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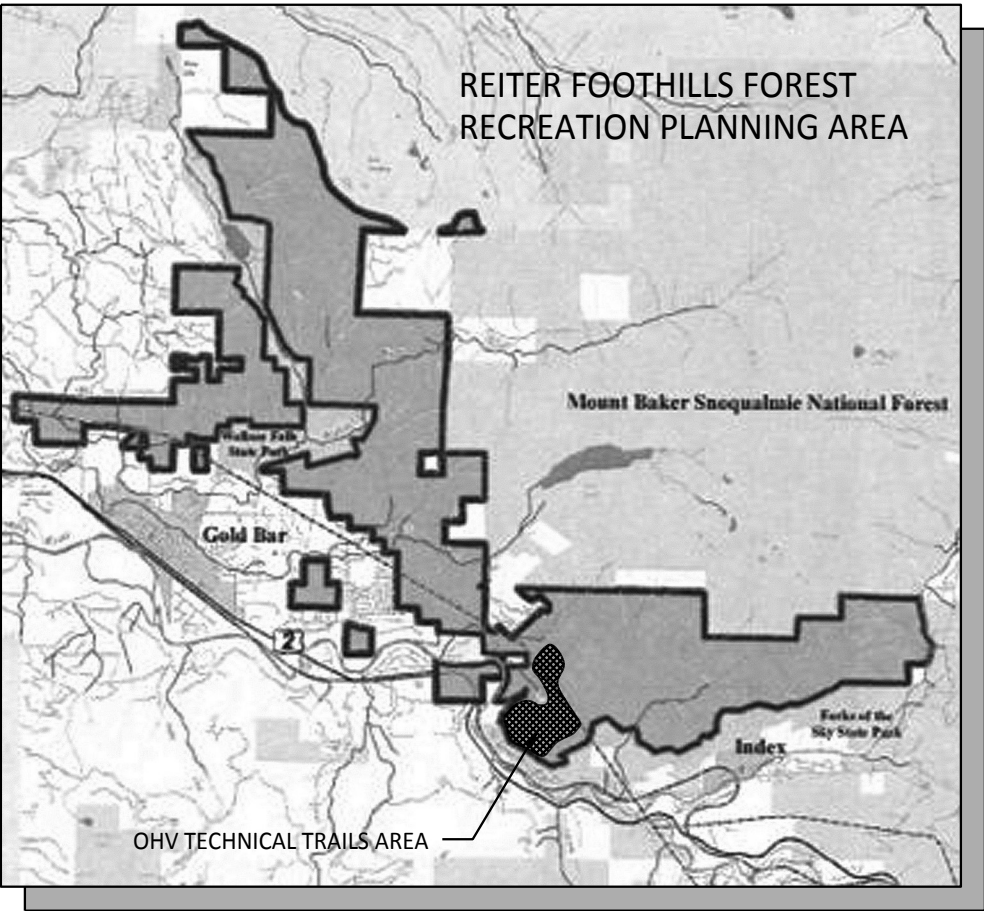
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VICINITY MAP



NOTE: THESE DRAWINGS DO NOT INCLUDE SIGNAGE THAT WILL BE REQUIRED PRIOR TO COMPLETION AND USE OF ANY TRAIL IN THE REITER 4X4 MOTORIZED TRAIL SYSTEM. THESE DOCUMENTS ARE NOT INTENDED TO PROVIDE ALL INFORMATION NEEDED TO CONSTRUCT TRAILS.

NOTE: ALL TRAILS NEED TO BE REVIEWED ON A REGULAR BASIS AFTER CONSTRUCTION AND MAINTAINED AS NECESSARY TO COMPLY WITH THE STANDARDS AND DETAILS IN THESE CONSTRUCTION DOCUMENTS.

NOTE: TECHNICAL TRAIL CONSTRUCTION DOCUMENTS INCLUDING SPECIFICATIONS AND DETAILS ARE PROVIDED FOR CONSTRUCTION OF PURPLE, GREEN AND YELLOW TRAILS ONLY, INCLUDING FOUND OR IMPORTED OBSTACLE FEATURES. NODE AREAS ARE NOT INCLUDED. "STEEP YELLOW" AND "BOULDER YELLOW" TRAILS, PER D.N.R. DIRECTION, ARE ALSO NOT INCLUDED.

NOTE: ALL TRAIL CONSTRUCTION SHALL UTILIZE DRAINAGE DESIGN DETAILS, SPECIFICATIONS, AND STANDARDS SET FORTH BY DNR OR USFS IN CONJUNCTION WITH THESE DOCUMENTS.

SHEET INDEX

- 0.00 Cover
- 1.00 Specifications
 - 1.01 Specifications and Glossary
- 2.00 Detail - Trail Surface and Edge
 - 2.01 Detail - Boulder and Tree Trail Feature
 - 2.02 Detail - Boulder Pile Gatekeeper
 - 2.03 Detail - Dip and Bump



WASHINGTON STATE DEPARTMENT OF
Natural Resources



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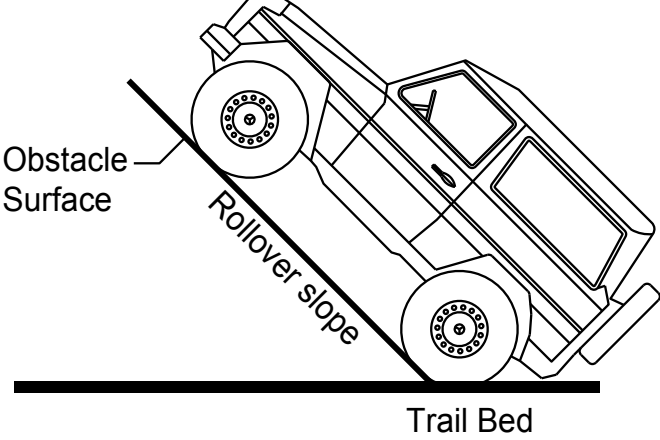
Reiter Foothills
Trail Construction
Phase One

4x4 Technical
Trail Design and
Specifications

Snohomish County, Washington

Cover

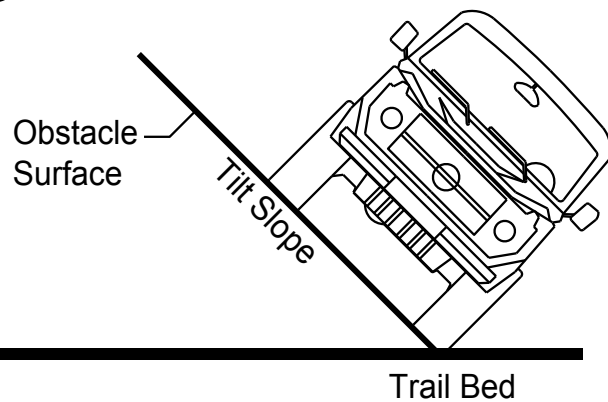
A MAXIMUM ROLL OVER SLOPE



Trail features will be constructed to not exceed the following established criteria for maximum roll over slope. Measure steepest angle at any two points on surface between 80 inches (wheel base).

Trail Type	Roll Over Slope
Purple	67% slope
Green	67% slope
Yellow	90% slope

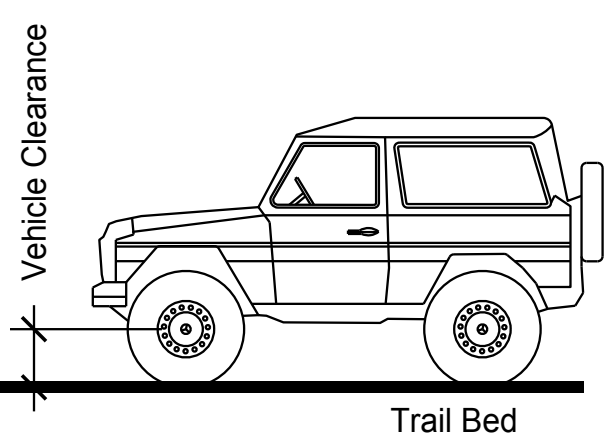
B MAXIMUM OBSTACLE TILT



Trail features will be constructed to not exceed the following established criteria for maximum side slope. This is based upon minimum 66" outside track width. Measure steepest angle at any two points between 66".

	Purple Trail	Green Trail	Yellow Trail
One tire on obstacle	100%	100%	119%
Two tires on obstacle	83%	83%	100%

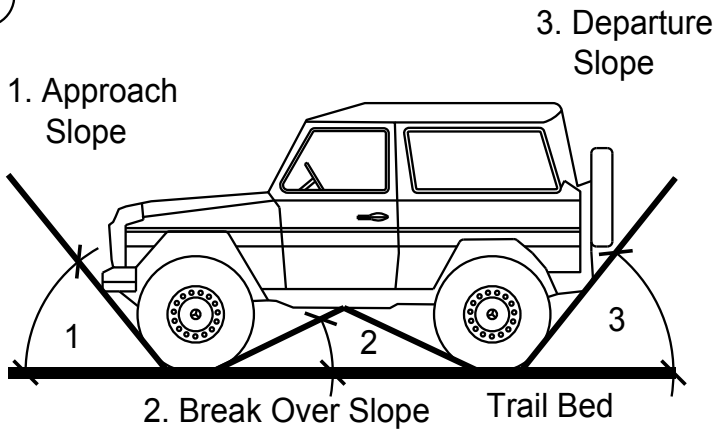
C VEHICLE CLEARANCE



Following are the minimum vehicle clearances to design to for each trail type. Clearance on a vehicle is measured from bottom of tire to bottom of axle. Construct trail obstacles so no single given vertical face exceeds the following values for each type of trail.

Purple Trail: 12" minimum
Green Trail: 12" minimum
Yellow Trail: 24" minimum

D VEHICLE MINIMUM SLOPE



Trail features will be constructed to not exceed the following established criteria for vehicle approach slope, breakover slope, or departure slope. If two way trail, use approach slope for both values.

Trail Type	Purple Trail	Green Trail	Yellow Trail
Approach Slope	62%	62%	72%
Breakover Slope	36%	36%	44%
Departure Slope	44%	44%	72%

Reiter Foothills
Trail Construction
Phase One

4x4 Technical
Trail Design and
Specifications

Snohomish County, Washington

Specifications

A GLOSSARY OF TERMS

4x4 :: Off-highway vehicle. A motorized vehicle intended primarily or only for use off paved roads.

Clearing Limits :: Zone between edge of trail and trail bed width which should be clear of protruding vegetation or surface obstacles such as limbs and branches.

Gatekeeper :: Group of obstacle features such as boulders, vertical logs, or horizontal logs that when combined at entrance to a trail, will limit the access of that trail to only the designated vehicles.

Lift :: Distance between a vehicle's suspension and its frame or between the vehicle's body and its frame. Most 4x4's have an after-market lift kit installed to increase this dimension.

Obstacle :: Physical objects large enough to significantly impede travel. Logs and boulders are typical obstacles.

Obstacle Free Zone :: The trail bed free of obstacles. Trail cobble is allowed in this zone.

Outside Track Width :: The dimension measured from outside of tire to outside of opposite tire.

Rock Gallery :: A linear combination of multiple obstacles without defined obstacle free zones used to increase challenge of trail navigation. If located in trail, signage is required at trail gatekeeper to notify trail users of location and length of rock gallery.

Trail Bed :: The width of the traveled portion of the trail.

Trail Cobble :: Stone used in trail bed to increase challenge of navigation. Cobble not to exceed 50% of maximum obstacle height for each trail type. Bury at least 50% of volume of cobble in trail bed base course aggregate material.

B OUTSIDE TRACK WIDTH

Following are recommended minimum and maximum track widths for each trail type:

Black:	120" typical
Purple:	66" / 86" minimum/maximum
Green:	66" / 96" minimum/maximum
Yellow:	66" / 96" minimum/maximum
Red:	66" / 120" minimum/maximum (not included in these drawings)

Note: See F/1.01 for definition of trail bed width.

C OBSTACLE RUN LENGTH

Trail obstacles shall not exceed following maximum lengths depending upon the maximum slope found on the obstacle for each defined trail type. The length includes the approach and departure of the obstacle.

Purple and Green Trail: 48' length at 30%
44' length at 40%
40' length at 50%

Yellow Trail: 36' length at 60%
32' length at 70%

A level or near level clear zone of a minimum length of 18'-20' shall be constructed before each obstacle run and in-between obstacles.

Note: Obstacles constructed longer than maximum lengths or with less than minimum clear zone lengths shall be considered a rock gallery. If rock galleries are located within a designated trail, signage shall be utilized at each end of trail noting location, length and challenge level of rock gallery with notation of distance between clear zones on either side of rock gallery for safety of users.

D TRAIL BED EDGE TREATMENT

Various edge treatments can be utilized on a trail system. Following are some criteria to consider when selecting the most appropriate edge treatment:

- impact to trail drainage and erosion
- impact to trail sustainability and maintenance
- impact to visual quality of trail setting
- ability to contain trail users to defined trail

Some edge treatment options are:

Boulders - Non-linear placement of boulders assists trail containment, allows drainage to pass thru and can add to difficulty level of trail experience. Boulders under 1500 lbs. shall have 75% of mass below grade, boulders from 1500 lbs. to 4500 lbs. will have 50% of mass below grade, boulders larger than 4500 lbs. shall have 25% of mass below grade.

Tree plantings - New or existing trees can help with trail containment, allow drainage to pass thru and help with erosion control. Plant trees with varying sizes and spacing configurations to mimic natural settings. Plant trees with adequate density to present a defined edge.

Vertical log placement - Vertical log placement should only be used in a limited manner. It's best use is as a control point, see gatekeeper detail, sheet 2.02.

Horizontal log placement - Horizontal log placement should only be used in a limited manner. Secure log in place against trail edge by trapping between boulders or bury 50% of log mass below grade

Fencing - fencing can be used where other options are not appropriate or not available. Location should be minimum of 2' from edge of trail.

E TRAIL TYPES

Following are definitions of each trail type:

BLACK	Old DNR roads used for access to nodes, for maintenance, and as a link between Areas 1 and 2; minor obstacles included to control speed.
PURPLE	Special use trails, primarily for an outside track width of 66" minimum. Minimum turn radius shall be 120". Wheelbase of 80" to 100" (106" with front & rear steering), narrow "jeep type" vehicles; trails would be "tight and twisty" as its primary challenge; this is the only trail with size limits.
GREEN	Trails for lightly modified vehicles, design has obstacles and turns designed to be a challenge to stock 4x4 vehicles locked in 4WD. Vehicles will need be able to maneuver over a 12" high obstacle, generally this requires a 2" lift kit and/or a larger tire size. Vehicles shall have a minimum of rear axle lockers.
YELLOW	Trails for moderately modified vehicles, design has large obstacles and turns designed to be a challenge to 4x4 vehicles locked in 4WD. Vehicles shall be able maneuver over a 24" high obstacle, generally this requires more than a 2" lift kit and larger tire sizes. Vehicles shall have lockers on both front and rear axles.
RED	Trails for highly modified, built vehicles, mostly large boulders that are a challenge for "rock crawler" type vehicles. Vehicles will need to be capable of maneuvering on and over a 36" high obstacle and equipped with lockers on both front and rear axles. Vehicles typically will have the ability to adjust the center of gravity and height of ground suspension stiffness. (Not included in these drawings)

F TRAIL BED WIDTH AND CLEARING LIMITS

Trail bed widths are to be the maximum outside track widths plus an additional 6" on either side. Obstacles or other features in trail beds may reduce this width to track width for short distances. The clearing limits on either side of the outside of trail bed shall be 12-18". The combination of the trail bed width plus the clearing limits is the trail width.


All trails should have pull outs that are a minimum of 8' wide x 40' long. Pull outs should generally be located in obstacle free zones, be at either mid-points of trails or a distance of approximately 300' between pull outs or between pullout and gatekeeper(based upon a field review). If trail visibility is challenging, additional pull outs may be necessary.

G TRAIL BED TREAD COURSE AGGREGATE SIZE


The table below defines the minimum particle size that can be expected to resist displacement based upon constructed trail grade:

Trail bed Grade:	0%+	10%+	15%+	20%+	25%+
High Displacement Trail Use Aggregate Size	2.00"	2.50"	3.50"	5.00"	8.00"


Note: Trail bed tread course depth must be minimum of twice the depth of the aggregate size.



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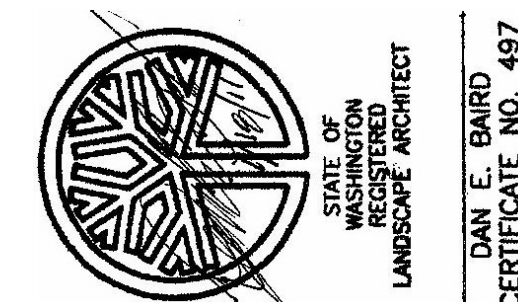
4x4 Technical
Trail Design and
Specifications

Snohomish County, Washington

Specifications & Glossary



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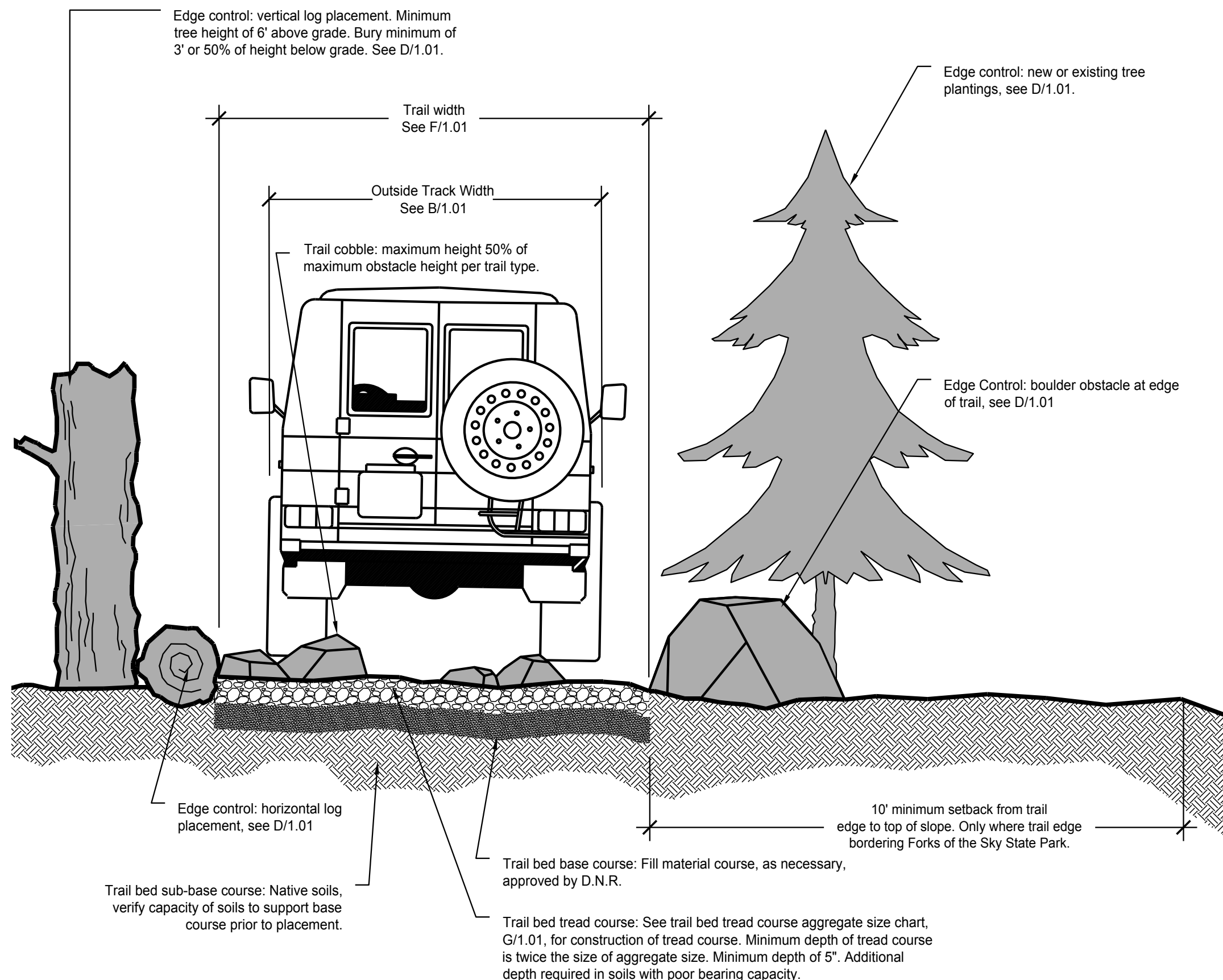
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4x4 Technical Trail Design and Specifications

Snohomish County, Washington

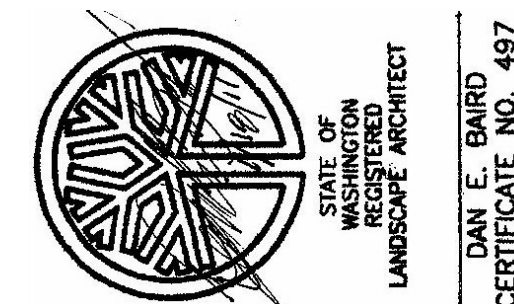
Detail - Trail Surface and Edge

Sheet Number **2.00**





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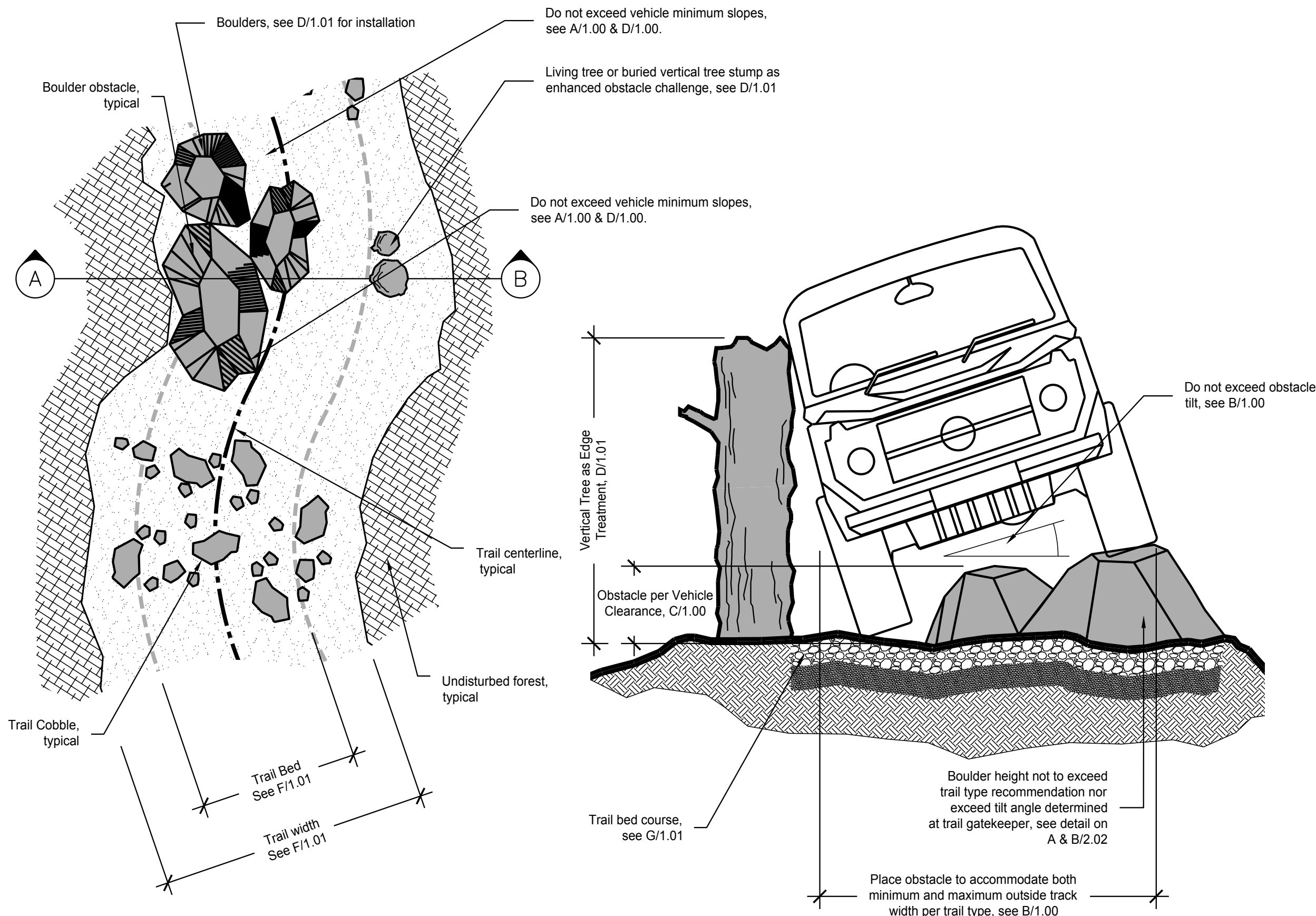
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4x4 Technical Trail Design and Specifications

Snohomish County, Washington

Detail - Boulder and Tree Trail Feature

Sheet Number **2.01**

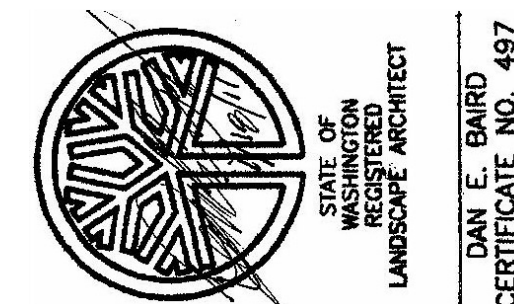


A Plan - Boulder and Tree
Not to Scale

B Section A-B - Boulder and Tree
Not to Scale



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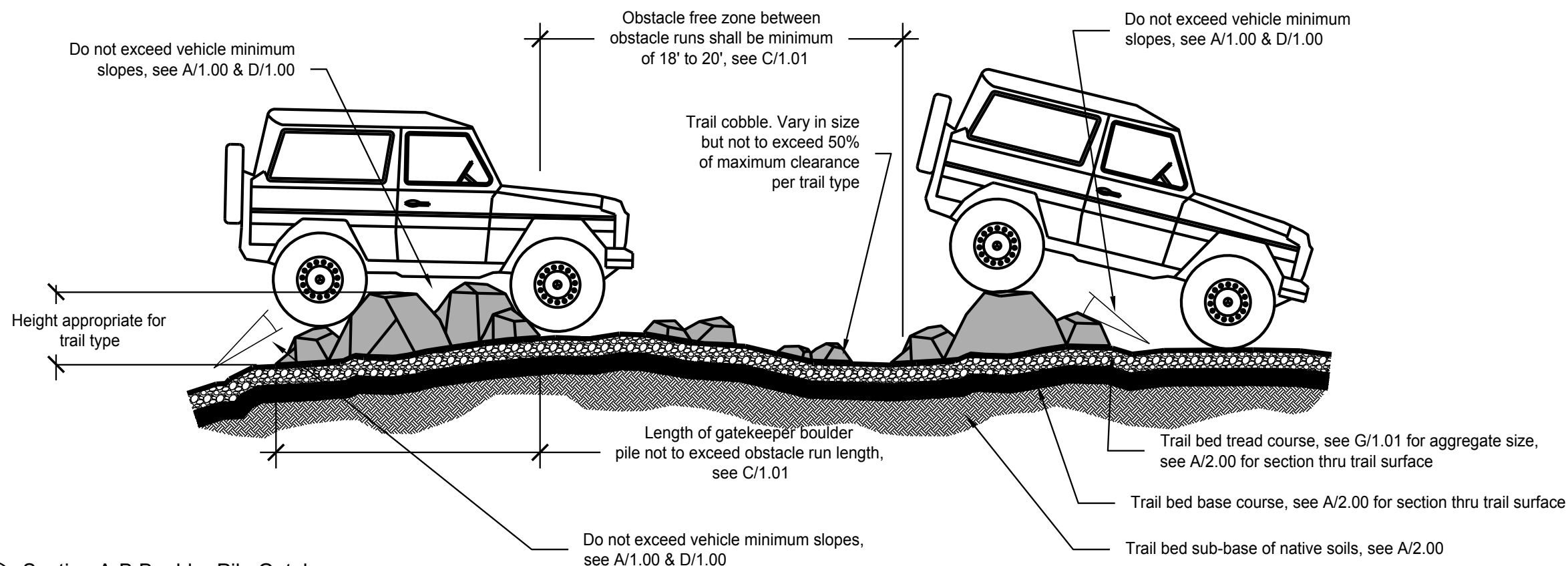
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4x4 Technical Trail Design and Specifications

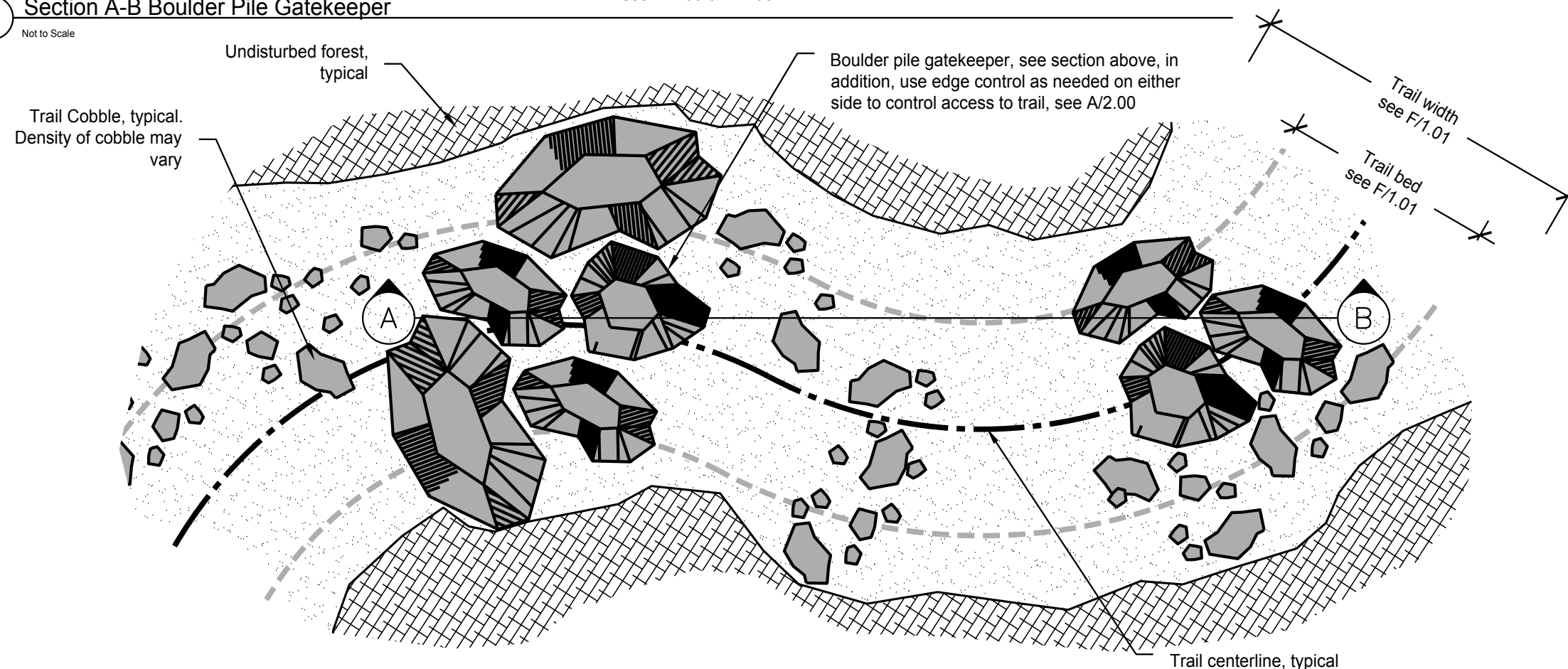
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Detail - Boulder Pile
Gatekeeper

Sheet Number **2.02**



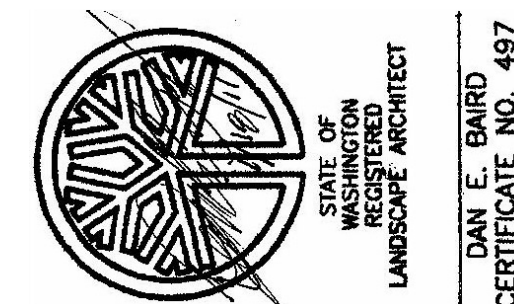
A Section A-B Boulder Pile Gatekeeper
Not to Scale



B Plan - Boulder Pile Gatekeeper
Not to Scale



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4x4 Technical Trail Design and Specifications

Snohomish County, Washington

Detail - Dip and Bump

Sheet Number

2.03

