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CAMDEN SNOW BOWL

SKI AREA CONCEPT PLAN

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August 20, 2008

Project Number 08117
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SKI AREA CONCEPT PLAN

I. INTRODUCTION

In December 2006 the Town of Camden Parks and Recreation Department engaged Horizons Engineering, LLC to undertake a Feasibility Study and Long Range Plan concerning the future viability of the Camden Snow Bowl.

The feasibility study concluded that the physical and market attributes and strong community support for the Ragged Mountain Recreation Area and the Snow Bowl underscore the long term continued operation of the facility. The feasibility study also identified challenges that the Snow Bowl faces, primarily the weather and the need to provide reliable snow conditions. Staying modern in the highly competitive ski industry is also a challenge. Another conclusion reached is that the facility is currently underutilized, especially in the summer and non-skiing months.

The December 2006 Long Range Plan presented a summary of growth opportunities and operating efficiencies to improve the future business at the Snow Bowl. The content of this Ski Area Concept Plan carries forward the suggestions from the Long Range Plan. In recent months there have been significant efforts put into generating local interest for funding of capital improvements at the facility. Given the success of those efforts the Ski Area Concept Plan provides a plan for upgrading and expanding the Snow Bowl to achieve the goal of creating a facility that will provide reliable winter recreation pursuits for future generations of users.

The goal of this Ski Area Concept Plan is to illustrate a conceptual plan for the upgrading and expansion of the on-mountain ski facilities and to collaborate with base area planners in regard to the layout and complexion of base area facilities. The concept plan calls for the replacement or relocation of all lifts, the addition of about 22 acres of ski terrain, the creation of a bona-fide beginner area, the upgrading of snowmaking capabilities, and the relocation of the tubing area.

The Ski Area Concept Plan has inherent flexibility in its recommendations, particularly in regard to the layout and complexion of base area facilities. There is also flexibility in the timing of implementation of the various upgrades. Many of the recommended upgrades will require further design, engineering, and permitting.

The estimated capital costs contained herein are order of magnitude figures that should be used for long range budgeting purposes.

II. EXISTING CONDITIONS

The existing ski area has not undergone a modernization or expansion phase of development in at least a couple of decades. As such, the facilities are aging and as time goes by they become less attractive and competitive in the market place.

The attached map of existing conditions shows the facility as it currently exists. The existing ski area has the following attributes:

A. Ski Lifts - There are four existing lifts with a total theoretical uphill capacity of 2,720 persons per hour; the lifts consist of:

- Two t-bars
- A double chair lift
- A handle tow

The shorter of the two t-bars does not typically run once the chairlift and the long t-bar to the top of the mountain are open. With the exception of the fact that the t-bars require snow to be made on the track before they can be used, these lifts are in relatively good operating condition. Although it is rather old, the double chair lift is also in good operating condition. The handle tow is very short and is not a user-friendly type of lift for beginners.

B. Ski Terrain

There are 44 acres of skiable terrain of which 46% (20 acres) has snowmaking capability. The terrain is predominately low intermediate and many of the trails are rather narrow by modern standards. There is a distinct shortage of beginner and novice terrain which is a clear disadvantage for the viability of the Snow Bowl due to its expected target market of local and beginner skiers, especially children. The absence of a kinder ski school also represents a missing segment of the market and an opportunity for growing the business at the Snow Bowl.

Many of the existing trails, and particularly those on the north side, are narrow by modern standards. The narrowness of the trails increases the degree of difficulty of the terrain and narrow trails do not meet the needs of skiers on shaped skis and snowboards. The chart in the Appendix, Terrain Distribution by Ability Level - Existing Conditions, shows that the Snow Bowl has primarily intermediate and low intermediate terrain with an almost complete absence of beginner and novice terrain; this situation is nearly the opposite of the way it should be for a small community ski area where the learning environment is critical to its viability. This ski area upgrading program will recommend selective trail widening to reduce the degree of difficulty of some trails. The upgrading program will also endeavor to create as much beginner and novice terrain as possible within the natural constraints of the mountain.

C. Snowmaking System

The existing snowmaking system is a weak link in the ski area's physical facilities.

The existing system is not capable of producing a desirable amount of snow in an efficient and economic manner given the local climate factors. Recent upgrades to the system have been beneficial but there are more improvements needed in order to bring the Snow Bowl to a standard where it will be attractive, competitive, and economically viable. The challenges faced by the current system include:

- Reliance on conventional air-water technology and a limited amount of compressed air.
- The system is not designed to take advantage of the short windows of weather and snowmaking opportunity that are typical in the Camden area
- Marginal performance during marginal temperatures, making early season opening difficult
- Limited on-hill piping network, which in turn limits the amount of terrain that can be covered by snowmaking, especially at the upper reaches of the mountain
- Water pumping capacity is marginal across the upper sections of the mountain.

The existing piping network allows about 48% of the terrain to be covered with snowmaking (including the tubing lanes).

The goal of an upgraded snowmaking system is to install equipment that will allow the Snow Bowl to take advantage of the small windows of climate opportunities that exist. Energy efficiency is also an objective that should become a part of the snowmaking system strategy.

D. Lodge Facilities

The existing base lodge and related structures comprise approximately 6,000 square feet with room for approximately 100 seats inside. The mezzanine level of the lodge provides space for the Camden Parks and Recreation Department (which includes ski area management). The existing lodge facilities are undersized to be in balance with the current carrying capacity of the ski area (see below). The Appendix chart, Ski Area Space Needs – Existing and Expansion, shows that there should be roughly 6,700 square feet of existing lodge space. Using the ski industry norm of three times turnover per seat, there should be in the order of 205 seats in the existing lodge. Summer and other non-skiing space-use requirements should, of course, be integrated into the analysis and design process for any new lodge facilities.

As mentioned earlier, a child care and young children's ski program should be implemented at the Snow Bowl. The Ski Area Concept Plan calls for the option to provide a conveyor type lift directly adjacent to the new lodge location for easy access for young children.

E. Ski Area Carrying Capacity

The ski area comfortable carrying capacity (CCC) for existing conditions has been calculated to be 620 skiers at one time (SAOT).

We have not performed a detailed terrain density analysis which would compare the uphill carrying capacity of the lifts with the downhill carrying capacity of the terrain, but on a ski area wide basis the average terrain density is quite low. Of the ski area CCC of 620 the rule of thumb is that approximately 30% of the skiers are actually on the trails themselves. Therefore, about 155 skiers/riders are actually on the terrain at any given time.

The average terrain density would be 3.5 skiers/riders per acre (155 ÷ 44 = 3.5), if all of the terrain were open (which, typically, is not the case). This is a low figure by industry norms. If only the terrain with snowmaking capability were open (20 acres), the average density would be 7.75 skiers/riders per acre (155 ÷ 20 = 7.75). This is still a low figure. The conclusion is that there is ample terrain to ensure low terrain densities; we view this as a favorable condition for an enjoyable ski experience but it also means that the Snow Bowl should increase uphill lift capacity in order to improve the business environment.

F. Tubing Area

At present the Snow Bowl has a small tubing area on the south side of the base area with two lanes approximately 600 feet long. The tubing area does not have a lift to transport tubes or participants to the top of the lanes. The location of the tubing area precludes the use of a novice level trail formerly known as Coaster on the south side of the Small T-bar. The upgrading and expansion plan recommends relocating the tubing area to the north side of the base area.

III. PROPOSED UPGRADING AND EXPANSION PROGRAM

The proposed Ski Area Concept Plan represents a program to upgrade and expand the on-mountain ski facilities in a manner that will improve the opportunities for the Snow Bowl to attract additional winter visitors. The goals of the program are:

- Upgrade the ski terrain in order to be more attractive in the market place
- Increase the availability of beginner and novice terrain and have an attractive progression of learning terrain
- Provide consistent top to bottom skiing and riding
- Modernize the lift systems to increase uphill capacity and to reduce the dependence on surface lifts (which require snow to be made on the track before they can be used)
- Increase the capacity and improve the energy efficiency of the snowmaking system
- Modernize and expand the lodge facilities
- Improve (relocate) the tubing area and add additional lanes and a lift

The recommendations as presented in this plan will in all likelihood be implemented in phases. Given the fact that the entire Snow Bowl facility is in need of upgrading the upgrading program will be driven by the availability of funding and the notion of upgrading the weakest components first. In the case of the Snow Bowl the weakest component is the snowmaking system.
Yet in reality the terrain upgrades would occur at the same time as the on-mountain snowmaking upgrades. And the fact that the surface lifts should be replaced with aerial lifts as soon as possible will also factor into the phasing schedule. On-mountain improvements therefore could be phased in sections such as the north side first, then the south side. No matter how the on-mountain improvements are phased in, upgrading the snowmaking system remains the number one priority.

From a winter use perspective, the construction of a new base lodge should follow the upgrades on the mountain. From a summer use point of view, however, the schedule for a new lodge may be on a faster track.

The main elements of the Ski Area Concept Plan are described below. The attached map, Ski Area Upgrading Plan, shows the proposed lift and trail improvements.

A. Ski Lifts
All of the existing lifts at the Snow Bowl will be either replaced or reconfigured. In planning for the lift upgrades consideration has been given to the flexibility of operations to give management the options to not run all of the lifts during off-peak periods.

Highlights of the lift upgrading program are:

- A new fixed grip chairlift to go to the top of the mountain; Lift B on the map. Ideally, this lift will be a reconditioned quad chair operating at 2,400 persons per hour, but it may be difficult to find a quad chair on the secondary market. A reconditioned triple chair would also be appropriate.
- The existing double chair lift should be shortened in order to service the prime learning terrain on the south side of the ski area.
- A new conveyor lift will provide access for beginners to the new beginner terrain on the lower slope of the former Coaster trail; Lift C. The Ski Area Upgrading Plan shows this lift as 425 feet long. This lift could be installed as a shorter conveyor if capital funds are not available for the full length. The conveyor is the best type of lift for beginners. During off-peak periods it may not be necessary to operate both the double chair and the conveyor to service the terrain in the learning area.
- A short conveyor at about 75 feet long and a very gentle slope should be installed adjacent to the new base lodge to service the young children's ski program; Lift D on the map. This lift may be operated by the ski school and would operate only on an as-needed basis.

- As shown on the map the tubing area has been relocated to the north side of the base of the ski area where it will be out of the way of skier/snowboarder traffic and it will have a much longer (and necessary) run-out. The tubing area should have a lift to transport people and tubes to the top of the lanes. We suggest looking at the option to utilize the existing handle tow by replacing the motor and lengthening the cable, or if this is not feasible, potentially purchasing a new or reconditioned handle tow. General design criteria for the tubing lanes are attached to this report.

B. Ski Terrain

The primary goal of the terrain upgrading program is to position the Snow Bowl with the appropriate offering of ability levels in order to optimize the regional community's involvement and enhance visitor satisfaction. This will be accomplished by creating a progression of learning terrain that is served by the appropriate lifts while also maximizing interest and fun for the more accomplished skiers and riders.

As mentioned earlier, some of the trails on the north side of the ski area should be widened. By selectively cutting trees and widening and creatively grading the surface the top to bottom trails on the north side will rival the quality of many trails at larger ski areas.

A new beginner/novice pod is proposed on the south side of the ski area. The existing tubing lane should be relocated to restore the former Coaster trail and the associated ski terrain near the top of the toboggan chute.

Following the suggested upgrading program the skiable acreage will increase from 44 acres to approximately 62 acres; a 41% increase in terrain. As shown on the Terrain Distribution by Ability Level – Upgrading, the distribution of ability levels has improved over existing conditions, particularly with respect to the provision of beginner and novice terrain.

Trail densities will continue to be low throughout the ski area. We view this as beneficial for the ski experience and for the community. Although it is not necessarily advantageous to have very low trail densities from a business point of view, given the community nature of the Snow Bowl we do not see this as an impediment to business.

C. Snowmaking System

An improved snowmaking system is the most critical aspect of the Snow Bowl upgrading plan. The goals of the system upgrades are:

- To design a system based on components that will maximize the potential for early season snowmaking when temperatures are marginal and windows of snowmaking opportunity are short

- Provide reliable top to bottom skiing on more than the existing two primary trails
- Purchase new equipment with energy efficiency in mind.

The Appendix table, Ski Terrain Specifications – Upgrading and Expansion, shows the trails that are proposed to have snowmaking added. An additional 29.4 acres of snowmaking terrain is proposed to be added to the existing 20.4 acres of snowmaking terrain over the multi-phase development program. The proposed coverage would bring the percent of terrain covered to 81% (not including the tubing area).

Prior to upgrading the snowmaking system there will need to an engineering study and system design performed by snowmaking engineering specialists in this field.

D. Lodge Facilities

The placement and configuration of a new base lodge is being studied by the firm of Terry Dewan & Associates. Horizons Engineering offers the following input to the planning and design effort.

- The Appendix table, Day Skier Space Needs – Existing and Expansion, shows the breakdown of space for each of the major functions of the lodge and skier services facility. The typical approach for sizing a ski area base lodge is to base the square footage to be in balance with the comfortable carrying capacity (CCC) of the ski area, i.e. the on-mountain lift and trail carrying capacity. The Appendix table shows the industry norm of square footage per skier of CCC for a small day ski area. The table also shows the square footage that should be considered for each of the major functions based on the Snow Bowl's existing and upgraded CCC. These figures should be used as a guide or a starting point for planning purposes; they will need to be tailored specifically to the Snow Bowl clientele based on the experience of management and the goals for growth. Additionally, summer and non-skiing functions will need to be factored into the design of the new lodge.
- There is flexibility regarding the placement of the new lodge. Our recommendation is to place it centrally within the base area but to orient it near the beginner area (south side of the base area) and that it have space outside for a short conveyor lift for the use of young children for a snow play area.

E. Ski Area Carrying Capacity

With the addition of new lifts and expanded terrain, the comfortable carrying capacity (CCC) of the ski area increases from the current 620 skiers at one time (SAOT) to 1,036 skiers at one time, a 67% increase.

From a ski area planning perspective, the CCC is used as the basis to determine potential business volume and for determining the space needs for skier services, parking requirements, drinking water supply and sewage treatment.

The Appendix table, Parking Requirements – Existing and Expansion, shows the calculated acreage to be in balance with the CCC of the ski area. For parking requirements it is assumed that there will be a number of peak days throughout the ski season when the CCC of the ski area will be exceeded by as much as 25%. Space must be provided for these cars. Also, parking for employees should be factored in to the parking requirements. It should be noted that the parking acreage requirements stated in this report do not consider the likelihood that because the Snow Bowl is a community facility there will be many children, teenagers, and others who will be dropped off and picked up by other family members and therefore will not require space for parking. Management should be involved in fine-tuning the parking requirements to reflect the actual situation.

As far as drinking water supply and sewage treatment are concerned, the ski industry has long used a figure of ten gallons per day (gpd) per skier of capacity for design purposes. Here again, given the assumption that the ski area will exceed capacity on a number days, the systems must be designed to handle this demand.

With an upgraded CCC of 1,036 skiers at one time the water supply and sewage treatment capacity should be 12,950 gallons per day (1,036 + 25% X 10 gpd = 12,950).

F. Tubing Area

The Ski Area Concept Plan shows the tubing area relocated to the north side of the base area. The concept plan also suggests that tubing area consist of two lanes and that a handle tow lift is installed. In this location the tubing lanes will not interfere with the skiing terrain and there is ample space for longer lanes and for an adequate run-out. The lower portion of the Spinnaker trail will need to be re-routed to the south and combined with the Northeaster trail to avoid the top section of the tubing area.

The Appendix to this report contains a description of generic design criteria for a tubing facility.

IV. PRELIMINARY ESTIMATED CAPITAL COSTS

The Appendix titled, Preliminary Estimate of Capital Costs – Upgrading and Expansion, identifies a range of estimated capital costs for the major components of the proposed ski area upgrading plan. The costs are intended to be order of magnitude for long range budgeting purposes yet they are based on a combination of recent actual quotes for similar installations and rule of thumb unit costs.

The budget estimates are presented with several options, the most significant of which is the option to purchase a reconditioned fixed grip quad chairlift for the proposed top to bottom installation versus purchasing a new quad chair lift.

There are not many good used quad chair lifts available on the market so if one cannot be found we suggest the option to place a used triple chair in this location if funding sources restrict the ability of the Snow Bowl to purchase a new chair lift (used triple chair lifts are typically more available).

Another option to consider is to shorten the proposed beginner conveyor lift. At 425 feet long this is a fairly long conveyor, yet it is the best alternative for a beginner lift. Assuming that the existing double chair lift remains in its current alignment but is shortened and provides a good progression of learning terrain for this area, the beginner conveyor could be made shorter by up to 150 feet. Cost savings would be roughly proportionate to the decrease in length.

We highly recommend the creation of a children's snow play area (and child care and Ski Wee facilities) and the short conveyor.

The range of costs for trail improvements is significant due to the uncertainties of construction costs at the time of work, the unknowns regarding rock blasting that will be required, and the amount of work that may be done by in-house labor.

Snowmaking system improvements are presented as a rule of thumb cost for new installations on a per acre basis. The per acre cost estimate as presented includes costs to upgrade the main plant (water pumping, compressed air, and electrical switchgear) as well as piping distribution and new snow guns.

Costs for planning, design, engineering, and permitting are estimates based on 5% of projected capital costs. The extent of environmental permitting that will be required is unknown, but the range of costs shown on the spreadsheet may be adequate to cover them.

The capital cost spreadsheet does not include costs to upgrade trunk lines for power upgrades if this is necessary. It is our understanding that drinking water supply and sewage treatment are provided by on-site systems; costs to upgrade these systems must be accounted for.

The capital cost spreadsheet shows several options to vary the components of the upgrading and expansion program. In addition to these options there are a number of options related to timing. The spreadsheet has highlighted those aspects of the development program that are recommended as first phase. The first phase may be a multi-year development program.

APPENDICES

Appendix	Title
1	SKI AREA MAP – EXISTING CONDITIONS
2	SKI AREA MAP – UPGRADING PLAN
3	SKI TERRAIN SPECIFICATIONS – EXISTING CONDITIONS
4	ABILITY LEVEL DISTRIBUTION – EXISTING CONDITIONS
5	SKI TERRAIN SPECIFICATIONS – UPGRADING
6	ABILITY LEVEL DISTRIBUTION - UPGRADING
7	SKI AREA COMFORTABLE CARRYING CAPACITY
8	DAY SKIER SPACE NEEDS
9	PARKING REQUIREMENTS
10	PRELIMINARY ESTIMATE OF CAPITAL COSTS
11	TUBING DESIGN CRITERIA

SKI AREA MAP – EXISTING CONDITIONS

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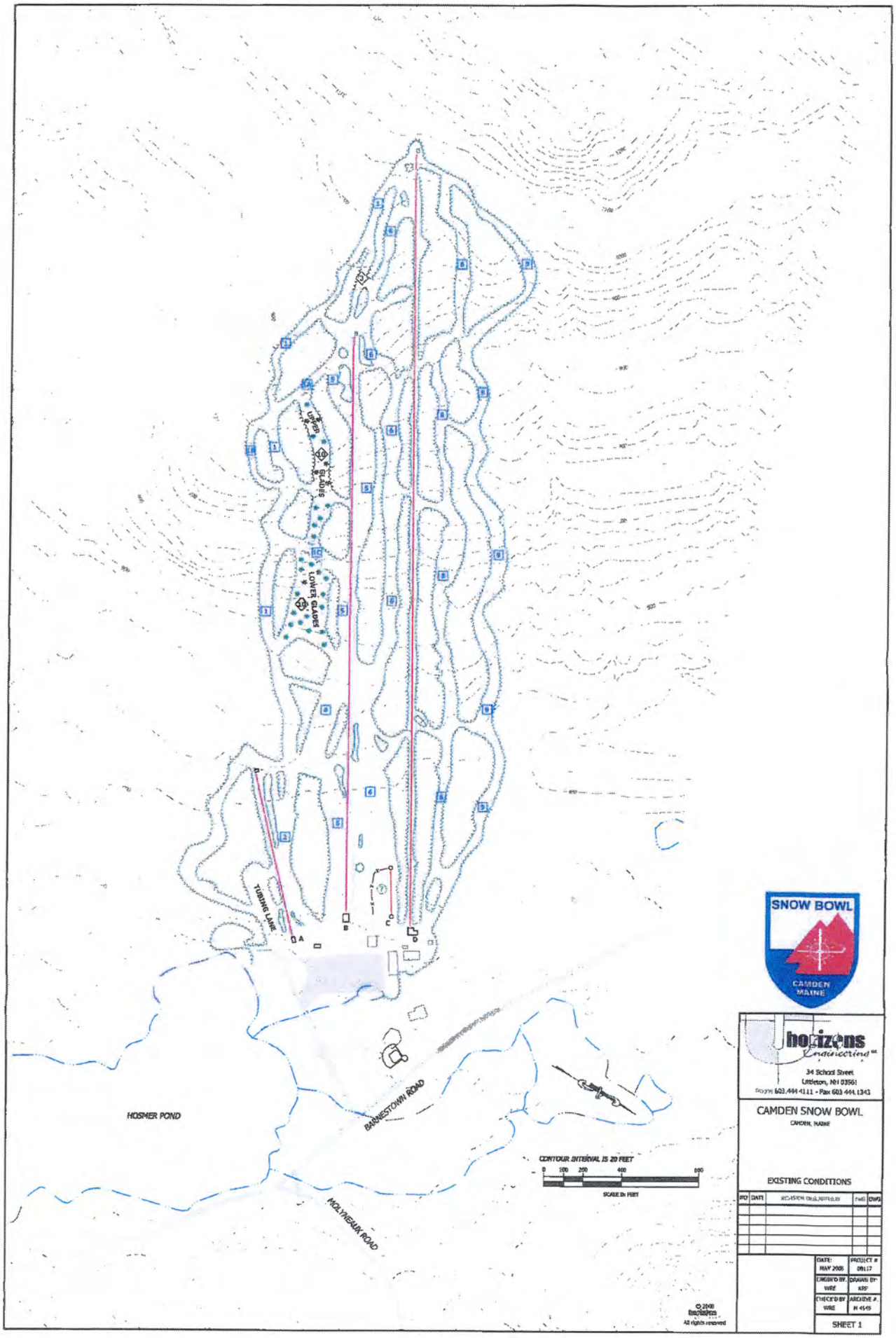

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CAMDEN SNOW BOWL
CAMDEN, MAINE

EXISTING CONDITIONS

NO	DATE	REVISION DESCRIPTION	PAGE	DWG

DATE: MAY 2008	PROJECT #: 08117
ENGINEER: WRE	DRAWN BY: KRP
CHECKED BY: WRE	ARCHIVE #: H 4545

SHEET 1

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SKI AREA MAP – UPGRADING PLAN

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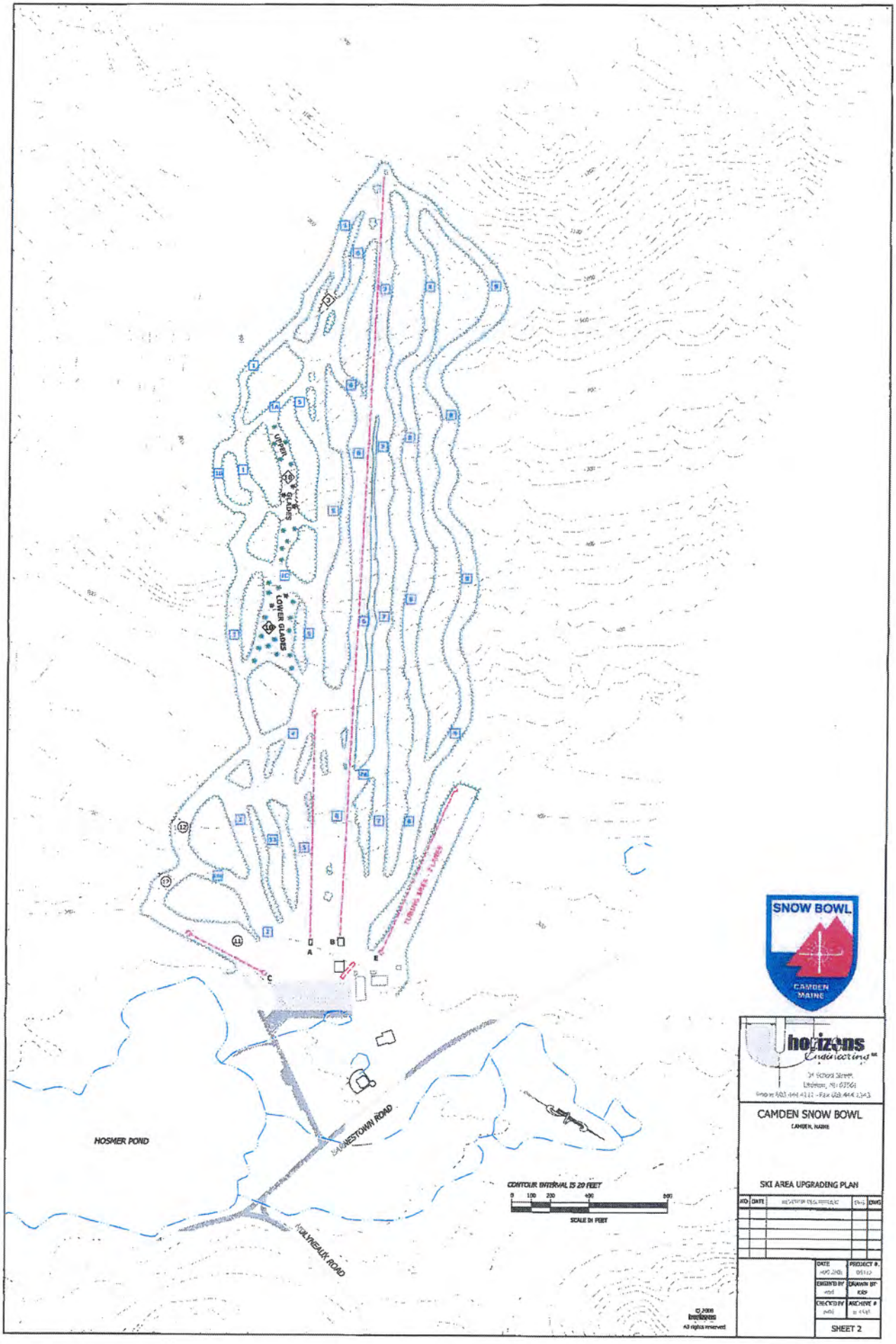

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SKI TERRAIN SPECIFICATIONS – EXISTING CONDITIONS

SKI TERRAIN SPECIFICATIONS - EXISTING CONDITIONS

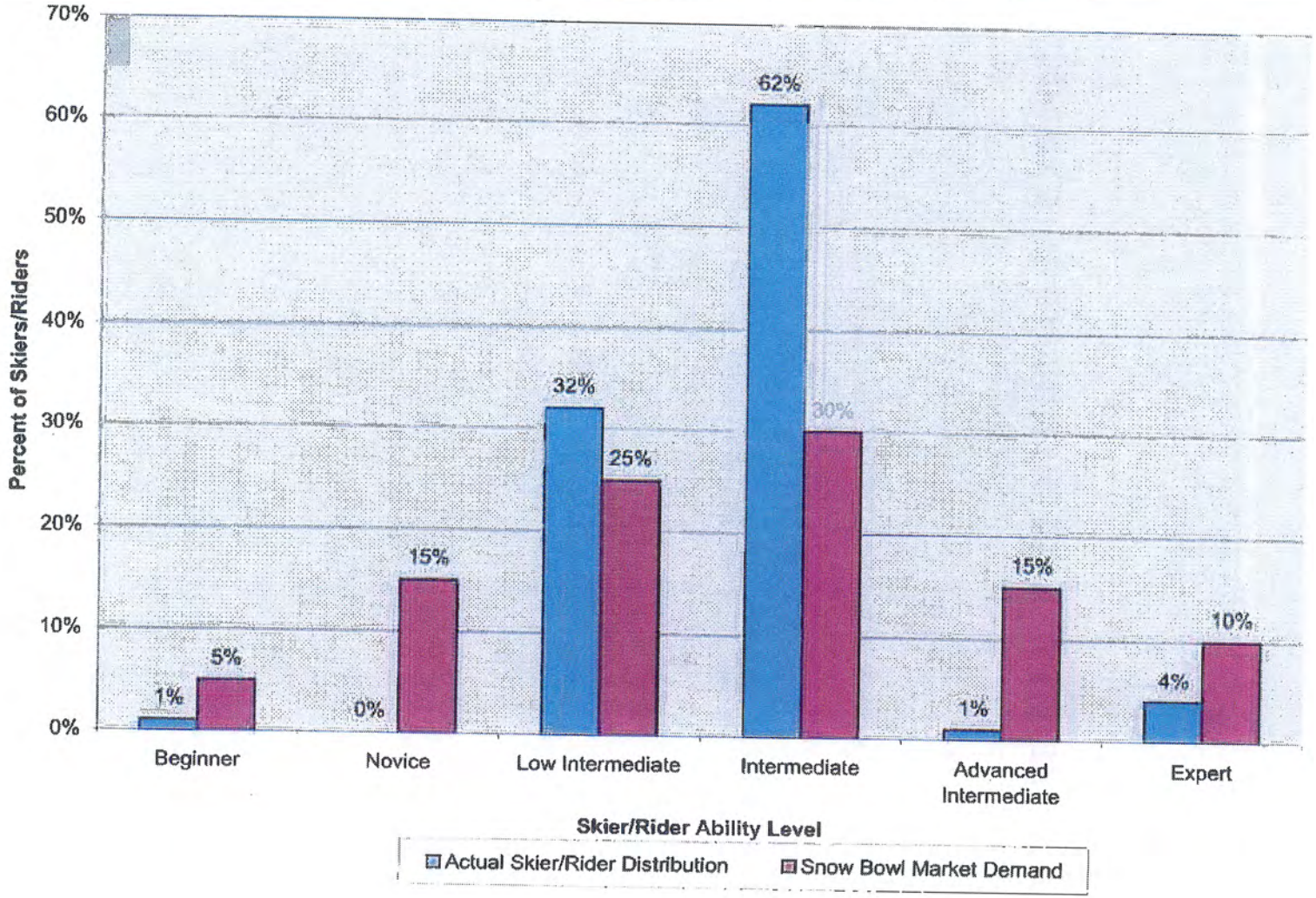
Map No.	Trail Name	Length (ft)	Area (ac)	Vertical (ft)	Avg. Slope %	Ability Level	Snowmaking
1	Lookout	3,330	5.6	640	19%	Low Intermediate	
1A	Lookout Connector	325	0.4	25	8%	Low Intermediate	
1B	Lookout Bypass	485	0.6	95	20%	Intermediate	
1C	Mussel Ridge Connector	360	0.6	65	18%	Low Intermediate	
2	Foxy	800	1.5	200	25%	Intermediate	*
3	Bump Run	400	0.5	60	15%	Advanced Intermediate	
4	Terrain Park	500	1.6	60	12%	Intermediate	*
5	Mussel Ridge	3,075	8.4	700	23%	Intermediate	*
6	Clipper	3,780	8.3	840	22%	Intermediate	*
7	Beginner Area	180	0.6	25	14%	Beginner	*
8	Northeaster	3,885	7	840	22%	Intermediate	
9	Spinnaker	4,440	7.4	840	19%	Low Intermediate	
10	Glades, Upper & Lower	1,300	1.5	390	30%	Expert	
	Total Ski Terrain		44.0				
	Tubing Area	600	1.2	80			*
	Acreage with Tubing		45.2				

Total snowmaking acreage is 20.4 acres which is 46% of total ski terrain.
Glades skiable acreage is calculated as 50% of total glades terrain

ABILITY LEVEL DISTRIBUTION – EXISTING CONDITIONS

CAMDEN SNOW BOWL

TERRAIN DISTRIBUTION BY ABILITY LEVEL - EXISTING CONDITIONS



SKI TERRAIN SPECIFICATIONS – UPGRADING

SKI TERRAIN SPECIFICATIONS - UPGRADING AND EXPANSION

Phase	Map No.	Trail Name	Length (ft)	Area (ac)	Vertical (ft)	Avg. Slope %	Ability Level	Snowmaking	Notes
	1	Lookout	3,330	6.2	640	19%	Low Intermediate		
	1A	Lookout Connector	325	0.4	25	8%	Low Intermediate		
	1B	Lookout Bypass	485	0.6	95	20%	Intermediate		
	1C	Mussel Ridge Connector	360	0.6	65	18%	Low Intermediate		
	2	Foxy	875	1.5	215	25%	Intermediate	*	
1	3	Bump Run	400	0.5	60	15%	Advanced Intermediate	*	
	4	Terrain Park	500	1.6	60	12%	Intermediate	*	
	5	Mussel Ridge	3,120	8.5	700	22%	Low Intermediate	*	
	5A	Mussel Ridge Bypass	350	0.6	60	17%	Low Intermediate		
2	6	Clipper	3,795	10.2	840	22%	Intermediate	*	a
3	7	New Trail	3,785	8.2	840	22%	Intermediate	*	
	7A	Clipper Connector	125	0.3	20	16%	Intermediate		
3	8	Northeaster	3,675	7.8	840	23%	Intermediate	*	
2	9	Spinnaker	3,530	7.3	840	24%	Low Intermediate	*	
	10	Glades, Upper & Lower	1,300	1.5	390	30%	Expert		b
1	11	New Beginner Area	640	1.5	85	13%	Beginner	*	
1	12	Coaster	760	2.1	130	17%	Novice	*	
1	12A	Beginner Slope Connector	265	0.6	55	21%	Novice	*	
	13	New Trail	915	1.7	200	22%	Low Intermediate		
		Total Ski Terrain		61.7					c
1		New Tubing Area	900	2.5	60			*	
		Acreage with Tubing Area		64.2					

Highlighted trails represent new or expanded snowmaking terrain

Notes:

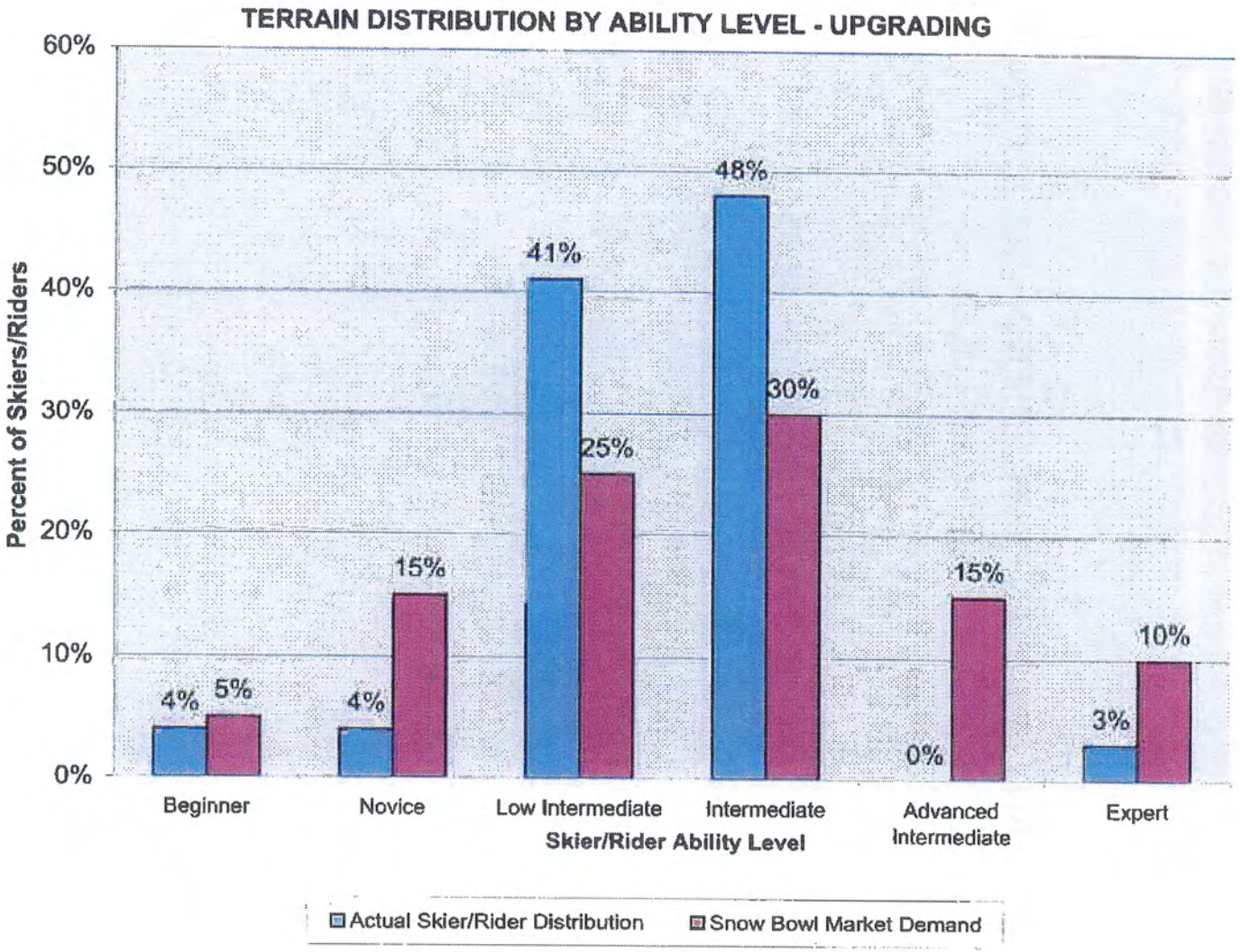
a. Snowmaking on Clipper trail to be extended to top of hill, adding 1.9 acres of snowmaking terrain.

b. Glades skiable acreage is calculated as 50% of total glades terrain

c. Total snowmaking acreage is 49.8 acres which is 81% of total ski acres (not including tubing lanes). Expansion of the snowmaking system will be phased in over a multi-year development program.

ABILITY LEVEL DISTRIBUTION – UPGRADING

CAMDEN SNOW BOWL



SKI AREA COMFORTABLE CARRYING CAPACITY

SKI AREA COMFORTABLE CARRYING CAPACITY

SKI AREA LIFT CAPACITY AND CCC - EXISTING CONDITIONS

	Lift System/Map Reference	Lift Type	Slope Length (ft)	Vertical Rise (ft)	Hourly Capacity (skiers/hr.)	Operating Hours (hrs.)	Loading Efficiency (%)	Adjusted Hourly Cap. (skiers/hr.)	VTF/Hr. (000's)	Vertical Demand (ft/day)	CCC (SAOT)
A	Small T-bar	T-bar	875	115	750	6	70%	525	86	3,000	121
B	Double Chair	Fixed Double	2,975	680	630	7	75%	473	428	12,500	180
C	Beginner lift	Handle Tow	175	25	540	6	70%	378	14	500	113
D	Long T-bar	T-bar	3,960	840	800	7	70%	560	672	16,000	206
					2,720				1,200		620

SKI AREA LIFT CAPACITY AND CCC - UPGRADING AND EXPANSION

A	Double Chair	Fixed Double	975	105	800	6	75%	600	84	2,500	151
B	New Chair	Fixed Quad	3,900	840	2,000	7	85%	1,700	1,680	18,000	555
C	Beginner Lift	Conveyor	650	85	800	6	80%	640	68	1,500	218
D	Magic Carpet	Conveyor	75	8	500	4	70%	350	4	100	112
					4,100				1,836		1,036

Notes:

1. Hourly capacities for existing lifts has been supplied by Snow Bowl management.
2. Loading efficiency is a reflection of the type of lift and the experience level of the typical user.
3. The adjusted hourly lift capacity is the theoretical capacity times the loading efficiency.
4. VTF/Hr., vertical transport feet per hour, is the product of a lift's vertical rise times the adjusted hourly capacity. The total VTF/Hr. of a ski area is generally recognized as the overall measure of a ski area's size in terms of supply of uphill transport.
5. Vertical demand, feet per day, is a measure of the estimated vertical feet of skiing in a full day that a skier/snowboarder will want in order to be satisfied.
6. Comfortable carrying capacity (CCC), as measured in skiers at one time (SAOT), represents the total number of skiers visiting the ski area, including active and inactive skiers/riders. The method to calculate CCC is an empirical formula which is derived by multiplying the adjusted VTF/Hr. times hours of operation per day then dividing by the vertical demand per day.

DAY SKIER SPACE NEEDS

DAY SKIER SPACE NEEDS - EXISTING AND EXPANSION

Skier Service Function	Range of SF per Skier CCC	Recommended SF	Existing SF at CCC = 620	Proposed SF at CCC = 1036	Notes
Food Service Seating	3.5 - 4.0	3.5	2,170	3,626	1
Kitchen/Scramble	1.5 - 1.8	1.2	744	1,243	
Bar/Lounge	.4 - .6	0	0	0	2
Public Restrooms	.7 - .9	0.8	496	829	
Ski School	.6 - .7	0.3	186	311	
Rental/Repair	.5 - 2.1	0.7	434	725	3
Retail Sales	.6 - 1.0	0	0	0	
Patrol/First Aid	.4 - .5	0.4	248	414	
Public Lockers	.6 - .8	0.3	186	311	
Employee Lockers	.1 - .2	0.1	62	104	
Day Care/Ski Wee	.8 - 1.3	0.8	496	829	4
Administration	.6 - .8	0.6	372	622	5
Ticket Sales	.1 - .2	0.1	62	104	
Mechanical	.1 - .2	0.2	124	207	
Storage	.3 - .5	0.4	248	414	
Circulation	1.4 - 1.6	1.4	868	1,450	
			6,696	11,189	
Square feet per skier CCC			10.8	10.8	6

Notes:

1. Estimate a need for about 350 seats (after ski area expansion). This equates to a 3 times turnover per seat based on ski area CCC. We also recommend providing additional seating for non-skiing family members who will visit while other family members are skiing or riding; say another +/- 25 seats. The total reccommended seats to be in balance with ski area expansion should be in the order of 375.
2. No space has been allocated to bar and lounge given the fact that the Snow Bowl is a municipal facility.
3. Rental shop space is a function of the number of rental units available. For each ski rental unit (skis, boots, and poles) there should be about 3.8 SF; this inlcudes space for seating, set-up, circulation, etc. For each Snowboard unit the figure is about 4.3 SF.
4. Day care space needs vary a lot depending on demand, state regulations, and type of cleintele.
5. Administration square footage is for typical small ski area only, i.e. it does not include space needs for Camden Parks and Recreation department.
6. The total recommended square footage for new lodge space breaks down to 10.8 SF per skier of CCC. This is on the low end of the range for a typical small day ski area space availability, but still satisfactory in our opinion.

PARKING REQUIREMENTS

PARKING REQUIREMENTS - EXISTING AND EXPANSION

	CCC	Peak Day (CCC + 25%)	Guest Cars (2.3 per car)	Employees (5% of CCC)	Employee Cars (2.0 per car)	Total Cars	Acres (125 cars per acre)
Existing	620	775	337	31	15	352	2.8
Expansion	1036	1295	563	52	26	589	4.7

PRELIMINARY ESTIMATE OF CAPITAL COSTS

CAMDEN SNOW BOWL

PRELIMINARY ESTIMATE OF CAPITAL COSTS
UPGRADING AND EXPANSION PROGRAM
Horizons Engineering, LLC
August 20, 2008

	ITEM	QUANTITY/DESCRIPTION	LOW ESTIMATE	HIGH ESTIMATE	NOTES
	Lifts				
1	Lift A	Shorten existing double chair lift	$200,000	$300,000	same alignment; assume only normal upgrades/code compliance
2	Lift B	New chair lift to top of mountain; 4200' x 840'			
		Options			
	1	Puchase/install refurbished chair lift	$750,000	$1,000,000	availability and capacity of used lift is uncertain
	2	New fixed quad chair lift	$1,500,000	$1,750,000	2000 to 2400 persons per hour
3	Lift C	New beginner Lift			
		Options			
	1	Long conveyor; 425' X 55'	$150,000	$175,000	
	2	Short conveyor; 275' X 28'	$85,000	$100,000	
	3	Handle tow; 275 X 28'	$20,000	$40,000	handle tow not recommended due to length
4	Lift D	New ski school conveyor; 75' x 8' - optional	$25,000	$40,000	low priority
5	Lift E	Tubing area handle tow/tube transport lift	$20,000	$50,000	options are for new vs. used handle tow
	Trails				
6		Additional new acreage; 21.6 acres	$216,000	$324,000	$10,000/acre low and $15,000/acre high
	Snowmaking				
7		New terrain & expanded plant; 16 acres new	$720,000	$880,000	$45,000/acre low and $55,000/acre high
	Estimated Costs with refurbished chair lift B		**$1,755,000**	**$2,280,000**	
	Estimated Costs with new chair lift B		**$2,721,000**	**$3,354,000**	
8	Planning, Design, Engineering, & Permitting		$87,750	$167,700	soft costs for items only on this list; 5%
		TOTAL RANGE OF ESTIMATED COSTS	**$1,842,750**	**$3,521,700**	

Highlighted yellow cells represent the low and high range of costs for the components of the suggested Phase 1 development program.

TUBING DESIGN CRITERIA

TUBING DESIGN CRITERIA

Slope Dimensions and Grades

- Tracks (lanes) should have 50' to 150' vertical and should be steepest at the top of the track. The top, or "kicker", should be 50-100 feet long, and the gradient should decrease gently along the length of the track; by half-way along the track, gradient should be reduced to near 0% runout. Typical slope gradients are 30-35% kicker, a 15-20% long slope, and a flat 0% runout.

- Tracks can be even grade all the way down or can have pitches, flats, and rolls. The track must be designed so that tubers never leave the track; the rider can not control the tube once the rider starts descending. Rolls should not cause riders to take air.

- The runout should be flat and straight. Some areas use a reverse slope at the runout. This is not desirable, but sometimes necessary.

- Ratio of slope to runout should be on the order of 1:2 –or 1/3 slope, 2/3 runout. A 200-400 foot slope and a 400-800 foot runout is typical. The length of runout needed changes based on snow conditions, tube/cover material, and rider weight. Riders should come to a complete stop by the end of the runout zone.

- Designate a walking path for tubers to return to lift or lodge. The path should be well to the side of the runout zone, and tubers should be encouraged to move to the path right after their runout.

- Tracks (lanes) should be 14'-16' wide, separated by a 3' high, 4-6' wide berm, and can have one of three cross-section design types.

    - Flat Track. Areas with a lot of snow, or generally straight trails in the fall line.

    - Slightly Concave. Areas with minimal snow, or off-slope tracks.

    - Pipe Track. For tracks that have sweeping turns.

- Tracks should be numbered or named for reference and operations.

- Plan sufficient space for a top staging area so riders can cue on crowded days. The staging area should be at least 10' deep at the top of each track.

- Provide tracks of different ability levels and vertical, if possible.

- Leaving trees between tracks is aesthetically pleasing. Trees do not create grooming difficulties because the groomers stay in the tracks. Fully cleared tubing parks are unsightly and uninteresting.

- Monitors in charge of starting tubers must be able to see the entire track or be in radio contact with spotters.

Lifts

- Handle tows and chairs are both used at tubing facilities; handle tows are appropriate based on capital and operating costs and the need to transport tubes uphill.

- Tow length determined by slope length; <15% grade is best.

- Tow should access a number of tracks; it is most efficient to place a tow in the middle of the tracks to distribute riders efficiently and evenly. A walking path should be available along the entire length of the tow.

- Two types of tows are being used currently:

    - A handle tow onto which an operator attaches the rubber ring at the end of the tube rope. At the top, the operator either tells the user to roll out and takes the tube off the tow (operator unloading), or the tube slides down an incline at the top of the tow, and unleashes itself (self-unloading).

    - Tubes are permanently fastened to the tow, and, as one goes by, users sit down in it and drag their own tube behind. At the top, riders are forced to stand up as the tube passes up and over a sidehill bank (self-unloading).

- The two "self-unloading" arrangements are most efficient.