

Preliminary Engineering Report

Big Rock Mountain
Chairlift and Snowmaking
Infrastructure Improvements
Mars Hill, ME



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1.0 Description of Project Components

Big Rock is a 501(c)(3) nonprofit ski area that is proposing a \$5 million infrastructure project that will save the mountain from closure due to aging infrastructure and a shortened ski season due to climate change. The proposed project is for replacement of an existing, 50+ -year-old double chairlift to the top with a modern quad chairlift, expansion of the existing snowmaking system, and an upgrade of the electrical distribution infrastructure.

The proposed infrastructure project has two primary components:

1.1 Chairlift Installation

The existing chairlift that serves as the primary, and only people mover to the top of the mountain is a 1969 Mueller Double Chairlift. The existing chairlift was built by a manufacturer that is no longer in business and parts/service are becoming increasingly difficult to obtain. Industry norms recommend the replacement of older lifts after 50 years.

The proposed new chairlift to the top was identified by Snow Engineering Consulting Group as the top priority project for future growth and sustainability of the mountain in the 2020 Big Rock Master Plan Update. The chairlift will be a fixed-grip quad chair that starts in front of the existing lodge and ends at the top of the mountain at a point central to existing trail layout. The lift will raise 930 vertical feet over a slope length of 3624 feet with thirteen towers. The installation will include lift operator houses at the base and top of the mountain with the electrical drive unit and hydrostatic gas backup in the base terminal.

The project will need significant earthwork, concrete foundations at the base/top operator terminals and towers, and electrical power distribution infrastructure.

1.2 Snowmaking Upgrade

The existing snowmaking system is served by a 200 HP/400 GPM pump located near the base of the existing Doppelmayr triple chairlift. The snowmaking system is undersized to maintain the pressure and flows needed to operate existing snow gun equipment and open the mountain in time for the crucial Christmas Break. With temperatures increasing over the previous decades this has placed even more emphasis on snowmaking at ski resorts worldwide.

The existing water piping infrastructure of 10 in. and 8 in. pipes covers 41.2 skiable acres and is sized to handle flows exceeding 2000 GPM. Water reservoir holding capacity of 2-2.5 million gallons is a significant limiting factor and requires auxiliary pumping from a nearby stream. Based upon industry average requirements of 3-feet of machine-made snow on trails covered with snow making, the total water requirements to cover all snowmaking terrain is 18 million gallons of water.

The proposed snowmaking upgrades will consist of the following:

- 1. Expansion of Snowmaking Reservoir Capacity.** The existing water reserve capacity is provided by 4 small reservoirs created by earthen dams. The proposed reservoir expansion will expand capacity by increasing the contained volume of the existing reservoirs or by adding additional reservoirs. Earthwork contractors will excavate dirt from the interior to

build embankments around the perimeter. All necessary federal, state, and local permits would be applied for, and federal standards followed in the design and construction.

2. **Water Pump Building.** An extension will be added to the existing Pumphouse building and skid mounted water pumps installed to serve as the primary water supply. Pre-engineered units with all piping, fittings, and variable frequency drives will be purchased from an equipment vendor who specializes in snowmaking systems to remove many variables of the construction process and greatly reduce project management.
3. **Electrical Wire Installation.** 10,000 feet of 250 MCM-4 direct burial cable will be run on the westerly side of trails where 480 VAC disconnects with receptacles will be installed to power fan-gun snow producers.
4. **Low-E Snowmaking Fan Guns Procurement and Installation.** 6 low energy, high efficiency snow producers will be purchased to increase total snowmaking output to 1500 GPM.

2.0 Statement verifying that the project components described in the engineering report are consistent with the EDA investment project description.

The project components described in this engineering report are consistent with the EDA investment project description provided in Section A.2 of Form ED-900.

3.0 Drawings showing the general layout and location of the existing site conditions and of the project components.

See attached conditions showing existing conditions and project components in Appendices B-D.

4.0 Feasibility analysis for constructibility of the project.

Big Rock Mountain is a ski area that has been in operation since the late 1960s. Existing mountain maintenance staff are well-versed in maintenance and construction projects throughout the entirety of the resort. The Graves Road gives easy access to the base terminal of the proposed quad chairlift and the existing pumphouse that will serve as the primary distribution site for power, snowmaking water and compressed air. The dirt access road from the base of the ski area to the top and a gravel road across the top of the mountain range used for windmill maintenance will provide lift construction crews access to the base and top terminals and most towers along the alignment of the lift. For the tower locations not accessible by ground vehicles it is customary in most ski lift installations to use a helicopter to deliver concrete and place steel towers.

The manufacturer who will design and engineer the chairlift equipment also provides a specialized crew who will install it using the help of local earthwork, concrete, and building trades contractors. Electrical work will be a combination of local electricians, manufacturer provided electricians, and manufacturer provided engineers who will do the initial startup and commissioning in connection with the Tramway Safety Board.

Snowmaking pump house construction will use a combination of local contractors for the building expansion, electrical design and wiring, and pipefitting and welding. Pre-manufactured, modular skid mount systems will be designed by snowmaking integrators and set in place using cranes and fork mounted booms. All snowmaking tower locations will be accessible using all-terrain vehicles and local pipefitters and welders used to do the required work. Existing mountain maintenance staff will play a heavy role in all construction activities and manufacturer provided experts will be on site for the final fitment, start up and training.

5.0 Construction Method

The construction process will be design-bid-build for this project. The design, manufacturing and installation of a ski lift and snowmaking systems are specialized fields with a few manufacturers with a proven track record. Bid efforts would be focused on these companies with a proven track record.

Construction management for project components will be performed by a project manager that is employed by the ski area.

6.0 Construction Contracts

The number of contracts anticipated will be four. The first will be for the engineering firm that will complete the detailed civil and electrical engineering needed to tie the proposed chairlift and snowmaking enhancements into existing mountain infrastructure. The second contract will be for the general contractor who will manage and construct all aspects of the project not within the scope of the chairlift and snowmaking contractors. The third contract will be for the chairlift equipment supplier and installation provider. And the fourth contract will be for the snowmaking equipment supplier, design and installation provider. The awarded contractors may hire additional specialty contractors to complete work such as groundwork, concrete, electrical, welding and pipefitting as needed to complete the chairlift and snowmaking projects. The subcontractors will contract directly with the awarded contractor.

7.0 Construction Cost Estimates

See Appendix A for the detailed Engineer's Construction Cost Estimate for the various project components. The summary of the estimate is:

Quad Chairlift to the top	\$3.1 million
Snowmaking Improvements	\$1.9 million
Total Project	\$5.0 million

8.0 Real Property Acquisition

The ski area owns all property related to this project. No property needs to be acquired for the construction of the chairlift or snowmaking improvements.

9.0 Permits

Listed below are the permits required for the proposed project. Upon receiving notification of EDA grant award, a competitive bid process will be used to engage an engineering firm to complete final design and make sure all necessary permits are filed with the proper local, state and federal agency.

- Building Permit - Town of Mars Hill
- Electrical Permit - Town of Mars Hill
- Site Location of Development Permit - Maine Department of Environmental Protection
- Stormwater Management Permit - Maine Department of Environmental Protection
- Natural Resource Protection Permit - Maine Department of Environmental Protection

10.0 Project Schedule

An overall estimated project schedule is:

Preliminary

- | | |
|-----------------------------------|--------------------|
| 1. Planning and Predesign | October, 2022 |
| 2. RFP - Engineer Design Services | Late October, 2022 |

Project

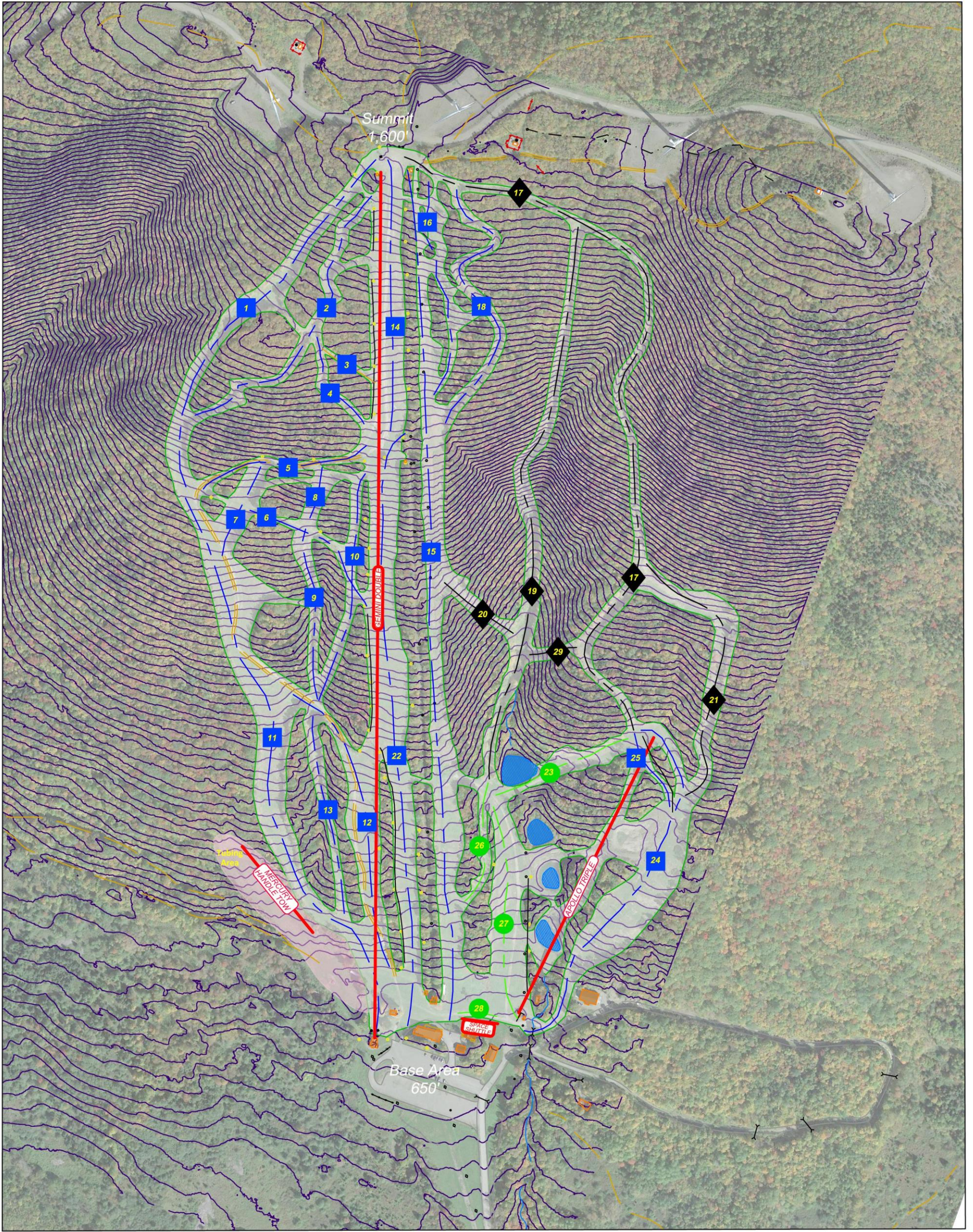
- | | |
|--|-----------------|
| 3. Hire Engineer | December, 2022 |
| 4. Preliminary Design Civil & Electrical | March, 2023 |
| 5. Final Design Civil & Electrical | August, 2023 |
| 6. Survey and Permits | August, 2023 |
| 7. RFP - General Contractor | August, 2023 |
| 8. Hire Contractor | October, 2023 |
| 9. Begin Construction | May, 2024 |
| 10. Finish Construction | September, 2024 |
| 11. Startup and Commissioning | October, 2024 |

Appendix A
Detailed Cost Estimate

Preliminary Engineer's Estimate

Big Rock Mountain Chairlift and Snowmaking Infrastructure Improvements	Address	37 Graves Road, Mars Hill, ME 04758		
	Prepared By	MJC	Date	06/02/22
Description	Unit	Amount	Unit Cost	Total Cost
ELECTRICAL				\$ -
2000 kVA 3-Phase Pad Mount Transformer	EACH	1	\$ 65,885.00	\$ 65,885.00
2500 Amp Service Entrance, Switchgear, Breakers	EACH	1	\$ 84,590.00	\$ 84,590.00
750 MCM-4 Copper Service Feeds, Branch Circuits, Conduit, etc.	EACH	1	\$ 174,241.00	\$ 174,241.00
250 MCM-4 Direct Burial Cable for Snowmaking	FEET	8,000	\$ 20.00	\$ 160,000.00
480 VAC Disconnects w/ Receptacles, conduit, etc. for Fan Guns	EACH	20	\$ 5,112.00	\$ 102,240.00
Labor - Electrician (4 x 400 hrs)	EACH	1,600	\$ 75.00	\$ 120,000.00
Structures - 20' x 20' MCC Building	SQFT	400	\$ 150.00	\$ 60,000.00
CHAIRLIFT				
Equipment - <i>*Manufacture provided</i>	EACH	1	\$ 1,968,595.00	\$ 1,968,595.00
Engineering - <i>*Manufacturer provided</i>	EACH	1	\$ 44,200.00	\$ 44,200.00
Freight	EACH	1	\$ 107,792.00	\$ 107,792.00
Earthwork - Terminals - Cuts, fills, grading, trenching for electrical	EACH	1	\$ 184,789.00	\$ 184,789.00
Earthwork - Towers - Cuts, fills, grading, excavation	EACH	1	\$ 130,514.00	\$ 130,514.00
Concrete Foundations - Forming, pouring, finishing	EACH	1	\$ 219,736.38	\$ 219,736.38
Installation - Steel erection and final assembly	EACH	1	\$ 204,162.68	\$ 204,162.68
Structures - Lift Operator Control Buildings	EACH	1	\$ 170,077.00	\$ 154,797.00
Demolition and Removal of Existing Chairlift	EACH	1	\$ 100,000.00	\$ 100,000.00
SNOWMAKING				
Equipment - Snowmaking Fan Guns	EACH	6	\$ 18,000.00	\$ 108,000.00
2 x 400-hp Pumps w/ VFDs	EACH	1	\$ 280,319.00	\$ 280,319.00
Primary Pump Connections to existing Pipe Infrastructure	EACH	1	\$ 50,000.00	\$ 50,000.00
Excavation to expand existing snowmaking ponds	EACH	1	\$ 300,000.00	\$ 300,000.00
SUBTOTAL, BIDDABLE ITEMS				\$ 4,619,861.07
Contingencies, Engineering, Legal, Grant Administration				\$ 431,841.22
ESTIMATED TOTAL				\$ 5,051,702.29


Appendix B
Existing Conditions



Existing Conditions

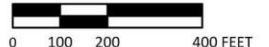
Big Rock Mountain
October 2020

LEGEND

-  Existing Terrain
-  Existing Ski Lift
-  Existing Building



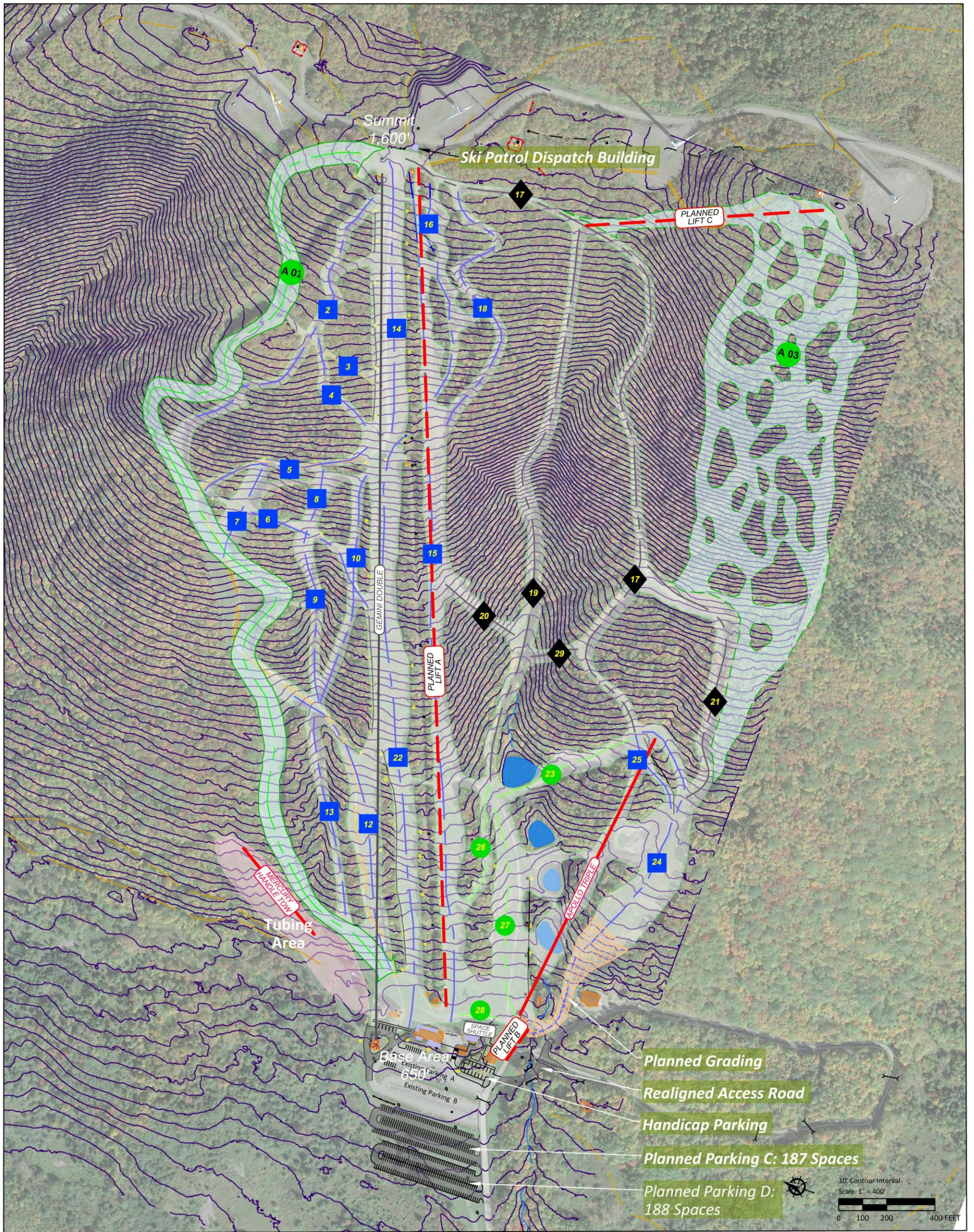
10' Contour Interval
Scale: 1" = 400'



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Appendix C
Upgrade Plan



LEGEND

- | | | | |
|--|-------------------|--|----------------------------|
| | Existing Terrain | | Planned Terrain |
| | Existing Ski Lift | | Planned Ski Lift |
| | Existing Building | | Ski Lift To Be Removed |
| | | | Planned Building Expansion |
| | | | Planned Parking/ Road |
| | | | Potential Grading |

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Upgrade Plan

Big Rock Mountain
October 2020

Appendix D
Chairlift Profile

BEB

1R 401
1R 401
Bottom station
ALPEN STAR
Drive movable
Station level 668.88 ft

BB

4N 401
4N 401

1

8N 401
8N 401
14.64 ft
0°

2

6T 401
6T 401
31.40 ft
6°

3

6T 401
4T 401
35.90 ft
0°

No ski under

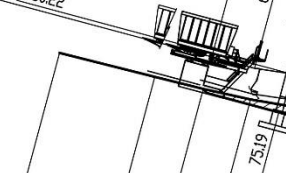
l : 108.30 ft
h : 39.00 ft
l_w : 115.11 ft
n : 36.01 %

l : 214.54 ft
h : 53.92 ft
l_w : 221.21 ft
n : 25.13 %

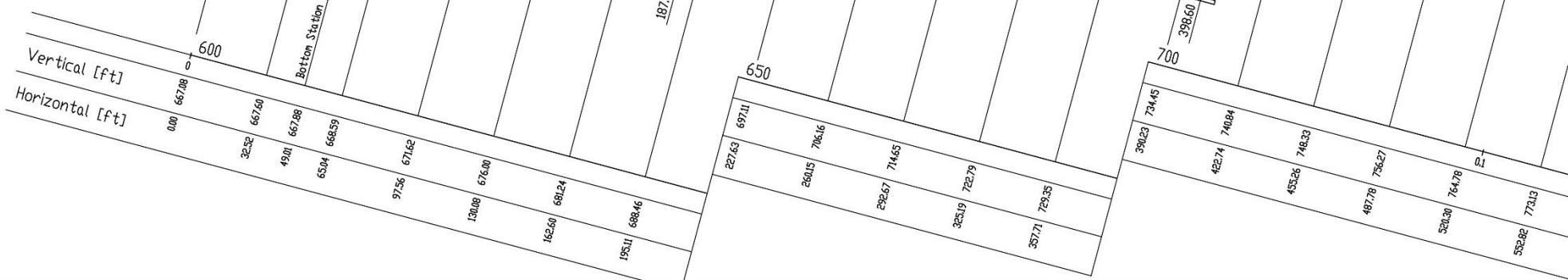
678.85 678.85 680.22

719.22

773.14



Bottom Station



600

650

700

75.19

667.40

687.29

187.37

736.63

398.60

398.34

183.80

0.20

2.01

0.75

6.98

h
l
n

l: 274.53 ft
h: 67.37 ft
m: 282.68 ft
n: 24.54 %

1.22
10.60

4
6T 401
4T 401
31.80 ft
6°

840.51
672.87
808.25
676.41

l: 288.33 ft
h: 67.32 ft
m: 296.09 ft
n: 23.35 %

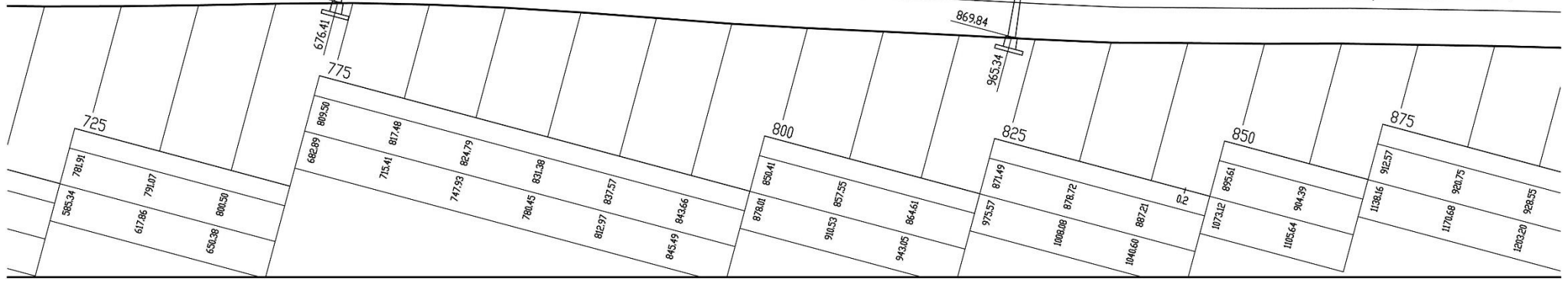
1.33
10.77

5
6T 401
4T 401
37.60 ft
6°

907.83
961.20
869.84
965.34

l: 276.91 ft
h: 68.60 ft
m: 285.28 ft
n: 24.77 %

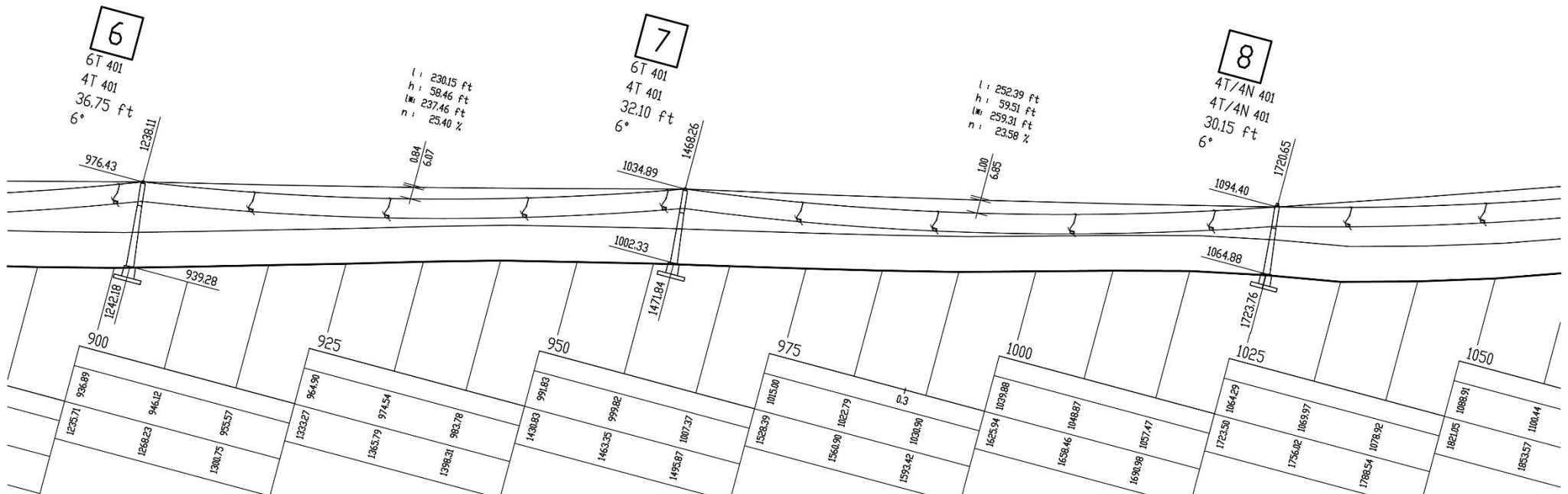
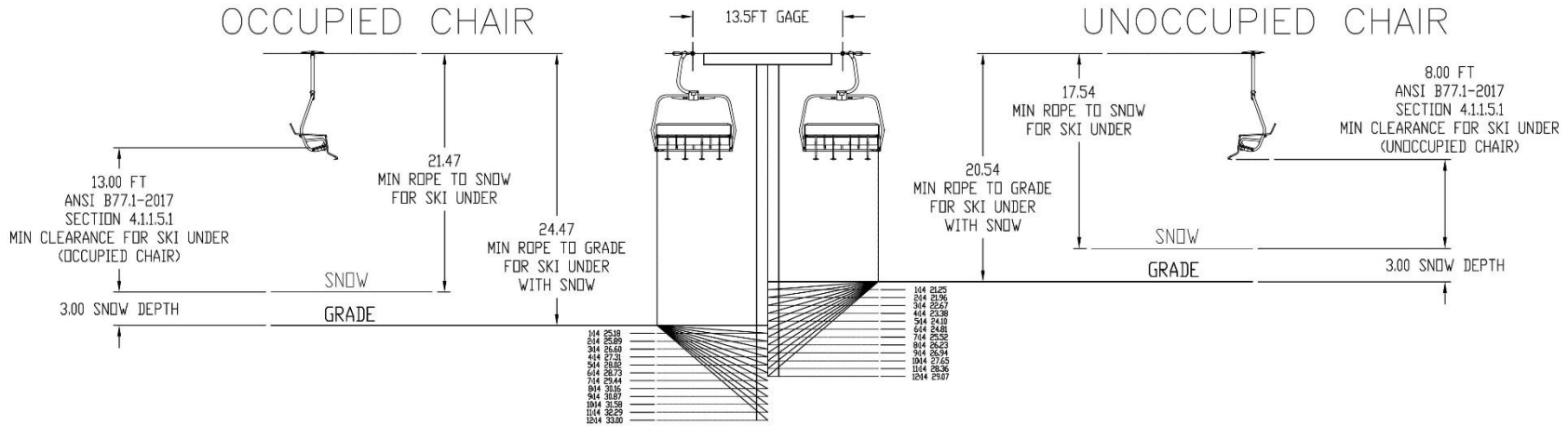
1.22
9.32



MINIMUM CLEARANCE WITH SIDE SLOPE

SKI UNDER OCCUPIED CHAIR

SKI UNDER UNOCCUPIED CHAIR



l : 416.25 ft
 h : 118.00 ft
 W : 432.65 ft
 n : 28.35 %

11

8T 401
 6T 401
 40.10 ft
 12°

Horizontal Length l : 454.24 ft
 Vertical Rise h : 139.00 ft
 Inclined Length W : 475.03 ft
 Average Grade n : 30.60 %

Sheaves Up
 Sheaves Down 6
 Tube length 3
 Tube Angle 12

