

Universal Trail Assessment Process (UTAP) & High Efficiency Trail Assessment Process (HETAP) Making the Measurements



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Making the Measurements Objective

Learn techniques for making
measurements

Describe where and when
measurements are taken on the trail

Goals for Measurements

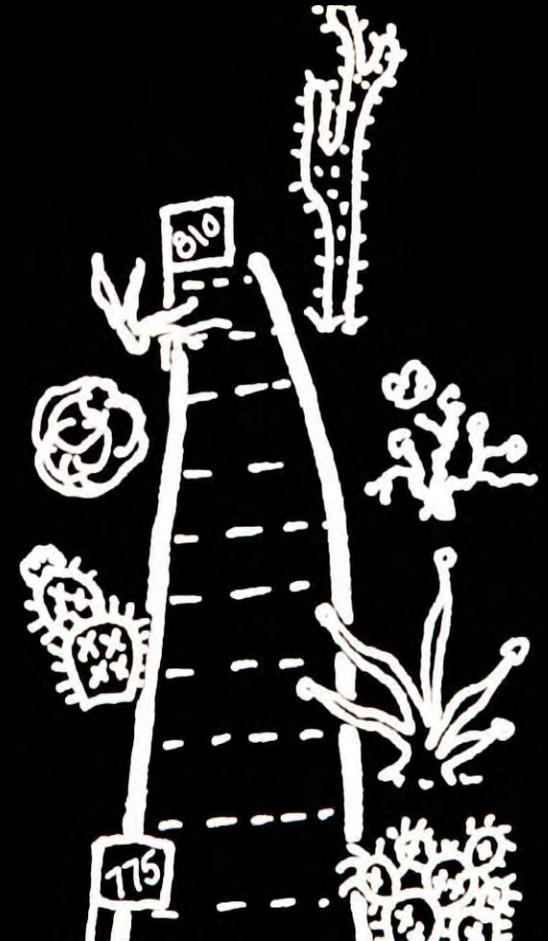
Consistent techniques

Accurate records

Standardized methods

Typical and extreme data

Spectrum of information



UTAP: TAI Stations

Visual change in direction,
grade, or cross slope

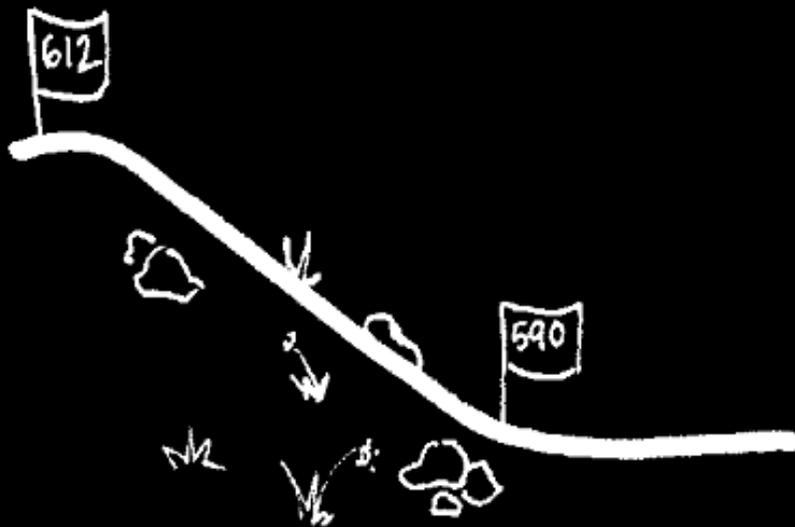
Sightline to previous station

Intersection, trailhead or
destination

Change in surface or tread
width

Temporary mark at station

100 feet (30 m) maximum



UTAP: Measurement Intervals

At each station length

From one station to the next trail direction, typical grade

Between consecutive stations typical & maximum cross slope, maximum grade, surface firmness and type, typical & minimum clearance width



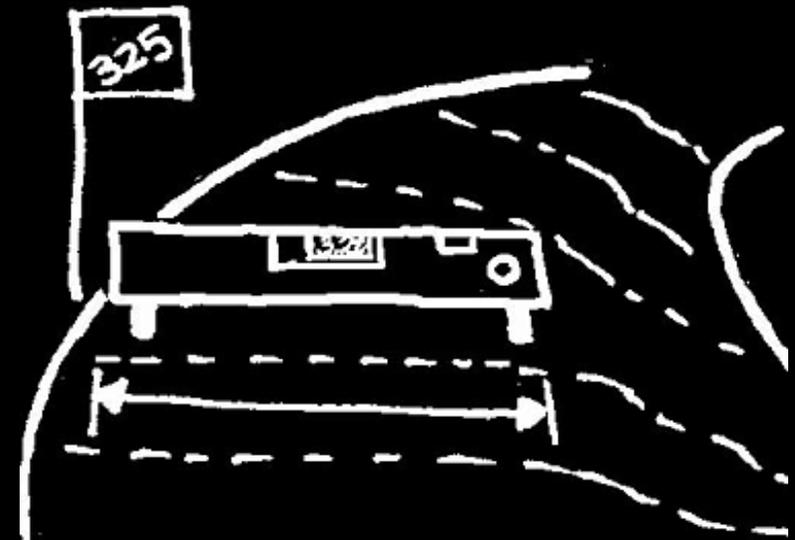
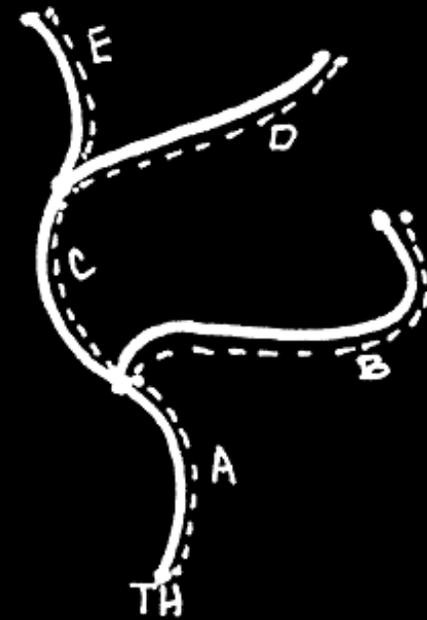
Key UTAP Concepts

Divide trail into segments

Measure best path of travel

Typical measures for all stations

Extreme measures where they occur



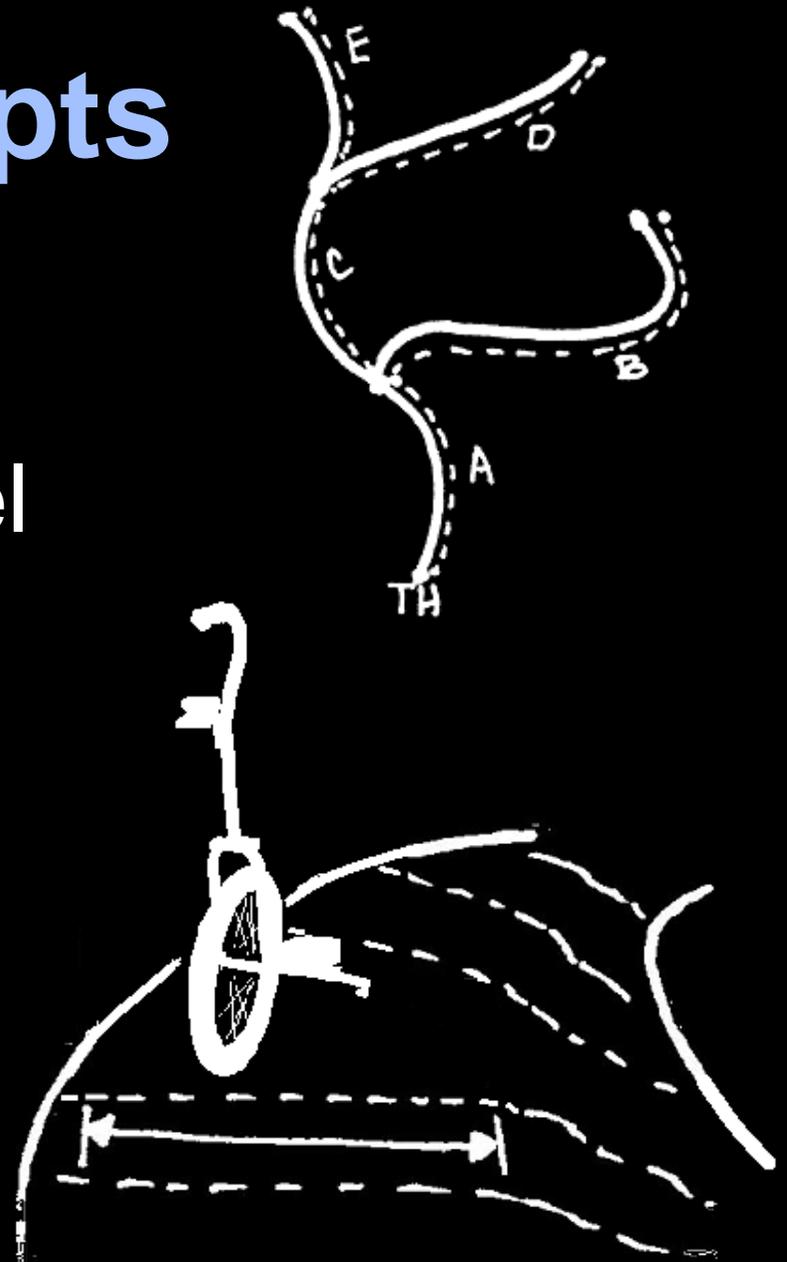
Key HETAP Concepts

Divide trail into segments

Measure best path of travel

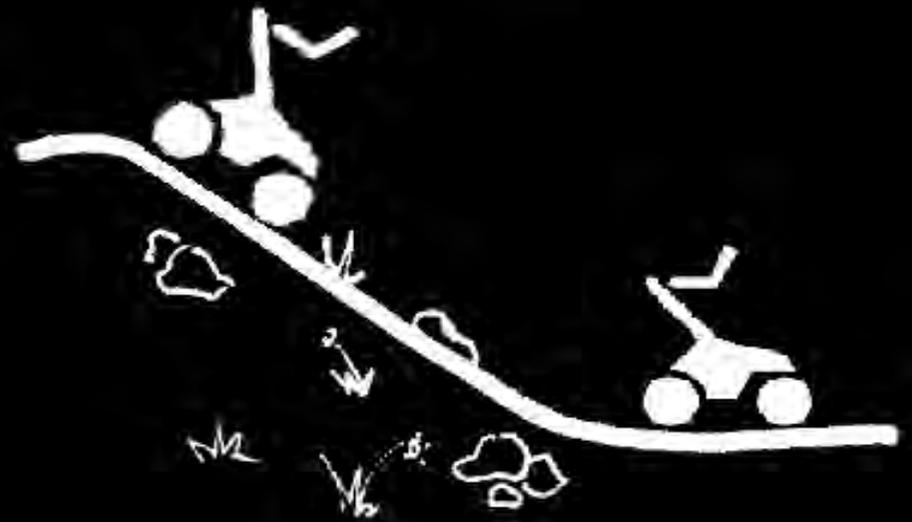
Typical measures for all stations

Record Stations where
Extreme conditions occur



Taking Stations

- Visual change in trail direction
- Visual change in grade or cross slope
- Significant change in tread width
- Surface type change
- Trail intersection
- Start and end of trail segment
- No more than 25 feet apart*



UTAP: Distance Rolla-wheel

Zero at the start of each trail
segment

Peg should be in front of
counter arm

Avoid measuring features

Measure center of best path

Record at each station and
feature



UTAP & HETAP: Typical Tread Width - tape measure

Clear path of travel or visible trail surface



Take a new station
whenever there is
a significant
change in tread
width

UTAP: Typical Cross Slope - Inclinometer

2 ft. space perpendicular
to path of travel

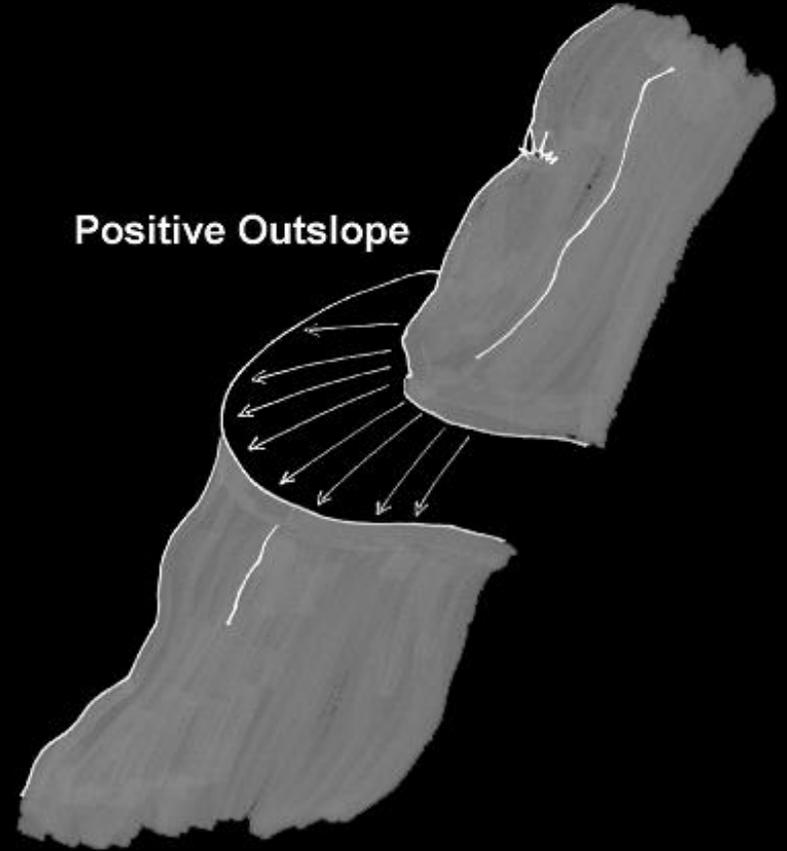
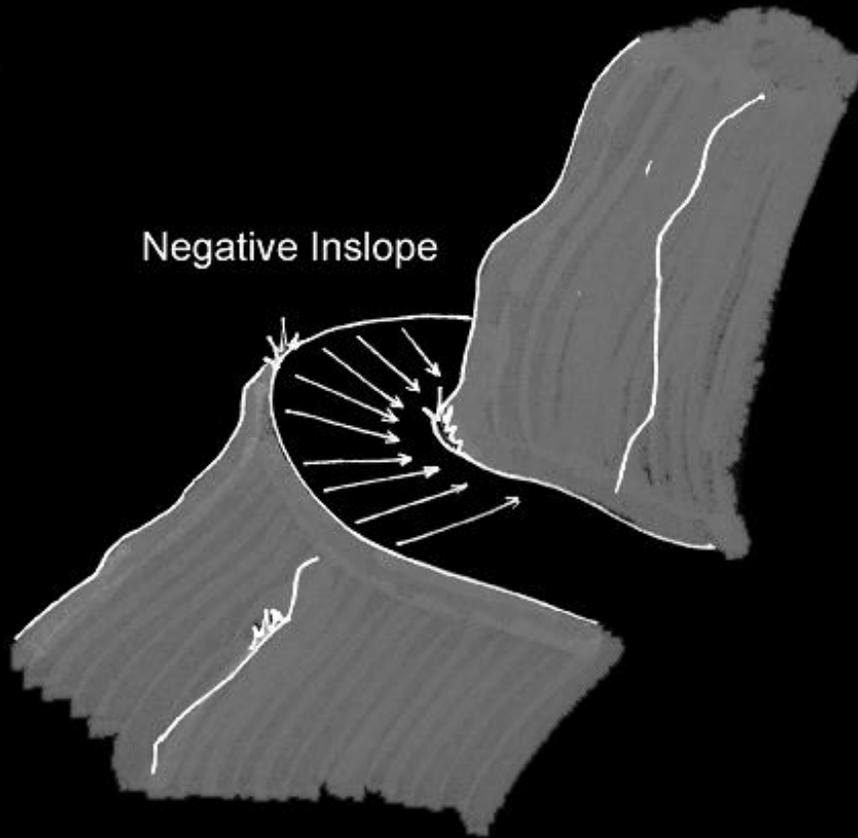
Representative measure
of cross slope between
stations

Record to nearest 1% or
as displayed

Record in slope as
negative (-%)



Inslope and Outslope



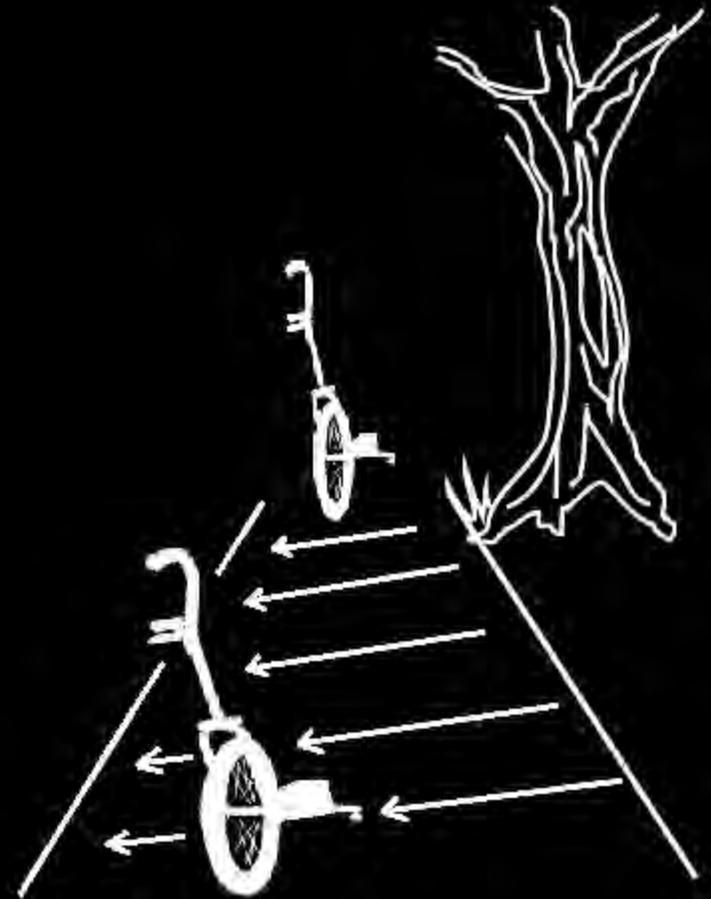
HETAP: Typical Cross Slope

2 ft. space perpendicular
to path of travel

Best path of travel

Records to nearest .1%

Record in slope as
negative (-%)



ADA Compliance

Standards for Outdoor Developed Areas now part of the Architectural Barriers Act (ABA) Accessibility Standards and apply to national parks and other outdoor areas developed by the federal government.

They do not apply to outdoor areas developed with federal grants or loans.

Outdoor Developed Areas

Picnic/Camping

Viewing Areas

Outdoor Recreation Access
Routes (ORAR)

Trails

Beach Access Routes



Format and organization

Chapter 10: Recreation Facilities

1011 Outdoor Constructed Features

1012 Parking Spaces within Accessible Camping Units and
Picnic Units

1013 Tent Pads and Tent Platforms

1014 Camp Shelters

1015 Viewing Areas

1016 Outdoor Recreation Access Routes

1017 Trails

1018 Beach Access Routes

1019 Conditions for Exceptions



Pedestrian Routes

Trails

Outdoor Recreation Access Routes (ORAR)

Beach Access Routes



Trail



Pedestrian route developed primarily for outdoor recreational purposes

Newly constructed/altered trail directly connected to a trailhead or another trail that substantially complies with guidelines

Trail

Grade

1:20 (5%) to 1:12 (8.33%) 200 feet max

1:12 (8.33%) to 1:10 (10%) 30 feet max

1:10 (10%) to 1:8 (12%) 10 feet max

Cross Slope

1:20 (5%) maximum unless concrete, asphalt or boards, then 1:48 (2%)

Trail

Width

36 in minimum width

Passing spaces – every
1,000 feet where less
than 60 inches in width

Tread obstacles

2 inches maximum, except concrete,
asphalt, or board = $\frac{1}{2}$ inch

Openings

$\frac{1}{2}$ inch maximum



ORAR - Outdoor Recreation Access Routes

Connecting
recreation
facilities



Outdoor Recreation Access Routes

Grade

Between 1:20 (5%) and 1:12 (8.33%), 50 feet maximum

Between 1:12 (8.33%) and 1:10 (10%), 30 feet maximum

Cross Slope

1:33 (3%) maximum unless concrete, asphalt or boards, then 1:48 (2%)

Outdoor Recreation Access Route

Surface

firm and stable

Width

36 inches min

Passing space

required where width is less than 60
inches - 200 ft. max

Openings

< 0.5 inch sphere



Beach Access Route



Beach Access Route

Permanent or removable

Minimum number

at least one for each $\frac{1}{2}$ mile of
shoreline managed by the entity

Not required to exceed the number of
pedestrian access points to a beach
provided by the entity



Beach Access Route

Grade

Between 1:20 (5%) and 1:12 (8.33%), 50 feet maximum

Between 1:12 (8.33%) and 1:10 (10%), 30 feet maximum

Obstacles

1 inch max, except concrete, asphalt, or boards = ½ inch

HETAP: Alarm Thresholds

Alarm Settings

Enable Alarms and Set Alarm Thresholds

Grade

Alarm Enabled

Limit (%)

Limit Type

Amount of Change

Absolute Percent

Cross Slope

Alarm Enabled

Limit (%)

Limit Type

Amount of Change

Absolute Percent

Distance

Alarm Enabled

Feet

Outslope to Inslope Changes

Alarm Enabled

Done **Cancel**

Threshold numbers can be set for compliance with accessibility guidelines

Surface

... shall be firm and stable.



Surface Firmness Category

Paved

Hard

Firm

Soft

Very Soft



Rotational Penetrometer



Objective surface
measurement device

Draft Standard for
measure of firmness
and stability under
development

Available from
Beneficial Designs

**What are some examples
of surface material types?**

Surface Type

Examples:

Aggregate

Shell

Asphalt

Soil

Crushed Stone

Snow

Grass

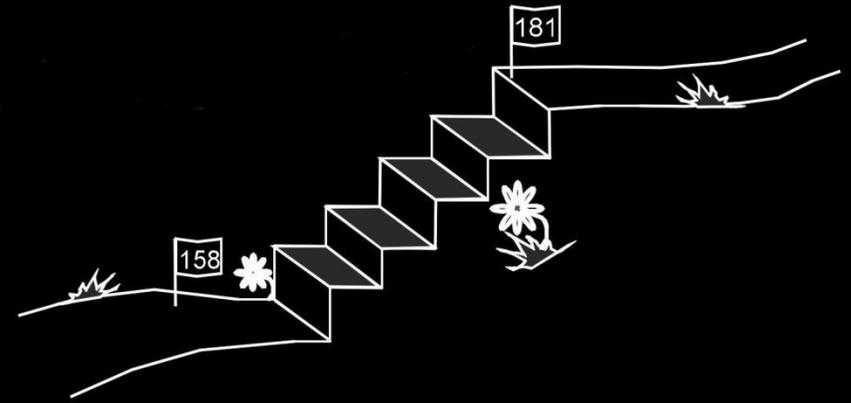
Water

Sand

Wood chip

Stairs and Ladders

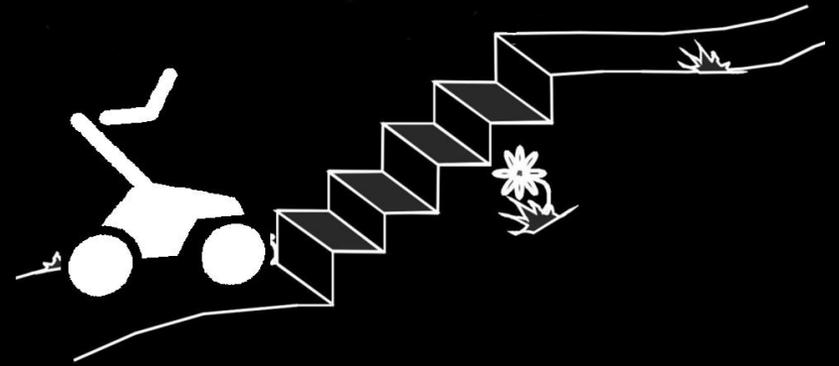
UTAP



- Stairs recorded as a surface type “stairs” or ladders
- Station at beginning and end
- Grade not in typical grade calculation
- Also record as a feature
- Recommend to disclose on TAI reports
- Single or long/deep steps only recorded as features

Stairs and Ladders

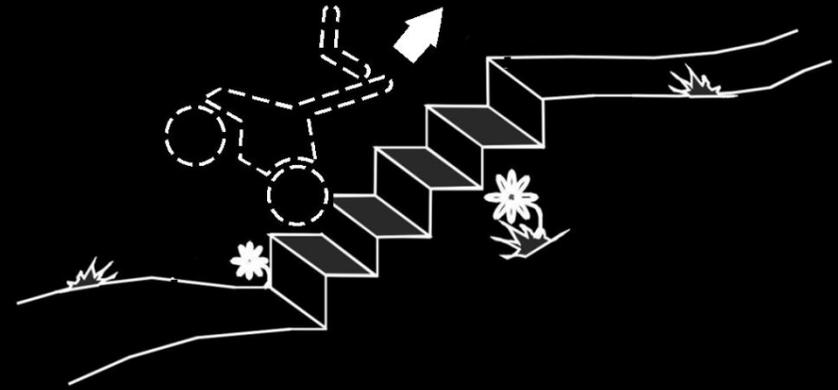
HETAP



- Record Station at the bottom with surface type set to Stairs
- **Record a feature for the Stair Feature**
- Select “Backwards”, rotate the WISP
- Select the flashing Distance Hold (Turn off Pause) and pull the WISP up the stairs

Stairs and Ladders

HETAP

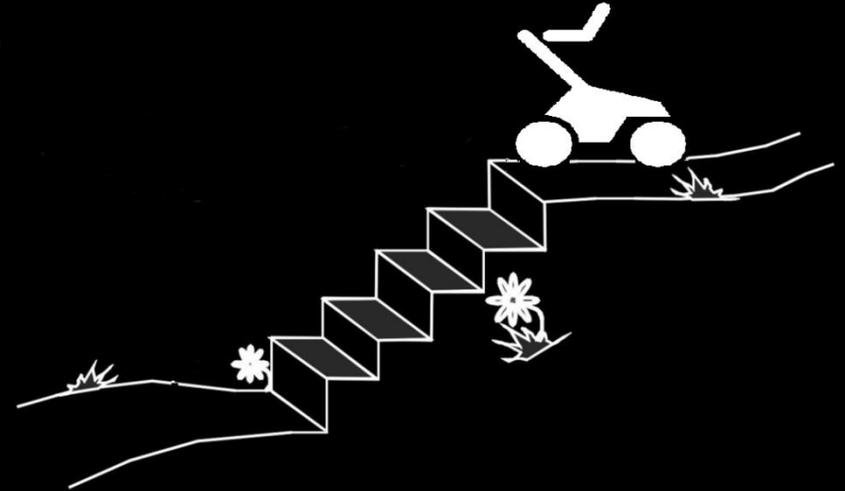


The WISP is recording a forward distance even though it is being pulled

- Once at the top, Record Station with Surface Type returned to current surface
- Select “Forwards”, and Rotate the WISP back around.

Stairs and Ladders

HETAP

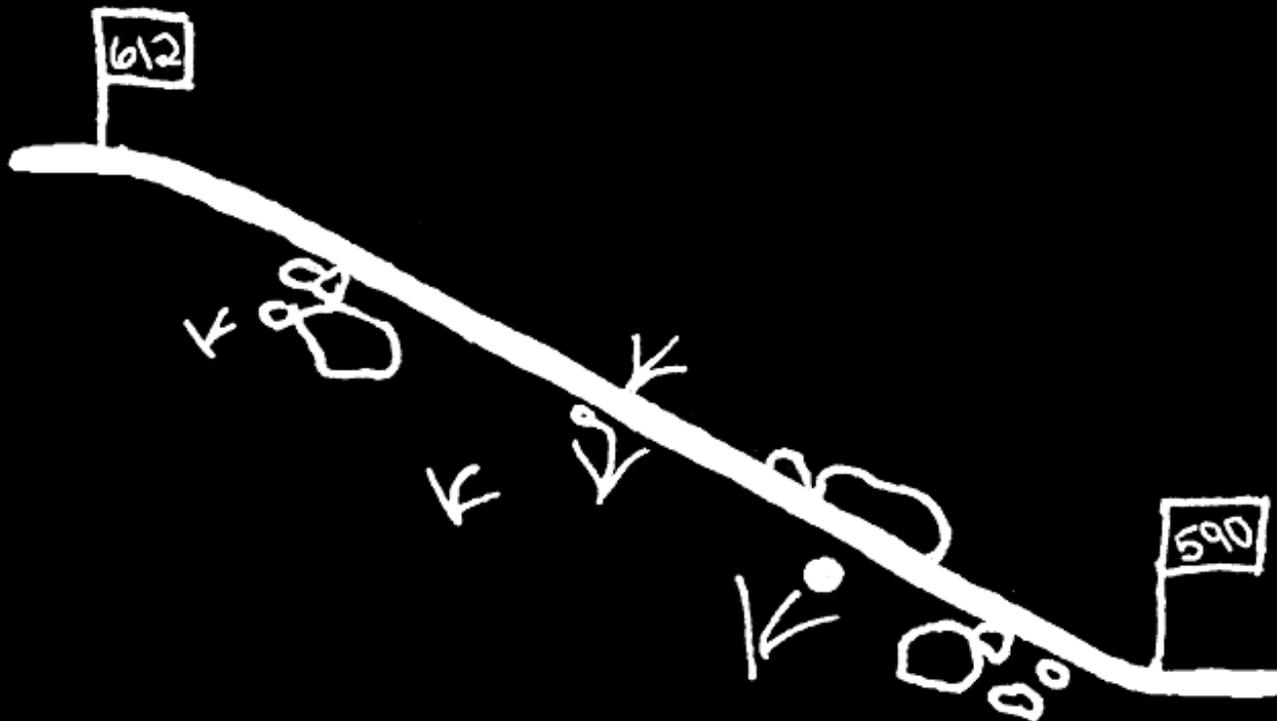


- Select the flashing “Distance Hold” and continue assessing the trail

UTAP: Typical Grade - Clinometer

Align hairline with eye level target

Read %, forward & backward within 1%



Record forward
sign

+ = uphill

- = downhill

Direction - Compass

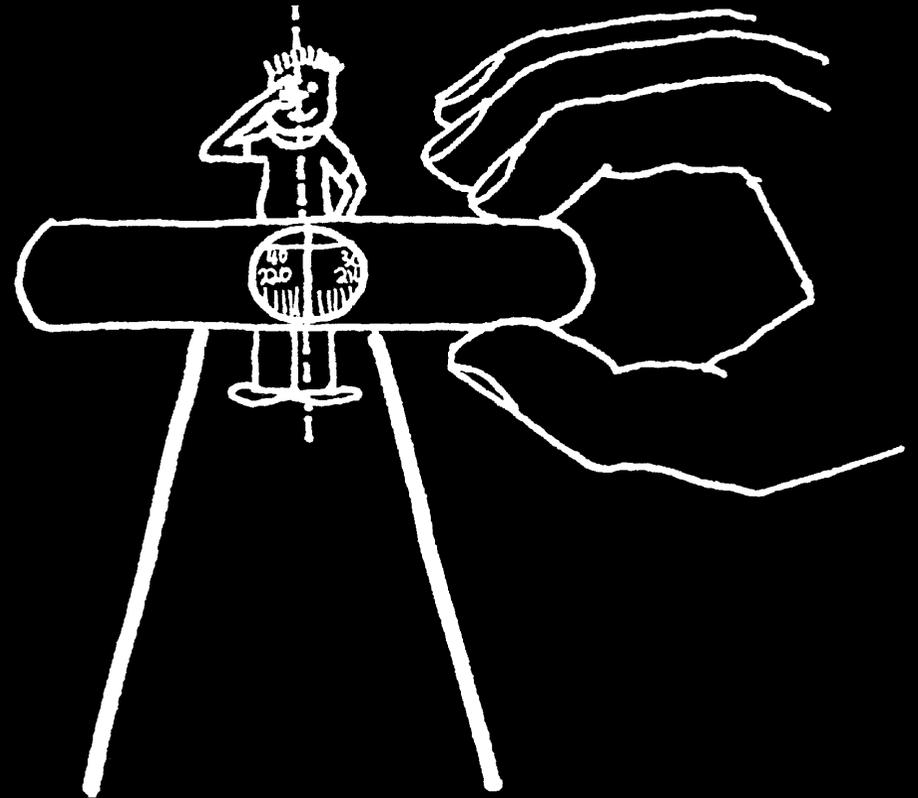
Align hairline with center
of tread/partner

Forward reading –
larger print on bottom

Backward reading –
smaller print on top

Beware of metal objects

Use dominant eye



Maximum Cross Slope - Inclinometer

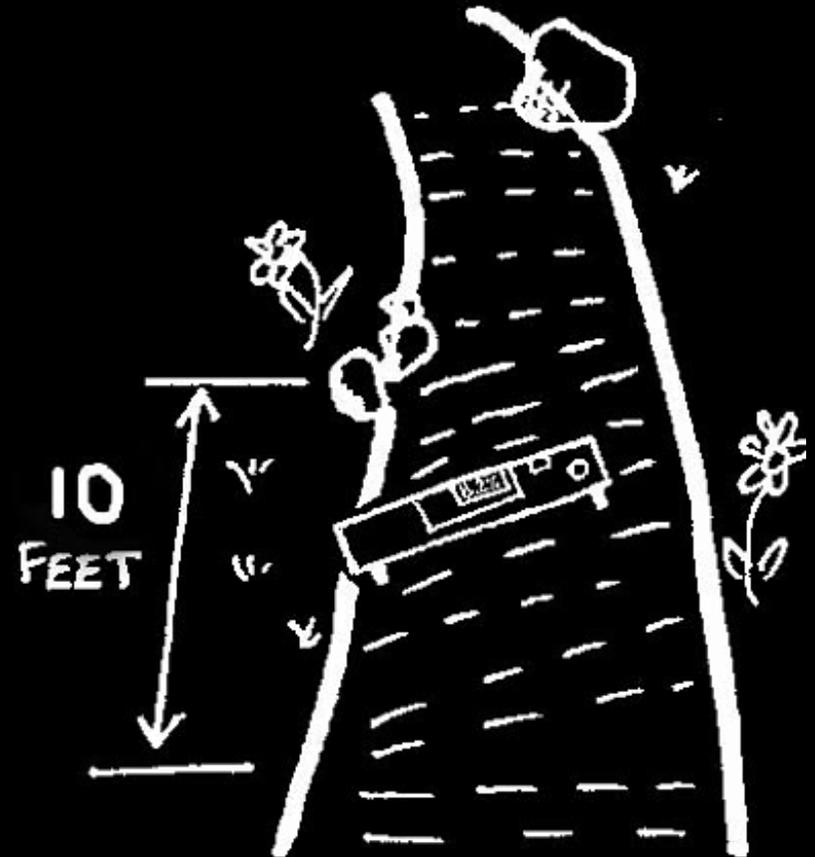
Visually greater than typical

Magnitude to nearest 1%

Inslope is negative (-%)

Length is the distance
within the maximum
tolerance

Report magnitude and
length



Maximum Grade - inclinometer

Sections visually greater than typical
Magnitude to nearest 1%



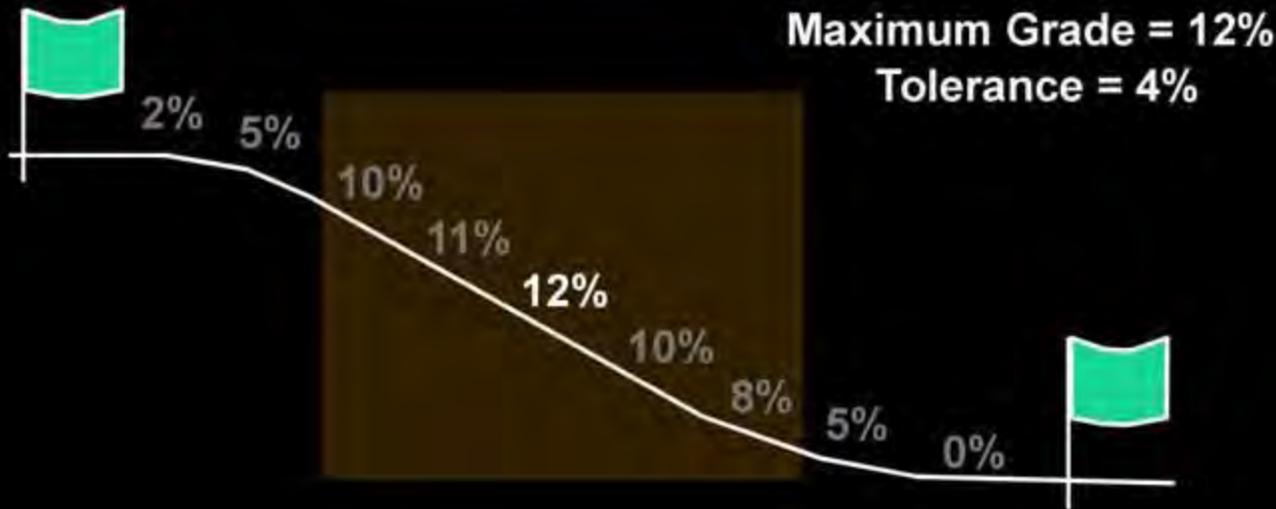
Length is total
distance within
maximum tolerance

Report magnitude
and length

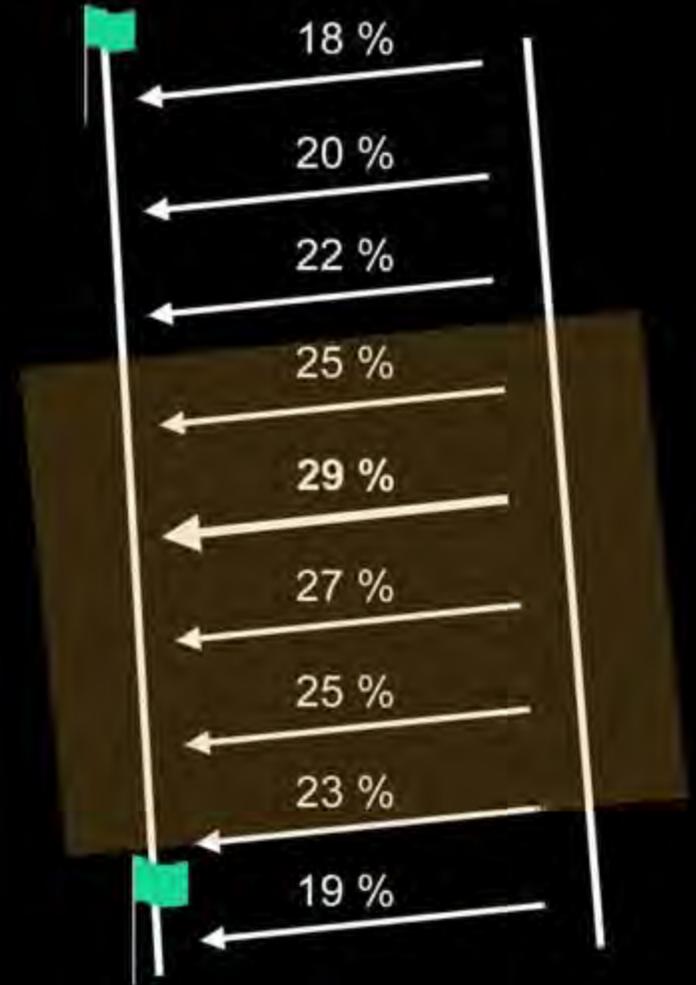
Maximum Tolerance

<u>Maximum</u>	<u>Tolerance</u>	<u>Example</u>	<u>Range</u>
$\leq 10\%$	2%	7%	5 - 7%
11% - 20%	4%	16%	12 - 16%
21% - 30%	6%	23%	17 - 23%
31% - 40%	8%	34%	26 - 34%
$\geq 41\%$	10%	60%	50 - 60%

Maximum Tolerance

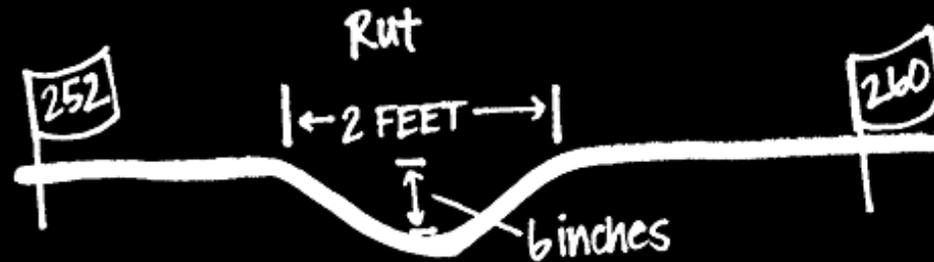


Maximum Cross Slope = 29 %
Tolerance = 6 %



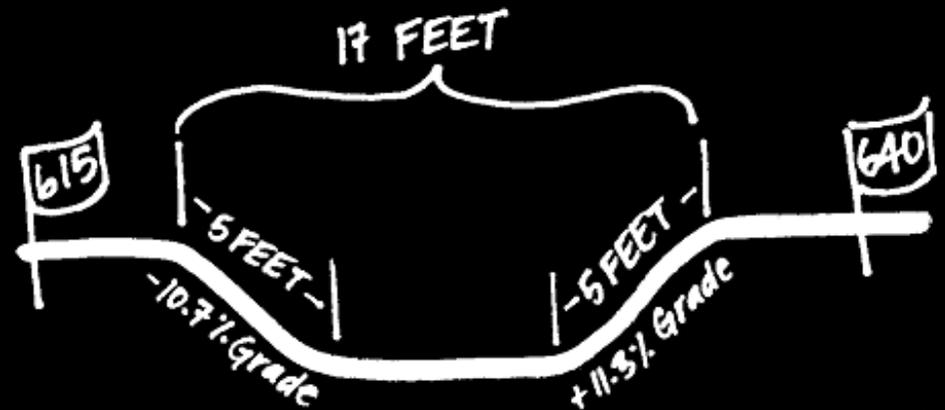
UTAP: Ruts and Bumps, Dips and Mounds

Ruts, bumps, dips and mounds are recorded as features



Do not record a maximum grade in a rut/bump
Record maximum grades into and out of a dip
or on a mound

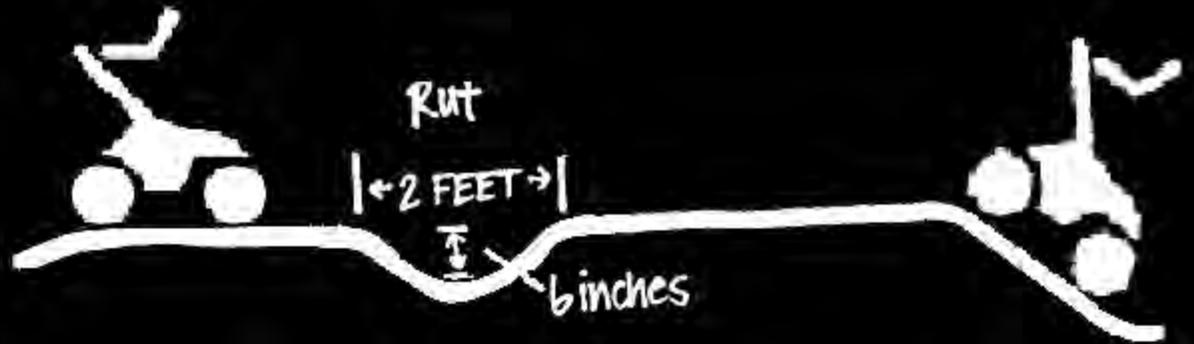
Put a station at the
bottom of long dips or
on top of long mounds



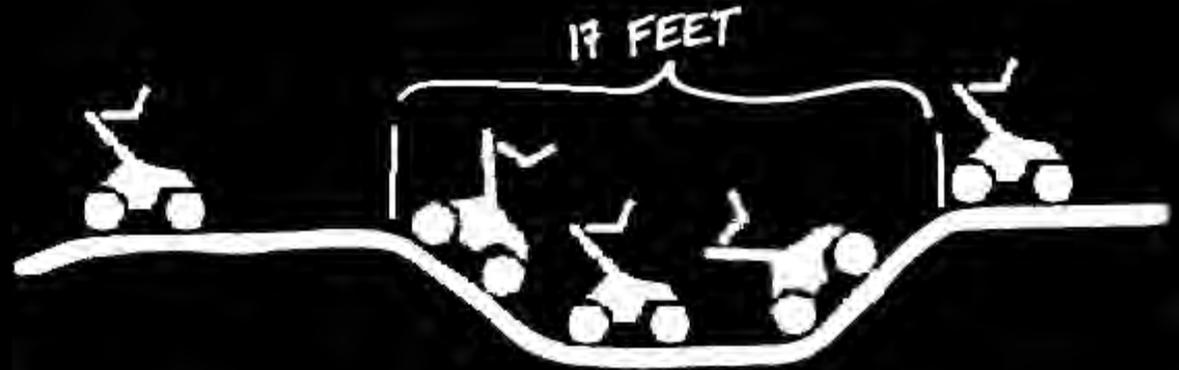
HETAP: Ruts and Bumps, Dips and Mounds

Measure wherever there is a visual change in the grade

Also record as a feature



Where would you record a station here?



When in doubt, record a station.

Minimum Clearance Width - Tape Measure

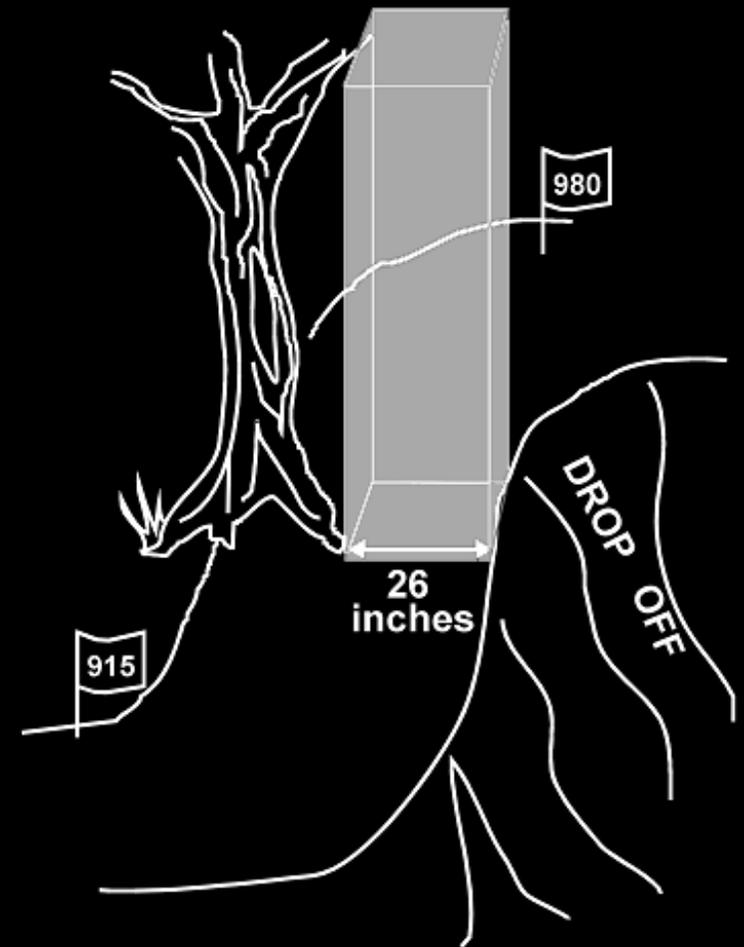
Measure when obstructions on both sides of trail reduce tread to less than the design width

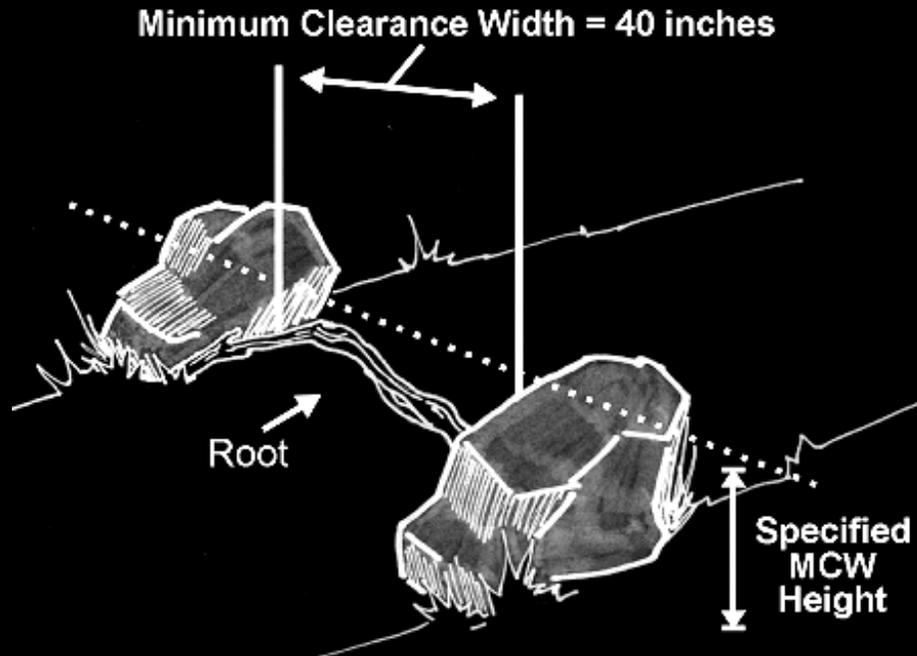
Specified obstruction height based on trail user group

No alternative path around the constriction

Size is L x W x H of clear path

Record features that create MCW

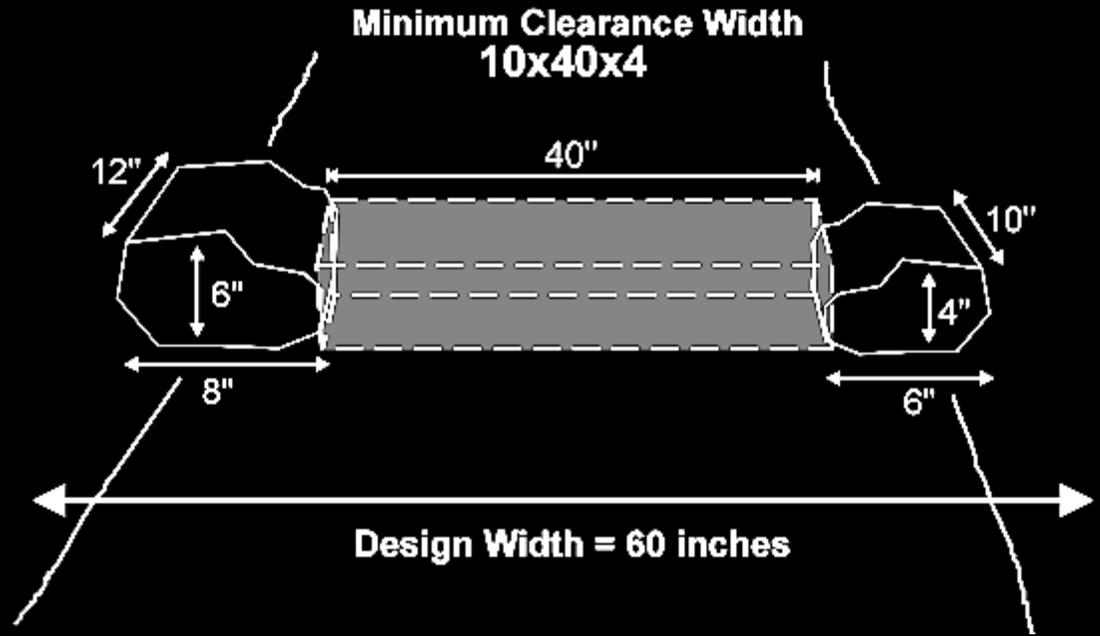




MCW Height

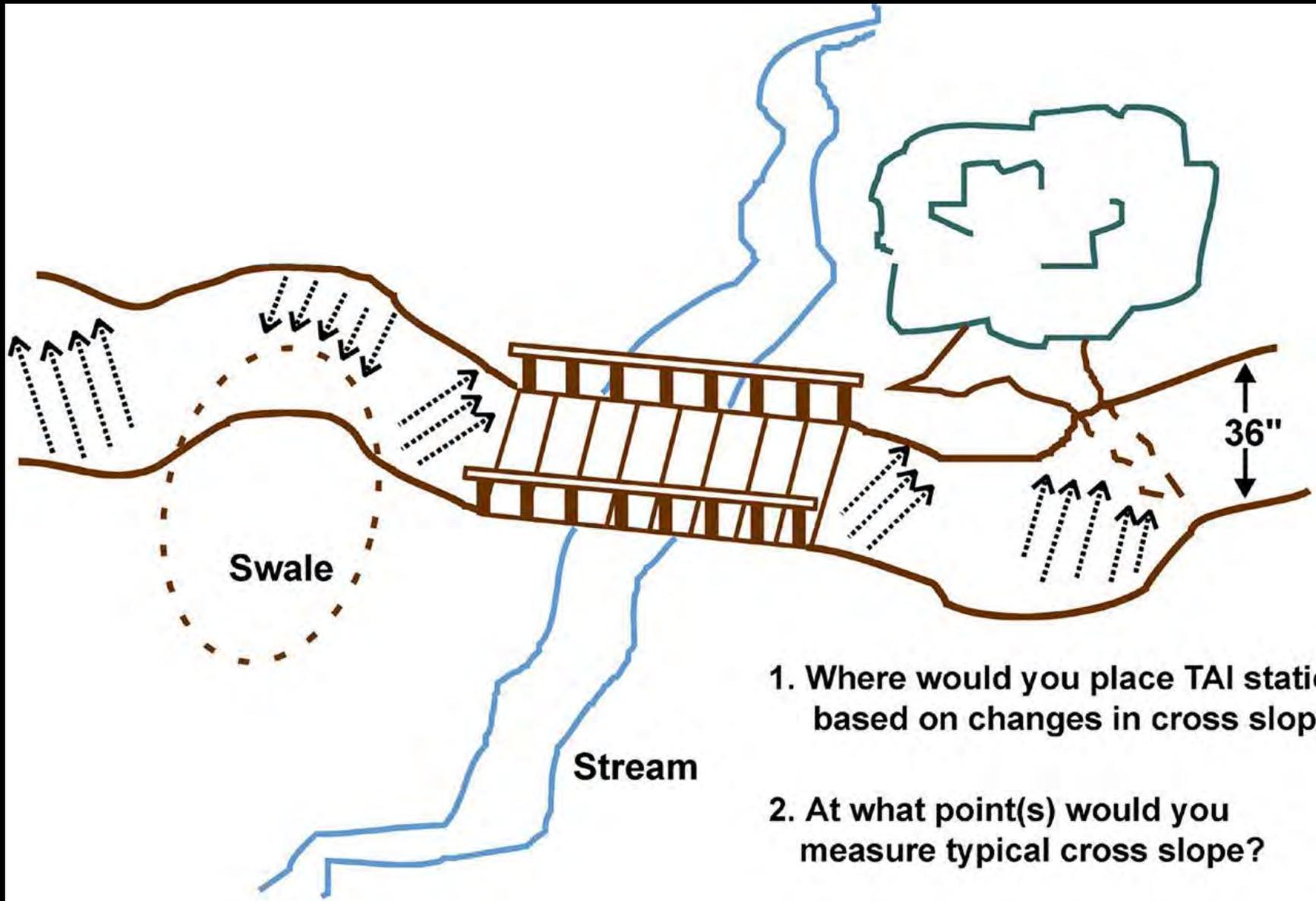
Not an MCW

Size of MCW

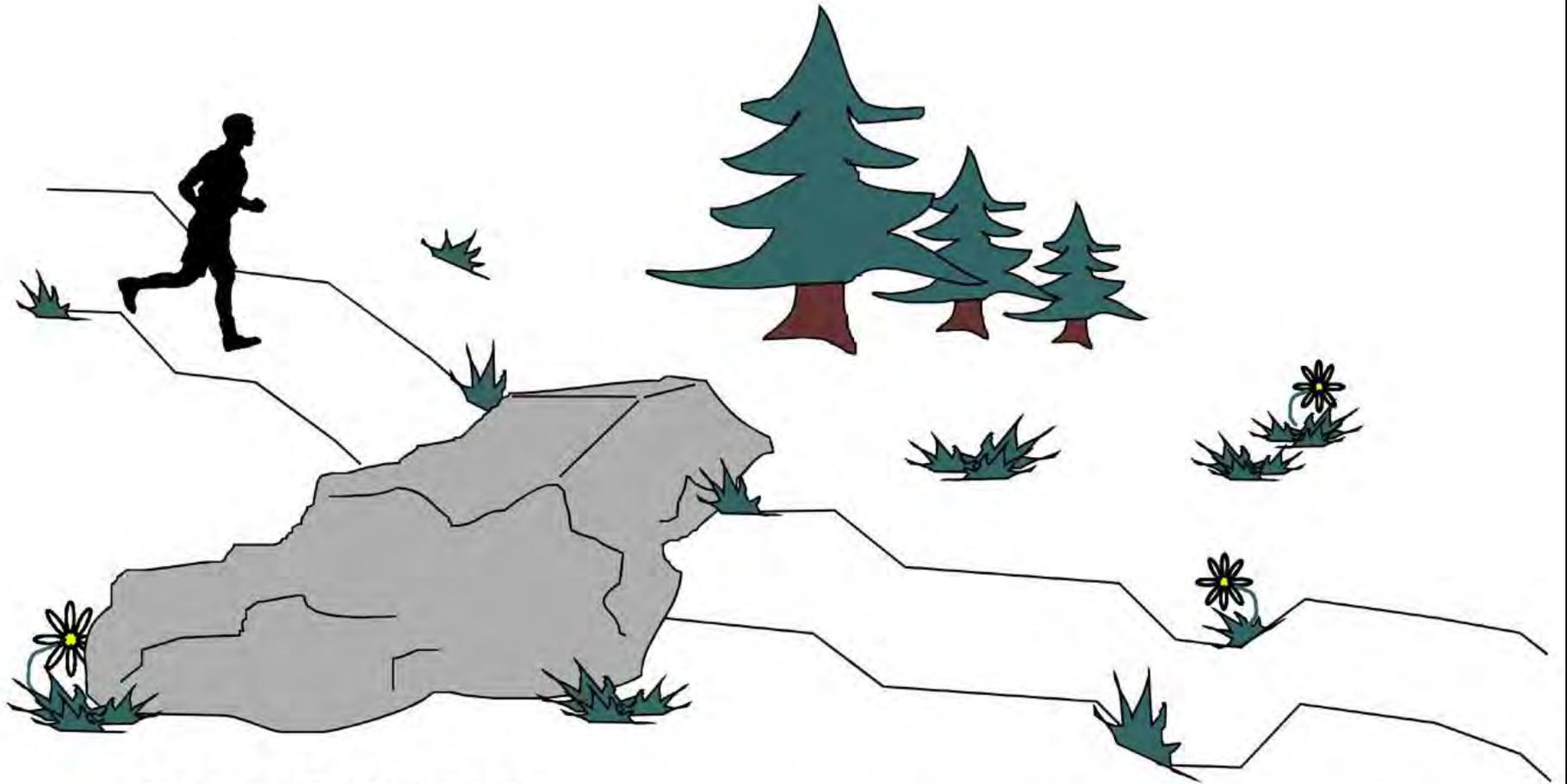


Suggested MCW Heights

0.25"	Shared use path/bike path
0.5"	Access Route
1.0"	Outdoor Recreation Access Route
2" - 3"	Accessible recreation trail
6" - 8"	Pedestrian recreation trail
12"	Equestrian trail
Vary	Snow/Ski/Snow machine trail



1. Where would you place TAI stations based on changes in cross slope?
2. At what point(s) would you measure typical cross slope?
3. At what point(s) would you measure maximum cross slope?



Bedrock Outcrop

1. Where would you place TAI stations based on changes in grade?
2. At what point(s) would you measure typical grade?
3. At what point(s) would you measure maximum grade?

Features

Natural or human
made

On, accessed, or
seen from the
trail



What are some examples of features?



User enjoyment
and comfort

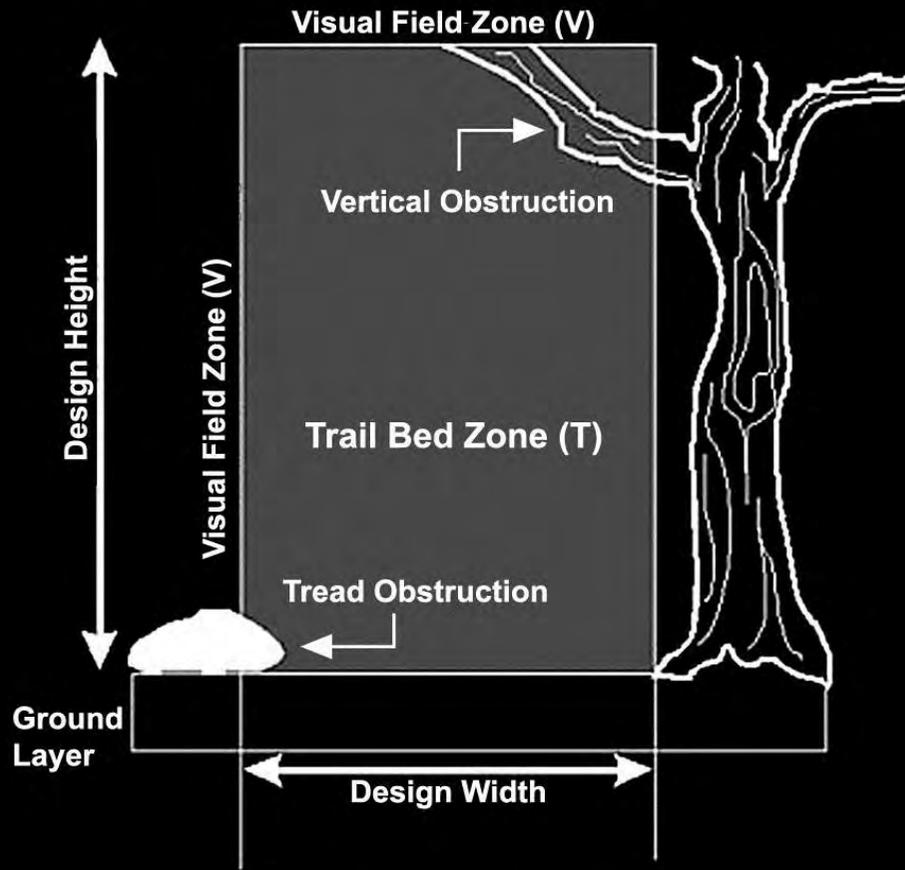


Construction and
maintenance



Health and
Safety

Zone



Trail Bed Zone

- visible right-of-way
- smaller of tread or design width
- height based on user groups or design height
- may vary by season

Visual Field Zone

- outside Trail Bed Zone
- easily accessed from trail
- significant features visible from trail

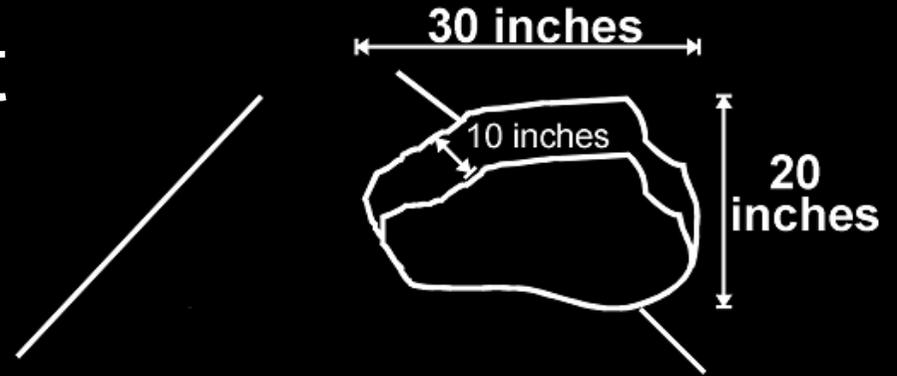
Size and Quantity

Length x Width x Height

- Length parallel
- Width perpendicular
- Height is vertical

All three recorded in
inches or feet

Count for repeated features



L = 10 inches
W = 30 inches
H = 20 inches

Feature Information

Type and Description

e.g., Tree - Torrey Pine

Actions (trained personnel)

e.g., construct, monitor, rehab

Accessibility

feature or facility built to accessible standards



HETAP: Recording Features

Location – auto recorded from start of segment

Zone - trail bed or visual field

Feature Information - type and description

Size, Quantity and Units - L x W x H

Obstruction - measure remaining tread



Obstructions

Features in the Trail Bed Zone that may be a barrier or hazard to users



Two types of obstructions - tread and vertical

Objects easily pushed out of the way are not obstructions

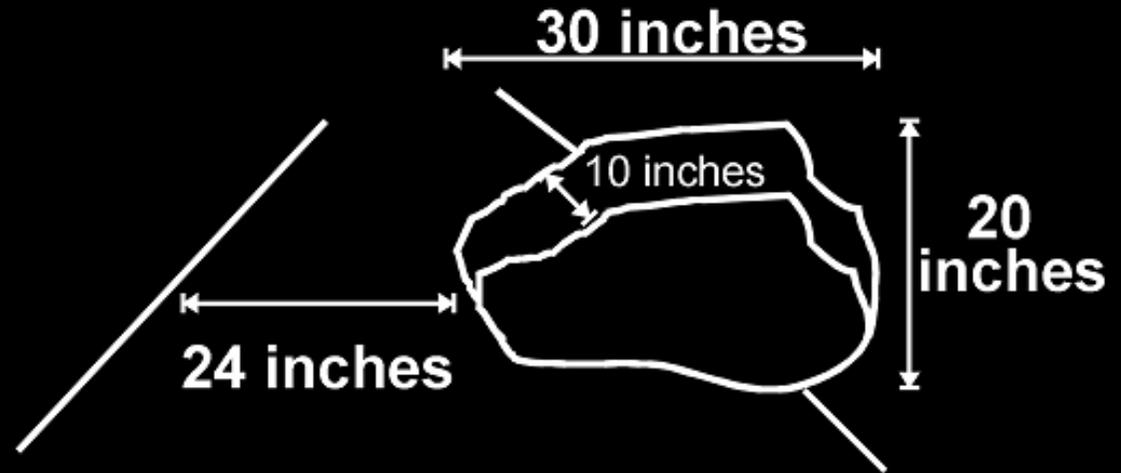
Tread Obstructions

Feature on the trail tread

Height exceeds the specified tread obstruction height

Record the feature type and dimensions

Remaining tread is space around the obstruction



Vertical Obstructions

Feature overhanging or lateral to the trail that does not contact the tread

Feature type is vertical obstruction

Size is the dimensions of the clear passage space underneath the obstruction

Remaining tread is space beside the obstruction



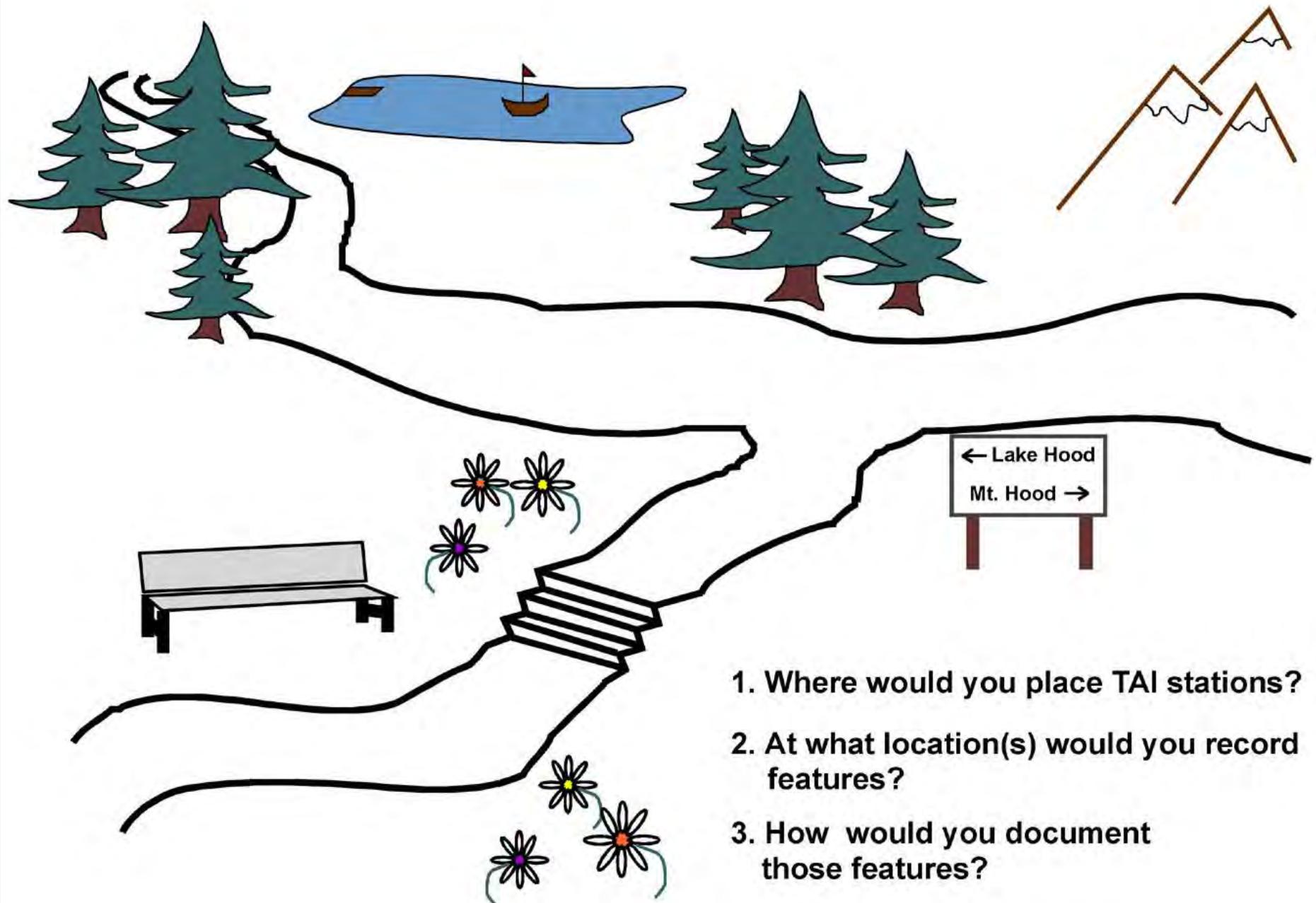
Multiple Features



Access barriers or hazards may result when two or more moderate features occur at the same point
Record as “Hazard” in the feature section

Examples

tread obstruction & very soft surface
max. grade & max. cross slope
max. cross slope towards a drop off
max. grade & soft surface



1. Where would you place TAI stations?
2. At what location(s) would you record features?
3. How would you document those features?

**How many people would
you need on your
assessment team?**

Team Options

- 3 – Person team is ideal
- 2 – Person team is ok if skilled
- 4 – Person team or more with volunteers

Trail Assessment Coordinator is responsible
for safety and data quality

Consider including:
Person with mobility impairment
Land management personnel

Example 3 Person Team

- 1 – Trail Assessment Coordinator, data form, surface category & type
- 2 – rollawheel, TAI stations, features, clinometer, compass, tread width
- 3 – inclinometer, compass, clinometer

Measurements Summary

Keep the HETAP goals in mind during all assessments to guide your decisions

Measure the best path of travel

Accurately represent the conditions that the user will be required to negotiate

Typical measurements for all stations

Extreme measurements where they occur

Land manager determines feature detail

UTAP: Data Recording Objectives

Identify each data form used during the UTAP

Determine where data are recorded on each form

List tips for recording data

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 _____
 Development Fully developed Cleared path Undeveloped
 Partly developed Undeveloped

*Type Linear Network Loop Stacked Loop Age _____
 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:
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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	Design Height
<input checked="" type="radio"/> 36 in (0.9 m)	<input type="radio"/> 84 in (2.1 m)
<input type="radio"/> 60 in (1.5 m)	<input type="radio"/> 96 in (2.4 m)
<input type="radio"/> 120 in (3 m)	<input type="radio"/> 120 in (3 m)

Other _____ Other 80 in

Rotational Penetrometer Readings

Surface Type ▼ firmness wet dry stability wet dry

Minimum Obstruction Height	Minimum MCW Height
<input type="radio"/> 0.5 in (2.5 cm)	<input type="radio"/> 0.5 in (2.5 cm)
<input checked="" type="radio"/> 2.0 in (5.0 cm)	<input type="radio"/> 2.0 in (5.0 cm)
<input type="radio"/> 3.0 in (7.5 cm)	<input type="radio"/> 3.0 in (7.5 cm)
<input type="radio"/> 6.0 in (15 cm)	<input checked="" type="radio"/> 6.0 in (15 cm)

Other _____ Other _____

▼ Please use only values from Trail Cover Value List

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Data Recording Summary

Trail Cover Sheet information from land management agency

Segment Cover Sheet information specific to assessment conditions

Segment Data Collection Form is a combination of the Station Log and Feature Log

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