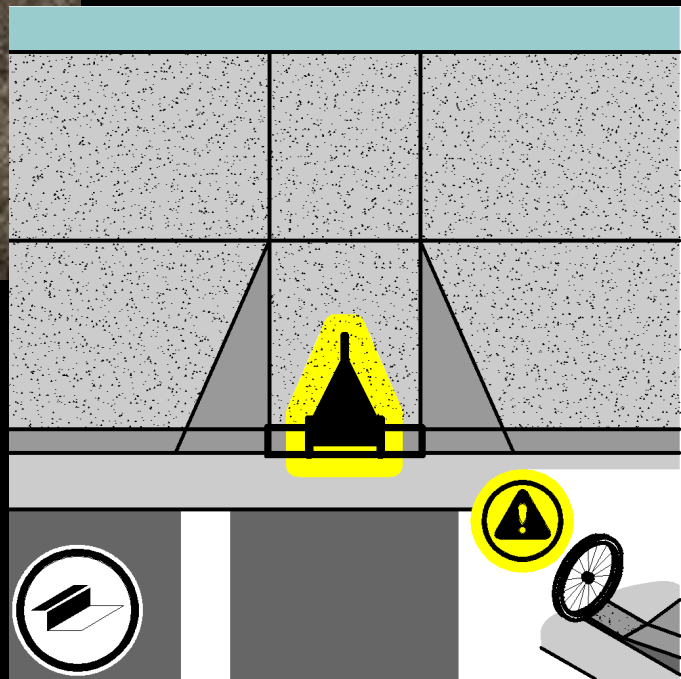
Sidewalk assessment

Public Rights-of-Way Assessment Process (PROWAP)

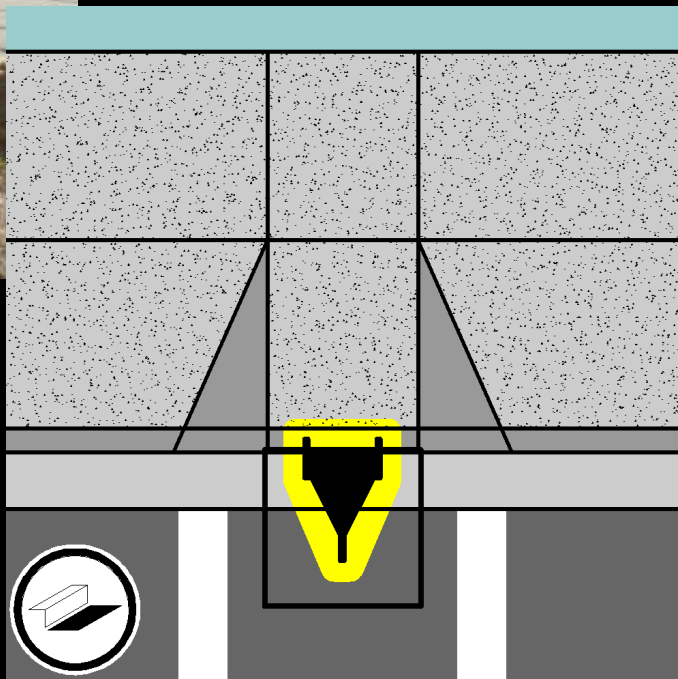

GPS receiver
Laptop prompts the user to evaluate conditions when a walkway violates the standard
1.9-megapixel webcam automatically captures sidewalk imagery
Gyro distinguishes between changes in grade and acceleration/deceleration
Sensors monitor the plane between the three wheels to measure grade and cross-slope
Detachable wheel measures areas the cart can't reach
Magnet in the rear wheel tracks distance
Detachable height tool measures trip hazards

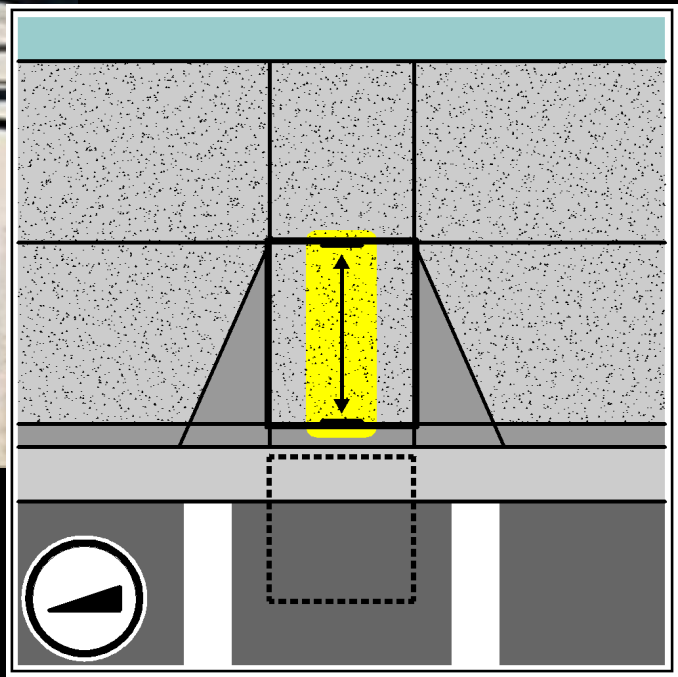
Digital Measuring Wheel (DMS)

Digital Height Measuring Device

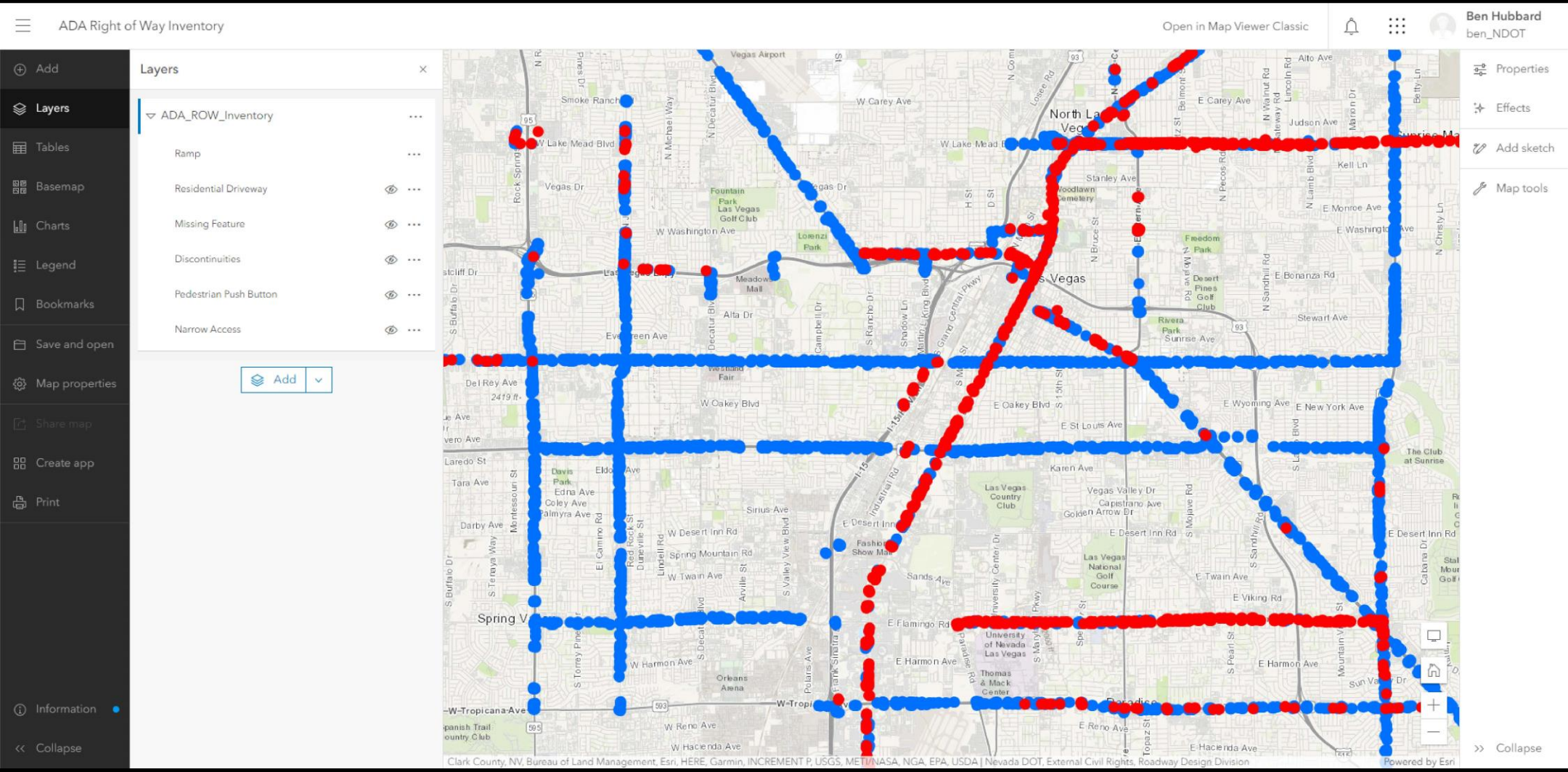



ONE STOP
AUTO REPAIR

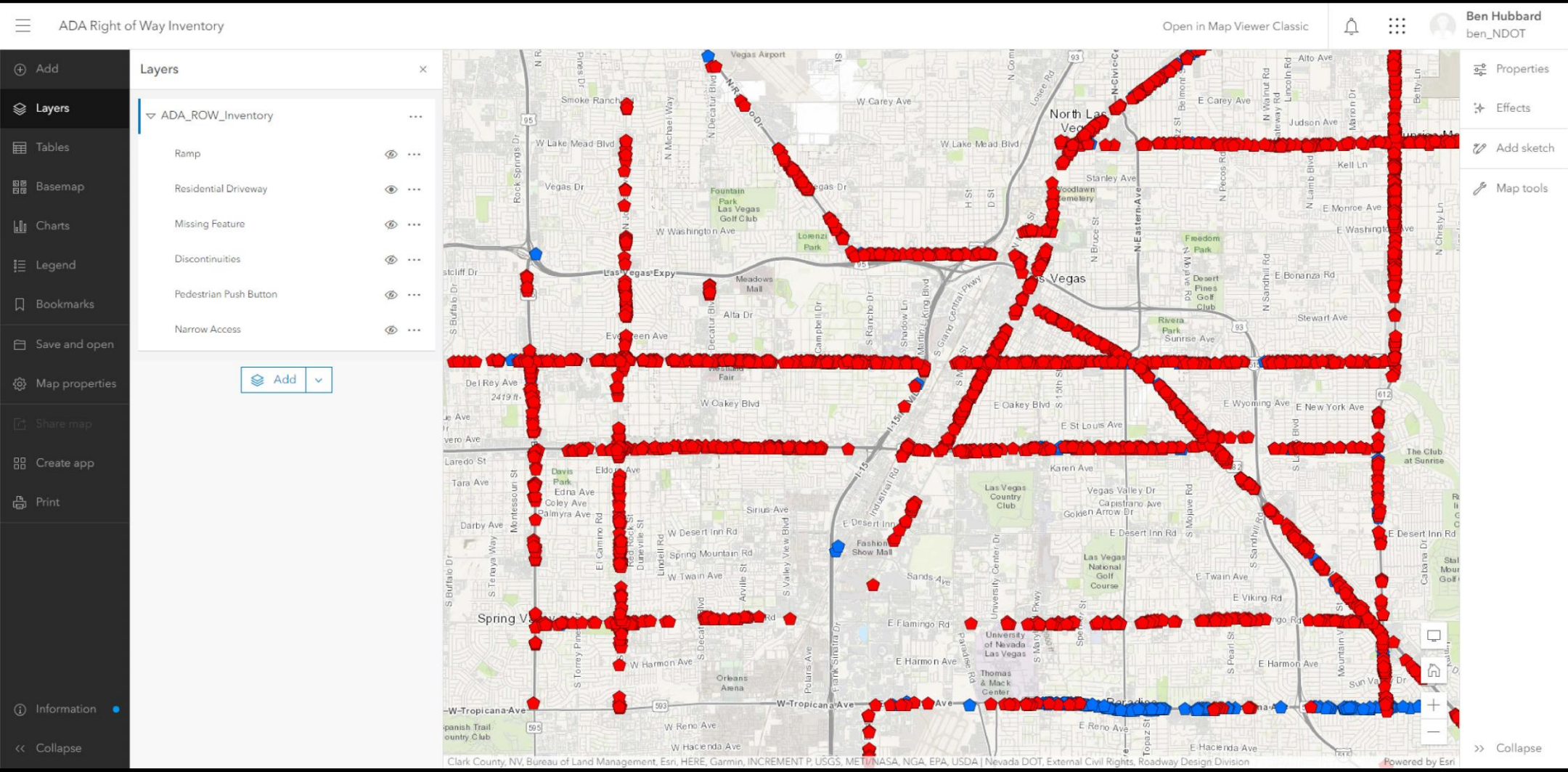




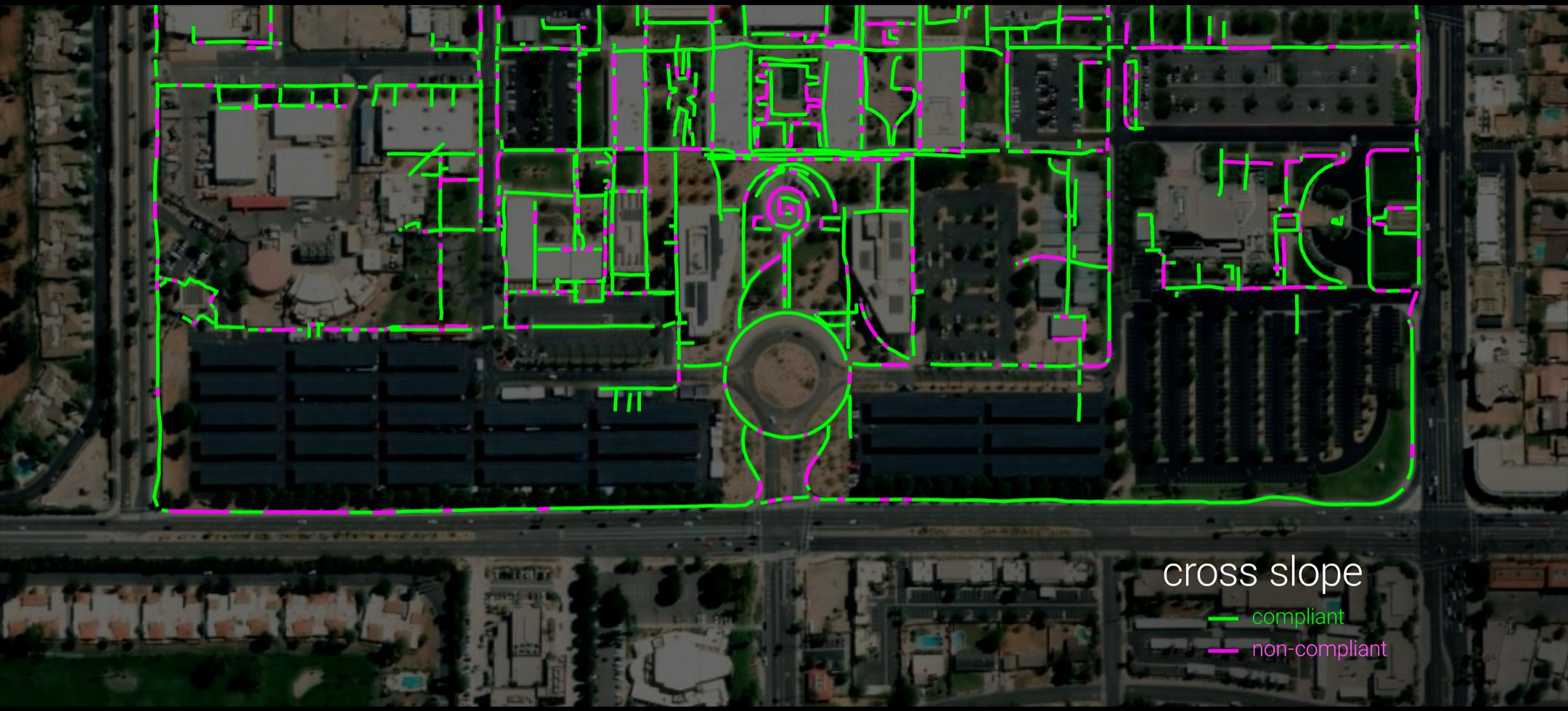
NDOT Curb Ramps



NDOT Residential Driveways



PROWAP

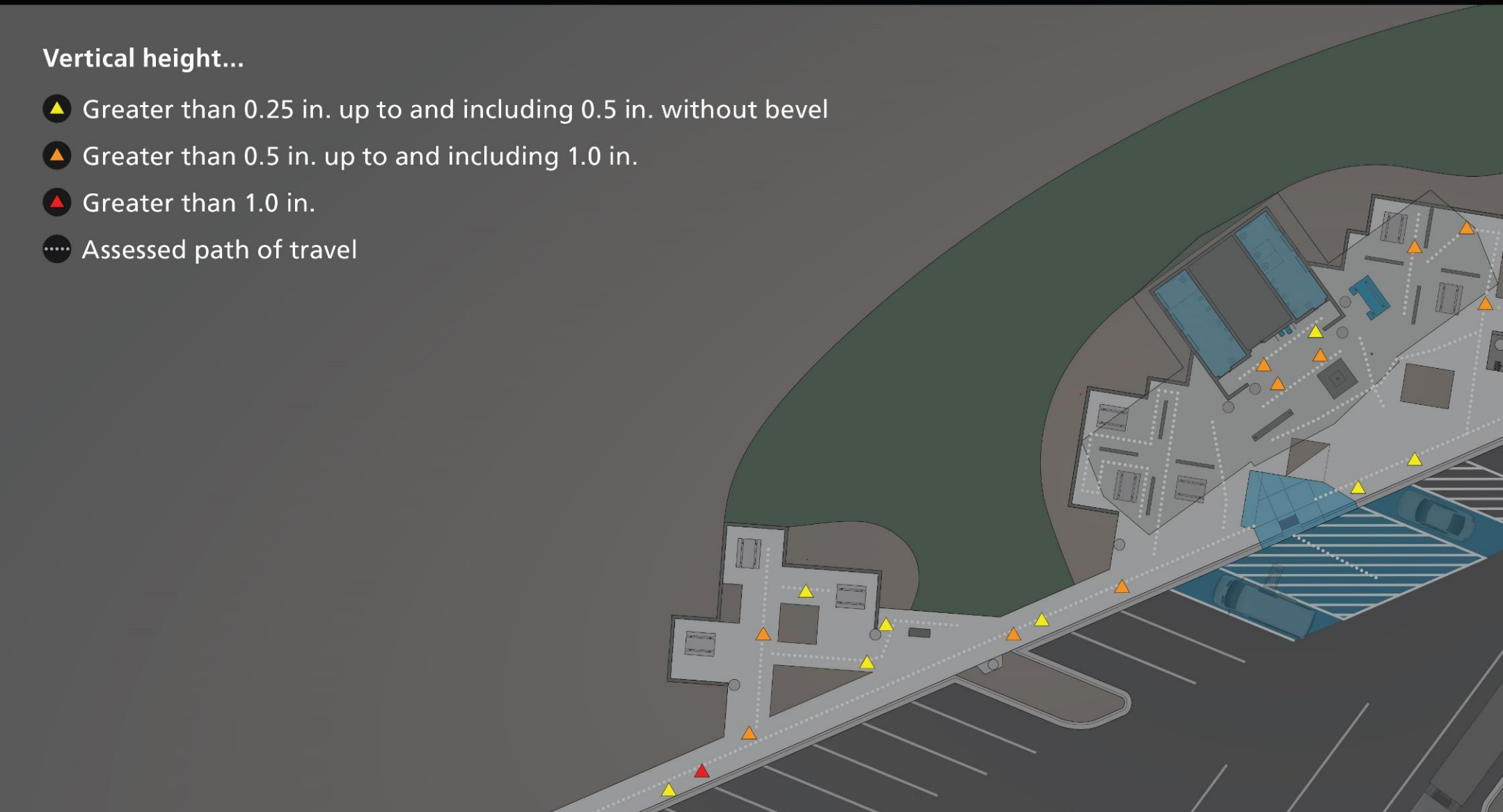


Wadsworth Rest Area

Path Events: Vertical Discontinuities

Vertical height...

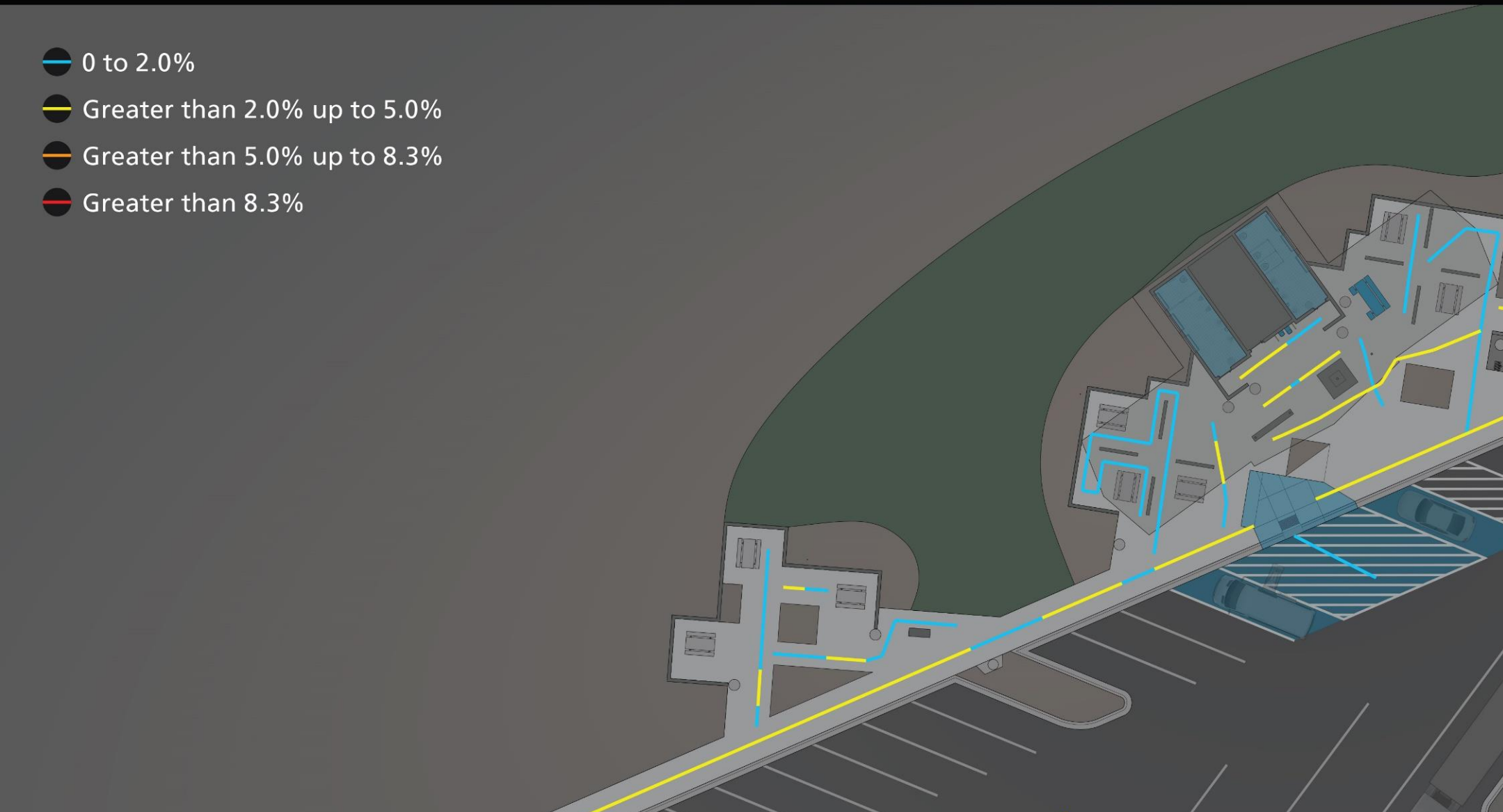
- Greater than 0.25 in. up to and including 0.5 in. without bevel
- Greater than 0.5 in. up to and including 1.0 in.
- Greater than 1.0 in.
- Assessed path of travel



Wadsworth Rest Area

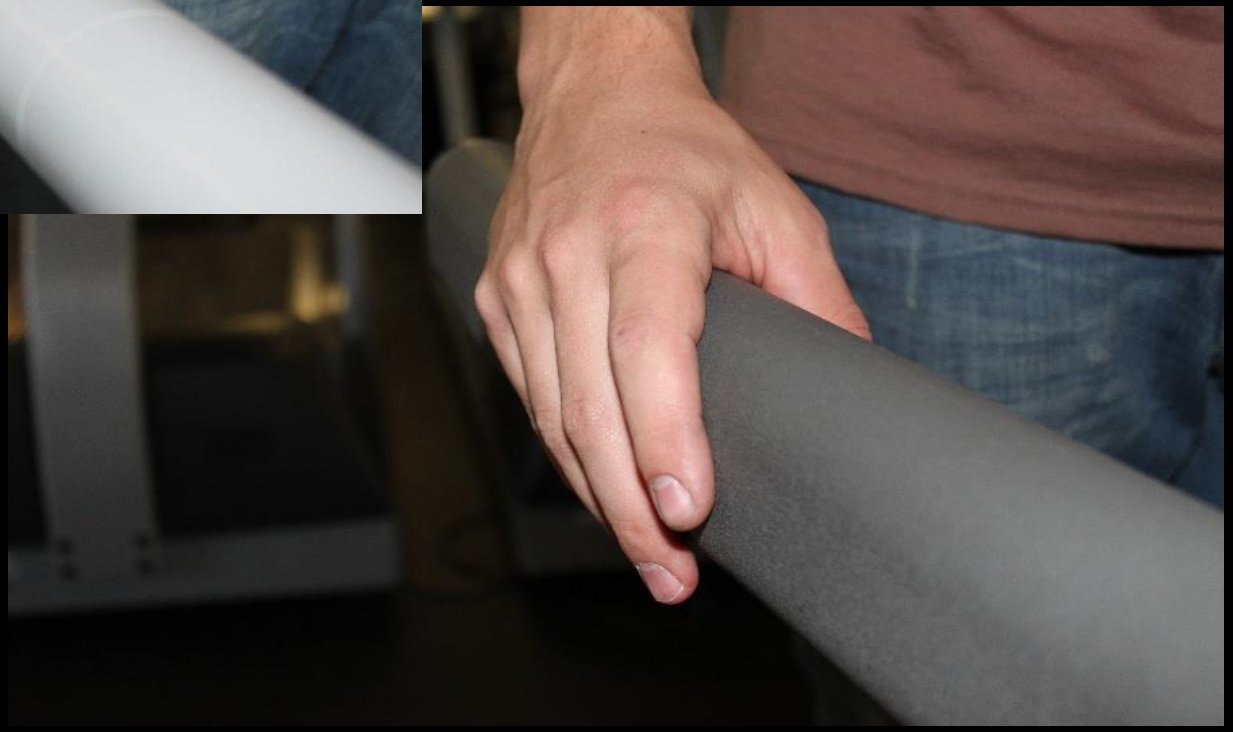
Paths of Travel: Cross Slope

- 0 to 2.0%
- Greater than 2.0% up to 5.0%
- Greater than 5.0% up to 8.3%
- Greater than 8.3%



Universal Design of Fitness Equipment (UDFE) Standards

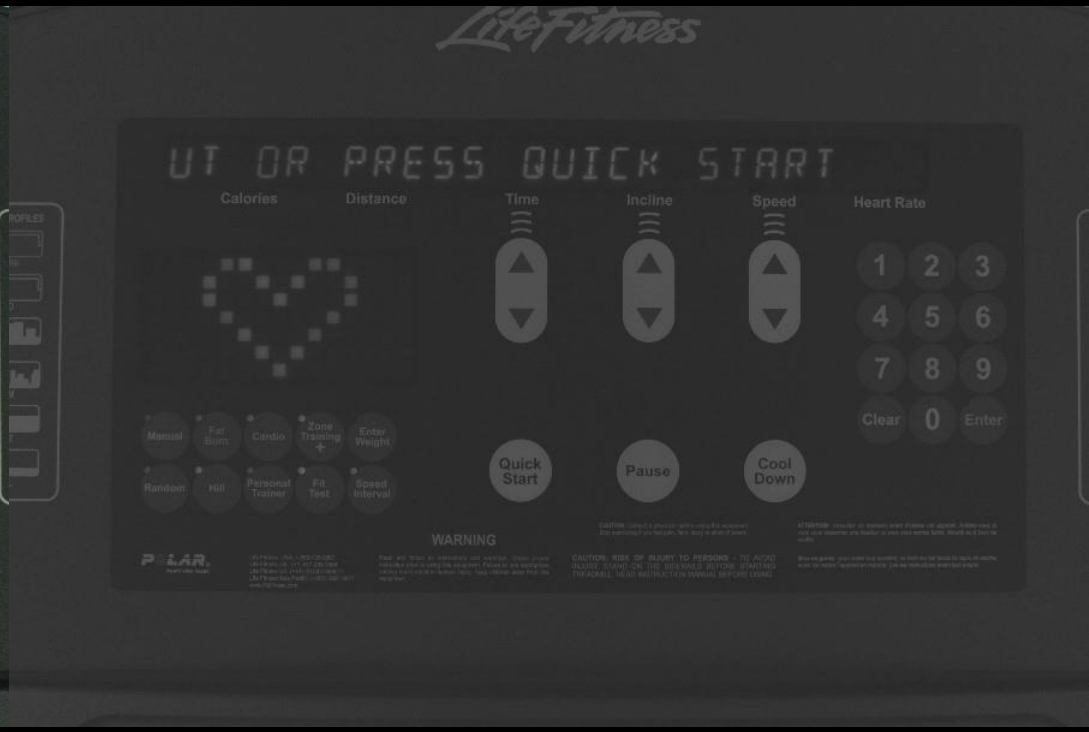
Low step-up height design



Finding the

Weight Adjustment Pin

color contrast



value contrast

color contrast

value contrast


DIR 24


MAURER SOHNE


2013.12.23 13:17


2013.12.23 13:18


2013.12.23 13:19


2013.12.23 13:19


2013. 12. 23 13:43


214
6°

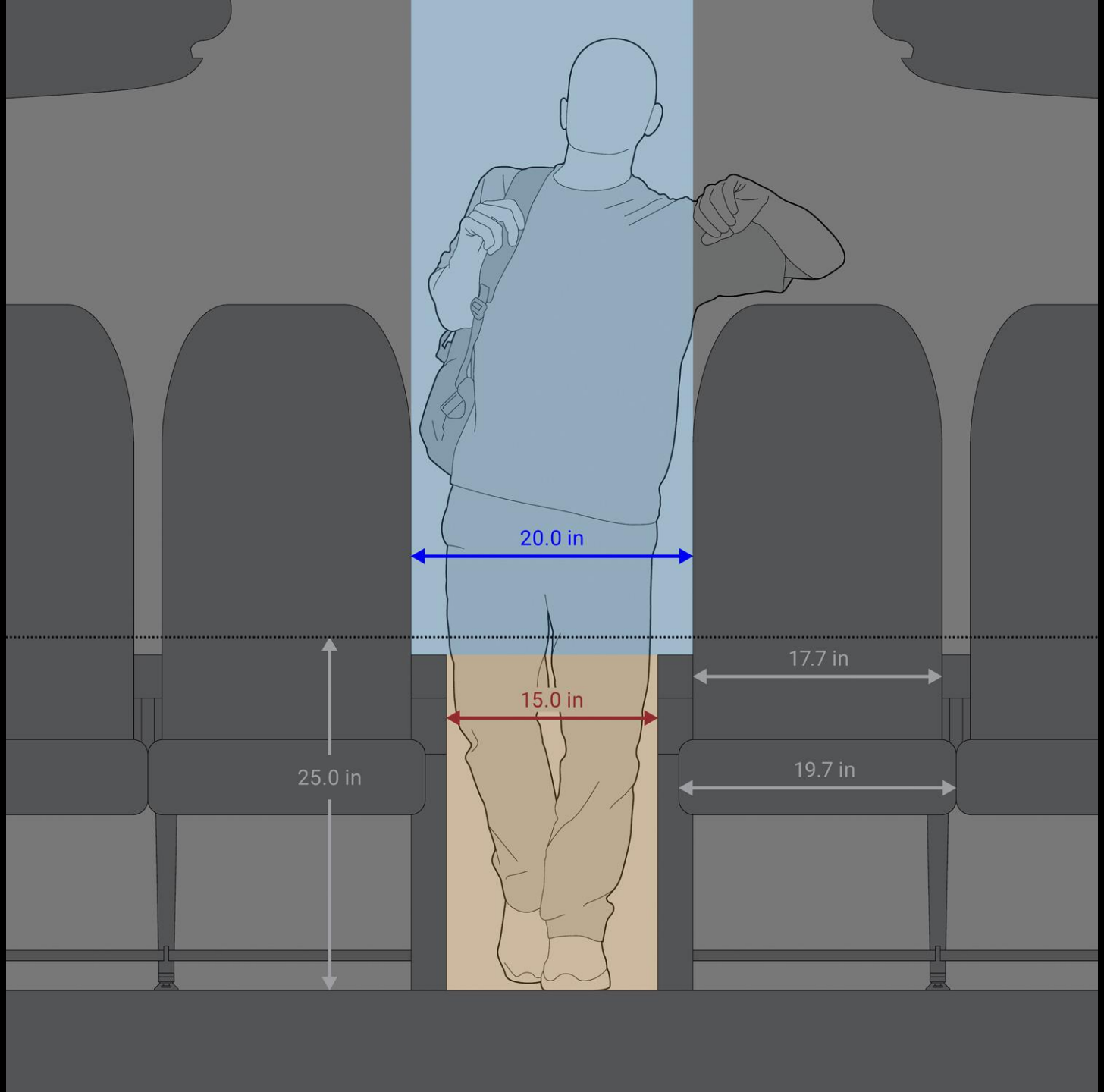

29
SabadellCAM
6°

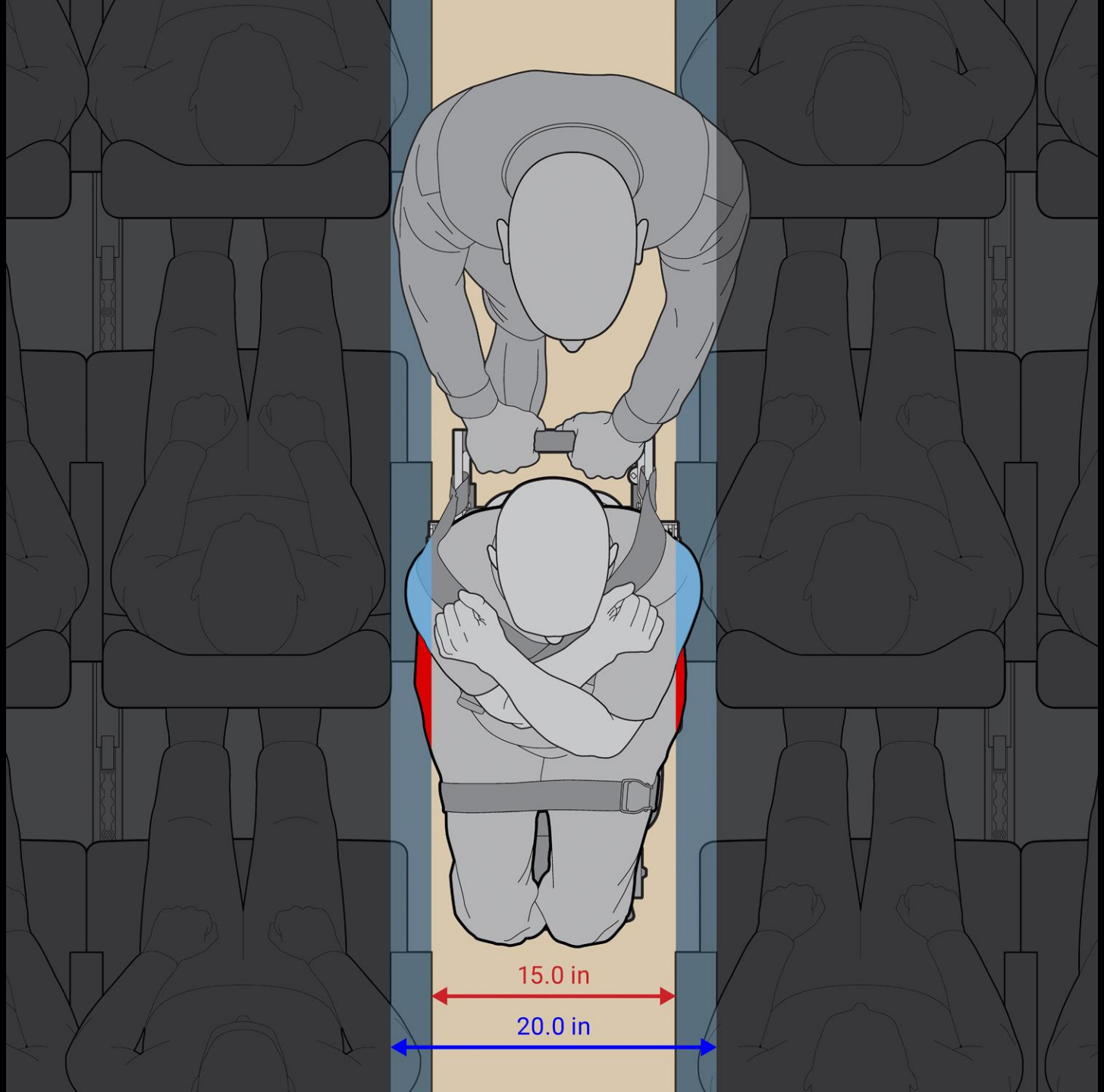
Boarding devices

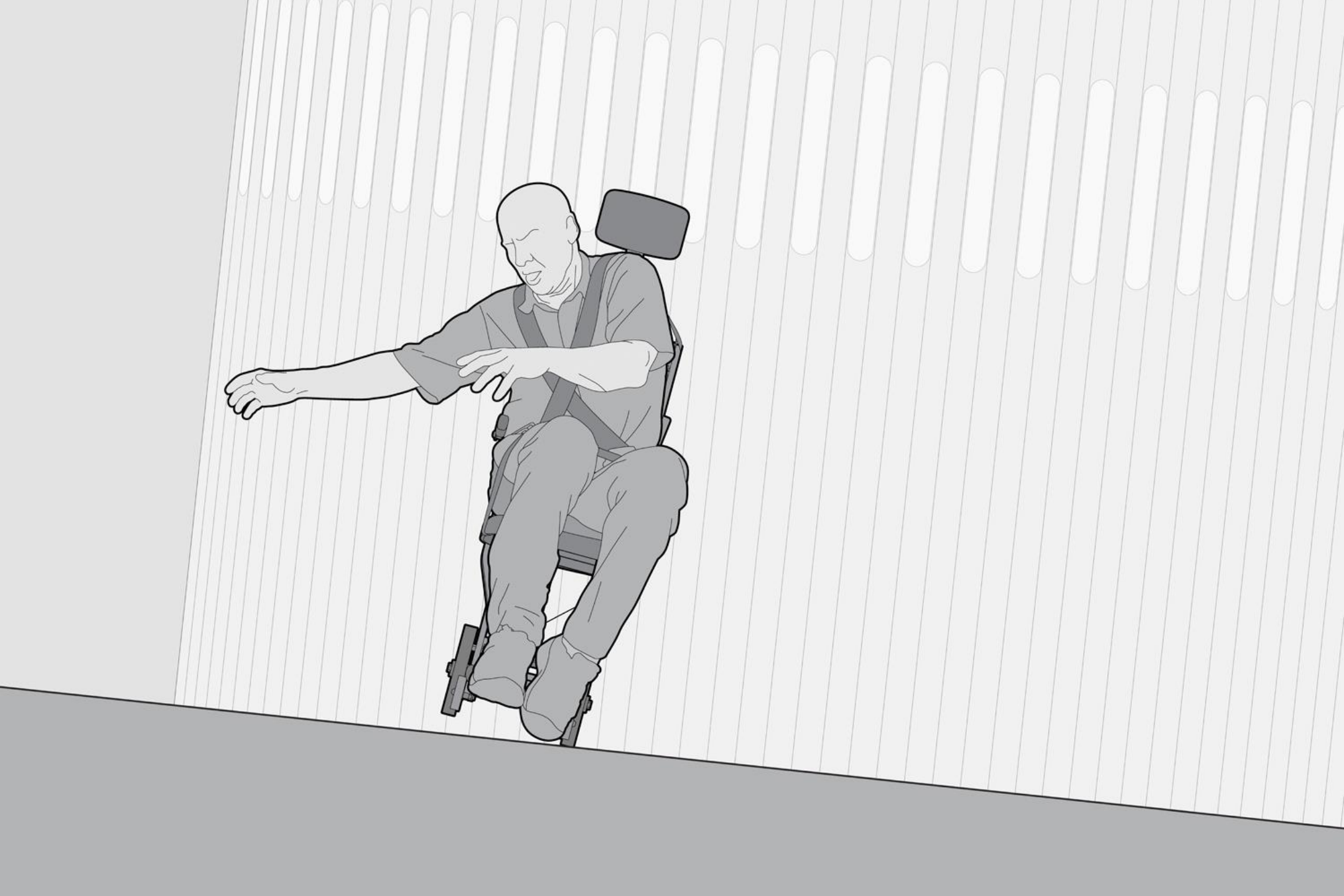
Assessment of

Traditional aircraft boarding devices

Stability


20.0 in
15.0 in
25.0 in
17.7 in
19.7 in

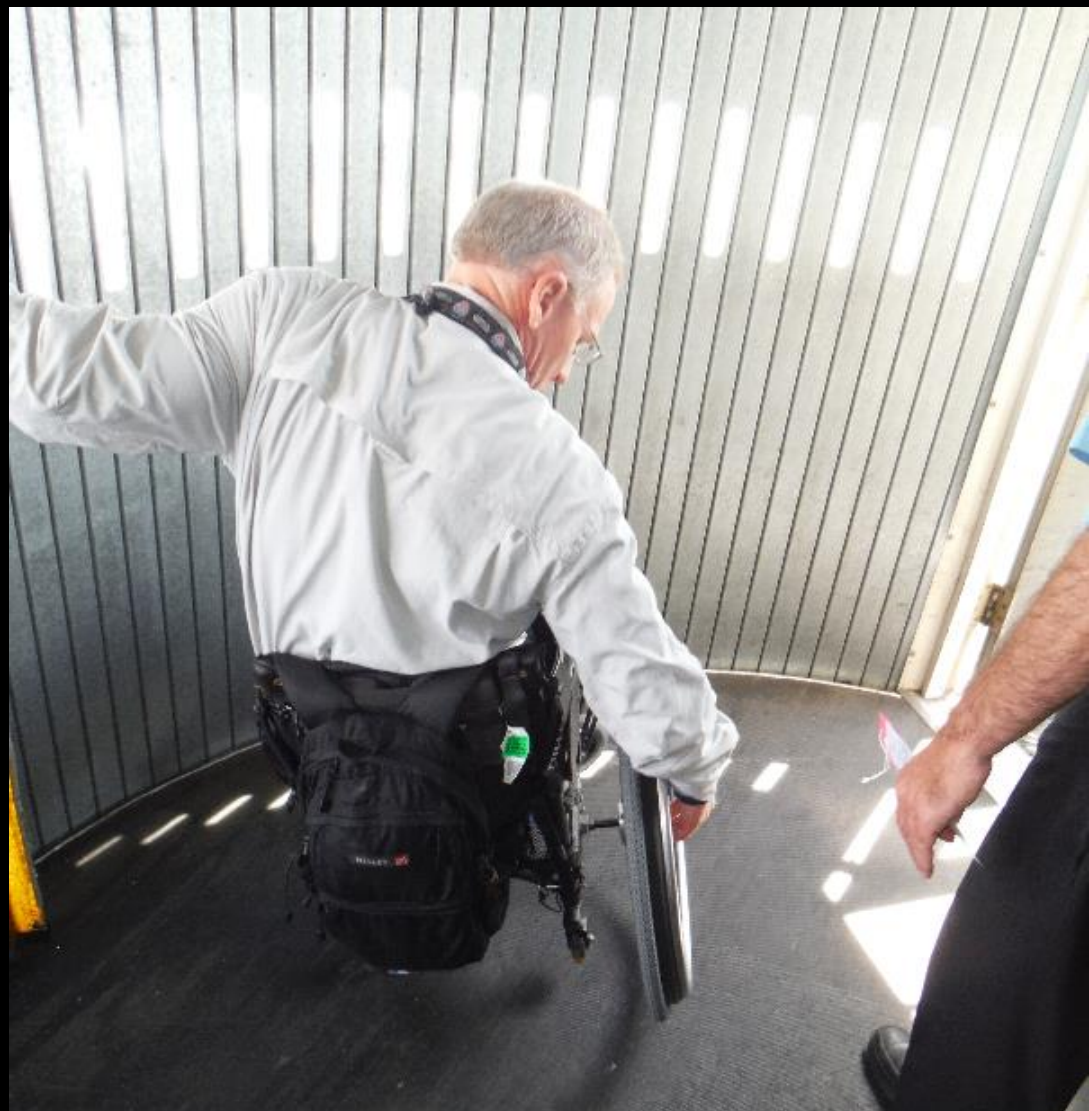

15.0 in
20.0 in



Aircraft boarding using a wheelchair with

Narrow accessory wheels

- Fewer transfers



Aircraft-compatible wheelchair

Transfer assist technology

Aircraft seating with

Pressure relief cushion from wheelchair

- Legs hanging
- Shoulders forward
- Neck extended
- Arm not supported

Aircraft seating with

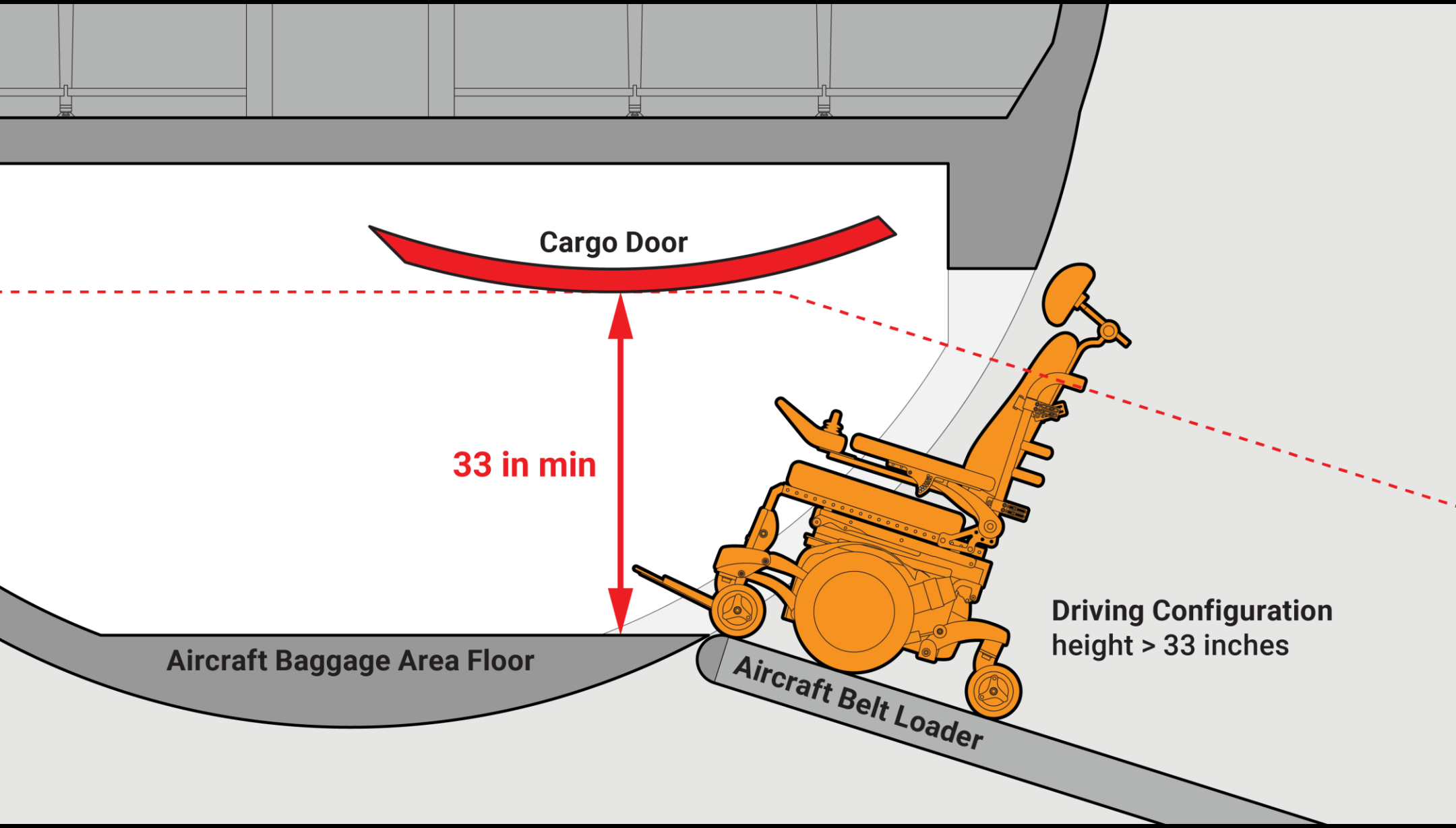
Pressure relief cushion and “accessories”

- Foot support
- Lumbar and spine support
- Neck/head support
- Arm Support

Aircraft seating with

Pressure relief cushion and “accessories”

- Feet supported lumbar and
- Spine supported
- Neck/head support
- Arm supported

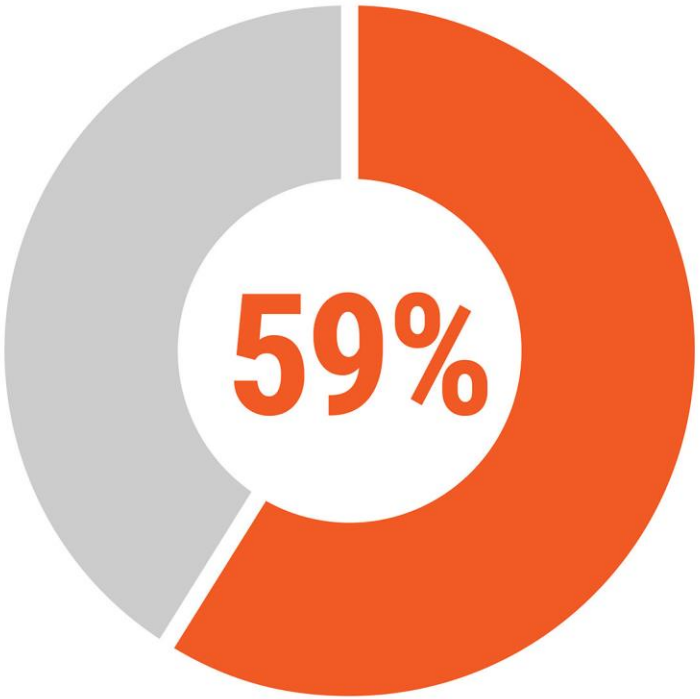

Cargo Door
33 in min
Aircraft Baggage Area Floor
Aircraft Belt Loader
Driving Configuration
height > 33 inches


Short height baggage door


PWC tilted on side to fit through door

Damage

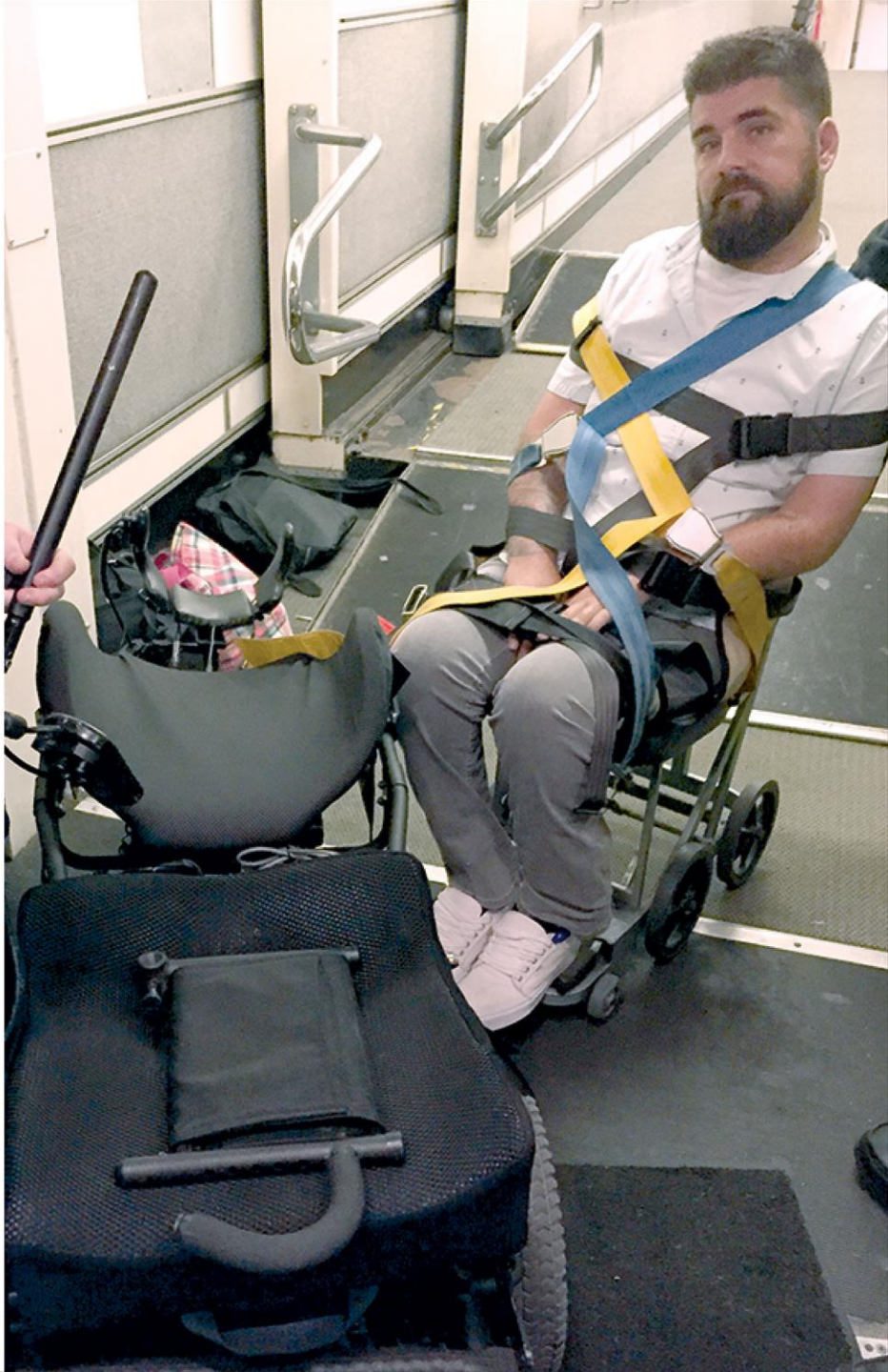
Damage to drive wheel that came off powered wheelchair



responded that their...

mobility devices were damaged after air travel

and over 50% still experience device damage when proper procedures are followed by carrier agents.



RESNA AT-1 Section 4 Standard

American National Standard

RESNA AT-1:2021

for Assistive Technology for Air Travel–

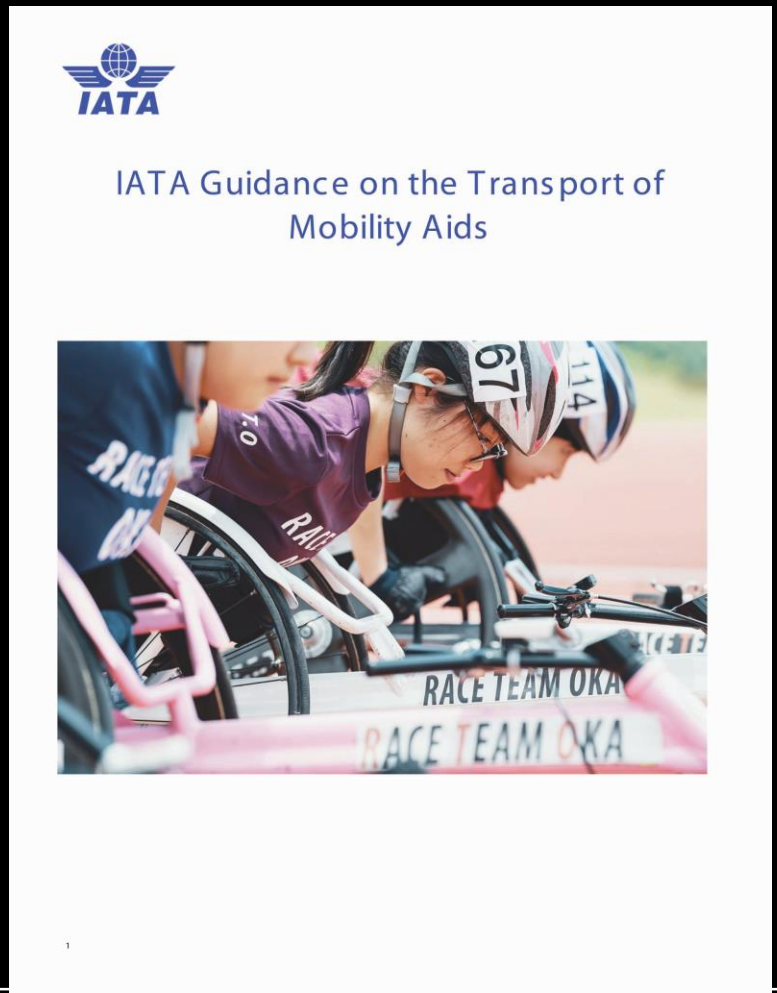
Volume 1: Requirements and Test Methods Related to Mobility Devices

RESNA

Rehabilitation Engineering and Assistive Technology Society of North America

International Air Transport Association (IATA)

IATA Guidance on the Transport of Mobility Aids



Assistive Technology for Air Travel Standards

Airline carriers and manufacturers

Wheelchair manufacturers

Disability organizations

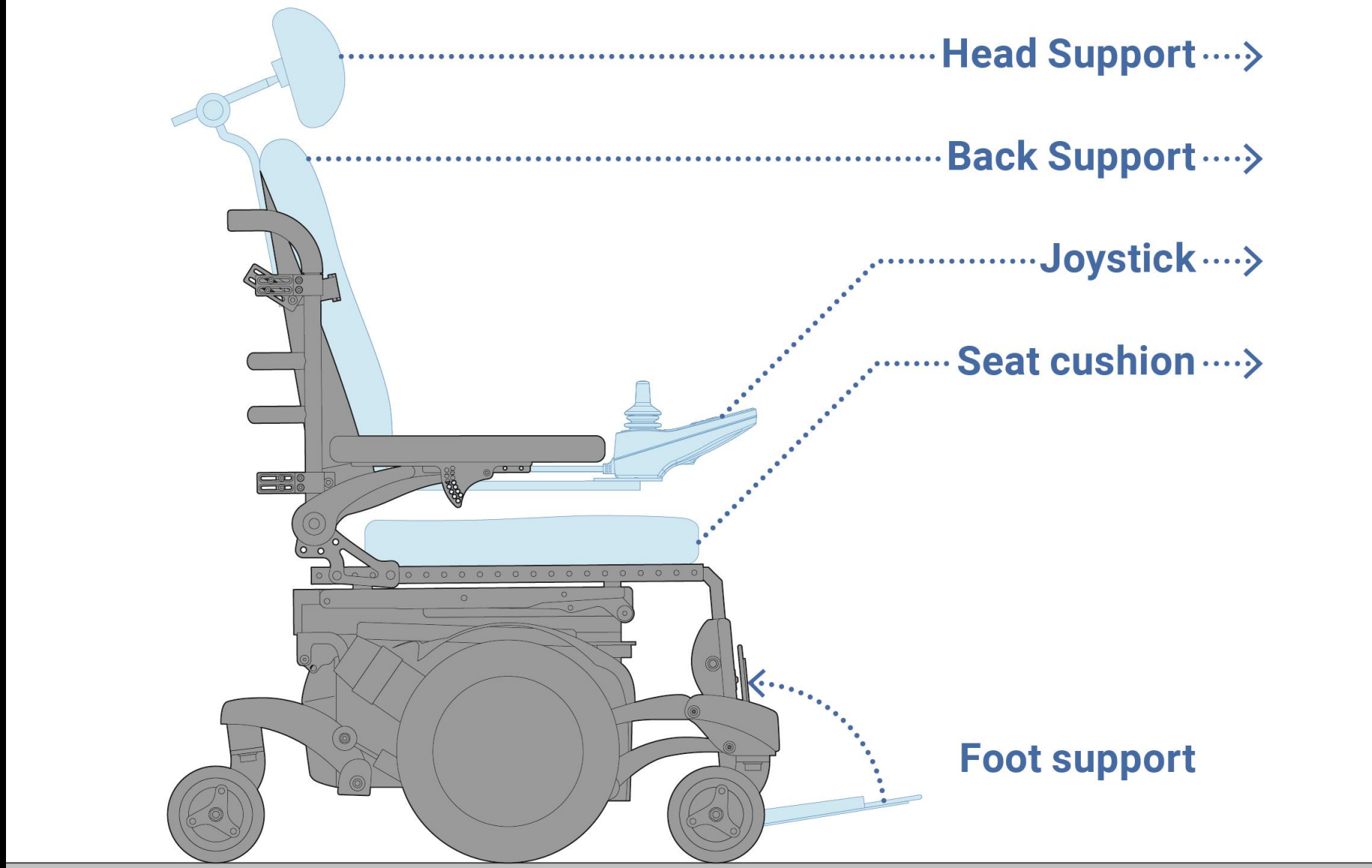
Government agencies – DOT - FAA

Wheelchair repair companies

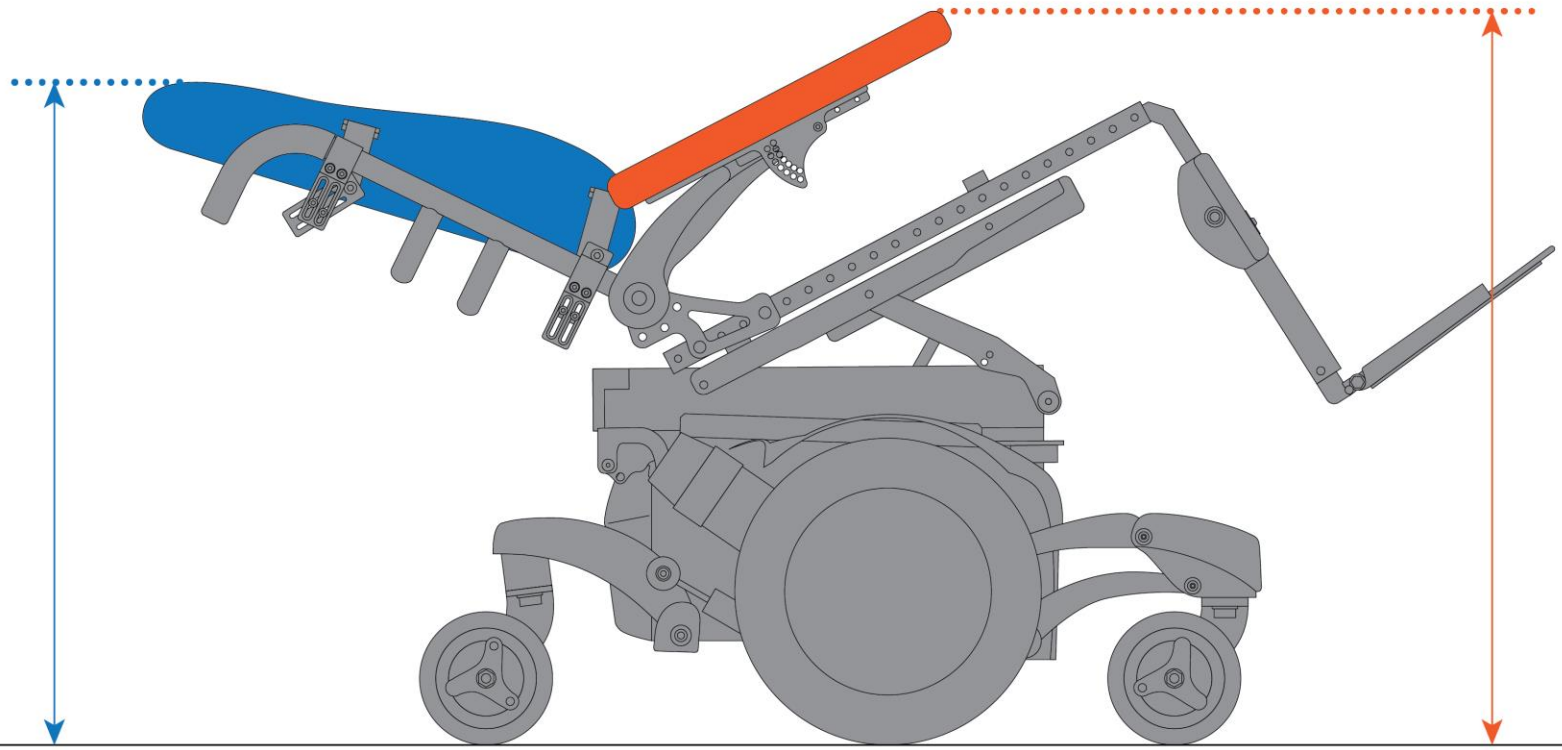
Standards for

PMDs designed for air transport

Create specifications for design features that will enable powered mobility devices to be able to withstand the rigors of being loaded and unloaded from aircraft

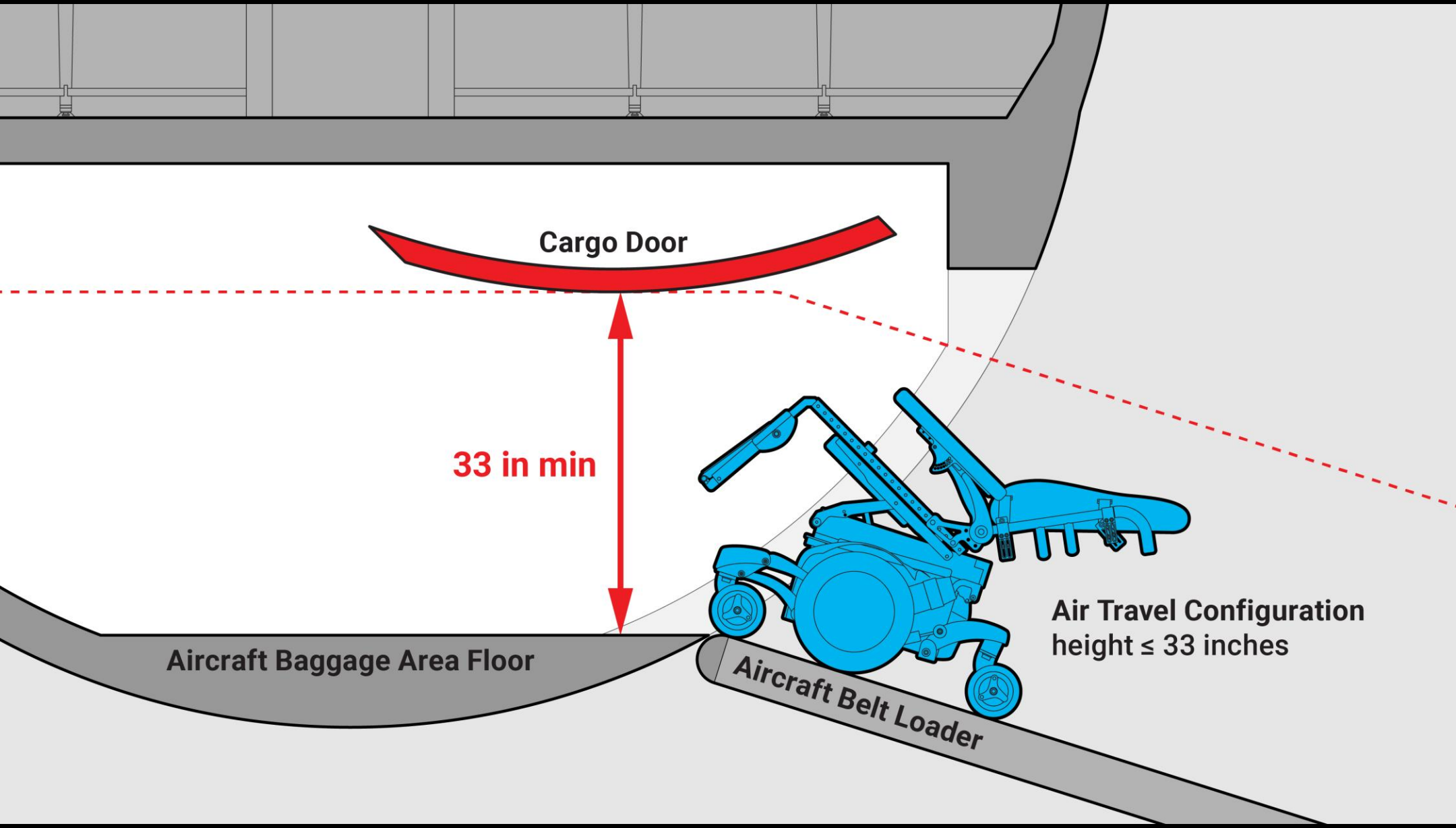

Head Support
Back Support
Joystick
Seat cushion
Foot support

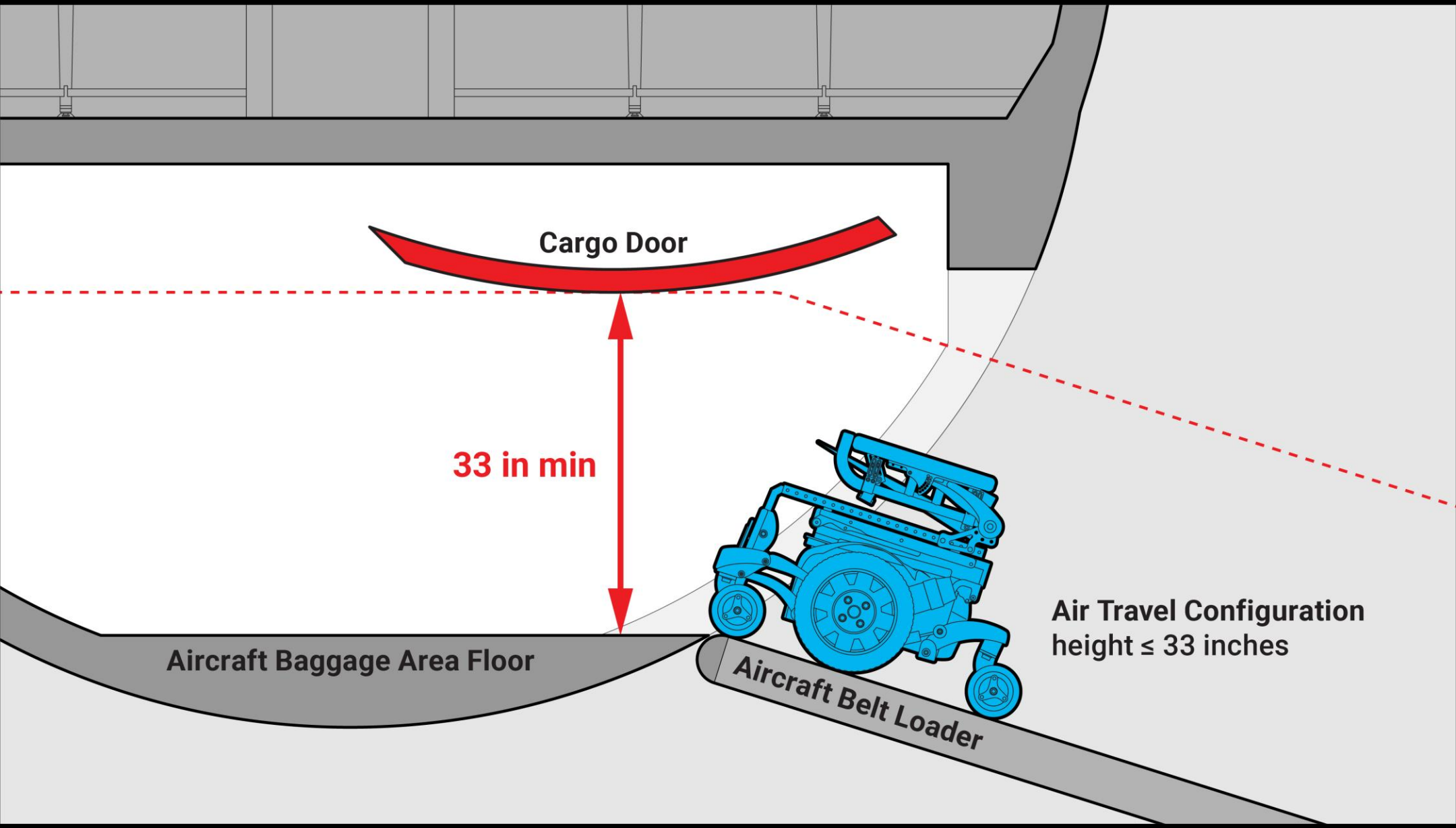
33" max



Travel
Back

Travel
Arm


Cargo Door
33 in min
Aircraft Baggage Area Floor
Aircraft Belt Loader
Air Travel Configuration
height ≤ 33 inches


Cargo Door
33 in min
Aircraft Baggage Area Floor
Aircraft Belt Loader
Air Travel Configuration
height ≤ 33 inches

PMD Labeling Guidelines

Weight

WHEELCHAIR WEIGHT

150 kg

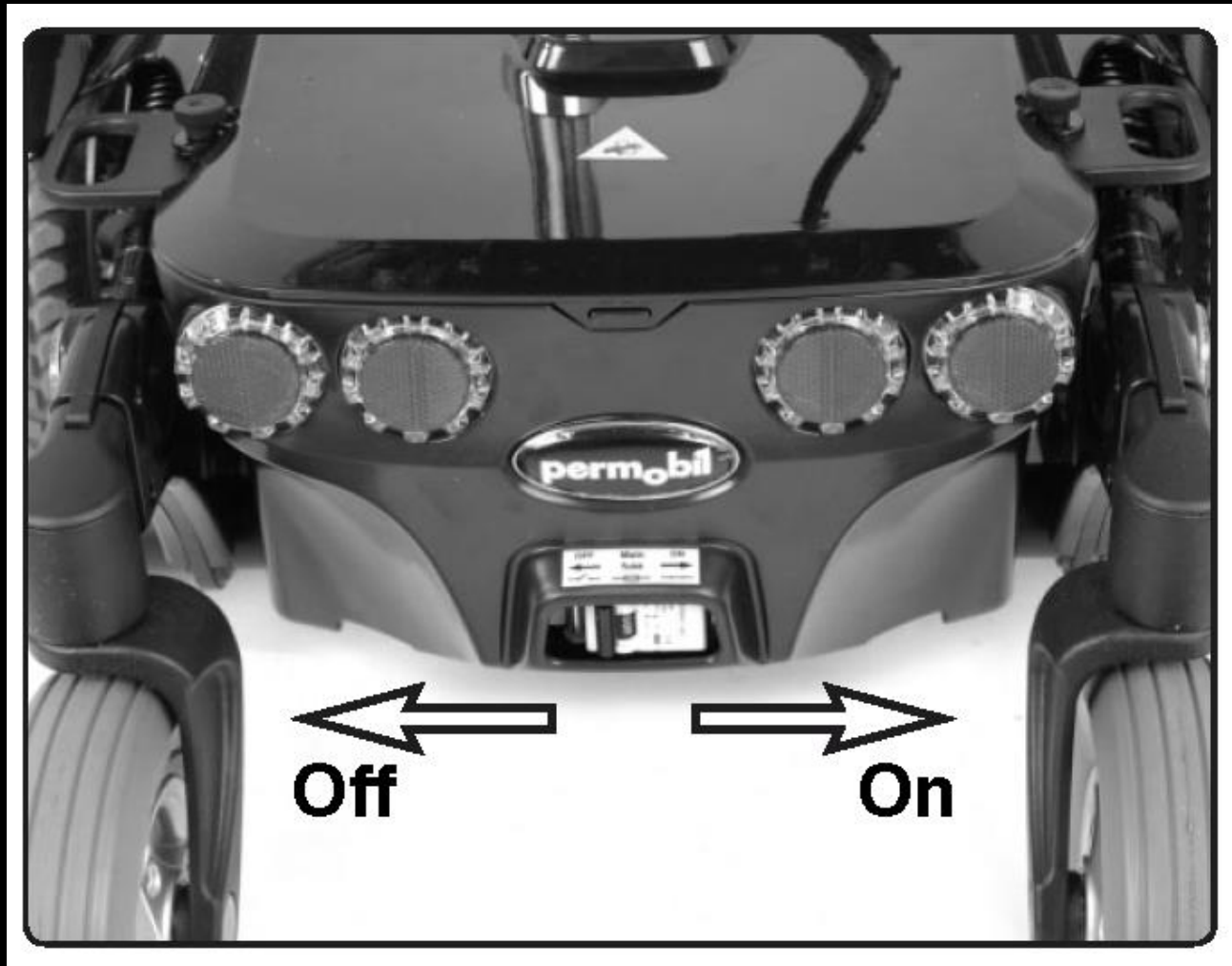
330 lb

https://wheelchairtravel.org/air-travel/reduce-risk-wheelchair-damage/


C400

PMD Labeling Guidelines

Location of power disconnect



Labeling symbols

For existing devices, create an

Air Travel Information Card

air travel *information*

Manufacturer
Model
COMPLIANT with RESNA AT-1

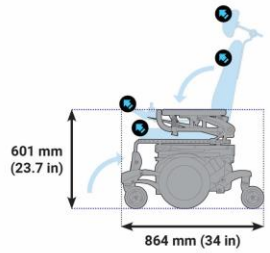
owner: John Doe **phone:** 123 456 7890 **email:** john.doe@email.com **chair serial number:** 7200003

air travel preparation

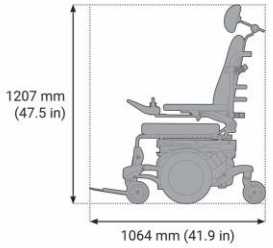
The owner of this device, or a designated assistant, is encouraged to participate in the following process.

1. **remove seat cushion**
   Remove seat cushion; store in aircraft cabin.
2. **remove head support**
   Remove head support; store in aircraft cabin.
3. **lower back support to fit into aircraft**
   Remove back support cushion; store in aircraft cabin. Cushion is fixed in place by means of velcro on the rear. Disconnect quick release pin on back support actuator at the attachment point behind back support. Fold back support forward.
4. **remove joystick**
   Remove electrical connection to joystick. Remove joystick controller; store in aircraft cabin.
5. **raise foot supports**
   Move foot supports to upright position.
6. **isolate battery power**
   Switch breaker to off to fully disconnect power.
7. **disengage drive system**
   Rotate lever on each motor to manually push the mobility device.

air travel configuration



driving configuration

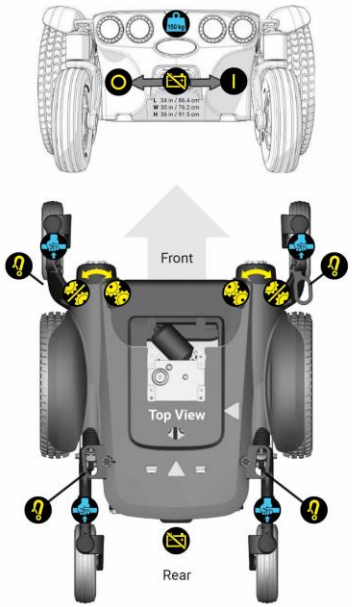


unoccupied product weight
150 kg (330 lb)
WARNING: This product should be lifted using a mechanical lift to avoid injury.

weight of additional components
(if greater than 10 kg)
12 **kg** (26.5 lb)

battery information
WARNING: Only non-spillable lead acid group 34 batteries may be installed on this product.
This wheelchair was manufactured with **2 lead acid sealed gel cell non-spillable batteries** conforming to **DOT 49 CFR 173.159 (d)** and **IATA Provision A67.**

rev: 2022-11-30



isolate battery power SWITCH
Switch breaker to off to disconnect power from the battery.
The circuit breaker is located in the rear beneath the tail lights.

disengage drive system
Move levers outwards to release the brakes.
Disengage drive motors with brake release levers to move product manually. The brake release levers are located at the front of the mobility device.

manual lift points
Manual lift points are located on all four caster arms.
WARNING! This product should be lifted using a mechanical lift to avoid injury. Unoccupied product weight is 150 kg (330 lb).

chair securement
RESNA WC19 securement points can be used to secure the mobility device.
After positioning and securing the mobility device, re-engage the drive system to lock the drive wheels.

user operator manual online
Scan the QR code to visit the RESNA ATAT webpage. Configuration card prototype was created based on the product having a built-in electrical isolation switch to isolate the batteries. Some data was obtained from user operator manuals available online. All values are estimated and may not represent actual product data. The manufacturers of the products on this card have not reviewed or approved this information.

14 CFR §382.129(a) states the following:
"As a carrier, you must permit passengers with a disability to provide written directions concerning the disassembly and reassembly of their wheelchairs, other mobility aids, and other assistive devices. ***You must carry out these instructions to the greatest extent feasible...***"

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