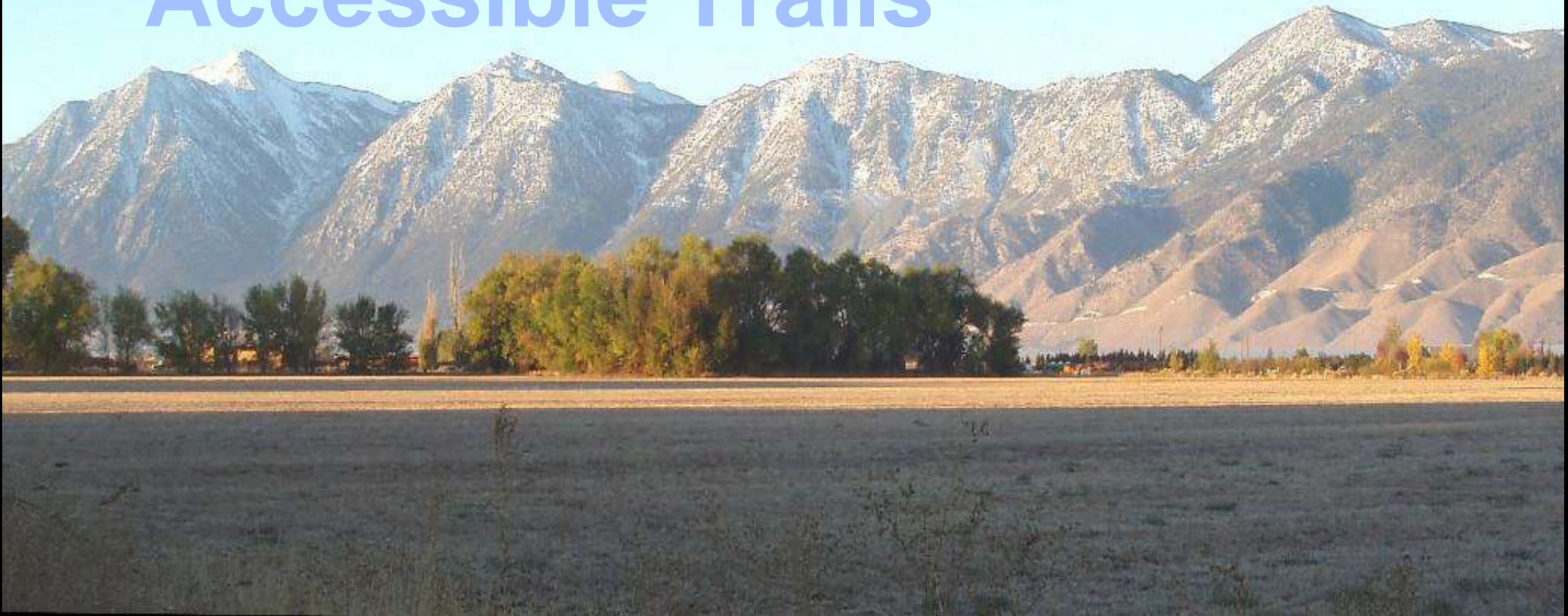


Tools and Technology for Accessible Trails



Peter Axelson
Jeremy Vican

Beneficial Designs, Inc.
Minden, Nevada

What makes a trail accessible?

Providing trail access information

Preventing access barriers

Improving trail surfaces

Protecting the environment

Meets accessibility guidelines

Access Guidelines

- Architectural Barriers Act Accessibility Guidelines (ABAAG)
- U.S. Forest Service Guidelines (FSORAG)
- Scope
 - Trails
 - Outdoor Recreation Access Routes
 - Outdoor Recreation Elements

Access Guideline Characteristics

- Surface
- Openings
- Tread Obstacles
- Running Slope
- Rest Intervals
- Clear Tread Width
- Protruding Objects
- Passing Space
- Cross Slope
- Edge Protection

Four General Exceptions for ABAAG: Exception 1

Where compliance would cause substantial harm to cultural, historic, religious, or significant natural features or characteristics

Exception 2

Where compliance would substantially alter the nature of the setting or the purpose of the facility, or portion of the facility

Exception 3

Where compliance would require construction methods or materials that are prohibited by federal, state, or local regulations or statutes

Exception 4

Where compliance would not be feasible due to terrain or the prevailing construction practices

Surface-ADDAG

Trail

ORAR

Firm and Stable

Firm and Stable

Measurement of Surface Firmness and Stability

Rotational penetrometer developed to objectively measure surfaces

Portable device that can be used in the field

Allows measurement of carpets, playgrounds and trail surfaces

Rotational Penetrometer



Objective surface
measurement device

Draft Standard for
measure of firmness
and stability under
development

Available from
Beneficial Designs

Rotational Penetrometer Readings

Surface

Firmness

Stability

Decomposed Granite

0.18

0.82

Gravelpave2

0.17

0.38

Geoblock2

0.17

0.41

Envirogrid Geoweb

0.18

0.44

EGA20 Geoweb

0.20

0.62

Rotational Penetrometer Readings-Gravelpave 2

Before Application

Firmness Stability

0.18 0.77

0.17 0.87

0.17 0.77

0.18 0.88

0.18 0.79

0.18 Avg 0.82

After Application

Firmness Stability

0.17 0.37

0.17 0.38

0.18 0.42

0.17 0.35

0.18 0.40

0.17 Avg 0.38

Clear Tread Width-ADDAG

Trail

ORAR

36" Minimum

36" Minimum

32" Exception

32" Minimum

Openings-ADDAG

Trail

Max $\frac{1}{2}$ " diameter

Elongated openings

$\frac{1}{4}$ " sphere

ORAR

Max $\frac{1}{2}$ " diameter

Elongated openings

$\frac{1}{4}$ " sphere

Protruding Objects-ADDAG

Trail

ORAR

Less than 80"

Less than 80"

Tread Obstacles-ADDAG

Trail

ORAR

Up to 2"

Up to 1"

Exception up to 3"

Exception up to 2"

Passing Space-ADDAG

Trail

ORAR

At least 60" width

At least 60" width

1,000 foot interval

200 foot interval

Minimum

minimum

Running Slope-ADDAG

Trail

5% any distance

8.33% up to 200 ft

10% up to 30 ft

12.5% up to 10 ft

ORAR

5% any distance

8.33% up to 50 ft

10% up to 30 ft

Cross Slope-ADDAG

Trail

5% maximum

ORAR

3.3% maximum

Rest Intervals-ADDAG

Trail

60" length

Slope less than 5%

Wide as widest
adjacent trail

Segment

ORAR

60" length

Slope less than 5%

Wide as widest
adjacent trail

segment

Edge Protection-ADDAG

Trail

ORAR

3" minimum height

3" minimum height

Where provided

Where provided

Outdoor Recreation Elements

Picnic Tables

Benches

Restrooms

Grills

Water Fountains

Showerheads

Assessment and Compliance

Inventory existing facilities and infrastructure

Determine compliance with existing ADAAG and Developed Outdoor Recreation facilities

Create transition plan with goals and objectives for accomplishing access

Development of a Complete Outdoor Recreation Assessment Process

**Develop and validate a repeatable
assessment process for all Outdoor
Recreation Elements**

**Create instructions and data collection
forms to determine compliance**

**Set up electronic data collection and data
base for management of information**

DORAP Deliverables

Data collection forms with instructions
Software to record and export data
Tool kit for performing all measurements
One day training course on DORAP
Web based DORAP training course
Combine with UTAP for comprehensive training

DORAP applies too

Urban or rural trails of any type

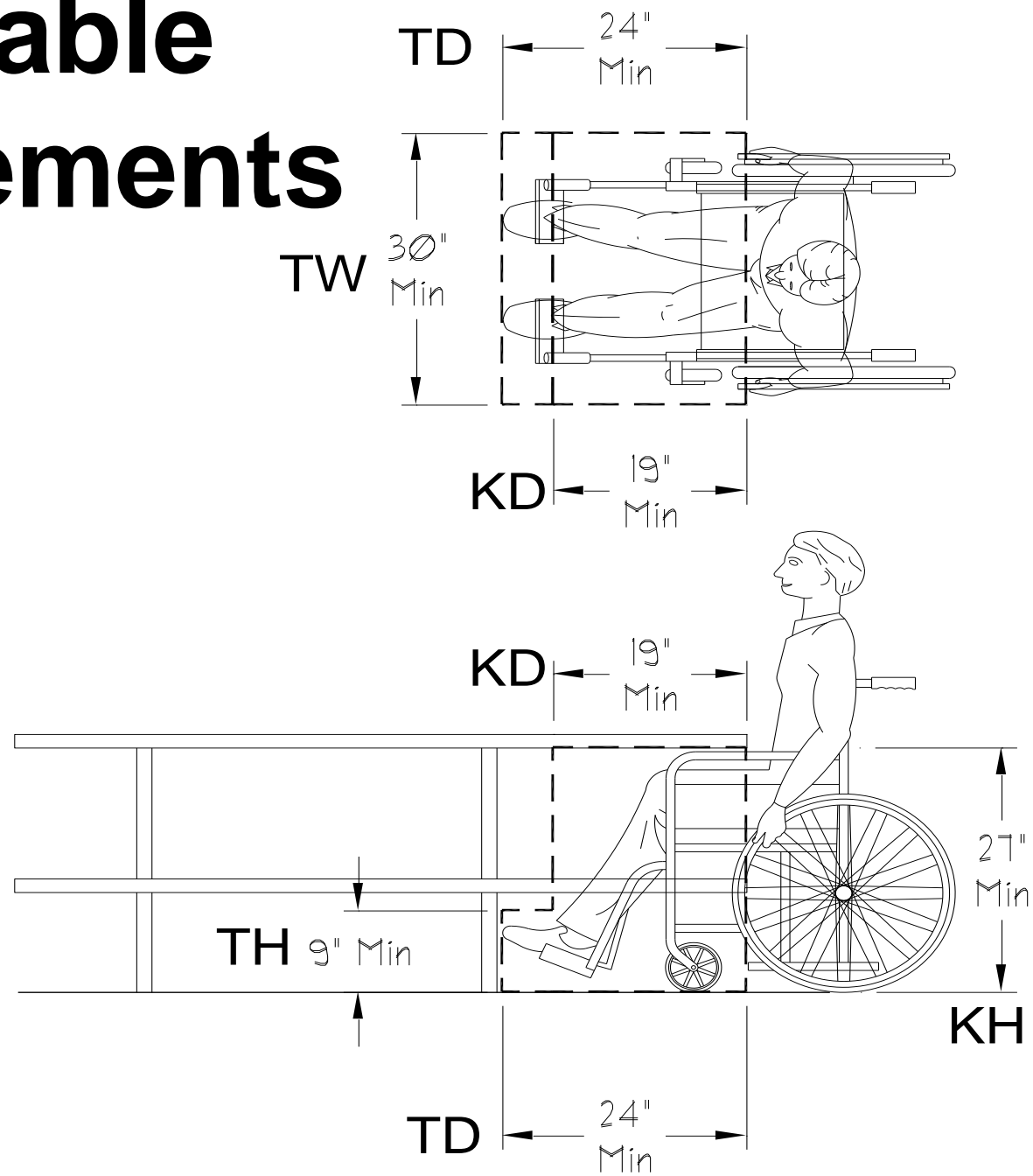
City, county and state parks

Picnic and camping facilities

Visitor centers and rest areas

Any public area that has any Outdoor
Recreation Elements

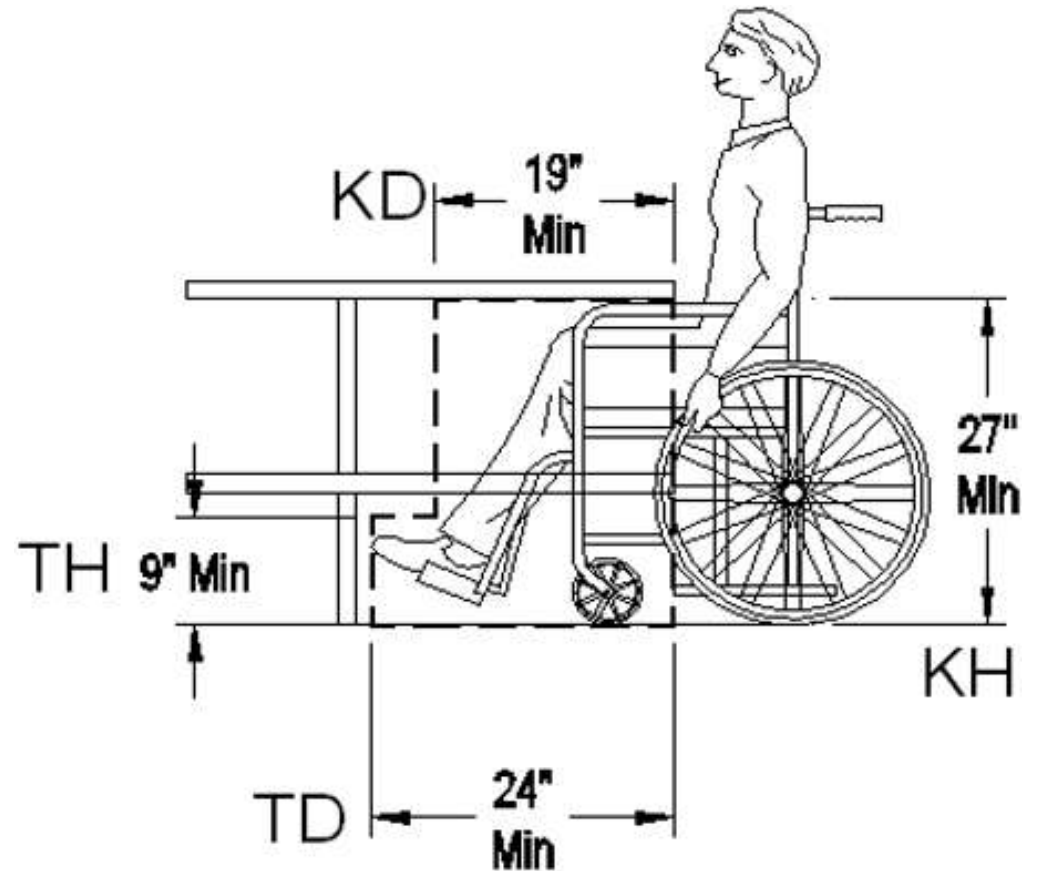
Picnic Table Measurements





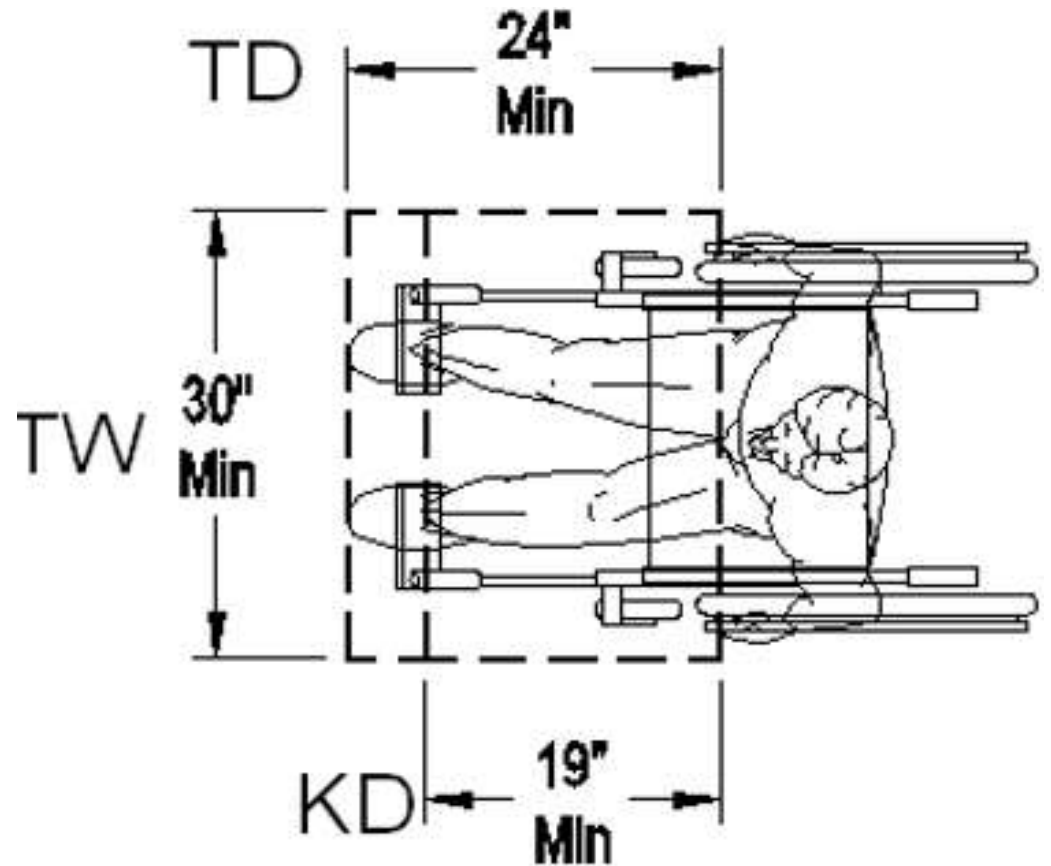
Picnic Table

Clearance Space		
	Min	Actual
TW (Total Width)	30 in	in
KD (Knee Depth)	19 in	in
KH (Knee Height)	27 in	in
TD (Toe Depth)	24 in	in
TH (Toe Height)	9 in	in
Accessible Spaces Available		
Perimeter Clear	Y	N



Picnic Table

Clearance Space		
	Min	Actual
TW (Total Width)	30 in	in
KD (Knee Depth)	19 in	in
KH (Knee Height)	27 in	in
TD (Toe Depth)	24 in	in
TH (Toe Height)	9 in	in
Accessible Spaces Available		
Perimeter Clear	Y	N



Measurement Comparisons

Name	Premm iter Feet	Spaces Req'd	Total Width Inches	Knee Depth Inches	Knee Height Inches	Toe Depth Inches	Toe Height Inches
Minimum		1	30	19	27	24	9
P.K.	~	1	37	8	27.5	8	27.5
K.N.	~	1	28	9	27	9	27
J.V.	16.8	1	36	8	28	8	28
B.B.	16.4	1	37	7.5	27	7.5	27
J.S	14	1	37	8	27	8	27
S.P.	16.6	1	37	8	27	8	27

Provide Objective Information



“Moderate” or “Easy”
mean different things
People have different
abilities (young children,

older adults, people with disabilities, unfit and
inexperienced individuals)

Assessment must provide objective
information

Universal Trail Assessment Process



Universal Assessment Team





**UTAP
Tools**

Key UTAP Information

Length



Grade



Width



Surface



Cross
slope



Features &
Facilities



UTAP – Implementation Status

Over 900 people trained to lead UTAP assessments

Over 55 trainers to teach UTAP workshops

State and agency-wide implementation is growing (AZ, MN, IN, NY, CA, FL)

UTAP assessments available from consultants

Trailware

Store and manage trail data

Split, copy, reverse and combine trail segments into trails for processing

Process data to generate grade, cross-slope, tread width and surface reports

Create Summary trail access information

Trail Cover Sheet with Data

TRAIL COVER SHEET Assessment Date _____

*Trail Name Rocky Hollow Trail Designation _____
 *Park Green River Agency Dept. of Parks & Open Spaces
 *Destination Rocky Hollow Falls Region Jasper County
 *Dest Type Water Falls District _____

Elevation Max _____ Min _____ u/m _____
 *Type Linear Network Loop Stacked Loop Age _____
 Development Fully developed Cleared path Partly developed Undeveloped
 Usage High Medium Low

Trail Info open all year
Park fee is \$3.00 from April to October
additional information is in the Green River Hiking Guide

Trail Notes _____

Trailheads Parking lot at Nelson picnic area beside Nature Center.

Activities	Allowed?	Environmental Zones
Hiking	<input checked="" type="radio"/> Yes <input type="radio"/> No	
Bicycles	<input type="radio"/> Yes <input checked="" type="radio"/> No	
Dogs	<input type="radio"/> Yes <input checked="" type="radio"/> No	
	<input type="radio"/> Yes <input type="radio"/> No	
	<input type="radio"/> Yes <input type="radio"/> No	
	<input type="radio"/> Yes <input type="radio"/> No	
	<input type="radio"/> Yes <input type="radio"/> No	
	<input type="radio"/> Yes <input type="radio"/> No	
	<input type="radio"/> Yes <input type="radio"/> No	
	<input type="radio"/> Yes <input type="radio"/> No	

▼ Please use only values from Trail Cover Value List *Data will be exported to Trail Explorer or used in Trail Explorer calculations.

This sheet contains valuable data. If found, please return to:
 Beneficial Designs, P.O. Box 69, Minden, NV 89423-0069 page 1
TWv2.0

Segment Cover Sheet with Data

SEGMENT COVER SHEET

*Trail Name Rocky Hollow
 Segment Name Trailhead to Falls
 Weather Conditions at time of assessment sunny and cool

Assessment Team

Date 10/3/00
 Coordinator F. Jones
 Certification # _____
 Data Recorder F. Jones
 Stations J. Cash
 Distance J. Cash
 Typical Tread Width S. Banks
 Typical Cross Slope M. Smith
 Surface F. Jones
 Typical Grade P. Henry & C. Cross
 Direction P. Henry & C. Cross
 Maximum Cross Slope M. Smith
 Maximum Grade M. Smith
 Minimum Clearance Width G. Banks

Temp at assessment	Low Temp <u>48</u>	High Temp <u>55</u>
	<input checked="" type="checkbox"/> F <input type="checkbox"/> C	
Most Recent Rainfall	Date <u>10/3/00</u>	Amount <u>0.25</u>
	<input checked="" type="checkbox"/> in <input type="checkbox"/> cm	
Elevation Data	Start	End
	Minimum	Maximum
	<input type="checkbox"/> ft <input type="checkbox"/> m	

Assessment Data Units and Standards Compass bearings GPS coordinates None

Length Units used
(ft, in, m, cm)

*Distance ft
 *Tread Width in
 *X-Slope Max ft
 *Grade Max ft
 *MCW in

Slope Units used
(pct, deg)

*X-Slope pct
 *Grade Avg pct
 *X-Slope Max pct
 *Grade Max pct
 *X-Slope in/out (+/-) recorded? Yes

Compass
Declination

Format: dd mm.m D
 d=degrees, m=minutes to one decimal,
 D=Direction (E or W)

Design
Tread Width

- 36 in (0.9 m)
 60 in (1.5 m)
 120 in (3 m)

Design
Height

- 84 in (2.1 m)
 96 in (2.4 m)
 120 in (3 m)

Other _____

Other 80 in

Rotational Penetrometer Readings

Surface firmness stability
 Type ▼ wet dry wet dry

Minimum
Obstruction Height

- 0.5 in (2.5 cm)
 2.0 in (5.0 cm)
 3.0 in (7.5 cm)
 6.0 in (15 cm)

Other _____

Minimum
MCW Height

- 0.5 in (2.5 cm)
 2.0 in (5.0 cm)
 3.0 in (7.5 cm)
 6.0 in (15 cm)

Other _____

▼ Please use only values from Trail Cover Value List

This sheet contains valuable data. If found, please return to:
 Beneficial Designs, P.O. Box 69, Minden, NV 89423-0069

*Data will be exported to Trail Explorer or used in
 Trail Explorer calculations.

Station Distance	D,N,E,S,V	Tread Width	Typ X-Slope	Surface Cat*	Type*	+/- Typ Grade	Compass / GPS Fwd/Lat	Bk/long	Max X-Slope Magnitude	Length	Max Grade Magnitude	Length	MCW	Feature Distance	TV Zone	Feature Type*	Feature Description	Size LxWxH	Count/ Qty	UM	End Distance	Remain Tread	Built Feature Access	Action Req'd
0														41	T	Rock	embedded	12x20x7 in	1			28		
50		0	F	Soil		-4	101	101	10	6	-	-	-	105	V	Bench	arms & backrests		1					
75														50	V	Bench	no arms no backrests		2					
48		1	F	Soil		-6	52	50	-	-	-	-	33	218	T	Roots	Multiple	5x5 in			224			
101														337	T	Roots	Multiple	4x4 in			347			
48		5	F	Soil		-9	18	16	-	-	12	6	-	175	T	Water Bar	wood	4x60x4 in	1			0		
193														261	T	Rut		12x48x8 in	1			0		
48		5	F	veg-mow		-4	53	51	-	-	20	2	28	391	V	Scenic View								
226														391	V	Bench	arms & backrests		3					
45		4	F	veg-mow		-15	123	123	-	-	-	-	-	391	V	Water-potable fountain			1					
287																								
45		2	F	veg-mow		-7	175	173	-	-	22	2	-											
309																								
45		3	F	veg-mow		-2	192	191	7	5	16	8	-											
391																								

* Please use only values from data lists.



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 Segment Name Date

Add Station

Finish Entry

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

Help

Exit TW

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 Segment Name Date

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											<input type="radio"/> <input type="radio"/> <input type="button" value="go"/> <input type="button" value="trash"/>
0	V	Restroom	Chemical Toilet					1			Yes			<input type="radio"/> <input type="radio"/> <input type="button" value="go"/> <input type="button" value="trash"/>
47	V	Picnic Table	Wooden					2						<input type="radio"/> <input type="radio"/> <input type="button" value="go"/> <input type="button" value="trash"/>
53	V	Scenic Viewpoint	Mt. Cora						149					<input type="radio"/> <input type="radio"/> <input type="button" value="go"/> <input type="button" value="trash"/>
69	T	Root	Multiple Roots	14	5	6	in	5	83	38				<input type="radio"/> <input type="radio"/> <input type="button" value="go"/> <input type="button" value="trash"/>
130	V	Bench	Back and armrests	60	18	18	in	1						<input type="radio"/> <input type="radio"/> <input type="button" value="go"/> <input type="button" value="trash"/>
199	T	Rock	Small Boulder	13	12	16	in	1		48		Remove		<input type="radio"/> <input type="radio"/> <input type="button" value="go"/> <input type="button" value="trash"/>
239	V	Bench	Back and armrests	60	18	18	in	1						<input type="radio"/> <input type="radio"/> <input type="button" value="go"/> <input type="button" value="trash"/>
334	T	Waterbar	4 X 4 Plank	4	54	8		1		0				<input checked="" type="radio"/> <input type="radio"/> <input type="button" value="go"/> <input type="button" value="trash"/>
338	T	Erosion	Center of Trail	10	8	12	in					Monitor		<input type="radio"/> <input type="radio"/> <input type="button" value="go"/> <input type="button" value="trash"/>
416	T	Minimum Clearance	Boulder- large, centered in path	40	22	20	in					Remove		<input type="radio"/> <input type="radio"/> <input type="button" value="go"/> <input type="button" value="trash"/>
521	V	Bench	Back only	60	18	18	in	1						<input type="radio"/> <input type="radio"/> <input type="button" value="go"/> <input type="button" value="trash"/>

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 Reports

English or Metric units

Data summaries:

Grade, Cross Slope and Width

Surface Category and Type

Tread and Vertical Obstructions

Trail Access Information

Station or Feature Log Report

Pioneer													Print w/Notes	Print no Notes	Export	Reports
Morgan Grist Mill																
Feature Log (to sort by column, click on underlined headings)																
Seg	<u>Feature</u> Distance	<u>TV</u> Zone	<u>Feature Type</u>	<u>Feature Description</u>	<u>L</u> x	<u>W</u>	<u>x</u> <u>H</u>	UM	Count	End Distance	<u>Remain</u> Tread	<u>Built</u> Feature	<u>Action</u> Required	<u>Materials</u>	Photo?	
2	1664	V	Waterfall	Grist Mill Waterfall											<input type="checkbox"/>	<input type="radio"/>
1	334	T	Waterbar	4 X 4 Plank	4	54	8		1		0				<input type="checkbox"/>	<input checked="" type="radio"/>
1	891	T	Waterbar		4	50	8 in		1		0				<input type="checkbox"/>	<input type="radio"/>
1	2077	V	Water	Drinking Fountain					2			Yes			<input type="checkbox"/>	<input type="radio"/>
1	1496	T	Vertical	Branches	36	60	48 in			1501	0		Remove		<input type="checkbox"/>	<input type="radio"/>
2	1463	T	Vertical	Branches	43	48	6 in			1457	0		Clear		<input type="checkbox"/>	<input type="radio"/>
2	1457	T	Vertical	Overhanging Rock	57	46	73 in			1463	20				<input type="checkbox"/>	<input type="radio"/>
1	1478	V	Tree	Old Hickory Grove						1509					<input type="checkbox"/>	<input type="radio"/>
2	236	V	Tree	Oak Tree Grove						293					<input type="checkbox"/>	<input type="radio"/>

Summary Tables for Typicalals

Pioneer
Morgan Grist Mill
Grade Percentages

first segment assessed Apr 22, 2002

last segment assessed Apr 22, 2002

Grade %	% of trail	Length		Sum % of trail	
		m	km		
0-3	63.9%	765.0	0.77	>=0	100.0%
3.1-5	25.1%	300.8	0.30	>3	36.1%
5.1-8	7.0%	83.5	0.08	>5	11.0%
8.1-10	0.9%	11.3	0.01	>8	4.0%
10.1-12	0.9%	10.4	0.01	>10	3.1%
12.1-14	0.7%	8.8	0.01	>12	2.2%
14.1-16	0.7%	8.2	0.01	>14	1.5%
16.1-20	0.8%	9.1	0.01	>16	0.8%
20.1-30	0.0%	0.0	0.00	>20	0.0%
30.1-50	0.0%	0.0	0.00	>30	0.0%
over 50	0.0%	0.0	0.00	>50	0.0%
Total	100.0%	1197.2	1.20		

Extreme Summary Tables

**Pioneer
Morgan Grist Mill
Maximum Grade Percentages**

First Segment Assessed Apr 22, 02

Last Segment Assessed May 7, 02

Grade %	Length ft	Location ft	mi	Cumulative Length (ft) and Grade
19.4 %	8.00	2264.0	0.43	
				8.0 >= 19.4 %
18.6 %	5.00	2307.0	0.44	
				13.0 >= 18.6 %
16.5 %	7.00	3127.0	0.59	
				20.0 >= 16.5 %
-16.3 %	10.00	3668.0	0.69	
				30.0 >= 16.3 %
15.4 %	6.00	2350.0	0.45	
				36.0 >= 15.4 %
15.3 %	6.00	3346.0	0.63	
				42.0 >= 15.3 %
14.1 %	15.00	433.0	0.08	
				57.0 >= 14.1 %
13.2 %	11.00	517.0	0.10	
				68.0 >= 13.2 %

TrailWare Calculations

Typical and extreme values for
Grade, Cross Slope and Width

Surface Category and Type

Tread and Vertical Obstructions

Development Support

Universal Trail Assessment Process

Rotational Penetrometer and

Trailware, trail data processing software

All supported with funding from the NIH

NICHD National Center for Medical

Rehabilitation Research SBIR Program

Wheeled Instrumentation Sensor Package - WISP

Stroller – 3 wheeled jogging stroller with
22 inch wheelbase

Rolawheel – measures 13 inch width
and 18 inch length

ATV – collects grades and x-slopes
based on the vehicle wheelbase

OHV – same as ATV



HETAP-Stroller

HETAP- Rollawheel





HETAP-
ATV

WISP Features

One person operation to record grade
and cross slope information

Distance – forward/reverse

Standard USB sensor box interface

Laptop with Weather resistant touch
screen recommended

Extra battery suggested

WISP Hardware

High speed sampling and adjustable digital filtering of grade and cross slope

Dual reed switches to sense forward and backward movement



WISP Software Interface

Designed for ETRACS compatibility

Component Object Module (COM)

interface to request distance, grade
and cross slope

Calibration routine provided

Compatible with HETAP 2.0 software

High Efficiency Trail Assessment Process - HETAP Software 2.0

Software that guides the user to collect
objective surface and feature trail data

Sort data to create grade, cross slope,
surface and tread width reports

SQL data base for compatibility with
larger data base systems

Calculation of Trail Access Information

HETAP 2.0 Station Data

Automatic recording of grade, cross-slope and distance

Automatic capture of GPS position

Automatic image capture

Programmable alarms for grade and cross-slopes



Last Station Recorded

48 in

Hard

Aggregate/ Gravel

6628.0 Ft

-7.1 %

0.7 %

Copy Surf. Data ->

Tread Width:
Surface Category:
Surface Type:

Distance:
 Grade:
 Cross Slope:

Current Station To Record

36 in Set MCW

Soft

Sand

6640.7 Ft

4.9 %

2.6 %

Record Station

Add Features

Return Home

Distance Hold

Manual Entry

View Data

Alarm Settings Calibration New Segment

Current Segment:
3 Nature Fort 2009-01-06

Outslope

Check Outslope Direction

<- Left Right ->

Vehicle Orientation

Forwards
 Backwards



Settings Hide Save Image

Compass Heading: True

GPS Location and Status

Lat: 39° 0' 3.25" N
Lon: 119° 46' 1.17" W
Apprx. Err: ± 47 Feet
Elev: 4647 ± 85 Feet

Fix is 3D

HETAP 2.0 Feature Data

Feature type drop down lists

Provides for recording of rotational
penetrometer firmness/stability

Image capture of features



Distance: **6640.7**

Type: **Rock**

Description:
Embedded Rock

Zone

Trail Bed **Visual**

Remaining Tread: **25** in

Dimensions

Units of Measure: **in**

L **12** W **8** H **4**

Quantity: Ending Distance:

1

End Distance Reminder

Optional Data

Recommended Action: **Remove**

Materials Needed:

For a Built Feature: Is this feature Accessible?

Yes **No** **This is not a Built Feature**

	Distance	Feature Type	E	D
34	6374.1	Sign	<input type="checkbox"/>	<input type="checkbox"/>
35	6413.9	Picnic Area	<input type="checkbox"/>	<input type="checkbox"/>
36	6606.2	Sign	<input type="checkbox"/>	<input type="checkbox"/>
37	6606.2	Bridge	<input type="checkbox"/>	<input type="checkbox"/>
38	6618.4	Restroom	<input type="checkbox"/>	<input type="checkbox"/>
39	6627.9	Parking	<input type="checkbox"/>	<input type="checkbox"/>

Record Feature

Stations

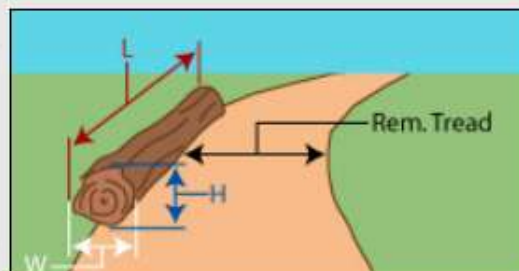
Manual Entry

Edit Feature

Copy Feature

Delete Feature

Rotational Penetrometer Data



Settings

Hide

Save Image

Distance:

Type:

Description:

Zone
 Trail Bed Visual

Dimensions
 L W H
 Units of Measure:
 Remaining Tread:

Quantity: Ending Distance: (to the nearest foot)
 End Distance Reminder

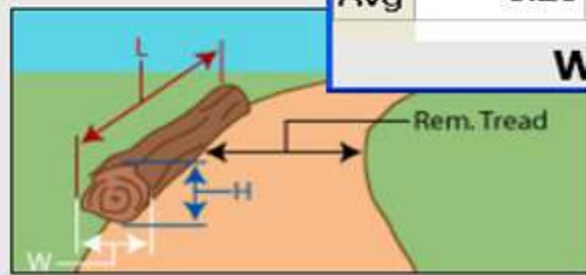
Optional Data
 Recommended Action:
 Materials Needed:
For a Built Feature: Is this feature Accessible?
 Yes No This is not a Built Feature

	Distance	Feature Type	E	D
1	<input type="text" value="7.2"/>		<input type="checkbox"/>	<input type="checkbox"/>

Rotational Penetrometer Data

	Firmness	Stability
1	0.20	0.30
2	0.20	0.20
3	<input type="text" value="0.00"/>	
4		
5		
Avg	0.20	0.25

Wet



-
-
-
-
-
-

HETAP 2.0 System Features

Data center to generate reports with
sorting

Combine, reverse and split trail
segments for data processing

Create TAI summary reports

Stations Data Report: Tread Width

	Seg. Number	Station Location	Station Length	Cumul. Length	Cumul. Percent	Tread Width	X-Slope (%)	Grade (%)	Surface Category	Surface Type	Lat.	Lon.
1	1	235.8	3.3	3.3	0.1	24.0	3.9	14.8	Firm	Sand	39.290	-119.277
2	1	277.4	8.6	11.9	0.4	24.0	21.9	-16.1	Firm	Sand	39.290	-119.277
3	1	286.0	7.1	19.0	0.6	24.0	21.6	-12.0	Firm	Sand	39.290	-119.277
4	1	293.0	8.6	27.6	0.8	24.0	11.9	8.6	Firm	Sand	39.290	-119.277
5	1	345.1	19.8	47.4	1.4	24.0	-7.2	0.3	Firm	Sand	39.290	-119.277
6	1	365.0	17.0	64.4	2.0	24.0	-4.0	3.6	Firm	Sand	39.290	-119.277
7	1	382.0	20.9	85.3	2.6	24.0	1.8	-2.0	Firm	Sand	39.290	-119.277
8	1	472.4	8.7	94.0	2.9	24.0	2.9	-10.3	Firm	Sand	39.290	-119.276
9	1	481.1	29.4	123.4	3.8	24.0	-2.5	-5.5	Firm	Sand	39.290	-119.276
10	1	510.5	20.9	144.2	4.4	24.0	11.0	0.3	Firm	Sand	39.290	-119.276
11	1	531.4	10.5	154.8	4.7	24.0	16.0	5.2	Firm	Sand	39.290	-119.276
12	1	541.9	7.8	162.5	5.0	24.0	8.0	-3.1	Firm	Sand	39.290	-119.276
13	1	549.6	2.2	164.7	5.0	24.0	-1.2	4.8	Firm	Sand	39.290	-119.276
14	1	551.8	6.2	171.0	5.2	24.0	32.8	-8.8	Firm	Sand	39.290	-119.276
15	1	558.1	4.7	175.7	5.4	24.0	12.9	-12.5	Firm	Sand	39.290	-119.276
16	1	223.9	3.5	179.2	5.5	30.0	0.1	-28.4	Firm	Sand	39.290	-119.277
17	1	227.5	4.0	183.2	5.6	30.0	1.9	-31.0	Firm	Sand	39.290	-119.277
18	1	231.5	4.3	187.6	5.7	30.0	-0.3	-11.9	Firm	Sand	39.290	-119.277
19	1	452.3	8.3	195.9	6.0	30.0	9.7	-18.0	Firm	Sand	39.290	-119.276
20	1	460.6	11.8	207.7	6.3	30.0	6.2	-26.6	Firm	Sand	39.290	-119.276
21	1	562.8	14.2	221.9	6.8	30.0	-1.5	-3.3	Firm	Sand	39.290	-119.276
22	1	577.1	5.1	227.0	6.9	30.0	-11.9	13.2	Firm	Sand	39.290	-119.276
23	1	582.2	2.7	229.8	7.0	30.0	-16.7	18.4	Firm	Sand	39.290	-119.276
24	1	584.9	11.0	240.8	7.4	30.0	3.6	-10.0	Firm	Sand	39.290	-119.276
25	1	595.9	64.3	305.1	9.3	30.0	-2.0	-1.5	Firm	Sand	39.290	-119.276
26	1	660.2	36.1	341.2	10.4	30.0	-2.1	-2.7	Firm	Sand	39.290	-119.276

Features Data Report: Feature Height

	Seg. Num.	Aggr. Dist	Zone	Feature Type	Description	L	W	H	Qty.	End Dist.	Rem. Tread	Blt. & Acc.	Action Required	Material Needed
11	7	1242.6	Trail	Bollard	Metal bollard in center of bike path	0.4	0.4	3.0	1	0.0	48.0			
12	7	2824.8	Trail	Bollard	Metal bollard in center of bike path	0.4	0.4	3.0	1	0.0	48.0			
13	7	2859.5	Trail	Bollard	Metal bollard in center of bike path	0.4	0.4	3.0	1	0.0	48.0			
14	7	13.8	Visual	Bench	Wood and metal bench with backrest	8.0	2.0	2.7	1	0.0	0.0			
15	7	2024.1	Visual	Bench	Wood and metal bench with backrest	8.0	2.0	2.7	1	0.0	0.0			
16	7	3340.8	Visual	Bench	Wood and metal bench with backrest	8.0	2.0	2.7	1	0.0	0.0			
17	7	2327.1	Trail	Hole	Hole in asphalt	0.7	0.7	0.6	1	0.0	72.0			
18	7	821.2	Trail	Hole	Hole in asphalt	0.2	0.3	0.4	1	0.0	60.0			
19	7	173.0	Trail	Rut	Crack in asphalt	0.1	4.0	0.1	1	0.0	48.0			
20	7	352.9	Trail	Other Feature	Monitoring well manhole in trail	0.9	0.9	0.1	1	0.0	76.0			
21	7	451.7	Trail	Rut	Crack in asphalt	0.1	5.0	0.1	1	0.0	48.0			
22	7	555.7	Trail	Other Feature	Manhole in trail	1.3	2.0	0.1	1	0.0	36.0			
23	7	558.1	Trail	Rut	Crack in asphalt	0.1	7.1	0.1	1	0.0	48.0			
24	7	627.4	Trail	Rut	Crack in asphalt	0.1	7.1	0.1	1	0.0	48.0			
25	7	700.7	Trail	Rut	Crack in asphalt	0.1	7.1	0.1	1	0.0	48.0			
26	7	1024.3	Trail	Rut	Crack in asphalt	0.1	4.0	0.1	1	0.0	48.0			
27	7	1115.2	Trail	Rut	Crack in asphalt	0.1	5.0	0.1	1	0.0	48.0			
28	7	1222.0	Trail	Bump		0.1	8.2	0.1	1	0.0	24.0			
29	7	1240.3	Trail	Bump		0.1	8.2	0.1	1	0.0	0.0			
30	7	1346.1	Trail	Rut	Crack in asphalt	0.1	6.3	0.1	1	0.0	0.0			
31	7	1470.0	Trail	Rut	Crack in asphalt	0.1	6.3	0.1	1	0.0	12.0			

Trail Information Formats

Trail Access Information - TAI
Information sheets

TAI Laminated strip decals

Full panel signage with TAI

TAI on Web Site

Internet Web Site



HOME ABOUT US DEFINITIONS LINKS TRAIL ACCESS INFORMATION

TRAIL FEATURES

Customize your search by trail use and features.

TRAIL ACCESS

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

TRAIL MANAGEMENT

Authorized trail managers may add or edit trail information. Contact Beneficial Designs.



QUICK TRAIL SEARCH



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

OR

View trails by state:

PICK OF THE MONTH



Big Basin Redwoods State Park
Boulder Creek, CA

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

Have you ever finished a three hour hike in one hour? Have you struggled on a "moderate" trail? Have you encountered barriers on an "easy" trail? The Trail Explorer website is unique because it uses [Trail Access Information](#) to help trail users make informed decisions about which public lands to visit, and which trails will best meet their interests, abilities and desired experiences. Trail Explorer benefits all users, but is particularly helpful for individuals with disabilities, older adults, parents with young children, and novice hikers.

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

© Copyright 2001 Beneficial Designs 

[TRAIL FEATURES](#)

Customize your search by trail use and features.

[TRAIL ACCESS](#)

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

[TRAIL MANAGEMENT](#)

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

[CONTACT US](#)



TRAIL ACCESS SEARCH Use this advanced search to find a trail to match your abilities by selecting your preferences from the options below. To broaden your search, remove preferences in categories of less importance. For the definition of a term, click on the term.

Choose a state:

Trail length:

Surface Firmness:

Typical grade:

Typical cross-slope:

Typical tread width:

Minimum clearance width:



TRAIL FEATURE SEARCH - Find a trail that fits your interests and abilities by selecting your preferences from the options below. To broaden your search, remove preferences in categories of less importance. For the definition of a term, click on the term.

TRAIL FEATURES

Customize your search by trail use and features.

TRAIL ACCESS

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

TRAIL MANAGEMENT

Authorized trail managers may add or edit trail information. Contact Beneficial Designs.

Choose a state:

Indiana ▼

Uses permitted:

hiking/walking/running ▼

Destination Feature:

No preference ▼

Desired trail length:

2.1 to 5.0 mi (3.3 to 8.0 km) ▼

Typical grade:

No preference ▼

Firmness required:

Firm or better ▼

Find Trails

Clear Form



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

Trail	Park	State	Length	Typical Grade	Max Grade	Typical Xslope	Max Xslope	Typical Tread Width	Min Clear Width	Surface Firmness	Surface Mats
Trail 10	McCormick's Creek State Park	IN	0.7 miles (1.1 km)	3.3%	34%	3.5%	12%	50 in (126 cm)	na	Firm	Rock/Boulder
Trail 8	McCormick's Creek State Park	IN	0.7 miles (1.1 km)	2.3%	12%	1.1%	4%	60 in (152 cm)	na	Paved	Asphalt
Trail A	McCormick's Creek State Park	IN	0.2 miles (0.3 km)	2.2%	9%	1.3%	4%	58 in (148 cm)	na	Firm	Crushed Stone (Fines)
Trail 6	Spring Mill State Park	IN	0.4 miles (0.7 km)	2.3%	7%	2.2%	4%	60 in (152 cm)	na	Paved	Asphalt
Trail 7	Spring Mill State Park	IN	0.9 miles (1.5 km)	3.3%	23%	3.1%	8%	52 in (131 cm)	na	Firm	Soil
Trail 7 Spur to Trail 4	Spring Mill State Park	IN	0.4 miles (0.6 km)	3.9%	27%	2.8%	9%	49 in (125 cm)	na	Firm	Soil
Trail 10 Spur to Camels Back	Turkey Run State Park	IN	0.1 miles (0.2 km)	0.9%	2%	1.8%	5%	60 in (152 cm)	na	Firm	Crushed Stone (Fines)
Trail 11	Turkey Run State Park	IN	0.2 miles (0.3 km)	3.1%	9%	4.3%	11%	60 in (152 cm)	na	Firm	Crushed Stone (Fines)
Trail 7 Spur to Campground	Turkey Run State Park	IN	0.1 miles (0.2 km)	3.3%	6%	2.7%	5%	60 in (152 cm)	na	Firm	Soil



Trail 11

Turkey Run State Park

Route 1 Box 164
Marshall, IN 47869

County:

Phone: (765) 597-2635

FAX:

Email:

Website: <http://www.state.in.us/dnr/parklake/parks/turkeyrun.html>

Length: 0.2 miles (0.3 km)

Destination: Lieber Memorial & Log Church

Destination Type: Historical

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.

Cumulative Elevation Gain: 23 ft (7 m)

Cumulative Elevation Loss: 4 ft (1 m)

Uses: Hiking

Facilities: Historical

Features: Lieber Memorial
Log Church

Obstructions:



Typical Grade is 3.1%
7% of the trail is 6% to 9%
64 ft (20 m) is 8% to 9%
8% grade is a standard ramp.



Minimum Tread Width is 60 in (152 cm)
Maximum Tread Width is 60 in (152 cm)



Typical Cross Slope is 4.3%
18% of the trail is 6% to 11%
160 ft (49 m) is 10% to 11%



Trail Surface is Crushed Stone (Fines)
100% of the trail is Firm
0 ft (0 m) of the trail is Soft

TAI Information Sheet



Trail Uses



Hiking

Dogs on Leash



No Bikes



No Equestrians



No Motorized Vehicles

Hazards and Obstructions



Step
30



Rock
12



Root
6

Pacific Crest Trail

Eldorado National Forest

Trail Length 1.1 mi (1.8 km)

Linear trail

Trail is part of the Pacific Crest National Scenic Trail and starts next to the seasonally open visitor center at Carson Pass. Restrooms are available at trailhead. A \$3.00 parking charge is required to park and hike. Envelopes/depository for fee is present. An overnight camping permit is required if staying overnight. Several local and regional maps are displayed at the trailhead.

Cumulative Gain 427 ft (130 m)
Elevation Change Loss 82 ft (25 m)



Typical Grade is 8.5%

48% of the trail is between 8% and 22%
144 ft (44 m) is between 20% and 22%
8% grade is a standard ramp.



Typical Cross Slope is 3.1%

20% of the trail is between 5% and 11%
226 ft (69 m) is between 8% and 11%



Typical Tread Width is 49 in (124 cm)

Tread Width ranges from 14 in (36 cm) to 100 in (254 cm)



Trail Surface is Soil

100% of the trail is Hard or better
5962 ft (1817 m) of the trail is Firm or better

Trailhead Location

At Carson Pass on Highway 88 directly on north side of the seasonally



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.

Obstructions less than 6.0 in (15 cm) or outside the tread area 12 in wide by 120 in (3 m) high were not measured. Minimum clearance boundaries were at least 12 in high.

This report has been generated by TrailWare which has been created by Beneficial Designs, Inc.

Truckee River Bike Path

Cottonwood Park to
Larkin Avenue

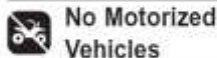
Length 2.4 mi (3.9 km)



Hiking



Bicycling



No Motorized
Vehicles



Grade

Typical Grade 0.9%

409 ft (125 m) is 4% to 5%
8% grade is a standard ramp.



X-Slope

Typical Cross Slope 1.0%

1209 ft (369 m) is 3%



Tread
Width

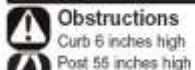
Typical Tread Width
9.5 ft (2.9 m)



Surface
Type

Asphalt

100% is Paved



Obstructions
Curb 6 inches high
Post 55 inches high
Rut 2 to 3 inches high.

WARNING: Trail conditions may have changed since July 2003 when 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.

Sign created by Beneficial Designs Inc., P. O. Box 0069, Minden, NV 89423-0069 using data collected by a certified trail assessment coordinator.



Trail Access
Information

Truckee River Bike Path

Cottonwood Park to
Larkin Avenue

Length 2.4 mi (3.9 km)



Hiking



Bicycling



No Motorized
Vehicles



Grade

Typical Grade 0.9%

409 ft (125 m) is 4% to 5%
8% grade is a standard ramp.



X-Slope

Typical Cross Slope 1.0%

1209 ft (369 m) is 3%



Tread
Width

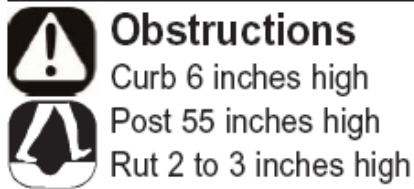
Typical Tread Width
9.5 ft (2.9 m)



Surface
Type

Asphalt

100% is Paved



Obstructions

Curb 6 inches high

Post 55 inches high

Rut 2 to 3 inches high

WARNING: Trail conditions may have changed since July 2003 when 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.

Sign created by Beneficial Designs Inc., P. O. Box 0069, Minden, NV 89423-0069 using data collected by a certified trail assessment coordinator.



Trail Access
Information

TAI Trail Signing Examples




BIKE LANE

VEHICLES ALLOWED
VIOLATORS WILL BE
PROSECUTED

KEEP
→
RIGHT

**TAI on Carsonite &
Existing Signpost**



TAI on Wooden Post



Narrow Trails



Color and Logos

Full Panel Signage Examples

Trail Access Information

Top view map for location
information

Agency Logo

Locator information

**RIVERVIEW
PARK
TRAIL**

Riverview Park / Mexican Ditch Trail System

Trail User:

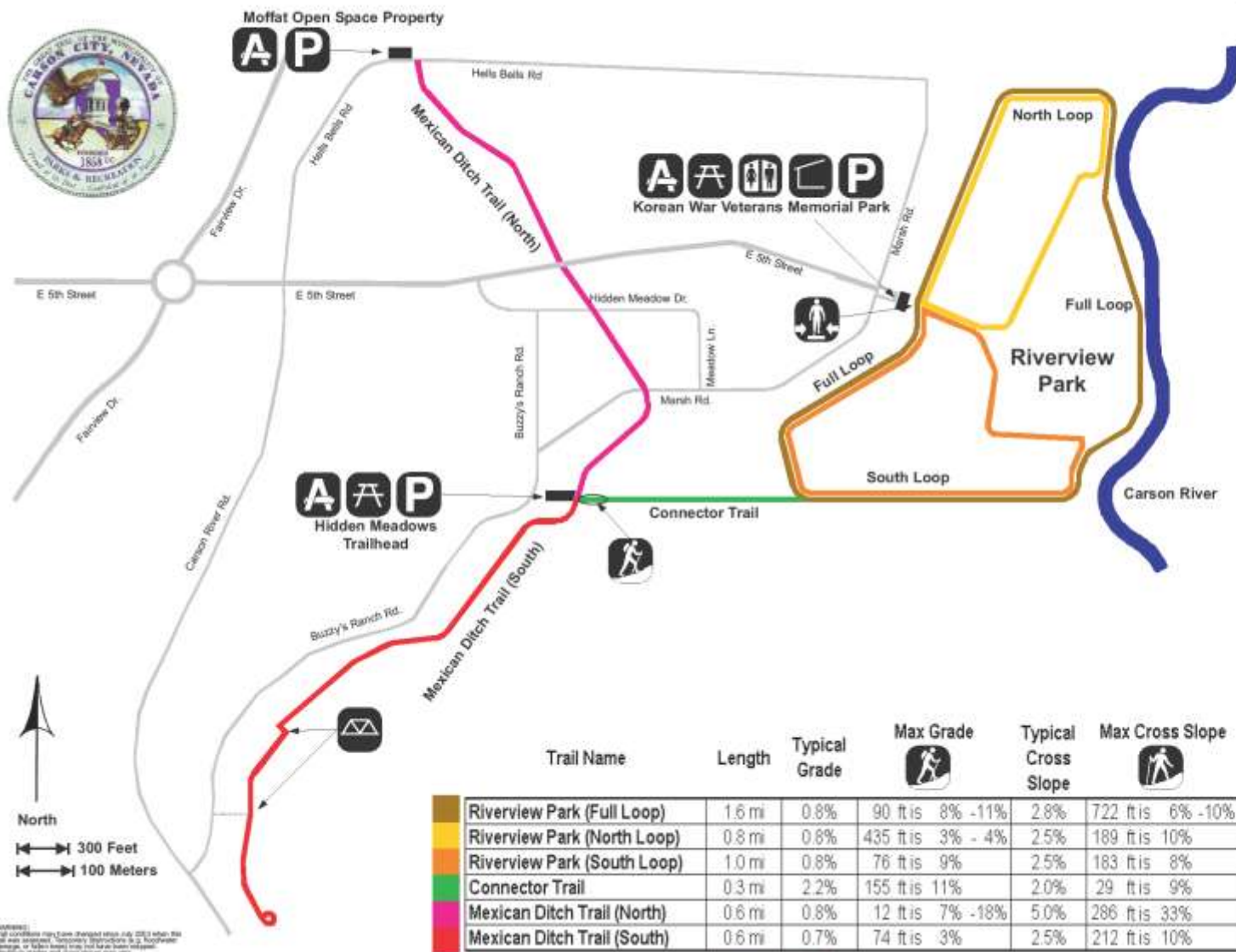
- Hiking
- Mountain Biking
- Wheelchair
- Stroller
- Service Dog
- ATV/UTV
- Motor Vehicle
- Trail Access Information

Trail Name	Length	Trail Status	Trail Type	Trail Surface	Trail Width	Trail Elevation	Trail Difficulty	Trail Season	Trail Access
Riverview Park (Loop)	1.2 mi	Open	Hiking	Gravel	4-6 ft	7,000 - 8,000 ft	Easy	Year-round	Open
Riverview Park (Point-to-Point)	2.0 mi	Open	Hiking	Gravel	4-6 ft	7,000 - 8,000 ft	Easy	Year-round	Open
Riverview Park (Short Loop)	0.5 mi	Open	Hiking	Gravel	4-6 ft	7,000 - 8,000 ft	Easy	Year-round	Open
Mexican Ditch (Loop)	1.5 mi	Open	Hiking	Gravel	4-6 ft	7,000 - 8,000 ft	Easy	Year-round	Open
Mexican Ditch (Point-to-Point)	0.75 mi	Open	Hiking	Gravel	4-6 ft	7,000 - 8,000 ft	Easy	Year-round	Open
Mexican Ditch (Short Loop)	0.375 mi	Open	Hiking	Gravel	4-6 ft	7,000 - 8,000 ft	Easy	Year-round	Open

Trail Access Information:

- Trail Access: Open
- Trail Access: Closed
- Trail Access: Limited
- Trail Access: Restricted
- Trail Access: No Access

Riverview Park / Mexican Ditch Trail System



Trail Use:

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

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

A standard ramp has an 8% grade.

WARNING: Trail conditions may have changed since July 2013 when this map was developed. Users are encouraged to use common sense and caution when using this map. The City of Carson City is not responsible for any injuries or damage caused by the use of this map. © 2013 Carson City Parks and Recreation Dept. All rights reserved.

Round Hill Pines / Kahle Park Bike Paths



Kahle Park Loop Kahle Park

Length 0.6 mi (0.10 km)

- Hikers
- Dogs on Leash per posted restrictions
- Bikes
- No Equestrians
- No Motorized Vehicles

Grade

Typical Grade 3.8%

1020 ft (313 m) is 5% to 8%
227 ft (69 m) is 8% to 12%
0% grade in a standard ramp

X-Slope

Typical Cross Slope 3.7%

1044 ft (318 m) is 5% to 8%
150 ft (46 m) is 8% to 9%

Tread Width

Typical Tread Width 32 in (207 cm)

Surface Type

Asphalt

Typical Firmness 0.19
Minimum Firmness 0.22



Typical Stability 0.25
Minimum Stability 0.27



100% is Firm and Stable

WARNING: Trail conditions may have changed since August 2007 when this trail was assessed. Temporary conditions such as fallen trees and wet/dry areas may not be shown.

Trail Access Information

Round Hill Pines Round Hill Pines

Length 4.4 mi (7.1 km)

- Hikers
- Dogs on Leash per posted restrictions
- Bikes
- Equestrians
- No Motorized Vehicles

Grade

Typical Grade 4.0%

13% of the trail is 8% to 10%
25.1 ft (7.6 m) is 10% to 23%
0% grade in a standard ramp

X-Slope

Typical Cross Slope 3.1%

16% of the trail is 5% to 8%
75.2 ft (229 m) is 8% to 13%
21 ft (6 m) is 21%

Tread Width

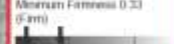
Typical Tread Width 33 in (235 cm)

Minimum Tread Width 78.6 ft (240 m) to 24 in (61 cm)

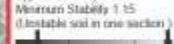
Surface Type

Asphalt or Soil

Typical Firmness 0.20
Minimum Firmness 0.33 (0.8m)



Typical Stability 0.26
Minimum Stability 1.15 (1.5m stable soil in cross section)



Obstructions

Multiple 20' Rock Slopes
Remaining Insect 0 in (0 cm)

14' Road
Remaining Insect 12m (39cm)

WARNING: Trail conditions may have changed since August 2007 when this trail was assessed. Temporary conditions such as fallen trees and wet/dry areas may not be shown.

Trail Access Information



Sparks Marina Loop Trail

Sparks Marina

Length 2.0 mi (3.2 km)



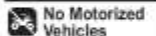
Hikers



Dogs Allowed
per posted restrictions



Bikes



No Motorized
Vehicles



Grade

Typical Grade 1.9%

94% of the trail is 0% to 5%

576 ft (176 m) is 5% to 8%
9% grade is a standard ramp.



X-Slope

Typical Cross Slope 1.9%

94% of the trail is 0% to 3%

100 ft (30 m) is 5% to 8%
9% grade is a standard ramp.



Tread Width

Typical Tread Width
12 ft (3.7 m)



Surface Type

Asphalt / Concrete

100% is Hard or Better

Firmness - 0.19

Trail	Soft	Med	Firm	Hard
Score	40-55	55-65	65-75	75-85

Stability - 0.23

Trail	Low	Med	High	Very High
Score	11-25	25-35	35-45	45-55

100% is Paved



Obstructions

90" High Solid

90" High Solid

WARNING: Trail conditions can have changed since September 2008 when the trail was assessed. Temporary obstructions such as fallen trees and road closures were not reported.

For more information on trail conditions, visit www.parksandrec.com.

Trail Access Information

Trail Access Information

Sparks Marina



- Streets
- - - Sparks Marina Trail
- Connector Trail
- Private Boating Access
- The Public Hand Boat Launch
- /// No Fishing or Boating in the Cove

- Swimming Area
- Beach
- Playground
- Dog Park
- Restrooms
- Parking

The Legends



Lampe Park



Outer Loop
Lampe Park

Length 0.8 mi (1.2 km)

Hikers
Bikes
No Dogs
No Equestrians
No Motorized Vehicles

Grade
Typical Grade 1.3%
17 ft (5 m) is 5% to 8%
30 ft (9 m) is 17%
8% grade is a standard ramp

X-Slope
Typical Cross Slope 1.5%
7% of the trail is 3% to 5%
142 ft (43 m) is 5% to 8%

Tread Width
Typical Tread Width 127 in (323 cm)

Surface Type
Decomposed Granite / Pavers
Typical Firmness - 0.20
Minimum Firmness - 0.23

10-20	0-20	0-20	10-20
Soft	Med	Hard	Hard
Stable	Stable	Stable	Stable

Typical Stability - 0.20
Minimum Stability - 0.33

100% is Firm or Better

Trail Access Information

Inner Loop Trail
Lampe Park

Length 0.6 mi (0.9 km)

Hikers
Bikes
No Dogs
No Equestrians
No Motorized Vehicles

Grade
Typical Grade 1.1%
17 ft (5 m) is 5% to 5%
0% grade is a standard ramp

X-Slope
Typical Cross Slope 1.0%
100% of the trail is 0% to 5%

Tread Width
Typical Tread Width 145 in (369 cm)

Surface Type
Decomposed Granite / Pavers
Typical Firmness - 0.20
Minimum Firmness - 0.23

10-20	0-20	0-20	10-20
Soft	Med	Hard	Hard
Stable	Stable	Stable	Stable

Typical Stability - 0.20
Minimum Stability - 0.33

100% is Firm or Better

Trail Access Information

Senior Center Trail
Lampe Park

Length 0.2 mi (0.3 km)

Hikers
Bikes
No Dogs
No Equestrians
No Motorized Vehicles

Grade
Typical Grade 1.5%
27 ft (8 m) is 5% to 5%
0% grade is a standard ramp

X-Slope
Typical Cross Slope 1.1%
63 ft (19 m) is 3% to 5%

Tread Width
Typical Tread Width 115 in (291 cm)

Surface Type
Decomposed Granite
Typical Firmness - 0.19
Minimum Firmness - 0.23

10-20	0-20	0-20	10-20
Soft	Med	Hard	Hard
Stable	Stable	Stable	Stable

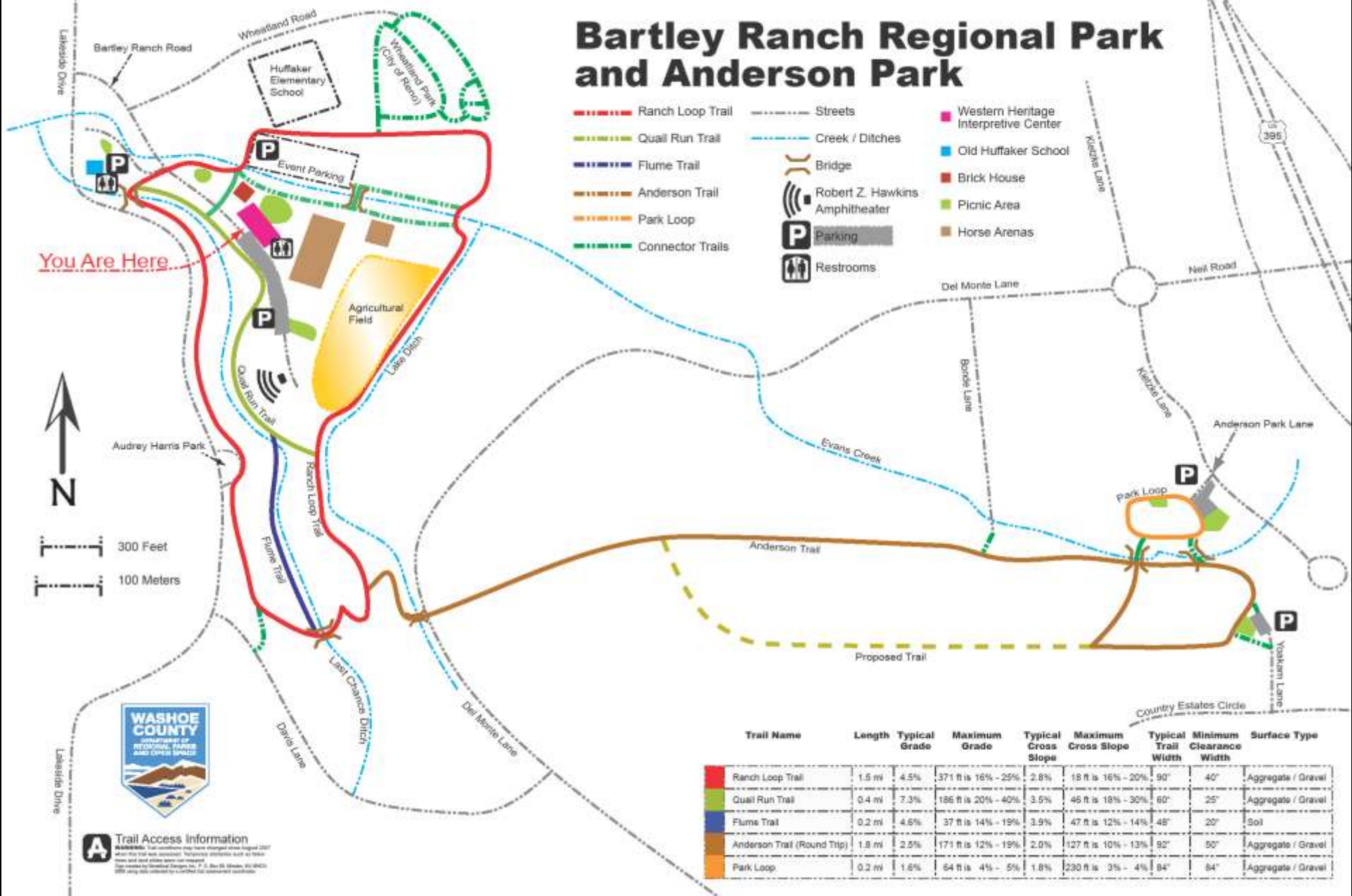
Typical Stability - 0.20
Minimum Stability - 0.33

100% is Firm or Better

Trail Access Information



Bartley Ranch Regional Park and Anderson Park



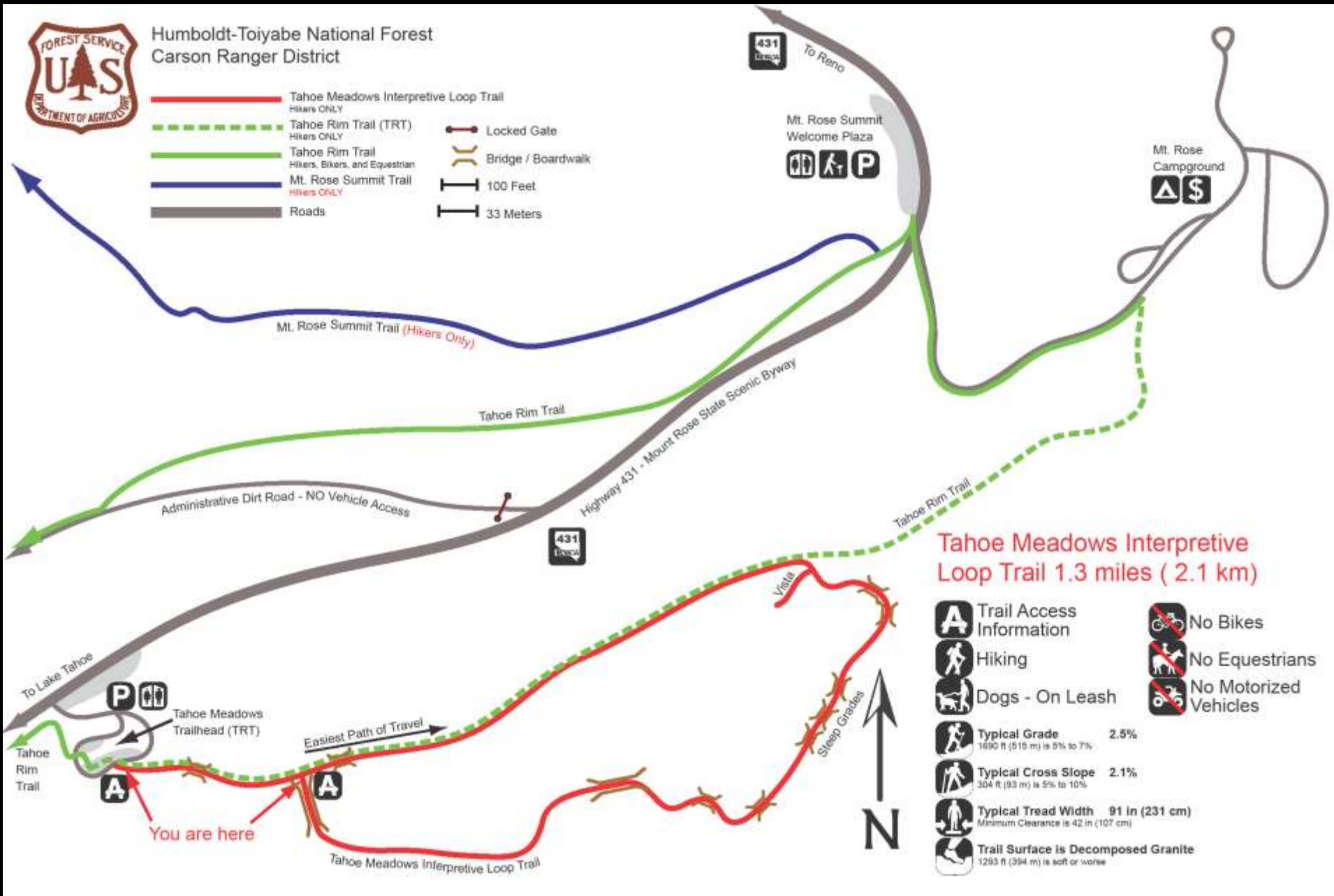
Trail Name	Length	Typical Grade	Maximum Grade	Typical Cross Slope	Maximum Cross Slope	Typical Trail Width	Minimum Clearance	Surface Type
Ranch Loop Trail	1.5 mi	4.5%	371 ft is 16% - 25%	2.8%	18 ft is 16% - 20%	90"	40"	Aggregate / Gravel
Quail Run Trail	0.4 mi	7.3%	196 ft is 20% - 40%	3.5%	46 ft is 18% - 30%	60"	25"	Aggregate / Gravel
Flume Trail	0.2 mi	4.6%	37 ft is 14% - 19%	3.9%	47 ft is 12% - 14%	48"	20"	Soil
Anderson Trail (Round Trip)	1.8 mi	2.5%	171 ft is 12% - 19%	2.0%	127 ft is 10% - 13%	92"	50"	Aggregate / Gravel
Park Loop	0.2 mi	1.6%	64 ft is 4% - 5%	1.8%	230 ft is 2% - 4%	84"	84"	Aggregate / Gravel

A Trail Access Information
 All information may have changed since August 2007.
 All trail users are responsible for their own safety. No liability is assumed by Washoe County for any injury or damage resulting from the use of these trails. All users must follow posted signs and regulations.
 © 2007 Washoe County, NV. All rights reserved.



Humboldt-Toiyabe National Forest
Carson Ranger District

- Tahoe Meadows Interpretive Loop Trail
Hikers ONLY
- Tahoe Rim Trail (TRT)
Hikers ONLY
- Tahoe Rim Trail
Hikers, Bikers, and Equestrian
- Mt. Rose Summit Trail
Hikers ONLY
- Roads
- Locked Gate
- Bridge / Boardwalk
- 100 Feet
- 33 Meters



Tahoe Meadows Interpretive Loop Trail 1.3 miles (2.1 km)

- Trail Access Information
- Hiking
- Dogs - On Leash
- Typical Grade 2.5%
1690 ft (515 m) is 5% to 7%
- Typical Cross Slope 2.1%
304 ft (93 m) is 5% to 10%
- Typical Tread Width 91 in (231 cm)
Minimum Clearance is 42 in (107 cm)
- Trail Surface is Decomposed Granite
1293 ft (394 m) is soft or worse
- No Bikes
- No Equestrians
- No Motorized Vehicles

Funding Support

Nevada Recreational Trails Program-
Nevada Division of State Parks

Administered by the Federal
Highway Administration (FHWA)
Safe, Accountable, Flexible, Efficient
Transportation Equity Act: A
Legacy for Users (SAFETEA-LU)

Preventing Access Barriers

**Need to provide access to all
allowed user groups**

**Need to prevent those user groups
not allowed**

A man with glasses, wearing a black puffer jacket, black pants, and black boots, is seated in a wheelchair. He is leaning against a chain-link fence barrier. He is wearing tan work gloves and has his right hand on the top rail of the fence. The background shows a park area with a building, trees, and a hillside under an overcast sky. A green trash bin is visible behind the fence to the right.

**Barrier at
Riverview
Park**



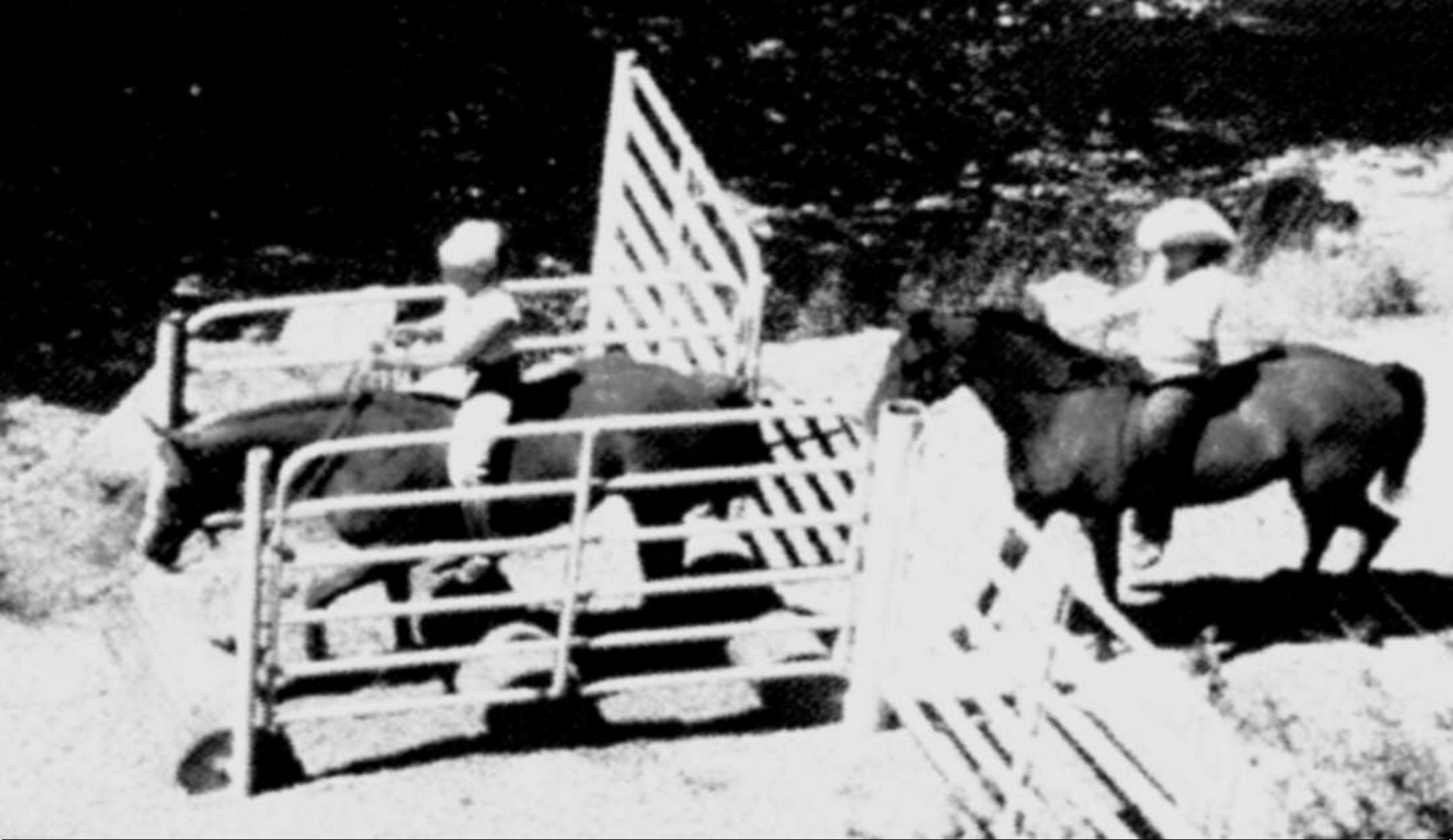
Deschutes Cattle Guard Barrier



Kissing Gate Barrier

Single Step Barrier





Step Over Barrier

Stile Barrier

PUBLIC
FOOTPATH



Latching Gate



Beneficial Designs Trail Gate Barrier Work





First Inverted Bollard Concept

Motorcycle Testing



Second Inverted Bollard Concept

Abilities EXPO



Third Inverted Bollard Concept

Motorcycle Testing

Electronic Trail Gate Barrier

Detect the presence of motorized trail vehicle at trail access entry

Notify via phone or internet message

Voice, image, text or GSM text message

Report via alarm or dispatch service

Capture of video before and after event

Onsite alarm options

Electronic Gate Barrier



Electronic TGB Specifications

Self contained wireless battery
powered detection unit

Base electronics receive signal via
wireless protocol with jamming
detection

Low battery monitoring and
notification

Electronic TGB Specifications

Infra-red sensor technology with
fresnel lens

Field of view is approx 2 degrees

At 50 feet the field of view is approx
20 inches

Dynamic detection of hot objects
entering field of view

Electronic Trail Gate Barrier

Set up 32 inch clearance mechanical trail gate barrier with steel or concrete bollards

Detect the presence of motorized trail vehicle at trail access entry point

Silently report violation using desired format or onsite alarm

Electronic TGB Specifications

Custom designed electronic circuit to control infra-red sensor

Custom software algorithm to detect movement of heated object against background

Detect the difference between hikers and count to monitor trail usage

Funding Support

Development of the High Efficiency Trail Assessment Process and the Trail Gate Barrier Project provided by the USDA CREES SBIR program

Beneficial Designs, Inc.

Minden, Nevada

www.beneficialdesigns.com

mail@beneficialdesigns.com

775.783.8822 voice

775.783.8823 fax

*Working toward universal access
through research, design & education*