

# ARCTIC VALLEY CROSS- COUNTRY SKI TRAIL 2019.01



**Tanner Stephens**  
**Rostislav Martynyuk**





# TEAM



- Tanner Stephens - **Project Manager**
- Rostislav Martynyuk - **Project Engineer**
  
- Rys Miranda, PE - **Project Mentor**
- Andrew Kastning- **Client**



# INTRODUCTION

Project Background & Challenges

Design Criteria

Trail Design

Budget & Outcome

# Project Overview

- Tasked to build a public use ski trail on the border of the permitted Arctic Valley Ski Area and Joint Base Elmendorf Richardson
- GOAL: Design a 3km ski trail sanctioned by the International Ski Federation (FIS) to be used for recreational and elite level skiing.
- The project shall include design and placement of structures associated with FIS ski competitions.

# Project Purpose

- Fulfill need for local elite level ski trails near Anchorage
- Act as a supplement to Anchorage trail systems
- Family-friendly place to bring more attention to Arctic Valley





# Background



- Arctic Valley is one of the first areas developed by the Anchorage Ski Club
- Remains an untapped local recreational area
- Proximity to Anchorage and Eagle River
- Cooler temperatures than coastal zones

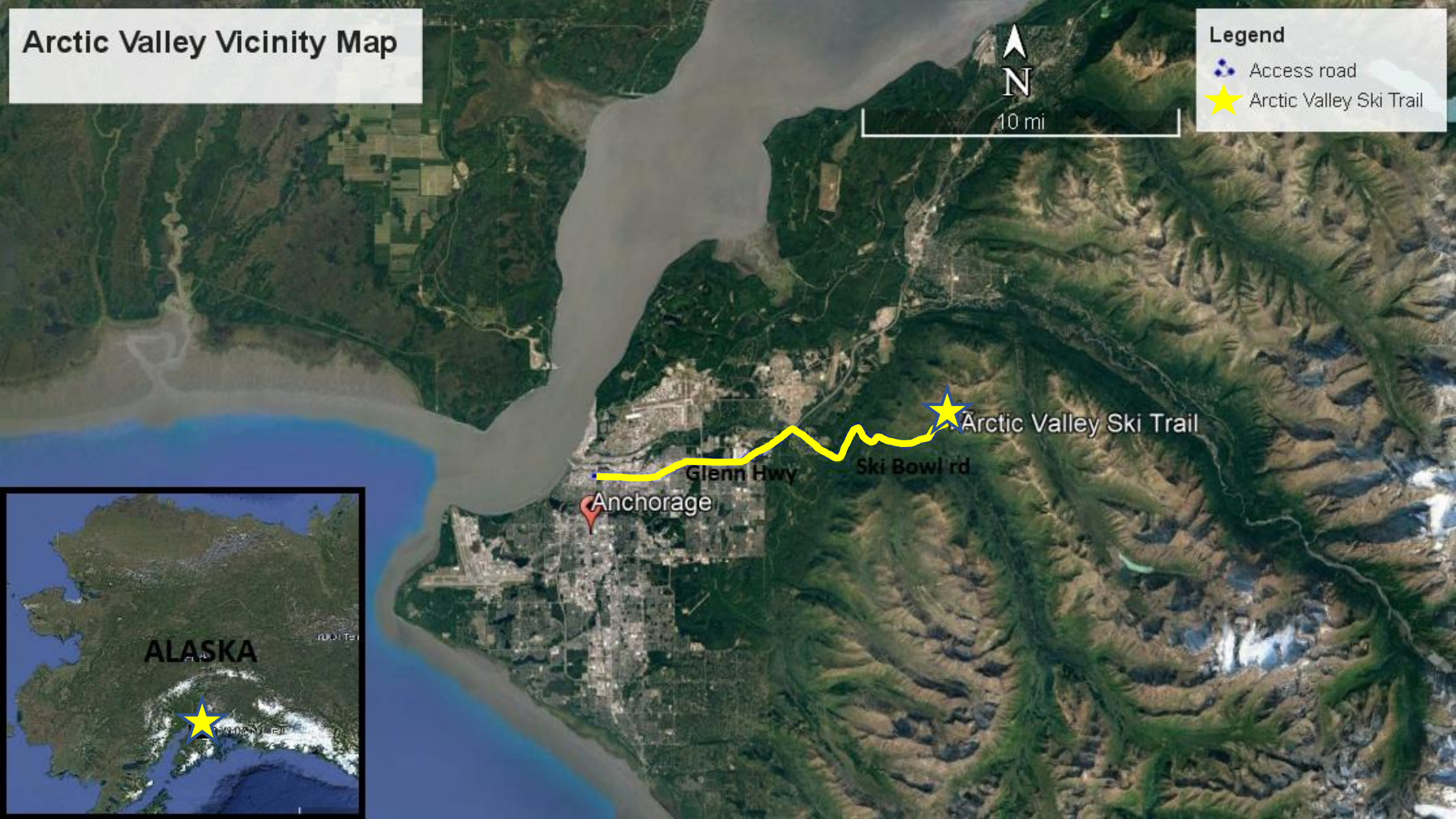


# Arctic Valley Vicinity Map



10 mi

- Legend**
-  Access road
  -  Arctic Valley Ski Trail



ALASKA

Anchorage

Glenn Hwy

Ski Bowl rd

Arctic Valley Ski Trail

# PROJECT CHALLENGES

- **Joint Base Elmendorf Richardson**
  - Cultural survey - Nike Historic District
  - Special permits required for access (iSportsman Program)
  - Military training exercises
  - Land acquisition - Acreage and Type







# PROJECT CHALLENGES

- **Chugach State Park**
  - Land Lease Renewal in 2022
- Contact with head of permitting for State Parks
  - Past proposed projects abandoned



# PROJECT DESIGN CRITERIA

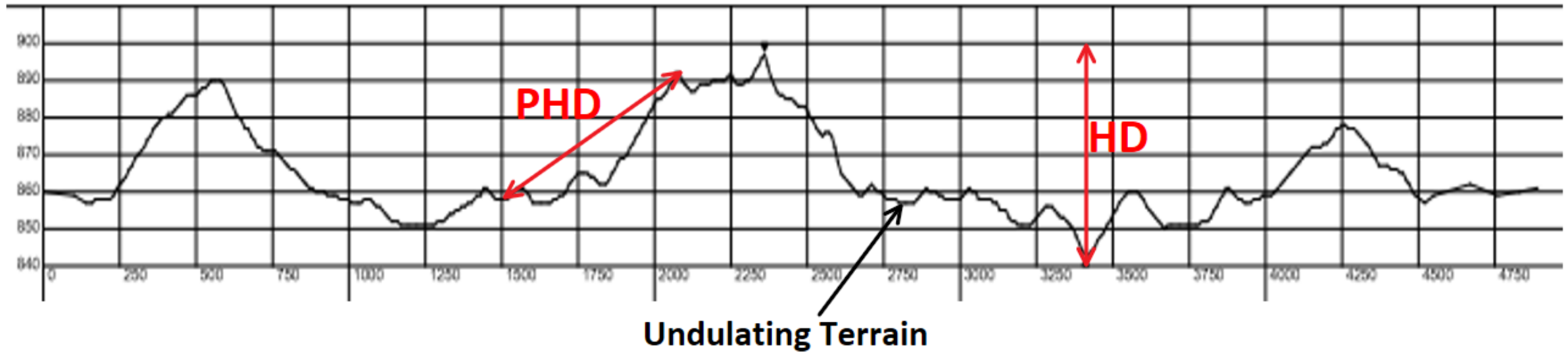
## INTERNATIONAL SKI FEDERATION (FIS)

- Test the skier in a technical, tactical and physical manner
- Be laid out as natural as possible using the terrain in a balanced manner
- Have a terrain distribution of:
  - 1/3 Uphill
  - 1/3 Downhill
  - 1/3 Undulating



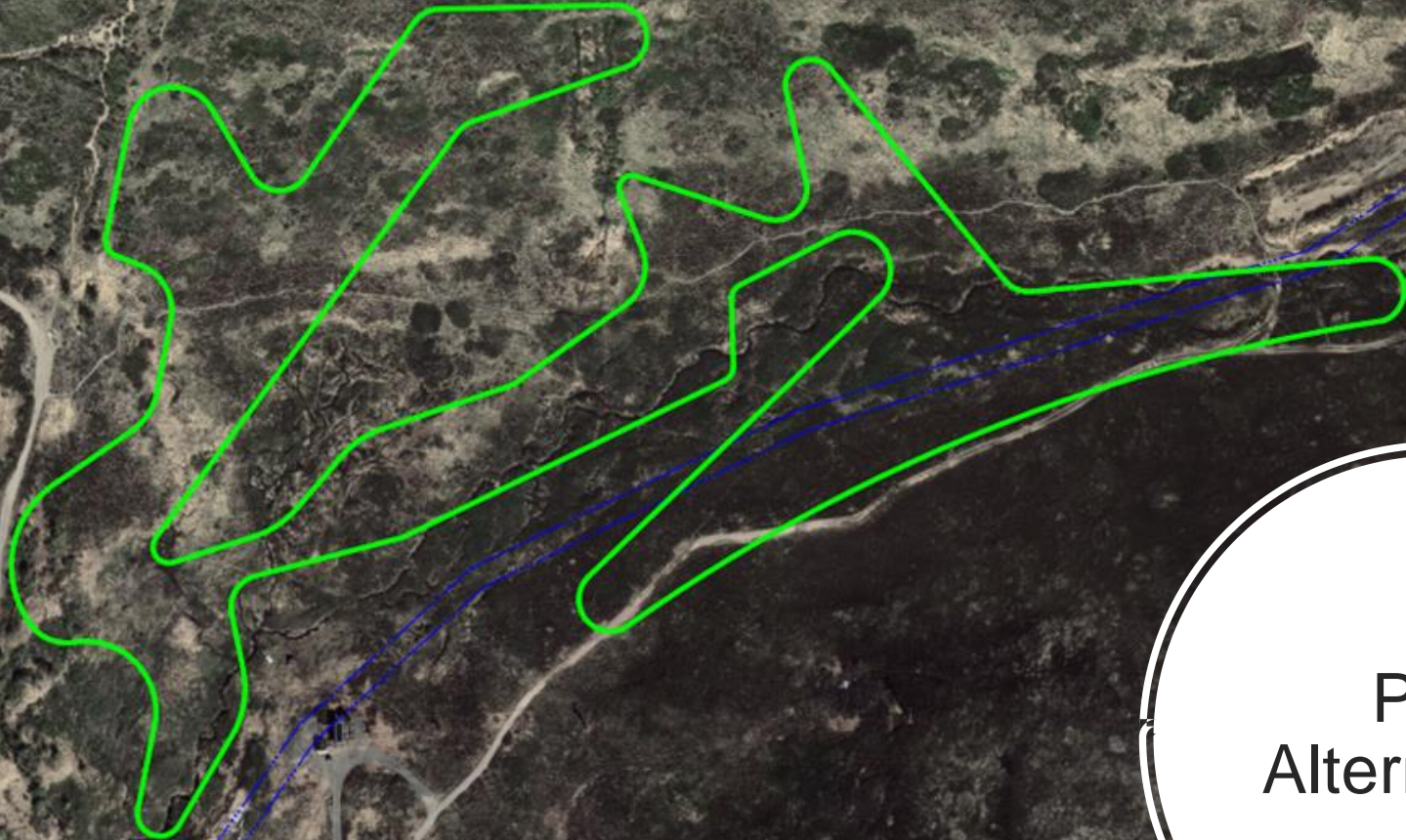
# FIS DEFINITIONS

**Total Climb (TC):** Sum of all climbs of the course



NOTES:  
1. AERIAL IMAGERY OBTAINED FROM MUNICIPALITY OF ANCHORAGE

CHUGACH STATE PARK



Plan  
Alternatives

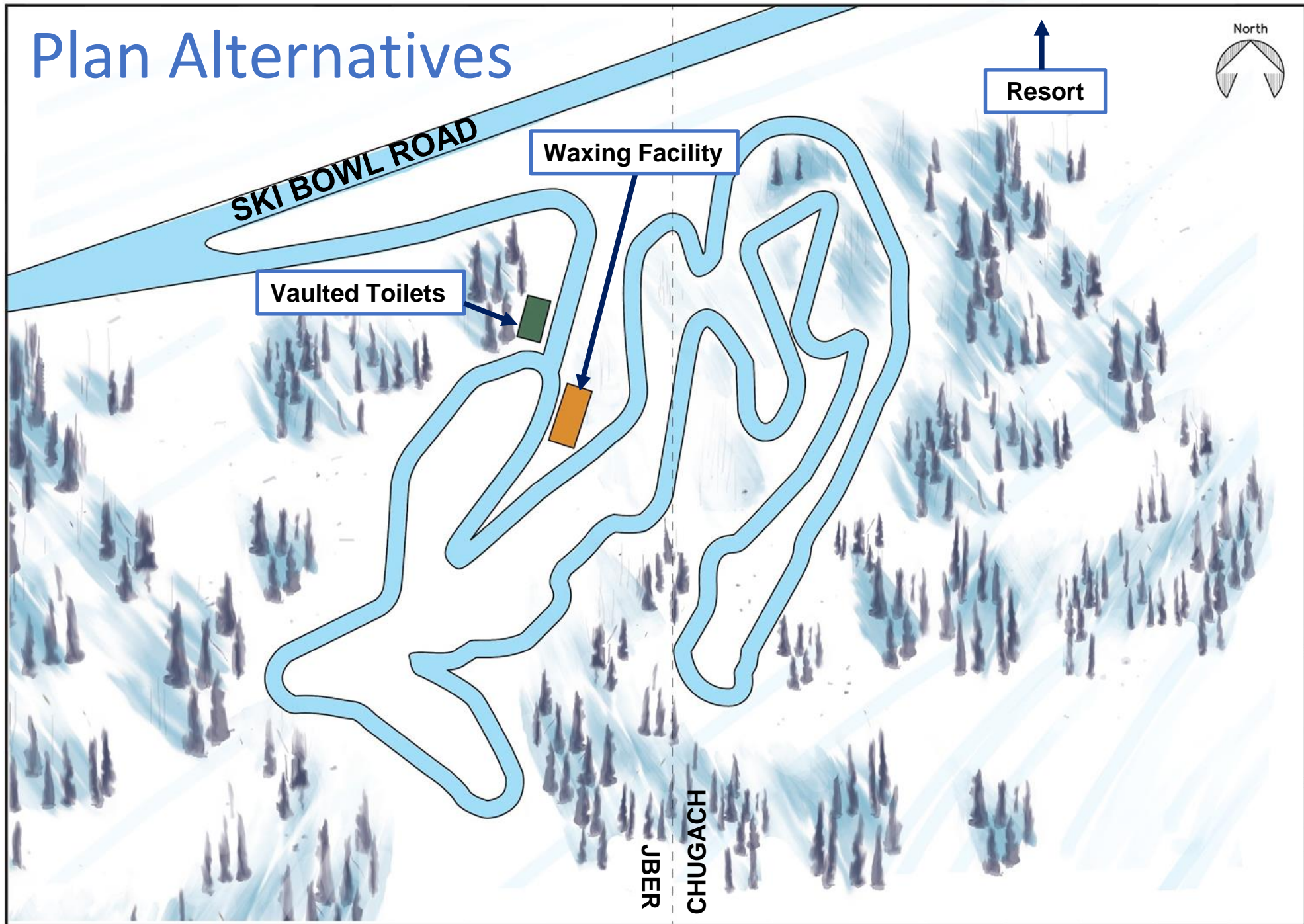
ARCTIC VALLEY RESORT

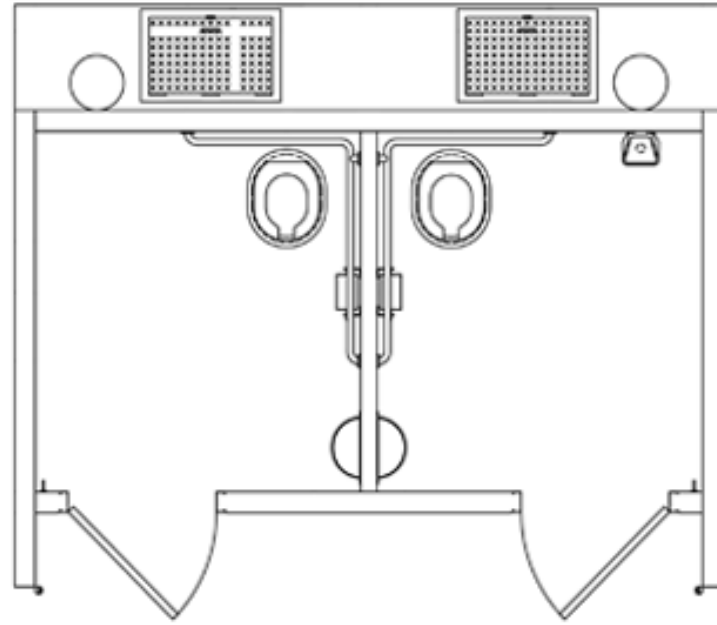


EXISTING CHALET

LOT 1

# Plan Alternatives





# Facilities

[http://www.cxtinc.com/double\\_rocky\\_mountain.asp](http://www.cxtinc.com/double_rocky_mountain.asp)



# Trail Design



Lowest Point	Highest Point
726m (2384')	779m (2558')

	Height Difference	Maximum Climb	Total Climb
Allowable	Max 65m	25 – 65m	100 – 140m
Design	53m	62m	130m

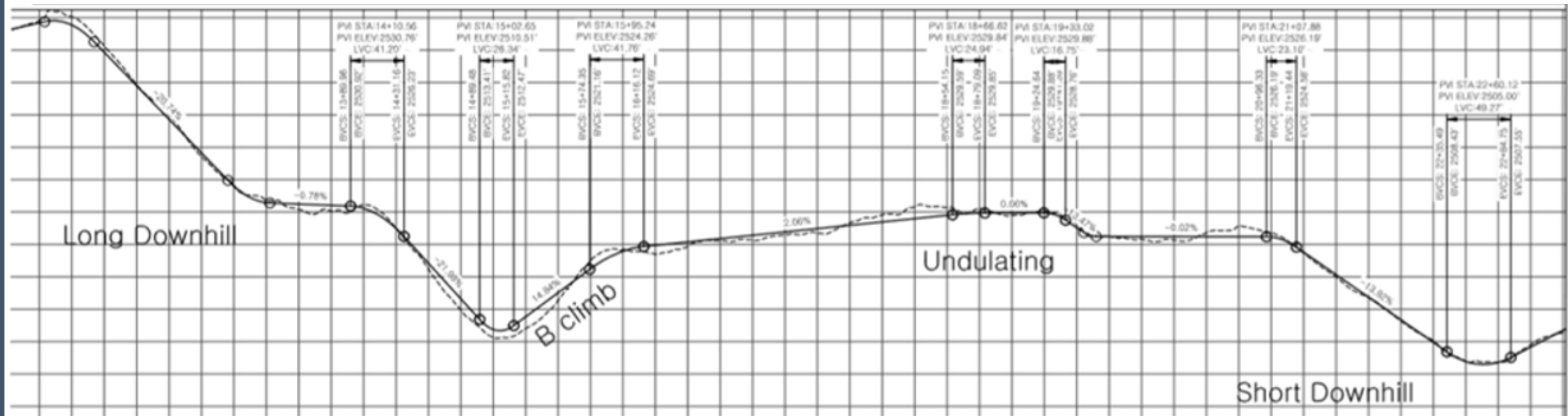
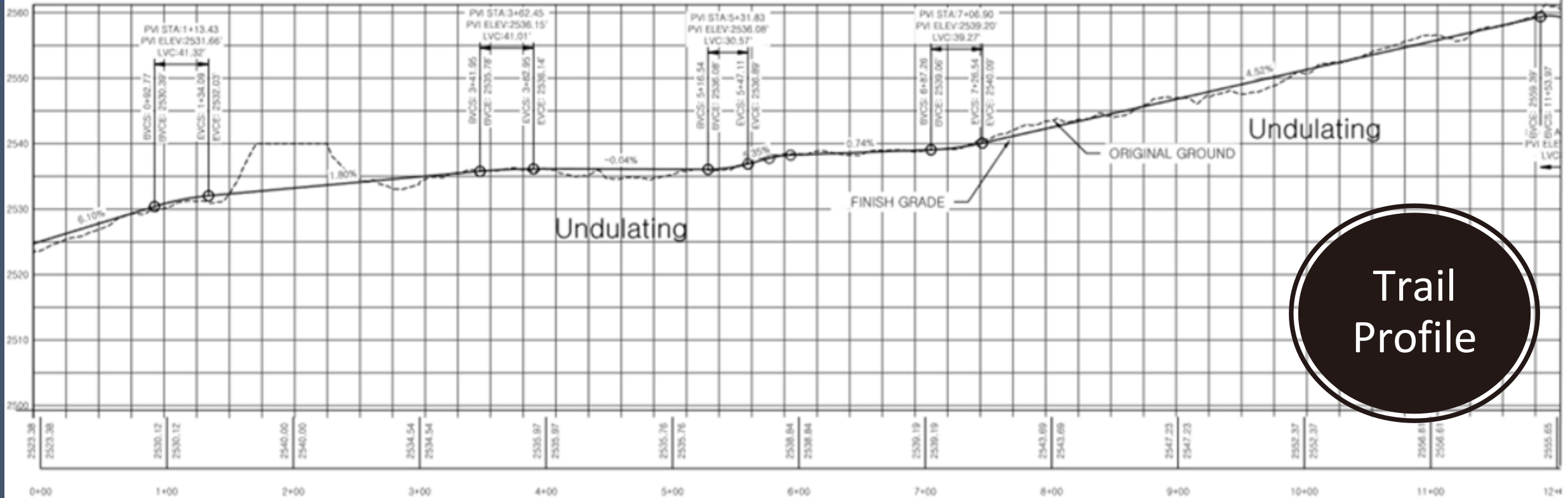


# Course Requirements



Length of Loop	Major Uphills (A)		Short Uphills (B)	Steep Up-hills (C)
	Gradient 9 - 18 %		Gradient 9 - 18 %	≥ 18 %;
	Average 6 - 12 %		10m<PHD<29m	4 m<10 m< PHD
	Qty	PHD (m)	Qty	Qty
Sprint Classic			1 - 2	0
2.5 km	1	30 - 50	1 - 3	0 - 2





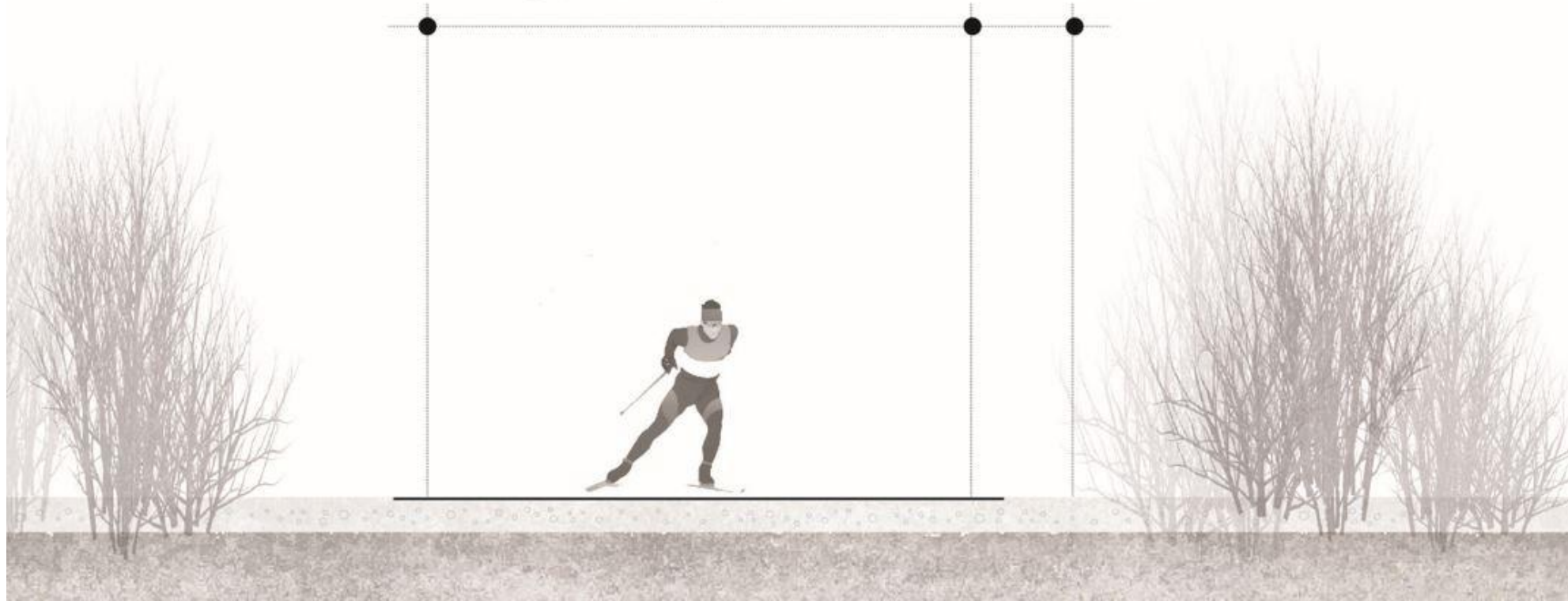


# Typical Section



GROOMED TRAIL  
3-9 METERS WIDTH

BRUSH CLEARANCE  
1 METER



# Snow Fence Recommendation

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- Pros
  - Cost effective
  - Utilizes high wind area
  - Ease of assembly & to move
- Cons
  - Need SnowCats to distribute snow
  - Wind & snowfall dependent
  - Eye sore





# Cost Estimate -Earthwork

- Volume Report
  - Cut Volume: 6,030 CY
  - Fill Volume: 912 CY
  - Net Volume: **5,118 CY Cut**
- Estimated Unit Price: \$10 / CY
- Estimated Earthwork: **\$51,180**

# Other Pay Items



- Clearing & Grubbing  
\$2,000 / acre = \$10,000
- Survey = \$3,000
- Signage = \$4,000
- Environmental Impact 2% = \$1,300
- Mobilization 10% = \$6,800
- **TOTAL ESTIMATED COST \$76,000**
  
- (Optional) Facilities & Installment = \$140k

# Project Outcome

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**3km Course: Total Climb exceeded allowable  
Shorten to 2.5km**



**Exceeded FIS Climb Limits**



**Designed 2.5km trail that (almost) meets FIS standards**



**Introduced concept to JBER**



**Included project in Arctic Valleys lease renewal with State**

# Summary

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- **Proposed a design in which maximizes recreational potential**
- **Design met client's expectations**
- **Chosen alternative keeps costs down**
- **FIS standards are still obtainable**
  - **Cost will greatly increase**



DESCRIPTION	Hours		Rate		AMOUNT
Team Member 1	120	x	\$ 103.60 =	\$	12,432.00
Team Member 2	105	x	\$ 92.50 =	\$	9,712.50
Team Member 3	10	x	\$ 81.40 =	\$	814.00
Professional Mentor	6	x	\$ 150.00 =	\$	900.00
Faculty Advisor 1	3	x	\$ 150.00 =	\$	450.00
<b>Total</b>					<b>\$ 24,308.50</b>

# Internal Company Operations





Questions?