

SPIRIT MOUNTAIN RECREATION AREA 2017 MASTER PLAN UPDATE



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I. INTRODUCTION

.1 Background

The Spirit Mountain Master Plan was prepared for the Spirit Mountain Recreation Area Authority (SMRAA) in 2008 by a team of consultants consisting of Johnson Controls, Architectural Resources, Inc. and Ecosign Mountain Resort Planners, Ltd. The plan included a blueprint for updating and renovating the alpine ski facility and developing other four season recreational amenities and activities to support regional tourism and generate more year round use of the property. Since 2008, the following capital improvements have been completed, in accordance with the Spirit Mountain Recreation Area Master Plan.

Ski Facility

- Upgrade Spirit Express with new Spirit Express II – detachable quad chairlift – 2012
- Build and open Grand Avenue Chalet – February 2013
- Snowmaking - St. Louis River water source and pumping station - 2015

Spirit Mountain Adventure Park

- Timber Twister Alpine Coaster - 2010
- Timber Flyer Zip Lines – 2011
- Mini Golf Course – 2011
- Snow Tubing Center – 2011
- Disc Golf Course at Grand Avenue Chalet - 2017
- Jumping Pillow - 2016

Spirit Mountain Bike Park

- Lift serviced bike park with 2 trails opened May 2013
- Skills/jump trails park added - 2013
- Additional downhill trails added in 2015
- Winter Fat Tire biking introduced in 2016

Over the past nine years, Spirit Mountain has successfully made the transformation from primarily a winter alpine ski facility to a four season recreation amenity and regional tourist attraction. While alpine ski/snowboarding is still the largest source of revenue, in 2015/16, the summer and shoulder season revenues from the Adventure Park, Summer Activities, Banquets/Weddings and the Campground accounted for 34% of total revenues, as shown in Plate I.1 below. Winter lift operations and the Adventure Park were the two highest sources of revenue and also provided the highest operating margins. According to the National Ski Areas Association 2015-16 Economic Analysis, mid-west ski areas with summer operations obtained 11.1% of total revenues associated to summer activities. Spirit Mountain has been more successful than its regional competitors in making the transition to four season operations, with summer operations accounting for 34% of total revenue (Adventure Park, Banquet, Campground, and Summer Activities).

REVENUE DISTRIBUTION – 2015/16

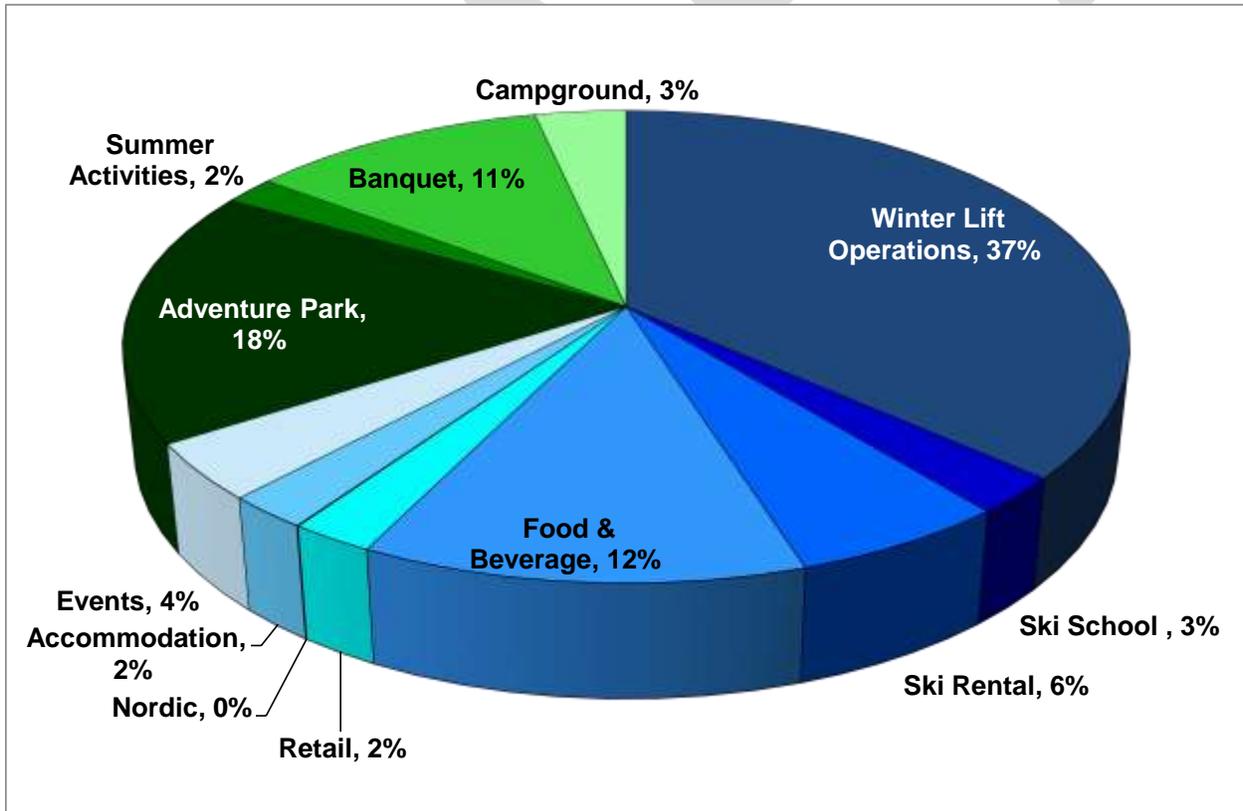


PLATE I.1

.2 St. Louis River Corridor Planning

Over the past seven years, the City of Duluth has completed a number of recreation planning initiatives for the St. Louis River Corridor which includes the Spirit Mountain Recreation Area (SMRA). A major thrust of this effort has been to develop a Trails Master Plan for Western Duluth to document the existing trail network (walking, hiking, cycling, cross country, multi-use, snowmobile, equestrian), consider the needs of the various user groups and create a long term development plan to make Duluth the “premier trail city in North America”. The following documents which address trail connectivity through the SMRA have been completed and adopted by the City.

- Duluth, Minnesota Trail and Bikeway Plan, October 2011
- St. Louis River Corridor Trails Plan, December 2014
- City of Duluth Cross Country Ski Trail Master Plan, May 2015
- Grand Avenue Nordic Center Mini Master Plan, June 2015
- Duluth Traverse Mini Master Plan, April 2017
- Cross City Trail Mini Master Plan, March 2017
- Western Trail and Waterfront Master Plan Progress Report, June 2017

.3 Master Plan Update Process

In 2016, Ecosign Mountain Resort Planners, Ltd. was retained by the City of Duluth to assist in preparing an update of the Spirit Mountain Master Plan. The SMRA Update was to address the following:

- Document the improvements completed at Spirit Mountain since 2008.
- Consider the various proposed trail network connections through the SMRA and work with the City and SMRAA to resolve the alignments to mitigate potential conflicts between the various user groups and the ski area and downhill mountain biking operations.
- Provide insight on the mid-western alpine ski industry and Spirit Mountain’s position in relation to its regional competitors.

- Update the Master Plan to reflect the SMRA's evolving role as a four season tourism and recreation amenity in western Duluth, taking into consideration the potential for integration with the proposed Grand Avenue Nordic Center and lower Spirit water access, improvements to the Zoo and the development of private lands in the vicinity of the Grand Avenue base.
- Evaluate the existing and future parking requirements for the upper and lower base areas and feasibility of a road connection between the two bases.

The City, Ecosign and the SMRAA management team worked collaboratively to prepare the Master Plan update. A public information meeting to present the work completed to date and obtain feedback from the community was held on Thursday April 20, 2017.

.4 Goals and Objectives

The Mission Statement, Objectives and Vision have been carried over from the 2008 Spirit Mountain Master Plan.

Mission

The Spirit Mountain Recreation Authority was created in 1973. The mission statement for the recreation area authority from Minnesota Laws, 1973, Chapter 327 (section 1, mission):

The purpose of this Act is to facilitate the development of a land area with the following objectives:

- *The development of wide-range recreational facilities available to both local residents and tourists;*
- *The aiding of the economy of northeastern Minnesota by encouraging private enterprise efforts in conjunction with the recreational facilities; and*
- *The preservation of the environment in the area by a timely and intelligent plan of development.*

Objectives

The Spirit Mountain Recreation Area will measure its success in satisfying its mission by the following:

- *Provide recreational opportunities available to and accessible by all potential users, local residents and tourists alike.*
- *Maintain and enhance winter revenues, and, increase revenue generation in spring-summer-fall seasons.*
- *Revenues should cover annual operating costs and maintenance and upkeep of facility. Substantial necessary improvements to the area are covered through established, legislated lodging and food and beverages taxes in which the Spirit Mountain Recreation Authority is specifically named, along with grants, local and state support and partnerships.*
- *Increase SMRA's regional economic impact in terms of total tourism dollars generated, enhancement of other regional attractions, and amount of spin-off private sector development.*
- *Maintain a sustainable land base protecting its ecological functions and cultural features.*

Vision

The Spirit Mountain Recreation Area will achieve its mission by being a premier four seasons outdoor adventure recreation center, recognized for its unique, multi-faceted recreation facility that meshes mountain terrain, Lake Superior experience, and semi-wild river access, and, accredited as a sustainable "green" facility and operation.

.5 Glossary

The alpine skiing/snowboarding industry has a number of terms and technical jargon specific to alpine resort area development, hence, a glossary is provided below:

1. **Skier** - Refers to a person that slides down the hill using skis, a snowboard, mono ski, snowblades, Big Foot skis, snow runners, or other devices attached to their feet.
2. **Skier Visit (Winter)** - One person visiting a winter recreation area for all or part of a day or night for the purpose of skiing, snowboarding, snowblading, etc. This is the total number of lift tickets issued and season pass visits recorded. Skier visits include

- a person holding a full-day, half-day, night, complimentary, adult, child, season, or any other ticket type that gives them the use of an area's lifts and trails.
3. **Rated Uphill Capacity** - The manufacturer's rated number of passengers per hour (pph) a lift can transport to the top of the lift. An area's hourly capacity is the sum of the individual lifts.
 4. **VTF/Hour (000) - (Vertical Transport Feet per Hour)** - The number of people lifted 1,000 vertical feet per hour (vertical rise of a lift, times the lift capacity per hour, divided by 1,000). An area's total VTF, is the sum of VTF for all lifts operated for skiing at the area. Lifts for tubing and snow play are not included in this calculation.
 5. **VTF Demand/Skier/Day** - The amount of vertical consumed (demanded) each day by a skier, snowboarder, snowblader, etc. This varies by skill level; the more advanced the skier, the more vertical they are likely to ski in a day.
 6. **Skier (Comfortable) Carrying Capacity at One Time (SAOT)** - The number of skiers that a given ski facility can comfortably support at one time on the slopes, lifts and in the base and mountain warming buildings, without overcrowding, or those that may be accommodated at one time and still preserve a congenial environment. An area's comfortable carrying capacity is a function of VTF demand per skier, VTF supplied per hour, difficulty of terrain, and scope of support facilities. This is some time referred to as Comfortable Carrying Capacity (CCC) or Skiers At One Time (SAOT).
 7. **Skier Walking Distance (SWD)** - Skier walking distance is defined as the distance someone walking in ski boots and carrying equipment can comfortably walk in 10 minutes. A walking speed of 1.7 miles per hour is assumed, which translates to a skier walking distance of 1,500 feet over level ground. If the terrain is sloping, the skier walking distance is reduced by 40 feet for every 10 feet of vertical grade change.
 8. **Utilization** - Is measured as a percent of SAOT. Comfortable Seasonal Capacity is the product of an area's daily carrying capacity times its days of operation. Utilization compares actual number of visits to calculated comfortable seasonal capacity.
 9. **Terrain Pod** - A contiguous area of land deemed suitable for lift and trail development due to its slope gradients, exposure and fall line characteristics.

II. EXISTING FACILITIES

The existing facilities at Spirit Mountain Recreation Area are illustrated on Figures 1a, 1b, 1c and 1d and described below.

.1 Winter Recreation Facilities

Winter recreation at Spirit Mountain includes downhill skiing and snowboarding, snow tubing, Nordic (cross-country) skiing and fat tire biking. The Timber Twister aerial coaster can also operate in the winter unless it is extremely cold. On-site accommodation is offered at the Mountain Villas. Both the Main Chalet at the upper base and the Grand Avenue Chalet are open during the winter season. There is a snowmobile trail on the east side of Knowlton Creek and parking for snowmobile access is provided in Lot P8.



Slopeside Mountain Villa

Alpine Skiing

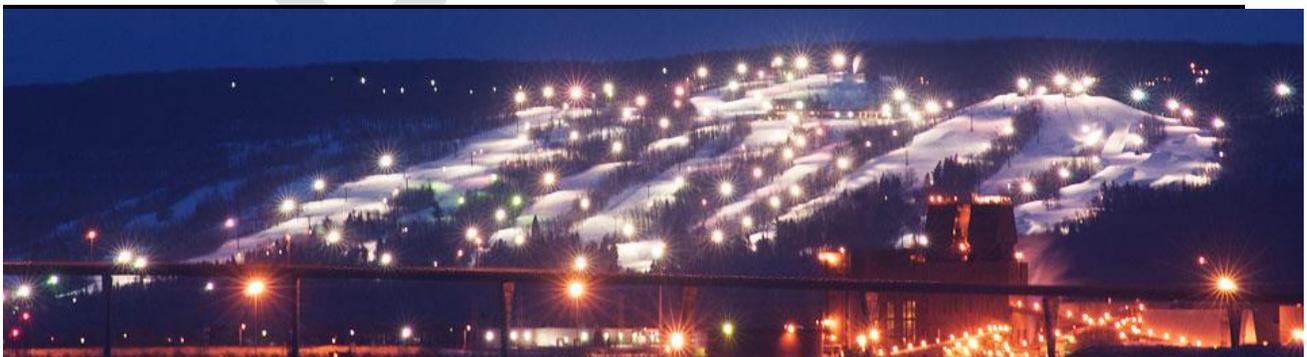
Alpine skiing and snowboarding remains the main focus during the winter season at Spirit Mountain. The public ski area operation is supported by equipment rentals and both group and private lessons for all ages. Spirit Mountain is open 7 days per week, weather permitting and also offers night skiing.

Lifts

- Total Lift Carrying Capacity – 4,150 skiers at one time with all lifts running
- 5 Chairlifts – 1 Detachable Quad, 1 Fixed Grip Quad, 2 Triples and 1 Double
- 3 Surface Lifts - 1 Handle Tow, 1 Moving Carpet and 1 High Speed Rope Tow
- Vertical Transport Feet / Hour – 4.1 million
- Rated Lift Capacity – 10,192 pph
- *Lifts 2, 3 and 4 are over 40 years old and extensive maintenance is required to keep them operational. Lifts 3 and 4 are only used during very busy times.*

**TABLE II.1
EXISTING LIFT SPECIFICATIONS**

Lift Number Lift Name Lift Type Year Constructed	1 Big Air 4C 1989	2 Gandy Dancer 3C 1976	3 Summit 3C 1974	4 Double Jaw 2C 1975	5 Spirit Express D4C 2011	6 Prospector Handle Tow HT 2004	7 Prospector Carpet MC 2005	8 High Speed Rope Tow RT 2016	TOTAL
Top Elevation ft.	1,208	1,207	1,284	1,200	1,282	1,197	1,184	1,262	
Bottom Elevation ft.	792	782	766	805	720	1,154	1,162	1,182	
Total Vertical ft.	416	425	518	395	562	43	22	80	2,461
Horizontal Distance ft.	1,980	1,690	2,924	2,022	3,450	381	136	597	
Slope Distance ft.	2,023	1,743	2,978	2,060	3,495	384	138	602	13,423
Average Slope %	21%	25%	18%	20%	16%	11%	16%	13%	
Rated Capacity pph	1,515	1,800	1,577	1,200	2,400	500	500	700	10,192
V.T.F./Hr. (000)	631	765	817	474	1,348	21	11	56	4,124
Rope Speed fpm	425	460	460	480	900	100	100	1,000	
Trip Time min.	4.8	3.8	6.5	4.3	3.9	3.8	1.4	0.6	
Drive Output (hp)	150	150	150	125	400	3	10	-	
Operating Hr./Day	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
V.T.F. Demand/Day	6,970	6,970	6,524	5,225	5,225	2,320	2,320	2,320	
Loading Eff. %	75%	80%	80%	80%	90%	90%	90%	80%	
Access Reduction	0%	0%	0%	0%	0%	0%	0%	0%	
Daily Lift Capacity	470	610	700	510	1,630	60	30	140	4,150
Cumulative Total	470	1,080	1,780	2,290	3,920	3,980	4,010	4,150	





Spirit Mountain Express II Detachable Quad Chairlift

Trails

- 89 acres of skiable terrain with a capacity of 2,460 skiers at one time; lift capacity currently exceeds trail capacity by 69%
- 26 marked trails with a total length of 6.1 miles
- Four terrain parks and one half-pipe
- While the existing terrain is predominantly beginner and low intermediate; the four terrain parks and half-pipe provide interest for the more advanced skiers and snowboarders.

**TABLE II.2
EXISTING TRAIL INVENTORY**

Trail Name	Trail No.	Skill Class	Elevation		Total Vert. Feet	Horz. Dist. Feet	Slope Dist. Feet	Percent Slope		Avg. Width Feet	Horz. Area Acres	Slope Area		Skiers At Area		Lift at Area
			Top Feet	Bottom Feet				Avg. Steep.	Steep.			Acres	Density	Total		
Lift 1 Big Air																
Big Air	1	3	932	835	97	452	464	21.4%	21.4%	72	0.8	0.77	24	20		
Super Pipe	2	3	1,069	791	277	1,482	1,512	18.7%	24.1%	149	5.1	5.17	24	120		
Terrain Park	3	3	1,198	791	406	2,308	2,350	17.6%	25.3%	134	7.1	7.23	24	170		
Cinder Snapper	5	3	1,204	785	419	1,914	1,964	21.9%	29.0%	146	3.2	3.29	24	80		
Total Lift 1	4						4,326				16.1	16.46		390	470	
Lift 2 Gandy Dancer																
Duck Leg Shorty	4	3	829	780	49	552	555	8.8%	8.8%	61	0.8	0.78	24	20		
Cinder Snapper	5	3	1,204	785	419	1,914	1,964	21.9%	29.0%	146	3.2	3.29	24	80		
Bear Claw	6	3	1,089	817	272	1,253	1,285	21.7%	25.0%	97	2.8	2.86	24	70		
Gandy Dancer	7	3	1,201	784	417	1,670	1,724	25.0%	31.9%	139	5.3	5.51	24	130		
Blue Ruin/Bull Wacker	8	3	1,206	781	425	1,905	1,959	22.3%	32.1%	134	5.9	6.02	24	140		
Total Lift 2	6						8,046				19.1	19.65		470	610	
Lift 3 - Summit																
Log Roller	9	2	851	782	69	547	552	12.6%	12.6%	67	0.8	0.85	30	30		
Bindle Stiff	10	3	1,275	765	510	3,050	3,100	16.7%	26.7%	125	9.1	9.21	24	220		
Sky Hooker	11	3	1,152	843	309	1,445	1,480	21.4%	26.3%	138	4.6	4.67	24	110		
	12	3	803	767	36	201	204	17.9%	17.9%	163	0.8	0.76	24	20		
	21	3	875	843	32	207	210	15.6%	15.6%	135	0.6	0.65	24	20		
	26	1	1,271	1,183	88	761	766	11.6%	12.0%	41	0.9	0.91	30	30		
Total Lift 3	6						6,313				16.8	17.05		430	700	
Lift 4 Double Jaw																
Double Jaw	13	2	1,192	807	385	2,084	2,123	18.5%	22.7%	85	4.1	4.13	30	120		
Total Lift 4	1						2,123				4.1	4.13		120	510	
Lift 5 Spirit Express II																
Timber Cruiser	14	2	1,159	831	328	2,020	2,052	16.2%	21.8%	47	2.2	2.22	30	70		
Juggler Joe	15	2	1,192	764	428	2,776	2,816	15.4%	22.7%	87	5.5	5.60	30	170		
	16	2	826	808	17	224	225	7.8%	7.8%	33	0.2	0.17	30	10		
Four Pipes	17	2	1,190	718	471	2,716	2,762	17.4%	21.9%	171	10.7	10.86	30	330		
Sissor Bill	18	2	1,199	809	390	2,336	2,375	16.7%	24.3%	113	6.1	6.18	30	190		
Sour Dough Sam	19	2	1,279	1,189	90	824	831	10.9%	10.9%	105	2.0	2.01	30	60		
Downhill Musher	20	2	781	720	62	899	903	6.9%	6.9%	59	1.2	1.22	30	40		
Total Lift 5	7						11,963				27.9	28.27		870	1,630	
Lift 6 Prospector Handle Tow																
Lakeside Beginner Area	23	1	1,197	1,155	42	395	398	10.6%	10.6%	130	1.2	1.19	60	70		
Total Lift 6	1						398				1.2	1.19		70	60	
Lift 7 Prospector Conveyor Lift																
Lakeside Beginner Area	24	1	1,186	1,164	22	182	184	12.0%	12.0%	115	0.5	0.48	60	30		
Total Lift 7	1						184				0.5	0.48		30	30	
Lift 8 - High Speed Rope Tow																
High Speed Park	22	1	1,260	1,182	78	591	596	13.2%	12.0%	100	1.4	1.37	60	80		
Total Lift 8	1						596				1.4	1.37		80	140	
Total All Lifts	26						6.1 miles				86.9	88.6 Acres		2,460	4,150	

SKIER SKILL CLASSIFICATION

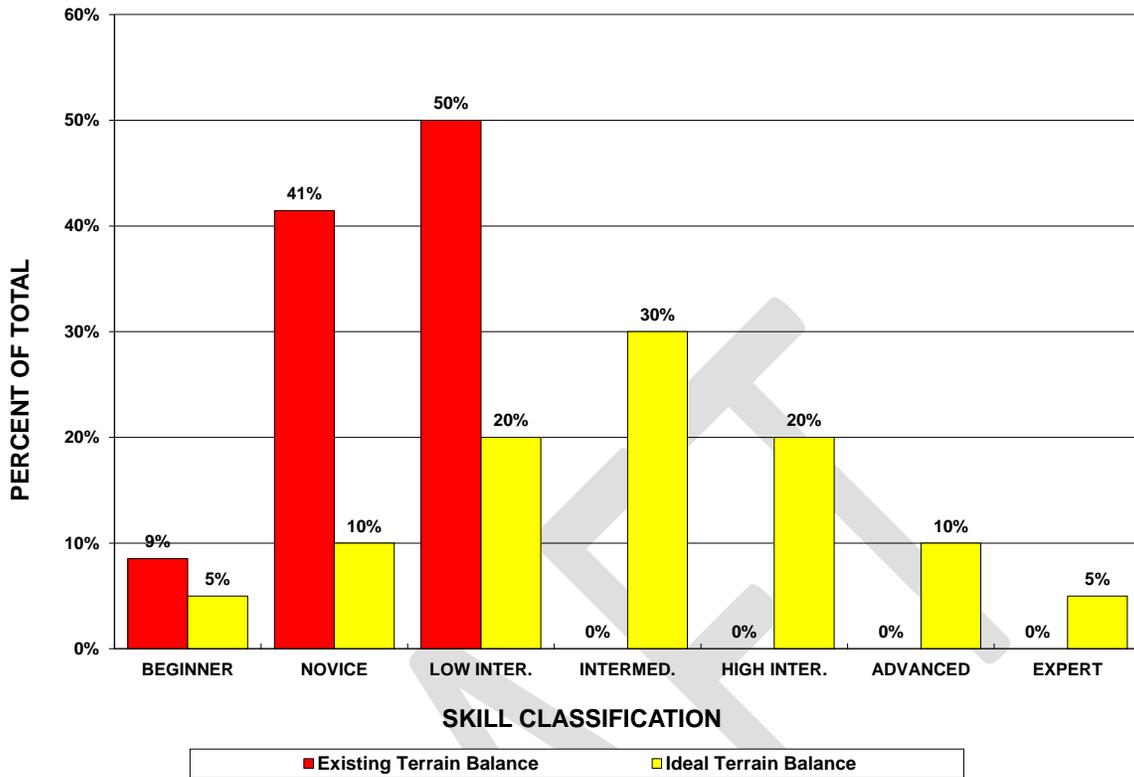


PLATE II.1

LIFT VS. TRAIL CAPACITY

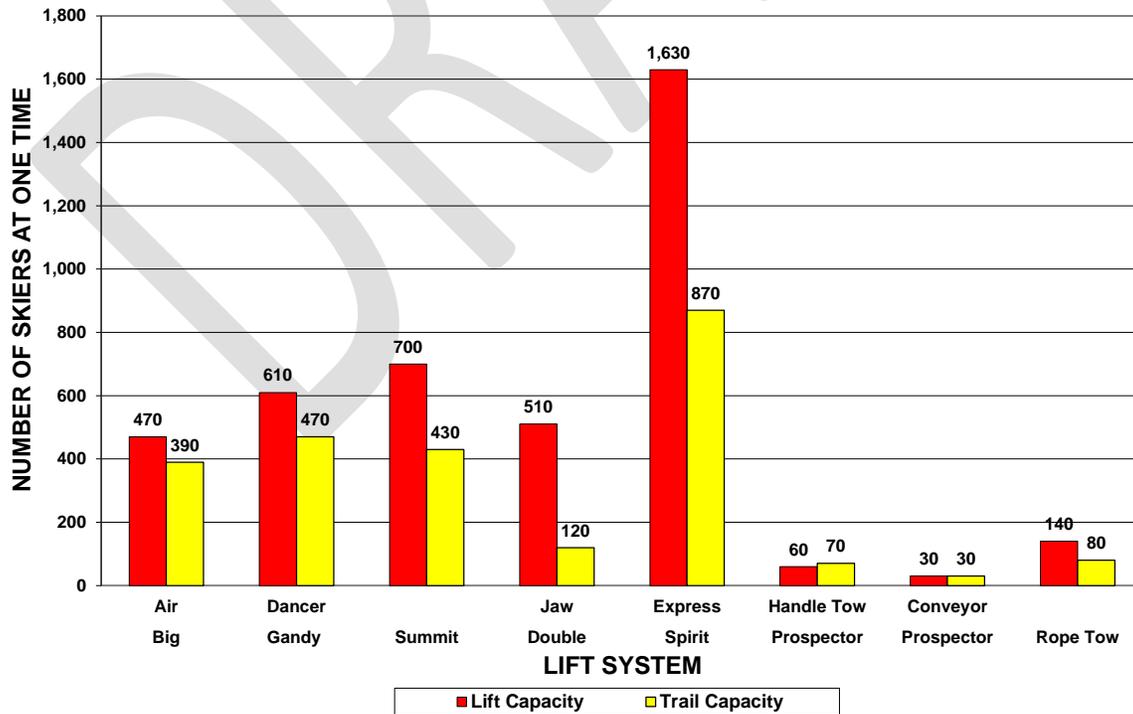


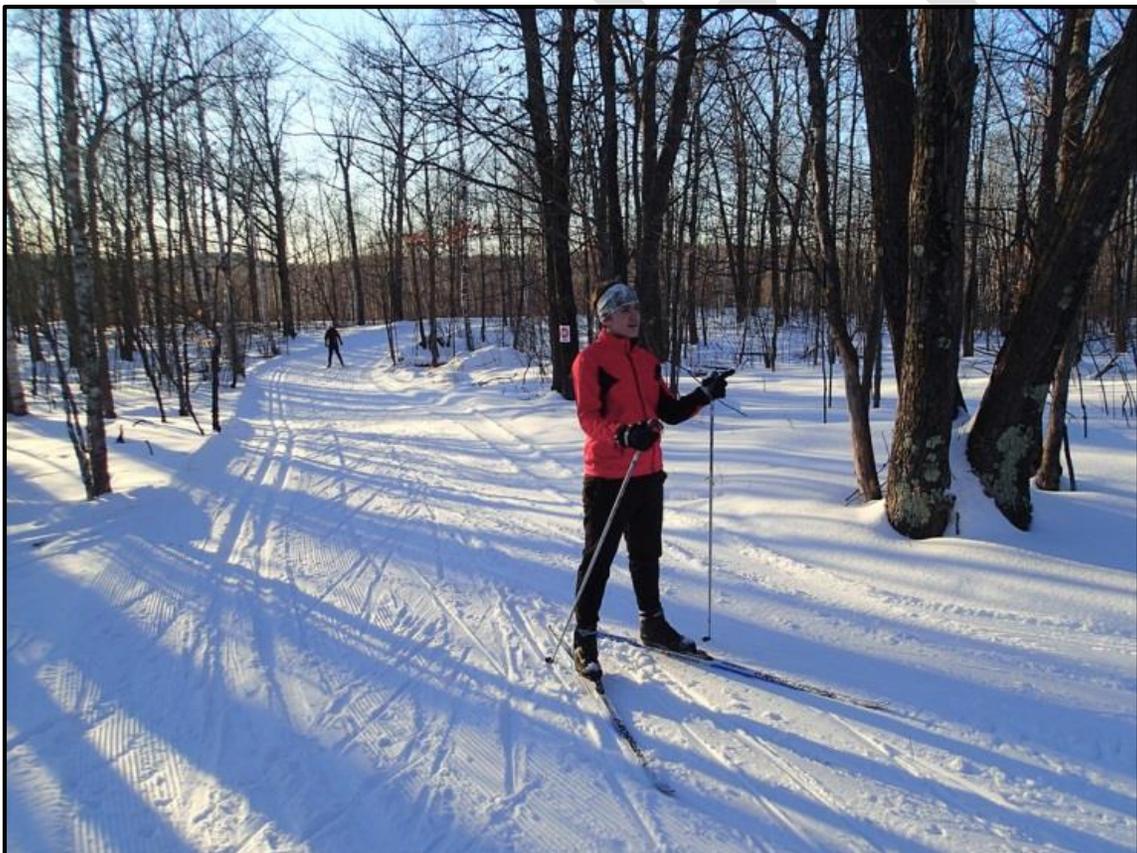
PLATE II.2



Terrain Parks at Spirit Mountain

Nordic Skiing

There are 13.7 miles of groomed cross-country trails at the top of Spirit Mountain in the wooded area surrounding the campground. The Spirit Mountain Nordic trails are groomed and maintained by the Duluth Cross-Country Ski Club (DXC). These trails are home to several high school Nordic ski teams. One of the campground buildings is used as a warming chalet and the campground parking area provides some parking; additional parking is available in Parking Lot P6. The proposed Phase 1 Grand Avenue Nordic Center consists of 2.0 miles of new illuminated ski trails with snowmaking on the lower mountain near the Grand Avenue Chalet. Phase 1 has been approved by the City of Duluth and fundraising is well underway. Phase 2 will provide a trail connecting these lower mountain trails with the existing upper mountain trails.



Cross-Country Skiing at Spirit Mountain

Snow Tubing

A 5-lane tubing park at the top of the mountain opened in 2011. The tubing area has its own tubing lift and the Spirit Mountain Adventure Park sprung structure provides tickets and washroom facilities. Parking is provided at the Adventure Park parking area (P7). When weather conditions are favorable, the Aerial Coaster also operates in conjunction with the tubing operation.



Spirit Mountain Tubing

Fat Tire Mountain Biking

Spirit Mountain introduced lift serviced winter fat tire biking in the 2015/16 ski season and were the first ski area in North America to do so. Fat biking was allowed on two of the groomed alpine trails and a few of the downhill mountain bike trails. On certain days, fat tire bikes are also allowed in the terrain park. Lift tickets and mandatory bike checks are available at the Grand Avenue Chalet. For the past two seasons, the mountain has hosted the Frosted Fatty, a weekend fat biking race event.



Fat Biking at Spirit Mountain



Skiers and Biker Sharing the Chairlift

Snowmobiling

There is an existing snowmobile loop on the east side of Knowlton Creek that extends from the Duluth Cross City Trail behind the Lake Superior Zoo and crosses the creek below the upper parking lot. This trail extends across Skyline Parkway and around the western perimeter of the SMRA to a trailhead in the Magney Snively Natural Area. Snowmobile parking is available in Lot P8 above Skyline Parkway. Since 1992, Spirit Mountain has hosted the opening event of the International Series of Champions' Championship SnoCross Series. Similar to ski cross, snocross for snowmobiles incorporates challenging natural and manmade terrain features in the race course. This event takes place on the upper mountain over Thanksgiving weekend and attracts high caliber racers and upwards of 30,000 fans.

.2 Summer Recreation Facilities

The existing summer recreation facilities at Spirit Mountain Recreation Area are illustrated on Figure 1b and include the following:

- Spirit Mountain Campground
- Spirit Mountain Adventure Park
- Spirit Mountain Bike Park – Downhill Trails and Skills Park
- Hiking Trails
- Cross-Country Biking Trails
- Disc Golf Course
- Various Summer Day Camp Programs for Children and Youth
- Weddings/Banquets

In 2015/16, summer activities made up 34% of total revenues for the SMRA. The two largest sources of summer revenue are the Adventure Park and the wedding/banquet business.

Spirit Mountain Campground

The campground is located in a wooded area above Skyline Parkway and consists of 73 individual campsites equipped with fire pits, picnic tables and electricity, as well as an area for walk-in tent camping. Thirty-nine of the sites have water hook-ups. Campground guests can purchase discounted tickets to the activities at the Adventure Park and a walking trail links the two facilities. The operator has stated that the campground is often fully booked during the peak summer season from mid-June to mid-September and they believe there is a market for additional sites.

An evaluation of the campground was not conducted for the 2017 Master Plan Update; however the 2008 Master Plan stated that the campground office and shower/washroom buildings were in poor condition and inadequate for the existing business levels.



Spirit Mountain Campground



Spirit Mountain Tent Camping Sites

Spirit Mountain Adventure Park

The Spirit Mountain Adventure Park was constructed following the completion of the 2008 Master Plan. Over the past eight years, a mountain coaster, zip line, mini-golf course and a jumping pillow have been added. The Adventure Park is supported by a small sprung structure that provides tickets, washrooms and a food concession. This building also supports the winter tubing operation. The Timber Twister aerial coaster descends on a 3,250-foot track that drops approximately 300 feet and then ascends back to the start. The Timber Flyer zip line drops 135 feet over a distance of approximately 700 feet. Riders can go solo or double on a bench seat complete with seatbelts. In addition to these two thrill rides, the Adventure Park also has a mini-golf course and a jumping pillow, which is a 30 by 60-foot in ground airbag. Participation in the activities can be purchased individually or as part of a package. The Spirit Express II chairlift also operates to provide transport for summer sightseeing. The Adventure Park is open to the public, and is also part of the summer day camp experience for children from 6 to 12 years of age. The Adventure Park can be rented out by private groups when it isn't open to the public.

Many other ski areas in the north-east and mid-west have added these types of facilities over the last 10 to 15 years to provide summer business. The key to a financially successful operation is to fine-tune the activity offering and the operating hours to meet the needs of the local and regional markets. Spirit Mountain's location just off I-35 makes the Adventure Park an easy stop for summer tourist traffic, provided there is sufficient signage and marketing to make the drive-by travelers aware of the offerings at SMRA. Over the past four years, the SMRAA management has been adjusting operating hours to more closely match with the demand for these activities and the Adventure Park is now only open on weekends in the shoulder seasons.



Timber Twister Aerial Coaster



Timber Flyer Zip Line



Jumping Pillow

Spirit Mountain Bike Park

The Spirit Mountain Express II chairlift was installed with downloading capacity for summer sightseeing, and hooks were added to the chairs to provide lift access for mountain biking. The bike park consists of 4 top to bottom gravity trails, with a few side trails and a skills park just above the Grand Avenue Chalet. The complete trail inventory is listed in Table II.3. There are a total of 4.8 miles of trails in the downhill bike park. On paper, the existing trail mix appears to be skewed towards beginner riders since two of the four full length trails are designated as easiest; however, with an average slope gradient of 8%, Spirit Mountain's "easy" trails tend to be more suitable for intermediate riders. Management has indicated that there is a need for a fun, flowing, novice trail, suitable for cross-country bikes to introduce more riders to downhill mountain biking. The split between flow and technical trails is 58%: 42%.

Since opening in 2013, the Spirit Mountain Bike Park has received high ratings for bike parks in the mid-west region. Peak ridership in the mid-summer is 150-200 riders/day. Like skiing, downhill mountain biking is an activity that draws repeat customers all season long. Throughout the peak summer months, the lift is scheduled to operate 5 days per week, weather permitting.

When the lift isn't operating and the trails are open, Happy Camper is designated as an ascent trail. Bike rentals are provided in the Grand Avenue Chalet and a variety of day and seasonal lesson packages are offered, as well as mountain bike day camps. The Spirit Mountain Bike Park hosts races and the downhill and enduro events for the annual 3-day Kraus-Anderson Bike Duluth Festival.



Spirit Mountain Bike Park



Kraus-Anderson Enduro Race at Spirit Mountain

**TABLE II.3
SPIRIT MOUNTAIN BIKE PARK TRAIL INVENTORY**

TRAIL TYPE: F = Flow, T = Technical

EASIEST	Top Elev. (ft)	Bot. Elev. (ft)	Vertical (ft)	Horiz. Length (ft)	Slope Gradient %	Slope Length (ft)	TRAIL TYPE
Sprung a Leak	1,281	1,210	71	771	9%	774	F
Candyland	1,210	791	419	5,366	8%	5,382	F
Happy Camper	1,210	809	401	5,152	8%	5,168	F
Skills Park - Beginner Bridge	765	740	25	323	8%	324	T
Skills Park - Beginner Rock	763	752	11	173	6%	173	T
Skills Park - Beginner Flow	765	740	25	360	7%	361	F
Subtotal Easiest			952	12,145	8%	12,182	48%
INTERMEDIATE	Top Elev. (ft)	Bot. Elev. (ft)	Vertical (ft)	Horiz. Length (ft)	Slope Gradient %	Slope Length (ft)	TRAIL TYPE
Smorgasbord	1,195	716	479	4,582	10%	4,607	T
Skills Park - Intermediate B Line	758	748	10	151	7%	151	F
Skills Park - Intermediate Jump	765	737	28	413	7%	414	T
Subtotal Intermediate			517	5,146	10%	5,172	20%
ADVANCED	Top Elev. (ft)	Bot. Elev. (ft)	Vertical (ft)	Horiz. Length (ft)	Slope Gradient %	Slope Length (ft)	TRAIL TYPE
Wrecking Ball	1,281	1,195	86	827	10%	831	T
Blaster	1,195	1,072	123	909	14%	917	T
Happy Camper - Thing 1	1,186	1,174	12	456	3%	456	F
Happy Camper - Thing 2	1,170	1,131	39	547	7%	548	F
Wild Cat	1,032	892	140	1,120	13%	1,129	F
Subtotal Advanced			400	3,859	10%	3,882	15%
EXPERT/PRO	Top Elev. (ft)	Bot. Elev. (ft)	Vertical (ft)	Horiz. Length (ft)	Slope Gradient %	Slope Length (ft)	TRAIL TYPE
Skills Park - Expert Jump Line	765	740	25	316	8%	317	F
Calculated Risk	1,195	770	425	3,504	12%	3,530	T
Boss Hog	865	809	56	480	12%	483	F
Subtotal Pro-line			506	4,300	12%	4,330	17%
TOTAL	Average Grade (%)	Total Vertical (ft)	Horiz. Length (ft)	Slope Gradient %	Slope Length (ft)	% of Total	
EASIEST	8%	952	12,145	8%	12,182	48%	
INTERMEDIATE	10%	517	5,146	10%	5,172	20%	
ADVANCED	10%	400	3,859	10%	3,882	15%	
EXPERT/PRO	12%	506	4,300	12%	4,330	17%	
TOTAL	9%		25,450		25,567		

Miles 4.84

Cross-Country Mountain Biking

The Duluth Traverse (DT) trail is a continuous, multi-use, natural surface trail envisioned to cross the entire City of Duluth and be suitable for all skill levels of mountain bikers. The DT will combine sections of existing trail with new trail sections. The existing Spirit Mountain Duluth Traverse trail extends from the end of North 80th Avenue West to the Grand Avenue Chalet over a distance of approximately 7,200 feet and is a single-track trail. Continuing south, it follows the abandoned Duluth Winnipeg Pacific (DWP) railway corridor to Gogebic Avenue. This section of the trail is the old railway bed and is also used by downhill bikers to return to the Spirit Express II lift from the bottom of the downhill bike trails. Cross-country mountain bikers are also permitted on the portion of the Superior Hiking Trail that connects the upper and lower parking lots, north of the lifts. While cross-country mountain bikers don't pay for trail access at Spirit Mountain, they do use the parking lots as a trailhead and take advantage of the food and beverage facilities when they are open.

Sightseeing and Hiking

From upper Spirit Mountain, there are good views over the Saint Louis River and western Duluth. The Spirit Express II chairlift is open for summer sightseeing 5 days a week from late June to early September, and on weekends in the fall.



View from Spirit Mountain

The Superior Hiking Trail (SHT) is a 310-mile long footpath that follows the ridgeline overlooking the north shore of Lake Superior from Jay Cooke State Park west of Duluth to just east of the Grand Portage Reservation near the Canada-US border. The trail is designated for hiking and walking and varies in elevation from 600 to 1,200 feet above sea level. The SHT traverses through the SMRA below the ski runs and there are spur trails connecting to the upper and lower base areas, as well as the campground and the USFS Superior National Forest Headquarters. The portion of the trail from the upper parking lot to the Grand Avenue parking lot is designated as multi-use.

Weddings/Banquets

The grass covered ski slopes in front of the Main Chalet with a view over the Saint Louis River makes a spectacular venue for weddings. Revenue from weddings and banquets was 11% of total revenues in 2015/16 and the wedding facility is booked summer weekends from May 1st to October for 2017. SMRA Management claims that the existing kitchen capacity of the Main Chalet limits the size of events they can accommodate and with a better kitchen, could attract larger and more lucrative events.

Disc Golf Course

The 18-hole Spirit Mountain Disc Golf Course is accessed from the Grand Avenue base via the Superior Hiking Trail. The course winds its way through the forest and onto open ski terrain. There is a fee to use the course and disc rental is available at the Grand Avenue Chalet.



Upper Portion of Disc Golf Course

.3 Day Visitor Parking and Base Area Staging Capacity

There is limited ski-in/ski-out accommodation at Spirit Mountain, so almost all guests are day visitors. The 14 Mountain Villa units contain 84 beds. Assuming an eighty percent bed occupancy rate on peak weekends and an eighty percent alpine skier participation rate, these beds would likely yield approximately 54 skiers. Most other guests arrive by private vehicle and park in one of the day visitor lots. Since Spirit Mountain is within the City, it is likely that some skiers are dropped off and picked up by private vehicles or taxis that don't park at the ski area. During the weekdays, there can be school groups that arrive by bus. There is also public bus service along Grand Avenue that skiers could use to access Spirit Mountain.

The existing parking lots are illustrated on Figures 1a and 1b and located at the upper mountain base (Main Chalet) and the Grand Avenue base (Grand Avenue Chalet). At Grand Avenue, there is a small paved lot with 48 stalls, a gravel area and a flat grassed area (P1). At the upper base area there are 7 different parking areas. The drop-off loop in front of the Main Chalet daylodge has some short term parking (P2) and there is additional roadside parking in front of the beginner area (P3). The main upper parking lot (P4) is located north of the daylodge and is terraced, resulting in a less than efficient spacing of cars, as illustrated below.



Upper Base Main Parking Lot (P4)

Further north, the near end of the overflow lot (P5) is 1,490 feet away from the end of the Main Chalet. Generally, we assume that a comfortable skier walking distance (SWD) is 1,500 feet over level ground based on the distance someone walking in ski boots and carrying ski equipment can comfortably walk in 10 minutes. This comfortable skier walking distance is a major determining factor for the location of the daylodge and parking in relation to the lifts. For a ski area to be pedestrian friendly, all parking should be within SWD of the ticket windows and lifts. Therefore, most of the overflow lot is beyond comfortable skier walking distance of the Main Chalet but is not too far for season pass holders who want to go straight to the Big Air lift and trails. The upper overflow lot (P6) is closer to the daylodge but guests must walk uphill at the end of the day to return to it. The Adventure Center parking area (P7) is used for the tubing park and by Nordic skiers. The most remote lot (P8) is used by snowmobilers.

Experience at other resorts has shown that if attendants are used to manage the parking of incoming vehicles, stadium parking densities of up to 150 cars per acre can be achieved on unmarked gravel lots. However, without aggressive management, people tend to park further apart, resulting in much lower parking densities, typically around 100 cars per acre or less. Assuming 100 cars per acre on the gravel lots, the total number of parking stalls available in the existing lots is approximately 1,390, as shown in Table II.4. If parking attendants were used to control closer spacing, this could be increased to approximately 1,920 stalls.

Typically, the average incoming vehicle occupancy rates at ski areas range from 2.0 to 3.0 people per car. Vehicle occupancy studies at other ski areas have shown that as the distance traveled to the ski area increases, the average vehicle occupancy rate also increases. Since Spirit Mountain is predominantly a local area, we have estimated the capacity of the lots to provide skiers to the area at an average of 2.5 people per vehicle. In addition to skiers, employees and other visitors use the parking lots. For the lots closest to skiing, we have assumed 90% of the users are skiers. Based on these assumptions, the capacity of the existing parking lots at Spirit Mountain is approximately 2,585 skiers without parking attendants, as shown in Table II.4. With the use of parking attendants, another 1,155 skiers could be accommodated, bringing the total potential of the parking lots to supply skiers to 3,740.

**TABLE II.4
EXISTING DAY SKIER PARKING LOT CAPACITY**

Lot Number	Location Description	Primary User Group	Area (acres)	Number of Stalls¹	People Per Car	Guests	% Skier Cars	Number of Skiers
P1a	Grand Ave. Chalet - Paved	Skiers	0.85	48	2.5	120	90%	108
P1b	Grand Ave. Chalet - Gravel	Skiers	0.68	68	2.5	169	90%	152
P1c	Grand Ave. Chalet - Grass	Skiers	1.39	139	2.5	347	90%	312
P2 ²	Main Chalet Drop-Off	Skiers	0.22	46	2.5	115	90%	104
P3 ³	Main Chalet Beginner	Skiers	0.31	59	2.5	149	90%	134
P4	Upper Main Lot	Skiers	4.78	478	2.5	1,195	90%	1,076
P5	Upper Overflow Lot	Skiers	2.49	249	2.5	623	90%	560
P6	Main Chalet - Overflow	Skiers/Nordic	0.99	99	2.5	248	50%	124
P7	Tubing Park	Tubing/Nordic	0.54	66	3.0	198	0%	-
P8	Above Skyline Parkway	Snowmobilers	1.28	85	2.0	171	0%	-
			13.52	1,337		3,333		2,569

Notes:

1. Cars per acre on unpaved, unmarked lots estimated at 100 assuming no parking attendants.
2. Parallel parking around main chalet drop off loop perimeter is approximately 530' / 22' per stall = 24 cars.
3. Roadside nose in parking in front of beginner area - 284' of roadway / 10' per stall = 28 cars.

Base Area Staging Capacity

The purpose of the base area staging capacity analysis is to estimate the number of skiers the base area can supply to the mountain during periods of peak occupancy. For this process, skiers are divided into two groups: “Day Skiers” who are skiers that originate from outside the area and are coming to ski for one day, and “Overnight Skiers” who are skiers generated from accommodation within the resort. Overnight Skiers are further divided into those staying in ski-in/ski-out accommodation close to the lift bases and those who must drive or take public transportation to get to the ski lifts. The base area capacity is the sum of the number of skiers who come from accommodation within walking distance of the lifts, plus the number of skiers that can be supplied to the resort from the available day skier parking within walking distance of the lifts and from public transportation and private shuttle bus systems. If overnight skiers use their cars to get to the lifts, there will be less parking available for day skiers from outside the resort.

Table II.5 summarizes the theoretical capacity of Spirit Mountain’s existing base area accommodation and parking to supply skiers to the staging lifts. This capacity was calculated using the assumptions for parking, accommodation occupancy and skier participation rates presented above.

As shown in Table II.5, the existing beds at Spirit Mountain located within skier walking distance to the ski lifts (Mountain Villas only) have the capacity to supply an estimated 54 overnight skiers. The existing day skier car and parking and private vehicle drop-off can supply between 2,569 and 3,717 skiers, depending on which lots use parking attendants. Therefore, the theoretical base capacity ranges from approximately 2,723 to 3,871 skiers.

**TABLE II.5
EXISTING BASE AREA STAGING CAPACITY**

Base Area Staging Capacity	Units	Beds	Guests	Skiers	
Skiers from Mountain Villas ¹	14	84	67	54	
Skiers Dropped Off by Private Vehicle/Shuttle (Estimate)				100	
Skiers from Parking				Parking Attendants	
				No 2,569	Yes 3,717
Total Skiers				2,723	3,871

1. Assuming 80% bed occupancy and 80% skier participation

The existing mountain lift capacity is 4,150 skiers at one time. *Therefore, the existing parking supply could be a limiting factor in reaching full utilization of the ski facility.*

However, there do not seem to be reports of the parking lots overflowing on busy days or people being turned away due to lack of parking capacity. If the lots are not regularly full, then current business levels are likely less than the actual lift capacity of the mountain.

SMRA management introduced scanning of season passes for the 2016/17 ski season, making this the first season that an accurate count of the number of skiers on the hill per day has been able to be determined. Previously, season pass use was estimated. The new system was working accurately after New Year's. The skier visit counts for the 7 busiest days, excluding the Christmas holidays, are listed in Table II.6. This season, the total skiers per day are less than the ski area's lift or trail capacity, even on the busiest days.

**TABLE II.6
BUSIEST DAY SKIER VISITS
2016/17 SKI SEASON**

Date		Day Tickets Sold	Season Pass Scans	Total Skiers
Thursday	26-Jan-17	1,103	163	1,266
Saturday	28-Jan-17	1,050	206	1,256
Monday	30-Jan-17	1,229	296	1,525
Tuesday	31-Jan-17	1,530	147	1,677
Tuesday	7-Feb-17	1,765	265	2,030
Saturday	18-Feb-17	1,065	94	1,159
Saturday	4-Mar-17	1,040	340	1,380
Average		1,255	216	1,470

.4 Buildings

A review of the buildings was not included in the scope of this project. The comments below are carried forward from the 2008 Master Plan. Ecosign is not aware of any significant upgrades to any of the buildings in the past nine years, other than the construction of the new Grand Avenue Chalet and the installation of the Sprung Structure at the Spirit Mountain Adventure Park. Both these new facilities will have eased crowding issues in the Main Chalet and improved the guest experience. However, the need to operate additional facilities will have increased the annual operating costs and provided some duplication of facilities (tickets, food and beverage, washrooms, rentals) resulting in operational inefficiencies.

Upper Mountain Daylodge (Main Chalet)

- The 40+ year old daylodge of wood frame construction has a significant amount of deferred maintenance, particularly the building exterior/envelope and interior mechanical systems including washrooms.
- Due to several additions over time, the layout is long and linear, resulting in less than efficient space use.
- Functional conflicts exist due to multiple entrances. The main skier entrance conflicts with the directly adjacent Shipping/Receiving and Trash/Refuse area.
- The food service preparation location is not convenient to the spaces it serves.
- Remodeling and reconfiguring the existing structure is deemed more fiscally viable and appropriate than building new.

- Improved external and internal flow will make the ski area more attractive to retain and expand current markets.
- Improved flow is needed to increase the capacity and efficiencies and reduce costs for catering/events.
- New food service preparation kitchen, ideally located within the chalet, is critical to the building function and success.



Main Chalet Daylodge from Lower Side

Campground Buildings

- The Campground control/Nordic building is old and not conveniently located. The Nordic parking area is inadequate.
- Campground shower buildings are old; one is located in a low lying area with possible drainage issues, and neither meet functional requirements due to inadequate amount of toilet fixtures and showers.

Maintenance Building

- The maintenance building has significant deferred maintenance requirements, does not meet current space needs, and is inconveniently located in the middle of ski runs without direct road access.
- These conditions do not necessarily impact revenues, but, they detract from the overall functionality of the facility and contribute to a sense of an older, resource-strapped operation.

Grand Avenue Chalet

This new building opened in February 2013 and provides a restaurant and bar, tickets, rentals, and washrooms. The new facility is making the lower base more attractive for local residents and other users during the ski season and the paved parking and gravel parking areas are often full, causing people to park on the grassed area. The mountain bike activities are run from this lodge; in winter, tickets and bike checks for fat biking are available at Grand Avenue. During the summer, bike park tickets, rentals and lessons are purchased here. The Grand Avenue Chalet can also be booked for meetings and special events, outside of normal operating areas. The Grand Avenue Nordic Center will introduce a new user group to the Grand Avenue base area.



Grand Avenue Chalet



Grand Avenue Chalet Great Room

Adventure Park Sprung Structure

Located at the edge of the Adventure Park parking lot, the approximately 1,600 ft² Sprung Structure provides tickets, washrooms and a small food and beverage facility to service the Adventure Park and the Tubing Center.

Skier Service Space

Skier service facilities are those which provide functions specifically related to the operation and management of the ski area. For planning purposes, these services can generally be broken down into three distinct categories:

Staging Facilities - those services that are required as skiers arrive at the area including ticket sales, public lockers, equipment rental and repair, ski school check-in and daycare, and are located in the base areas. These services should be sized in relation to the number of skiers staging through each base area.

Commercial Facilities - those services required throughout the day as skiers are on the mountain and during après-ski hours including food and bar seating, kitchen and serving areas, restrooms and accessory retail space. Restaurant seats should be planned relative to the number of skiers circulating in the vicinity of the proposed

restaurant sites. Kitchens and restrooms must be sized in proportion to the amount of seating proposed for each restaurant.

Operational Facilities - those services not directly required by skiers but which are essential for the day-to-day operation of the ski area and include “back of the house” services such as administration space, employee lockers and ski patrol facilities. These facilities can be located both on the mountain and in the base areas.

The Main Chalet and the Grand Avenue Chalet provide the necessary skier services (tickets, rentals, washrooms, food and beverage etc.) for Spirit Mountain. We have updated the inventory and skier service space use analysis in the 2008 Master Plan to include the new Grand Avenue Chalet. The existing skier service space inventory is listed in Table II.7. The Main Chalet provides 50,405 ft² and the Grand Avenue Chalet is 15,100 ft², for a total of 65,505 ft².

**TABLE II.7
SKIER SERVICE SPACE INVENTORY**

Skier Service Function	Main Chalet (ft²)	Grand Avenue (ft²)	Total Skier Services (ft²)
Staging Facilities			
Ticket Sales	575	50	625
Public Lockers	1,978		1,978
Equipment & Repair	6,097	1,846	7,943
Guest Services/Ski School	760	150	910
Children's Programs	1,514		1,514
Subtotal Staging	10,924	2,046	12,970
Commercial Facilities			
Food Service Seating	9,964	3,498	13,462
Kitchen & Scramble	3,478	1,215	4,693
Bar/Lounge	3,036	1,167	4,203
Restrooms	1,627	584	2,211
Accessory/Retail Sales	877	93	970
Subtotal Commercial	18,982	6,557	25,539
Operational Facilities			
Administration	1,448	200	1,648
Employee Facilities	1,033		1,033
First Aid & Ski Patrol	334	402	736
Subtotal Operational	2,815	602	3,417
Total Functional Space	32,721	9,205	41,926
Storage @ 10%	1,537	933	2,470
Circ./Walls/Waste/Mech.	16,147	4,962	21,109
TOTAL GROSS FLOOR AREA	50,405	15,100	65,505

Skier Service Floor Space Analysis

Table II.9, the Existing Skier Service Space Use Analysis compares the existing skier service space at Spirit Mountain Resort with Ecosign's average industry planning standards for North American ski resorts. These standards have been developed over several years and incorporate data from day ski area and regional and destination resorts in North America, and are used as a benchmark to evaluate the existing services provided at Spirit Mountain. The planning standards establish a recommended amount of floorspace for each function based on a designated level of business and the type of area. It is not necessary to build the skier service spaces large enough to service the peak day, since that level may only be achieved once or twice per season. Ecosign's planning standards and the standards we propose using for Spirit Mountain are outlined in Table II.8. For the most part, we believe Spirit Mountain is a typical local day ski area; most customers are either from the local area or day trippers. However, since Spirit attracts a high proportion of novice and beginner skiers who both rent equipment and take lessons, we have used triple the day skier space standard for rentals and double the day skier standard for guest services/ski school. For food service seating, kitchen and washroom space, we have based the space requirements on an average of 3 turns per seat since beginner and novice skiers take longer lunches and tend to spend more time in the lodge.

Typically, we select a "Design Day" that is 15-25% lower than the anticipated peak business level, which should be adequate for most days of the year. During peak holiday periods, the facilities will be busier than customers would prefer which is acceptable on the 5 -10 busiest days of the season. On the busiest days, the lunch period can extend over a longer duration allowing the food operation to experience more turns per seat, than the normal 2.5 to 3.5 turns per seat. However, if the facilities are overcrowded on most weekends, the customers may choose to switch to another ski area that is less crowded. This Space Use Analysis has been carried out assuming a design day of 3,110 skiers, which is approximately 75% of the existing Skier Carrying Capacity of the lifts. Table II.9 lists the Space Use Analysis. The existing floorspace per skier is compared with the recommended floorspace per skier. Since we don't know actual current peak business levels, it is also worth looking at the column "Theoretical Skiers Served" which indicates the existing theoretical capacity for each of the functions.

**TABLE II.8
SKIER SERVICE SPACE RECOMMENDATIONS**

Skier Service Function	Day Ski Area (ft²)	Average (ft²)	Resort Area (ft²)	Recomm. Spirit Mtn (ft²)
Staging Facilities				
Ticket Sales	0.10	0.13	0.15	0.10
Public Lockers	0.70	0.95	1.20	0.70
Equipment & Repair	0.80	0.90	1.00	2.40
Guest Services/Ski School	0.25	0.38	0.50	0.50
Children's Programs	0.35	0.43	0.50	0.43
Subtotal Staging	2.20	2.78	3.35	4.13
Commercial Facilities				
Food Service Seating	3.00	3.50	4.00	4.00
Kitchen & Scramble	1.50	1.75	2.00	2.00
Bar/Lounge	0.50	0.75	1.00	0.50
Restrooms	0.75	0.88	1.00	1.00
Accessory/Retail Sales	0.40	0.58	0.75	0.40
Subtotal Commercial	6.15	7.45	8.75	7.90
Operational Facilities				
Administration	0.60	0.80	1.00	0.60
Employee Facilities	0.30	0.40	0.50	0.30
First Aid & Ski Patrol	0.25	0.30	0.35	0.25
Subtotal Operational	1.15	1.50	1.85	1.15
Total Functional Space	9.50	11.73	13.95	13.18
Storage @ 10%	0.95	1.17	1.40	1.32
Circ./Walls/Waste/Mech. @ 20%	1.90	2.35	2.79	2.64
TOTAL GROSS FLOOR AREA	12.35	15.24	18.14	17.13
<i>Estimated Floorspace per Seat</i>	<i>12.00</i>	<i>12.00</i>	<i>12.00</i>	<i>12.00</i>
<i>Turns per Seat</i>	<i>4.0</i>	<i>3.5</i>	<i>3.0</i>	<i>4.0</i>

NOTES:

- 1. Equipment rental and repair based on triple the day ski area requirement due to high proportion of novice skiers.*
- 2. Requirement for Ski School/Guest Services Space is double the day ski area standard due to the high proportion of skiers taking lessons.*

In terms of total functional space, there appears to be sufficient built space at Spirit Mountain to service the design day of 3,110 skiers. However, there are some areas where there may be too little space and others where there could be too much. Space for ticket sales appears to be high, however, because of the two base areas some duplication of space is required. While guest service/ski school space appears to be low, when combined with children's space, the two functions, which are related, together have sufficient space. In terms of commercial space, while there is sufficient seating and more than enough bar space, the space for kitchens and washrooms is low, which is consistent with comments from SMRA management about the deficiencies in the Main Chalet. The significant excess in circulation, mechanical, walls/waste reflects the inefficient layout of the Main Chalet.

The Spirit Mountain Space Use Analysis is summarized below in Table II.9

**TABLE II.9
SKIER SPACE USE ANALYSIS**

Skier Carrying Capacity 4,150
Design Day at 75% of SCC 3,110

Skier Service Function	Existing Skier Services (ft²)	Existing Space per Skier (ft²)	Recomm. Space per Skier (ft²)	Theoretical Skiers Served
Staging Facilities				
Ticket Sales	625	0.20	0.10	6,250
Public Lockers	1,978	0.64	0.70	2,826
Equipment & Repair	7,943	2.55	2.40	3,310
Guest Services/Ski School	910	0.29	0.50	1,820
Children's Programs	1,514	0.49	0.43	3,562
Subtotal Staging	12,970	4.17	4.13	3,144
Commercial Facilities				
Food Service Seating	13,462	4.33	4.00	3,366
Kitchen & Scramble	4,693	1.51	2.00	2,347
Bar/Lounge	4,203	1.35	0.50	8,406
Restrooms	2,211	0.71	1.00	2,211
Accessory/Retail Sales	970	0.31	0.40	2,425
Subtotal Commercial	25,539	8.21	7.90	3,233
Operational Facilities				
Administration	1,648	0.53	0.60	2,747
Employee Facilities	1,033	0.33	0.30	3,443
First Aid & Ski Patrol	736	0.24	0.25	2,944
Subtotal Operational	3,417	1.10	1.15	2,971
Total Functional Space	41,926	13.48	13.18	3,182
Storage @ 10%	2,470	0.79	1.32	1,875
Circ./Walls/Waste/Mech.	21,109	6.79	2.64	8,011
TOTAL GROSS FLOOR AREA	65,505	21.06	17.13	3,825



View from Above

SKIER SERVICE SPACE ANALYSIS

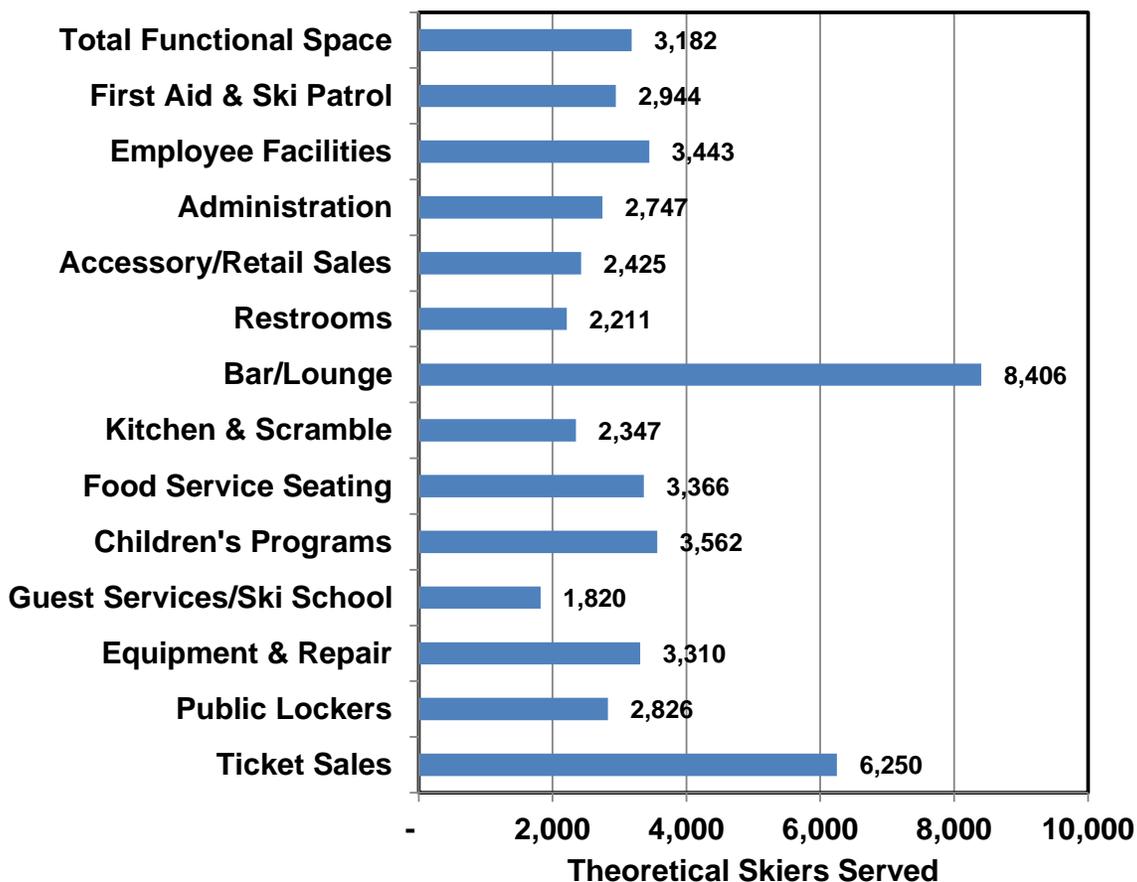


PLATE II.1

The total number of food service seats in the Main Chalet was documented in 2008. With the addition of the Grand Avenue Chalet, the facility now contains 1,125 indoor seats that can be used for food service seating. Assuming, an average of 3 turns per seat for the cafeteria and brown bag seating and 2.5 turns per seat for the restaurant areas, the existing seating is capable of providing lunch for approximately 3,190 guests during a typical 2 to 2.5 hour lunch period. Table II.10 summarizes the Spirit Mountain Food Service Seating.

**TABLE II.10
FOOD SERVICE SEATING**

Food Service Seating	Indoor Seats	Turns per Seat	Guests Served
Main Booting Areas	375	3.0	1,125
Picnic Lunch Area	155	3.0	465
Mountaintop Grill	120	3.0	360
Moosehead Saloon	140	2.5	350
Fireside Lounge	70	2.0	140
Eagles Nest Mezzanine	50	2.5	125
Subtotal Upper Chalet	910		2,565
Grand Avenue Chalet			
Restaurant/Bar	40	2.5	100
Great Room/Cafeteria	175	3.0	525
Subtotal Grand Avenue	215		625
TOTAL	1,125		3,190

.5 Area Facilities Balance

In the previous sections, we prepared an inventory of many of the existing facilities for the SMRA operation. For the ski facility, we have calculated the “Skiers At One Time” capacity of the following operational elements: lifts, trails, and staging capacity which is essentially parking and skiers dropped off by transit or private vehicle, as well as skier services. We have prepared a graphic representation of the overall balance of these facilities, as shown in Plate II.4. To easily compare these facilities, all capacities have been calculated in terms of the number of skiers that can be accommodated on the site at one time.

At most ski areas, the lift system capacity is the governing factor which determines the Skier Carrying Capacity (SCC) in terms of Skiers At One Time (SAOT). Other facilities such as ski trails and skier service space are not logistically limiting factors with respect to the carrying capacity of the resort but can be underutilized or over crowded based on their capacity when compared to the lift system’s SAOT. The staging capacity should be equal to, or greater than the lift capacity for a ski area to reach the Skier Carrying Capacity. As previously stated, at Spirit Mountain the staging capacity (number of skiers from parking stalls) appears to be lower than the lift capacity. Business levels for the past two seasons have been low due to the unpredictability of the snow conditions. Over time, as additional user groups are drawn to the area in the winter, there will be a greater demand for parking.

Since there is very little opportunity to increase the trail capacity within the existing lift serviced area, the replacement plan for the aging lifts should attempt to more closely balance lift and trail capacity to provide a more pleasant on-hill experience. Skier services and food service seating are adequate to accommodate between 3,180 and 3,225 skiers at one time, which is significantly higher than the existing business levels.

AREA FACILITIES BALANCE

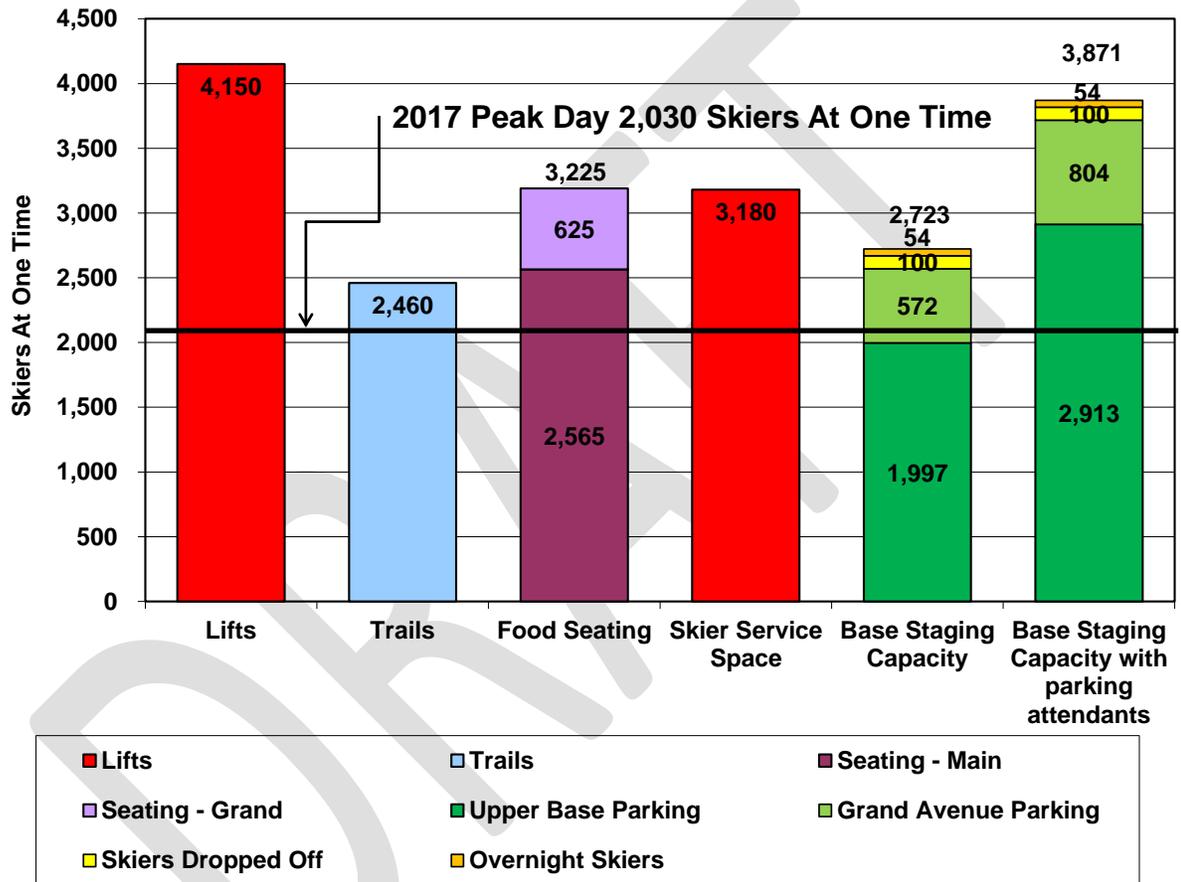


PLATE II.4

III. ALPINE SKI AREA MARKET ASSESSMENT

.1 Classification of Winter Sport Sites

The alpine ski industry utilizes a system of classification to document and predict present utilization of, and demand for, winter sports recreational areas. It is important to classify winter resorts to document their market characteristics. Proper classification can reasonably determine whereby winter sports sites are either competitive or complimentary with one another. Winter sports areas generally fall into one of the following classifications:

- a) Community Facility
- b) Regional Facility
- c) Destination Facility

The following section is a list of the site and infrastructure characteristics common to each of the above classifications.

a) Community Facility

A Community facility is an area that has approximately 500 feet or less vertical drop and a ski trail area of less than 100 acres. Rope tow, handle lifts or small T-bars are the normal lift services that cater mainly to the local population.

b) Regional Facility

A Regional facility is an area with 500 to 2,000 feet vertical drop, ski trail area of less than 200 acres and trails serviced by rope tows, handle lifts, T-bars and chairlifts. These ski areas will draw from a larger area, as skiers are more willing to travel to get to the larger facility. This type of area could have some weekend accommodation demand, but would not have any significant ski vacation package business. Mid-week skiers normally are local or regional visitors.

c) Destination Facility

A Destination facility typically has 2,000 feet or more vertical drop, three or more chairlifts and a total skiable area of more than 200 acres. These areas have sufficient facilities, both on and off the mountain, to make the area attractive for vacation and mid-week skiers. The majority of visitors on ski week packages would arrive by automobile from within a 5-hour distance or by airplane and automobile.

Spirit Mountain is essentially a Community ski and recreational facility; however because of the vertical drop and the number of chairlifts, it also functions as a Regional ski facility attracting some overnight visitors particularly on weekends and holidays. Within the local (2-hour drive) market, there are six other operating alpine ski areas including Chester Bowl, Mont du Lac Recreation Area, Giants Ridge, Mount Ashwabay, Lutsen Mountains and Wild Mountain. The Regional market (within approximately a 5-hour drive) encompasses a large area. Within the Regional market, there are currently 17 downhill skiing operations. Competitive ski areas in the Regional market offer a wide variety of facilities and include several major Regional/Destination resorts. Table III.1 provides a comparison of Spirit Mountain to the ski areas operating within the local and regional markets. For comparison purposes, we have included information such as vertical drop, hourly capacity, number of lifts, difficulty of terrain, ticket prices, etc. Plates III.1 and III.2 graphically illustrate the vertical drop and hourly capacity comparisons. *Some of the data for these tables was collected from information on the ski areas' websites, so may not be accurate. It is not uncommon for ski areas to overstate their vertical drop and/or skiable terrain for marketing purposes.*

Based on the data collected, Spirit Mountain has the second largest vertical drop in the Local market; only the Lutsen Mountains Resort has a larger vertical drop. Of the three Local areas that could be classified as Regional, Spirit Mountain is located closest to the large population center of Minneapolis/St. Paul. There are however; larger areas in Michigan's Upper Peninsula that are also within driving distance of Minneapolis for a long weekend or mid-week vacation. The adult lift ticket rate for Spirit Mountain seems in line with the competition.

**TABLE III.1
SPIRIT MOUNTAIN - COMPETITIVE WINTER RESORT AREAS**

	LOCAL MARKET						
SKI AREA	Spirit Mountain, MN	Chester Bowl, MN	Mont du Lac Recreation, WI	Giants Ridge, MN	Mount Ashwabay, WI	Lutsen Mountains, MN	Wild Mountain, MN
Nearest Town	Duluth	Duluth	Superior, Wisconsin	Biwabik	Bayfield, WI	Lutsen	Taylor's Falls
Distance to Nearest Town (miles)	9.2	3	13	5.4	5	3.3	7
Distance to Duluth (miles)	9.2	3	15	66	84	92	124
Drive time to Duluth	17 min.	10 min.	26 min.	1 hr. 20 min.	1 hr. 40 min.	1 hr. 50 min.	2 hrs.
Nearest Major City	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul
Distance to Nearest Major City	150	157	143	202	236	248	58
Drive time to Nearest Major City	2.5 hrs.	2 hrs. 30 min.	2 hrs. 15 min.	3 hrs.	3 hrs. 50 min.	4 hrs.	1 hr. 5 min.
Top Elevation (feet)	1284	875	917	1,972	1,286	1,913	1,112
Base Elevation (feet)	720	700	617	1,472	963	1,088	812
Vertical Drop (feet)	564	175	300	500	323	825	300
Skiable Terrain (acres)	88	117	55	202	65	986	100
Longest Run (feet or miles)	5,400 feet	1,000 feet	3,000 feet	4,000 feet	1,500 feet	2.5 miles	1 mile
Number of Trails	22	4	12	35	11	95	27
Number of Gondolas	-	-	-	-	-	1 - D8G	-
Number and Type of Chairlifts	1 - D4C, 1 - 4C, 2-3C, 1 - 2C	1 - 2C	1 - 2C	2 - 3C, 3 - 2C	1 - 2C	1 - D6C, 1 - 3C, 4 - 2C	4 - 4C
Surface Lifts	1MC, 1 HT, RT	-	RT, HT	T-BAR	RT	MC	4 RT
Hourly Capacity (pph)	10,712	960	2,500	7,000	1,500	10,000	11,000
Beginner Terrain	47%	40%	33%	25%	40%	18%	30%
Intermediate Terrain	53%	60%	34%	50%	35%	51%	33%
Advanced Terrain	0%	0%	33%	25%	25%	31%	37%
Terrain Park	2	N	Y	Y	Y	Y	4
Snowshoeing	N	N	N	Y	Y	Y	N
Cross-Country Skiing	Y	Y	N	Y	Y	Y	N
Tubing	Y	N	Y	Y	Y	N	Y
Night Skiing	Y	Y	Y	Y	Y	Y	Y
On-Mountain Restaurants	Y	Y	Y	Y	Y	Y	Y
Snowmaking Coverage (% of trails)	100%	100%	100%	100	75%	Y, 231 acres	100%
Ski Area Type Classification	R	L	L	R	L	R	L
2015/16 Ticket Price (top adult) w/o tax	\$49.00	\$6.00	\$39.99	\$54.00	\$24.00	\$82.00	\$43.00
Summer Activities	Adventure Park, Mt. Biking, Alpine Slide, Zip Line, Mini Golf, Jumping Pillow, Hiking, Disc Golf, Campground, Youth Camps, Scenic Chair Lift Rides	Hiking, Fishing, Concerts, Youth Camps, Soccer	Disc Golf, Mtn. Biking, Archery, Kids Camps	Golf, hiking, biking, lakes, disc golf Climbing Wall, Mtn. Biking, Children's Playground	Mountain Biking, Concerts	Alpine Slide, Voyageur Canoe Tours, Hiking	Waterpark, Alpine Slides, Go-Karts, Freerfall XP, Boat Tours and water sports, RV & Camping

D8G - 8 Passenger Gondola, D4C- 4 Passenger Detachable Chair, D6C- 6 Passenger Detachable Chair Fixed Grip Chairs - 4C-Quad, 3C-Triple, 2C-Double, MC-Magic Carpet Conveyor, TB-T-Bar, R-Rope Tow, HT-Handle Tow, P-Platter
Sources: Minnesota Ski Areas Association, Ski Area Websites, SkiTown.com, Google Maps

**TABLE III.1 CONT.
SPIRIT MOUNTAIN - COMPETITIVE WINTER RESORT AREAS**

SKI AREA	REGIONAL MARKET								
	Whitecap Mountains, WI	Indianhead Mountain, MN	Big Powderhorn, MI	Blackjack Mountain MI	Mount Ski Gull, MN	Trollhaugen Ski Area, WI	Powder Ridge, MN	Hyland, MN	Buena Vista, MN
Nearest Town	Hurley/Ironwood	Wakefield, MI	Bessemer	Bessemer, MI	Nisswa	Dresser, WI	Kimball	Bloomington	Bemidji
Distance to Nearest Town (miles)	11.5	3	4	5	10	1	3	5.6	12
Distance to Duluth (miles)	107	119	115	119	133	134	163	167	168
Drive time to Duluth	2 hrs. 10 min.	2 hrs. 20 min.	2 hrs. 10 min.	2 hrs. 20 min.	2 hrs. 25 min.	2 hrs. 15 min.	2 hrs. 50 min.	2 hrs. 30 min.	3 hrs.
Nearest Major City	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul
Distance to Nearest Major City	218	240	233	240	148	54	76	15	237
Drive time to Nearest Major City	4 hrs.	4 hrs. 30 min.	4 hrs. 20 min.	4 hrs. 30 min.	2 hrs. 40 min.	1 hr.	1 hr. 23 min.	25 min.	4 hrs. 10 min.
Top Elevation (feet)	1,750	1,935	1,200	1,650	1,515	1,200	1,460	1,075	1,510
Base Elevation (feet)	1,350	1,297	600	1,185	1,285	940	1,170	900	1,280
Vertical Drop (feet)	400	638	600	465	230	260	290	175	230
Skiable Terrain (acres)	500	238	253	140	under 100	90	68	35	30
Longest Run (feet or miles)	5,280 feet	5,280 feet	5,280 feet	5,300 feet	700 feet	2,500 feet	1,600 feet	2,000 feet	2,000 feet
Number of Trails	43	30	33	26	12	23	15	14	16
Number of Gondolas	-	-	-	-	-	-	-	-	-
Number and Type of Chairlifts	1 - 4C, 4 - 2C	1 - 4C, 1 - 3C, 3 - 2C	9 - 2C	4 - 2C	1-3C	2 - 4C, 1 - 2C	8	2 - 4C, 1 - 3C	2- 3C, 2- 2C
Surface Lifts	MC, 2 surface	2 T-Bars, Poma, RT	1 HT	HT, RT	2	7 RT		5	1
Hourly Capacity (pph)	9,400	10,131	10,800	4,800	2,080	10,000	7,400	3,800	4,500
Beginner Terrain	33%	17%	35%	20%	40%	29%	40%	40%	20%
Intermediate Terrain	33%	33%	35%	40%	30%	43%	40%	40%	55%
Advanced Terrain	34%	50%	30%	40%	30%	28%	20%	20%	25%
Terrain Park	Y	2	N	3	1	Y	Y	Y	Y
Snowshoeing	N	N	Y	Y	N	N	N	N	N
Cross-Country Skiing	N	N	Y	N	Y	Y	N	N	Y
Tubing	N	Y	N	N	Y	Y	Y	N	Y
Night Skiing	N	N	N	Y	Y	Y	Y	Y	Y
On-Mountain Restaurants		1	Y	1	Y			Y	Y
Snowmaking Coverage (% of trails)	90%	90%	93%	85%	100%	100%	100%	Y	Y
Ski Area Type Classification	R	R	R	L	L	L	L	L	L
2015/16 Ticket Price (top adult) w/o tax	\$55.00	\$49.00	\$65.00	\$49.00	\$31.00	\$50.00	\$40.00	\$31.00	\$38.00
Summer Activities	Golf, Water Sports, Fishing, Hiking, Biking		Mountain Biking, Hiking, Nature		Zipline, Golf	Zip Line, Aerial Challenge		Disc Golf	Wagon Rides, Festivals

D8G - 8 Passenger Gondola, D4C- 4 Passenger Detachable Chair, D6C- 6 Passenger Detachable Chair Fixed Grip Chairs - 4C-Quad, 3C-Triple, 2C-Double, MC -Magic Carpet Conveyor, TB-T-Bar, R-Rope Tow, HT-Handle Tow, P-Platter
Sources: Minnesota Ski Areas Association, Ski Area Websites, SkiTown.com, Google Maps

**TABLE 1 CONT.
SPIRIT MOUNTAIN - COMPETITIVE WINTER RESORT AREAS**

SKI AREA	REGIONAL MARKET							
	Afton Alps, MN	Buck Hill, MN	Loch Lomond, Ontario	Welch Village, MN	Coffee Mill, MN	Detroit Mountain, MN	Andes Tower Hills, MN	Mount Kato, MN
Nearest Town	Hastings	Burnsville	Thunder Bay	Welch	Wabasha	Detroit Lakes	Kensington	Mankato
Distance to Nearest Town (miles)	11.5	6.5	10	0.8	1	3.6	10	3.6
Distance to Duluth (miles)	169	172	186	188	191	196	224	238
Drive time to Duluth	2 hrs. 30 min.	2 hrs. 30 min.	3 hrs. 30 min.	3 hrs.	3 hrs. 25 min.	3 hrs. 30 min.	3 hrs. 45 min.	4 hrs.
Nearest Major City	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul	Minneapolis/St. Paul
Distance to Nearest Major City	29	20	338	44	82	207	144	85.2
Drive time to Nearest Major City	40 min.	30 min.	5 hrs. 45 min.	55 min.	1 hr. 40 min.	3 hrs. 30 min.	2.5 hrs.	1 hr. 45 min.
Top Elevation (feet)	1015	1,310	1,450	1,060	1,150	1,665	1,678	1,005
Base Elevation (feet)	705	1,000	700	700	725	1,440	1403	790
Vertical Drop (feet)	310	310	750	360	425	225	275	215
Skiable Terrain (acres)	300	45	90	140	28	45	60	55
Longest Run (feet or miles)	3,000 feet	1250 feet	1.5 miles	1,300 feet	5,100 feet	2,640 feet	1320 feet	2,100 feet
Number of Trails	50	16	14	60	10	17	16	19
Number of Gondolas	-	-	-	-	-	-	-	-
Number and Type of Chairlifts	1-4C, 3-3C, 14-2C	2-4C, 1-3C	1 - 4C, 2 - 2C	10	2 - 2C	2 - 3C	1-D4C, 2-3C	5 - 4C, 3 - 3C
Surface Lifts	3	4R, 2 MC	0	1 MC	HT	2RT, 4MC	R	2 HT
Hourly Capacity (pph)	20,000	6,000	4,600	12,300	2,800	6,600	4,000	14,650
Beginner Terrain	20%	40%	30%	31%	40%	40%	35%	24%
Intermediate Terrain	60%	40%	35%	50%	40%	40%	35%	59%
Advanced Terrain	20%	20%	35%	19%	30%	20%	30%	17%
Terrain Park	4	Y	Y	Y	Y	Y	Y	Y
Snowshoeing	N	N	N	N	N	Y	Y	N
Cross-Country Skiing	N	N	N	Y	N	Y	Y	N
Tubing	Y	Y	Y	N	N	Y	Y	Y
Night Skiing	Y	Y	Y	Y	Y	Y	Y	Y
On-Mountain Restaurants	Y	Y	Y	Y	Y	Y	Y	Y
Snowmaking Coverage (% of trails)	100%	100%	85%	100%	90%		100%	100%
Ski Area Type Classification	R	R	R	R	L	R	L	L
2015/16 Ticket Price (top adult) w/o tax	\$58.00	\$45.00	\$51.00	\$47.00	\$32.00	\$40.00	\$42.00	\$35.00
Summer Activities	Golf, Foot Golf, Disc Golf	Skiing, Boarding, Mountain Biking	Hiking, Mtn. Biking			Biking	Museum Tours, Chuckwagon Rides, Dinner/Show	

D8G - 8 Passenger Gondola, D4C- 4 Passenger Detachable Chair, D6C- 6 Passenger Detachable Chair Fixed Grip Chairs - 4C-Quad, 3C-Triple, 2C-Double, MC -Magic Carpet Conveyor, TB-T-Bar, R-Rope Tow, HT-Handle Tow, P-Platter
Sources: Minnesota Ski Areas Association, Ski Area Websites, SkiTown.com, Google Maps

**SPIRIT MOUNTAIN
VERTICAL DROP COMPARISON WITHIN THE LOCAL AND REGIONAL MARKETS**

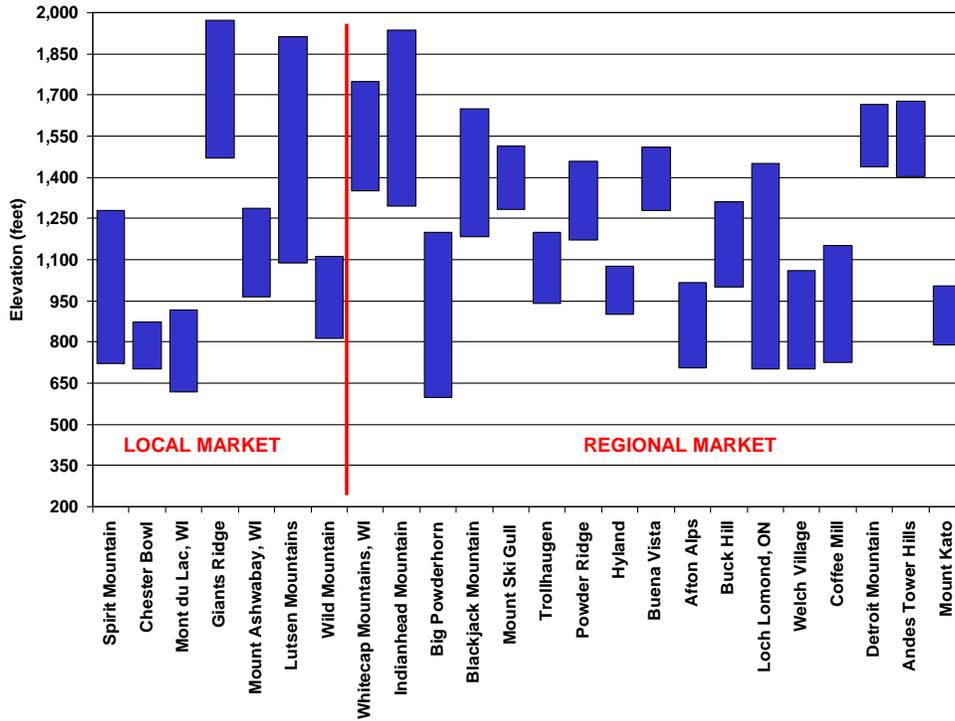


PLATE III.1

**SPIRIT MOUNTAIN
HOURLY CAPACITY COMPARISON WITHIN THE LOCAL AND REGIONAL MARKETS**



PLATE III.2

.2 Historic Midwest Skier Visitation

Ecosign has reviewed the historic skier visitation data for the Midwest region of the United States, as compiled by the Kottke End of Season Survey of US Ski Areas, for the past 35 years. The Midwest region includes the States of Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, North Dakota, Ohio, South Dakota and Wisconsin, according to the National Ski Areas Association. The majority of the ski areas in this region are in Michigan and Minnesota; however, this data provides a good indicator for the region as a whole. As illustrated in Plate III.3, skier visitation for the region was fairly constant around 7 million in the 20 years from 1980 to 2000. In the season ending in 2001, visitation increased to, and then fluctuated between 7 and 8 million visits depending on snow conditions over the next fourteen years. In 2014/2015, visitation was at the 7 million level; however very poor snow conditions at the start of the 2015/16 season and through the Christmas break period saw visitation drop to below 6 million. The Kottke report stated that “the Midwest had its worst season in 38 years of downhill snow sports visit tracking”.

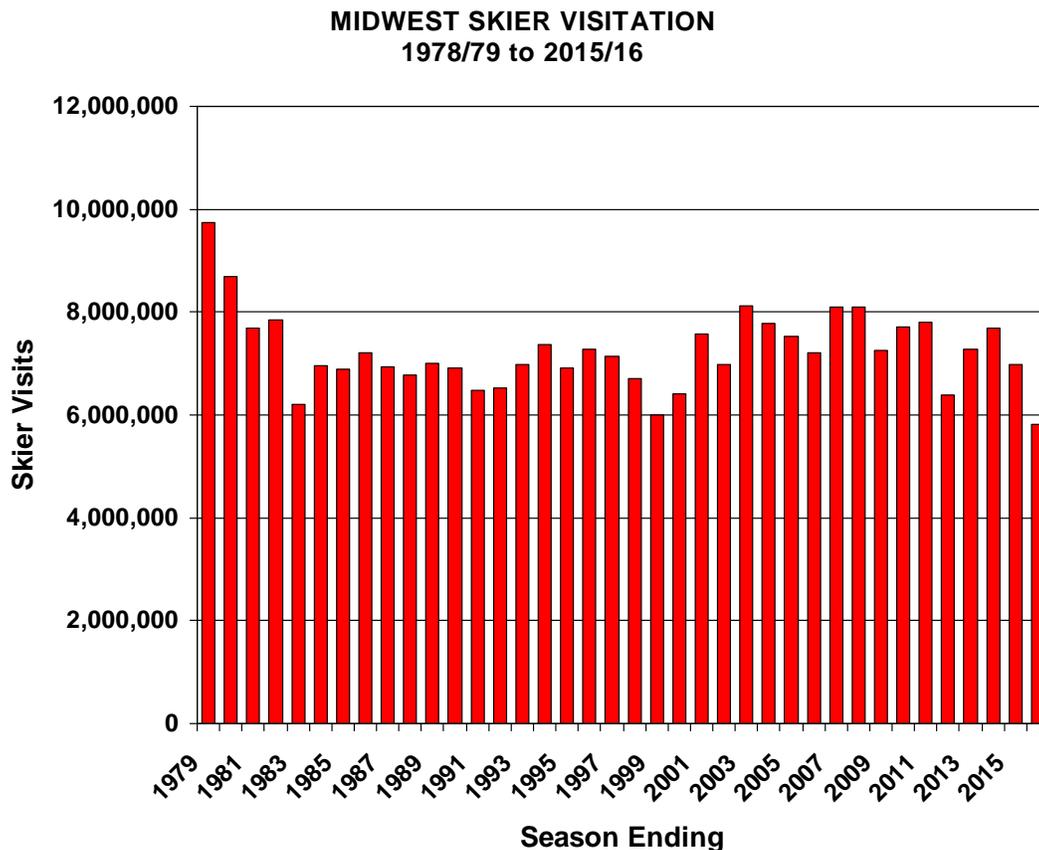


PLATE III.3

Source: Kottke End of Season Survey

Another trend that has become apparent is that the number of ski areas in the Midwest region has decreased from 145 in 1999 to 113 for the season ending in 2016. This trend in the decreasing number of operating ski areas in the United States is continuing. During the 1978/79 season there were 823 operating alpine ski areas in the US and by the 2015/16 season, the number had dropped to 463. A fairly rapid decrease in the number of ski areas in the US occurred from the 1980 until the mid-1990's. Since then, the decrease in the number of operating ski areas has declined, with a drop from just over 500 areas down to 463. Several factors have contributed to this decline; during the period from 1980 to the mid 1990's; the big areas embarked on large capital expansions, adding lifts and terrain. Many of the smaller areas lacked the capital to upgrade their equipment and therefore lost market share and went out of business. More recently, the Kottke report has noted that the "reduction in the total number of operating areas is impacted, in part, by mergers of adjacent ski areas, effectively combining the two or more resorts into one." They also noted that "some areas have closed and others have reopened in the recent past, contributing to the fluctuation in the total number of operating US areas." We have illustrated this trend of the reduction of the total number of operating ski areas in the United States in Plate III.4.

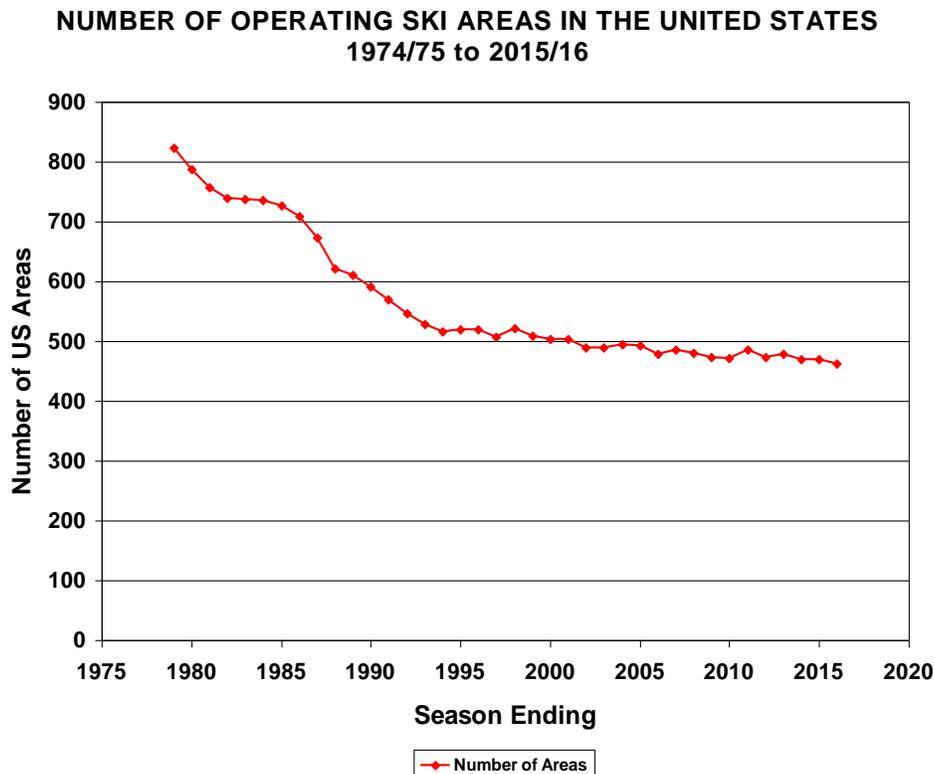


PLATE III.4

Source: Kottke End of Season Survey

.3 Population Projections

The existing and potential market base for any commercial skiing operation is heavily dependent on the size and proximity of local, regional, national and international population centers. The number of times that active skiers and snowboarders will participate in their chosen activity each year is partly dependent on the distance and travel time to the area. Ease of transportation and cost are also factors that affect levels of participation and visitation. In order to determine the existing and potential market base for Spirit Mountain, we have analyzed US Census population data to establish current trends and future projections for areas within the local and regional markets.

The demand for skiing is based on the regional population and participation rates. To establish skier/snowboarder participation rates for the Midwestern states, we have utilized population estimates and projections prepared by the US Census Bureau in 2005 based on data from the 2000 Census. We have tabulated the population data for the age groupings of 5 years to 64 years of age for the same states that we have skier visitation data for, as illustrated in Table III.2.

**TABLE III.2
MIDWEST POPULATION - AGES 5 TO 64**

STATE	2000	2005	2010	2015	2016
Illinois	10,042,719	10,266,192	10,389,381	10,378,060	10,371,099
Indiana	4,904,439	5,052,079	5,144,235	5,164,764	5,166,828
Iowa	2,301,698	2,347,590	2,366,707	2,340,159	2,330,687
Michigan	8,047,421	8,297,295	8,413,038	8,394,601	8,383,903
Minnesota	3,995,619	4,213,006	4,380,636	4,496,621	4,516,885
Missouri	4,469,934	4,611,004	4,705,555	4,745,802	4,751,286
Ohio	9,090,453	9,196,570	9,229,100	9,108,893	9,079,823
North Dakota	508,322	502,525	494,523	443,221	419,756
South Dakota	595,644	614,882	617,087	579,349	561,111
Wisconsin	4,318,782	4,483,017	4,587,866	4,620,481	4,622,232
Midwest Population (ages 5-64)	48,275,031	49,584,160	50,328,128	50,271,951	50,203,610

**SOURCE: US CENSUS BUREAU
2005 POPULATION PROJECTIONS BASED ON 2000 CENSUS DATA**

According to the Census Bureau, the regional population in the age group most likely to participate in skiing was expected to grow slightly to 2010 and then begin a gradual decline as the median age increases. As yet, there aren't projections available from the 2010 Census data, however, the actual population in this age group recorded for the region in the 2010 Census was 49.9 million, as opposed to the 50.3 million projected so population growth in the region during the first decade of the 21st century was less than 1 percent of what was forecast in 2005.

Midwest Skier Participation

Utilizing the skier visit data and the population data for the Midwest over the last ten years, we have established the participation rates for the Midwest region, as illustrated in Plate III.5. Participation has reached a high of over 0.16 skier visits per capita during good snow years and a low of 0.1389 in 2012 and 0.1158 in 2016, both poor snow years. Over the period from season ending 2005 to 2016, the region has averaged a participation rate of 0.15 per capita, or approximately 1 skier visit per annum for every 7 people between 5 and 64 years of age.

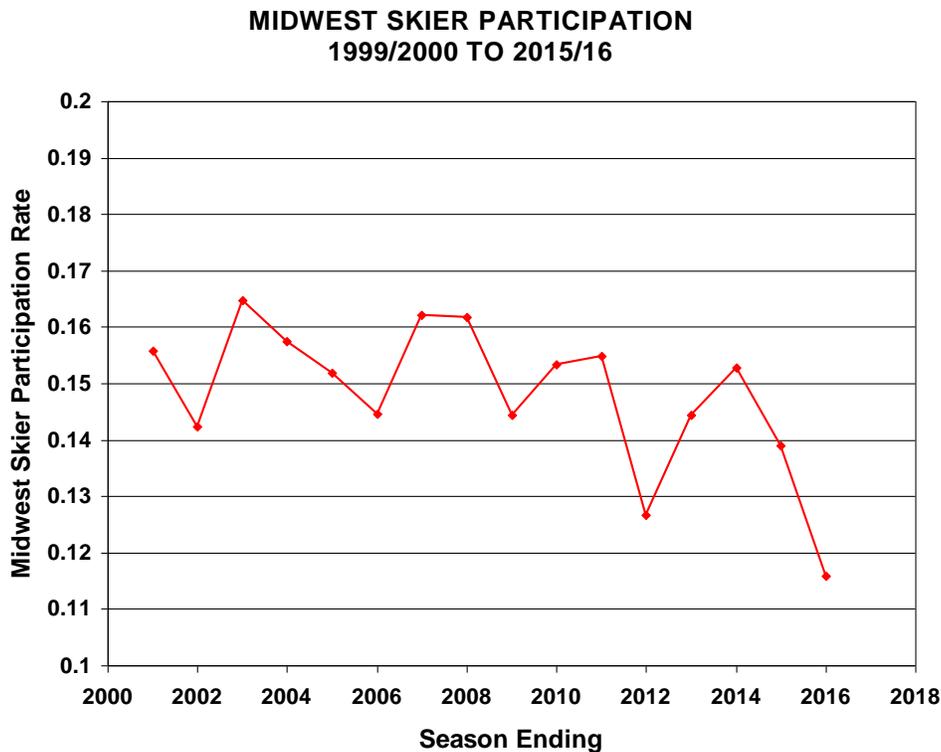


PLATE III.5

The long term population forecast for the Midwest region indicates that over the next 15 years, the population for the 5 to 64 year old age group will decrease slightly from its current levels of around 50.2 million people, down to about 48.6 million people in 2030, as listed in Table III.3.

**TABLE III.3
MIDWEST POPULATION FORECAST – AGES 5 TO 64**

STATE	PROJECTION		
	2020	2025	2030
Illinois	10,309,715	10,181,505	10,088,528
Indiana	5,152,086	5,114,476	5,099,926
Iowa	2,278,027	2,193,228	2,114,078
Michigan	8,297,857	8,118,128	7,952,653
Minnesota	4,582,257	4,634,884	4,696,235
Missouri	4,752,421	4,745,802	4,710,004
Ohio	8,921,980	8,667,819	8,460,516
North Dakota	468,067	443,221	419,756
South Dakota	600,414	579,349	561,111
Wisconsin	4,602,746	4,536,821	4,472,257
TOTAL Population	49,965,570	49,215,233	48,575,064

We have also reviewed population information and forecasts for the City of Duluth. Duluth currently has a population of 86,265 people. The Minnesota State Demographic Center has forecast that Duluth will grow by 4,450 people by 2030 to a population of 90,715 people, an anticipated growth of approximately 5% over the next 13 years.

.4 Summary of Spirit Mountain’s Market Position

The terrain at Spirit Mountain is ideal for the learn to ski market, beginner and low intermediate skiers. The terrain parks and half pipe provide interest for the higher skill levels. However, there is a lack of advanced and expert terrain. Therefore, outside of the local market, Spirit Mountain is most likely to attract beginner and intermediate skiers and will have the most success in catering to them. With demand for skiing and snowboarding leveling out across the Midwest region, we feel that Spirit Mountain isn’t likely to see any major increase in visitation unless they can increase participation through innovative programs that cater to the non-traditional skier market, or expand into other non-skiing activities. Tubing and snow play are activities that attract an entirely new market demographic to SMRA with much of it coming from Duluth and the immediate area. Over time, a portion of these new users may choose to learn to ski or snowboard and Spirit Mountain has ideal teaching terrain. Further investment in snow play and fun “learn to ski” programs are areas where investments can increase the customer base.

The City has approved and committed funding for the Grand Avenue Nordic Center, a 3.3 km illuminated snow made loop trail adjacent to the Grand Avenue Chalet. The trail will be suitable for recreational cross country skiing and regional competitions. Phase II will add a 5 km trail connection to the Spirit Mountain Nordic Center at the top of the mountain. These investments in Nordic skiing will enhance and increase usage of the Grand Avenue base and Chalet, and likely increase the demand for parking in the base area.

Spirit Mountain introduced lift serviced fat biking for the 2015-16 season. Since Duluth is a regional center for fat biking, this new initiative is gaining momentum and can be supported by bike rentals and special events. Continued investment in grooming and events to support fat biking will cement Spirit's leadership role in this emerging winter activity.

Summer activity now makes up almost 35% of total revenue at the SMRA. The two largest sources of summer revenue are the Adventure Park and the Wedding/Banquet business. SMRA must undertake an experimental stance on finding the right mix of summer activities that match the site's features and image, and, generate revenues capable of covering investment and operating costs.

To date, the recent upgrades to SMRA have not resulted in new private development in the immediate vicinity; however, the SMRA remains an important tourist attraction and recreation amenity for the local population. SMRA and the City can work with adjacent landowners to coordinate optimal solutions for vehicle access, parking, trail connections and complementary recreation facilities. The successful operation of the SMRA will eventually act as a stimulus for private investment in the area.

A SWOT analysis of the Spirit Mountain Recreation Authority facility is presented in Plate III.6.

SWOT ANALYSIS



PLATE III.6

IV. SPIRIT MOUNTAIN MASTER PLAN CONCEPT

.1 Mission, Objectives and Vision

It is worth restating the Mission, Objectives and Vision for the Spirit Mountain Recreation Area Authority, as the Master Plan Concept has been developed with the City and the SMRA Authority Board and management team to achieve these objectives.

Mission

The Spirit Mountain Recreation Area (SMRA) was created in 1973 and the Spirit Mountain Recreation Authority (SMRAA) was created to manage it. The mission statement for the recreation area authority from Minnesota Laws, 1973, Chapter 327 (section 1, mission):

The purpose of this Act is to facilitate the development of a land area with the following objectives:

- *The development of wide-range recreational facilities available to both local residents and tourists;*
- *The aiding of the economy of northeastern Minnesota by encouraging private enterprise efforts in conjunction with the recreational facilities; and*
- *The preservation of the environment in the area by a timely and intelligent plan of development.*

Objectives

The Spirit Mountain Recreation Area will measure its success in satisfying its mission by the following:

- *Provide recreational opportunities available to and accessible by all potential users, local residents and tourists alike.*
- *Maintain and enhance winter revenues, and, increase revenue generation in spring-summer-fall seasons.*

- *Revenues should cover annual operating costs and maintenance and upkeep of facility. Substantial necessary improvements to the area are covered through established, legislated lodging and food and beverages taxes in which the Spirit Mountain Recreation Authority is specifically named, along with grants, local and state support and partnerships.*
- *Increase SMRA's regional economic impact in terms of total tourism dollars generated, enhancement of other regional attractions, and amount of spin-off private sector development.*
- *Maintain a sustainable land base protecting its ecological functions and cultural features.*

Vision

The Spirit Mountain Recreation Area will achieve its mission by being a premier four seasons outdoor adventure recreation center, recognized for its unique, multi-faceted recreation facility that meshes mountain terrain, Lake Superior experience, and semi-wild river access, and, accredited as a sustainable "green" facility and operation.

All actions proposed for inclusion in the Master Plan will be consistent with the Vision, make progress toward the Objectives, and lie within the boundaries of the legislated Mission. Actions will be grouped into three broad categories:

- Actions that repair or replace the existing aging infrastructure to retain the existing customer base and increase the attractiveness of the facility to new users. It is anticipated that these investments will increase efficiency and utilization of the facility, thereby reducing operating costs on a per user basis.
- Actions that either generate new streams of net revenues, or, enhance generation of revenues at existing profit centers.
- Actions that do not increase efficiency or generate new net revenues but that otherwise contribute to the achievement of the facility's mission as measured by one or more of the stated objectives.

.2 Indigenous Peoples Cultural Values

Spirit Mountain has spiritual value to the regional Ojibwe, who view the mountain as a sacred component of the Ojibwe's westward migration. While the entire mountain may be considered sacred, particular areas at the peak are of greatest concern. If anything is to be done to provide access, identify areas, or create amenities for this area, it will be only done as a fully cooperative venture with regional Ojibwe. The SMRA should look for opportunities to partner with the Ojibwe Nations to identify, document and protect the existing cultural features within the recreation area. Consideration should be given to creating experiences within the recreation area that showcase and celebrate this cultural heritage.

.3 Master Plan Concept

A set of core elements form the structure for the Master Plan. These elements indicate the strategic direction to be taken by Spirit Mountain and provide the rationale for the suite of implementing actions.

- Renew Alpine Ski/Snowboard Facility
- Improve Parking, Signage and Arrival Experience
- Enhance Nordic Skiing with Grand Avenue Nordic Center
- Grow Year Round Use
- Regional Trail Connectivity and Trailhead
- Repair, Renovate and Renew Existing Buildings
- Sustainable Management of the forested land base to preserve ecological and cultural values
- Support and Integrate with Private Development on Adjacent Lands

The overall Master Plan Concept for the Winter Facilities is illustrated on Figure 2a and for Summer Facilities on Figure 2b. These plans demonstrate how a number of additional facilities and trails will fit on the site but do not commit the SMRA Authority or the City to constructing anything shown on the plans that has not already been committed. Prior to adding a new element, an assessment exploring the proposed user groups, revenue generation opportunities, social benefits and capital and operating costs should be carried out.

These due diligence steps are necessary to ensure that each project is assessed in terms of its potential contribution to operating revenues and expenses, as well as its alignment with SMRA's mission of providing an exceptional outdoor recreation experience in a mountain and river setting.

Renew Alpine Ski / Snowboard Facility

Alpine skiing/snowboarding is the core, identifying winter activity at Spirit Mountain. The majority of existing infrastructure is designed to serve this activity; it generates the bulk of the facility's revenues, and represents the best source of enhanced on-going revenues. A key concept for this plan is to build upon this base by enhancing the attractiveness of the alpine ski/snowboard facilities with improvements to better serve this market and thus encourage greater participation and utilization. The proposed alpine lift and trail enhancements are illustrated on Figure 2a.

Alpine Ski Lifts and Trails

- Implement a lift ticket scanning and card access system to accurately measure the use of all facilities on a daily basis. In addition to ensuring that all users have the appropriate ticket, the data collected from this system will greatly assist in planning efficient operations and future improvements. A lift ride analysis of the 20 busiest days should be carried out prior to any additional improvements to the lift system.
- Create a capital replacement program to fund a new lift system to replace the three chairlifts that are nearing the end of their useful life span.
- The plan also calls for the Gandy Dancer 3C to be replaced with a new fixed grip quadruple chair with a capacity of 2,400 pph.

- The new Gandy Dancer and the existing Spirit Express II detachable quadruple chair, will provide sufficient capacity to service the top to bottom trail system and provide a better lift to trail capacity balance than currently exists.
- Replace handle tow (Prospector) with conveyor.
- Consider adding a rope tow and/or platterpull tow over along Run 4 to service both the race hills and terrain park.
- Ongoing investment in snowmaking and grooming equipment is required to maintain the ability of the area to provide a quality snow surface in challenging weather conditions.

The proposed lifts and trails are shown on Figure 2a – Master Plan Concept – Winter. The proposed lift system will have a capacity of 3,390 skiers at one time, as shown Table IV.1. The revised Lift to Trail balance is illustrated in Plate IV.1. The three chairlifts will still have slightly higher capacity than the trail systems they serve, preserving the potential to add a trail to the south or north of the existing developed area, should there be a demand for it in the long term.

**TABLE IV.1
MASTER PLAN LIFT SPECIFICATIONS AND CAPACITY**

Lift Number	1R	2R	5	6	7	8	
Lift Name	Big Air	Gandy Dancer	Spirit Express II	Prospector Handle Tow	Prospector Conveyor	High Speed Rope Tow	
Lift Type	4C	4C	D4C	HT	MC	RT	TOTAL
Year Constructed	1989	New	2011	2004	2005	2016	
Top Elevation ft.	1,208	1,203	1,282	1,197	1,184	1,262	
Bottom Elevation ft.	792	762	720	1,154	1,162	1,182	
Total Vertical ft.	416	441	562	43	22	80	1,564
Horizontal Distance ft.	1,980	1,785	3,450	381	136	597	
Slope Distance ft.	2,023	1,839	3,495	384	138	602	8,481
Average Slope %	21%	25%	16%	11%	16%	13%	
Rated Capacity pph	2,400	2,400	2,400	500	500	700	8,900
V.T.F./Hr.(000)	999	1,058	1,348	21	11	56	3,494
Rope Speed fpm	425	400	900	100	100	1,000	
Trip Time min.	4.8	4.6	3.9	3.8	1.4	0.6	
Operating Hr./Day	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Est. VTF Demand/Day	6,970	6,970	5,447	2,320	2,320	2,320	
Loading Eff. %	75%	90%	90%	90%	90%	80%	
Access Reduction	0%	0%	0%	0%	0%	0%	
Daily Lift Capacity	750	850	1,560	60	30	140	3,390
Cumulative Total	750	1,600	3,160	3,220	3,250	3,390	



LIFT VS. TRAIL CAPACITY

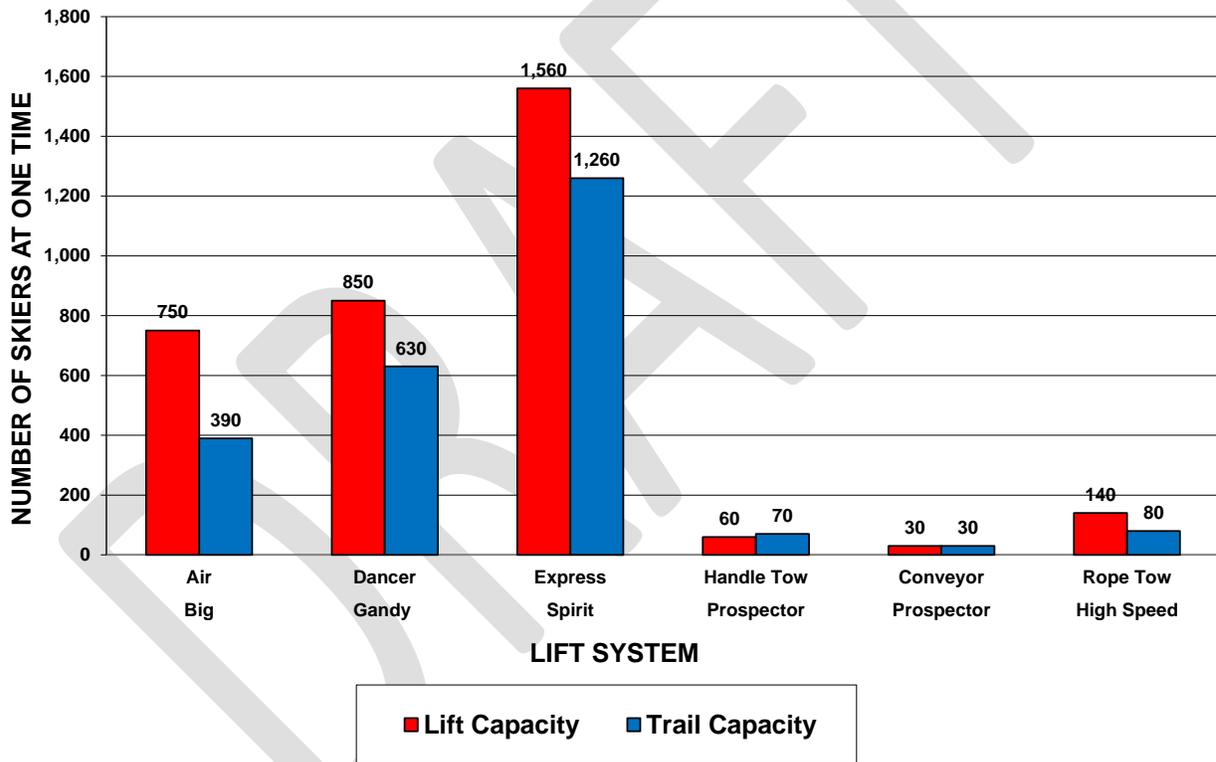


PLATE IV.1

Improve Parking, Signage and Arrival

The SMRA is predominantly a day use area. A private vehicle is the most efficient way to get families and their equipment (skis, bikes, strollers, kayaks, etc.) to the recreation area and therefore sufficient parking is an important component to maintain.

The existing lots at the top of the mountain are spread out and rough graded, making it difficult to achieve optimum parking densities. The drop-off area can reportedly be quite congested. At Grand Avenue, there is a small paved lot with an additional gravel surfaced area; both of which fill up on busy weekends causing people to park on the grass. Theoretically, there appears to be insufficient parking to provide enough skiers to meet the lift capacity of the ski area, however, there haven't been reports of skiers being turned away due to lack of parking and the overflow lot is often not full. This fact suggests that in the last few years, the peak day demand has been less than the lift capacity, which is based on visit counts provided for 2016/17 by the SMRA management is the case. Poor snow conditions caused many of the mid-west ski areas to have unplanned closures and resulting drops in skier visitation.

The current existing theoretical lift capacity greatly exceeds the trail capacity; the re-lifting plan described above envisions providing a lift system in better balance with the trail system to support a comfortable carrying capacity of 3,390 skiers at one time. If all those skiers were to arrive by cars that parked onsite, between 1,356 (2.5 skiers/car) and 1,695 stalls (2.0 skiers per car) would be needed. Additional stalls would be needed for employees, cross-country skiers, Tubing Center visitors, snowmobilers, etc.

We anticipate that, except for special events, the maximum parking demand will still occur on winter weekends and holidays. An estimate of the total parking demand if the ski area was operating at capacity and other activities were also occurring is presented in Table IV.2. It is important to note that while skiers and employees typically stay at the area for most of the day, other user groups such as cross-country skiers, trail users and visitors to the Adventure Park may only spend a couple of hours on site, so the parking that they use could turn over a few times per day. In this analysis, we are looking at total people on site, *at one time*, so likely mid-day. Fat bikers are lumped in with alpine skiers/snowboarders, as they will be using the lift and trails; hence reduce the lift capacity available for skiers. The analysis in Table IV.2 projects a parking demand of 1,621 stalls for peak day people at one time.

**TABLE IV.2
ESTIMATED PARKING DEMAND**

Users At One Time	Estimated Users	Slept on Site	Private Drop Off 5%	Take Transit 5%	People By Car	People per car	Stalls Required
Skiers/Snowboarders/Fat Bike	3,390	54	170	3	3,164	2.5	1,266
Nordic Skiers	175		9	9	158	2.5	63
Tubing/Snow Play/Adventure Park	150		8	8	135	2.5	54
Trailhead	50		3	3	45	2.0	23
Staff	300		15	15	270	1.3	216
TOTAL SPIRIT MOUNTAIN	4,065		203	37	3,771		1,621

The 2008 Master Plan indicated 1,411 parking stalls in the upper base area, not including the overflow lot (P5) which was proposed for an RV park, and 521 stalls at the Grand Avenue base for a total of 1,932 day use stalls. The parking lot layouts prepared in 2008 were conceptual in nature and didn't consider the site grading required. Northland Engineering was retained to re-evaluate the parking lot concepts from 2008 and provide a capital cost estimate to reorganize level and resurface each of the existing parking areas. This information is provided in Appendix 1. Northland also assessed realigning the bus drop-off area to facilitate more efficient unloading and loading by school groups, enlarging the parking area at Grand Avenue and repurposing the upper overflow lot as a year round RV park, as requested by the City and the SMRAA Board. The realignment of Skyline Parkway to provide additional space in the proposed RV Park and a scenic lookout pull-off on the west side of Skyline Parkway were also investigated.

A comparison between the existing parking supply and the proposed parking supply with the improvements outlined in Northland's plans is listed in Table IV.3. With all the proposed improvements, there would be a total of approximately 1,488 stalls, when attendants are used to control the parking on the unpaved lots. If the RV lot wasn't used in the winter season, another 250 – 350 cars could park there.

**TABLE IV.3
CAPACITY OF PROPOSED PARKING LOT REVISIONS**

Lot Number	Location Description	Primary User Group	Area (acres)	Number of Parking Stalls			
				No Parking Attendants		With Attendants	
				Existing Stalls ¹	Northland Plan ¹	Existing Stalls ²	Northland Plan ²
P1a	Grand Avenue - Paved	Skiers	0.85	48		48	
P1b	Grand Ave. Chalet - Gravel	Skiers	0.68	60	240	101	360
P1c	Grand Ave. Chalet - Grass	Skiers	1.39	139		208	
P2 ²	Main Chalet Drop-Off	Skiers	0.22	46	76	46	76
P3 ³	Main Chalet Beginner	Skiers	0.31	59		75	
P4	Upper Main Lot	Skiers	4.78	478	501	717	752
P5	Upper Overflow Lot	Skiers	2.49	249	RV	374	RV
P6	Main Chalet - Upper Loop	Employees	0.99	99	99	149	149
P7	Tubing Park	Tubing/Nordic	0.54	66	66	66	66
P8	Above Skyline Parkway	Snowmobilers	1.28	85	85	85	85
	TOTALS		13.52	1,330	1,068	1,869	1,488

Notes:

1. Cars per acre on unpaved, unmarked lots estimated at 100 assuming no attendants.
2. Cars per acre on unpaved, unmarked lots estimated at 150 with attendants.

Prior to undertaking any improvements to the parking lots, we recommend that during the next ski season, accurate counts of the number of cars parked in each lot by 11:30 a.m. on weekends and holidays be tallied and compared with visitor counts for the same days to get a better understanding of the actual demand for parking. It would also be useful to do incoming vehicle occupancy counts in the parking lots for one or two peak days to determine the average vehicle occupancy rate. These types of studies are extremely helpful in obtaining an accurate understanding of the transportation habits of the customers and critical to developing a successful parking supply strategy. SMRA management should be able to estimate the amount of parking needed for employees and whether or not there are ride share programs.

SMRA has expressed a desire to connect the lower mountain and upper mountain with a public roadway. Two options exist to accomplish this, both having their own challenges. The first being a reconstruction Knowlton Creek Boulevard. This roadway will need to be re-stableized at areas affected by the Duluth flood of 2012. The other option is an extension of Gogebic Street. This roadway will require significant realignment to connect to Skyline parkway with grades desirable for a roadway bed. Alternatively the roadway could be evaluated for use as an internal mountain connector for a shuttle bus and/or service vehicles. The use of the road as an internal mountain connector could potentially be designed and constructed at a lesser cost than a public road.

Actions

- Conduct parking lot counts at mid-day on peak holiday weekends and compare with daily visitor data for each activity
- Schedule an inbound parking lot vehicle occupancy count for either Martin Luther King or President's Weekend
- Estimate the peak visitor and employee numbers for each activity that could be on the site simultaneously to estimate the maximum parking demand. It is likely this will continue to occur during the peak winter season unless there is a special event such as the Snocross or a summer mountain bike festival.
- Review the opportunities for signage on Interstate #35 and the approach roads to SMRA to ensure that all opportunities to provide signage that reflects the offerings at SMRA are identified and capitalized on. As an example, the signage for the recreation area could include symbols for skiing, cross-country skiing, hiking, cycling, camping, etc.
- Conduct feasibility study for a connection between the upper and lower mountain.



Example of recreation area signage identifying activities available

Enhance Nordic Skiing

The City has approved the Duluth Cross-Country Ski Club (DXC)'s plan for the Grand Avenue Nordic Center and has dedicated funding towards the implementation of the plan. DXC has been fundraising to obtain the remainder and anticipate reaching their goal by the end of 2017. Phase I consists of 2.1 miles (3.3 km.) of new illuminated trails with snowmaking at the base of the mountain, south of the Grand Avenue Chalet. Phase II is a connector trail linking the facility to the existing 12.4 mile (20 km.) trail system at the top of the mountain. These trails are outlined on Figure 2a – Master Plan Concept – Winter. The area between the new trails and the Grand Avenue Chalet and parking lot has been identified as a potential staging area for cross-country events, as shown on Figure 3b - Opportunities – Lower Base.

The introduction of the GANC is going to bring a new user group to the Grand Avenue base which will increase the demand for parking and use of the Grand Avenue Chalet, particularly when the DXC hosts competitive events. They may also require space for timing and waxing equipment storage. While cross-country skiing typically doesn't generate large revenues, many of the skiers will likely purchase food and beverages in the Chalet.

Actions

- Cooperate with the DXC to integrate the cross-country user group into the facility.
- Develop an equitable framework for cost sharing the anticipated upgrades to the parking lot, snow clearing, snowmaking and the use of space within the Chalet by the new user group
- Coordinate with the DXC to identify locations suitable for storage or waxing sheds on the area south of the parking lot that don't interfere with access to the ski runs.

Other Winter Recreation

Actions

- Consider identifying a snowshoe loop trail and offering snowshoe rentals
- Increase snow play offerings at the Tubing Center

- Consider creating a snowmobile access trail and snowmobile parking area at either the upper or lower chalet so that snowmobilers could access the food and beverage facilities

Grow Year-Round Use

Over the past nine years, Spirit Mountain has asserted its image as a year-round outdoor adventure center by introducing the Spirit Mountain Adventure and Bike Parks, as well as the Snow Tubing Center bringing new users groups to the SMRA. The Master Plan Concept will continue this process by upgrading its campground, exploring the addition of a dedicated RV facility and incrementally adding new recreation activities to the Adventure Camp and the Grand Avenue base area. The areas that have been identified with potential for increased recreation development are identified on Figure 3a – Upper Base Area Opportunities and Figure 3b – Lower Base Area Opportunities.

Actions

Spirit Mountain Adventure Park

- Incrementally install new spring, summer and fall recreational facilities such as an aerial ropes course, climbing wall, children's playground, etc. that are complementary to the existing Spirit Mountain Adventure Park and the summer sightseeing chairlift operation.
- Each new element needs to be assessed for its compatibility with the existing operation, appeal to the target users groups and likelihood of financial success.



Aerial Ropes Course /Adventure Park

Spirit Mountain Bike Park

The Spirit Mountain Bike Park has strong regional appeal. Market research from other downhill bike parks has demonstrated that good mountain biking parks and cross-country biking trail systems can be a strong tourism draw. Like skiing, mountain biking is an activity that can involve the entire family and be the focus for a vacation; these visitors then spend money on food and accommodation and other recreational pursuits in the area.

- Create a top to bottom novice trail suitable for use with regular mountain bikes. The proposed All Weather Trail is expected to fulfill this need.
- Build an additional skills park adjacent to the Grand Avenue Chalet. When not being used for lessons, this facility should be considered as an amenity for the community like a playground and not as a revenue generator.
- Continue to expand the downhill mountain bike trail network to support the growth of the Spirit Mountain Bike Park. The proposed downhill trail network is illustrated on Figure 2b and will be developed over time. These alignments are conceptual and may be adjusted at the time of construction to provide a better integration with the site's natural features.
- Dedicate a sufficient operating budget to maintain the trails in good riding condition. This expense should be considered as necessary and integral to the ongoing success of the bike park, similar to grooming and snowmaking for the ski area.
- Maintain a fleet of rental bikes, helmets and armor to attract new users to the sport. A good strategy to maintain a state of the art rental fleet is to sell the rental inventory at cost at the end of every season or second season to local bikers who become potential season pass holders for the following year.
- Continue to host summer and winter mountain biking events.
- Cooperate with the Cyclists of Gitchee Gumees Shores (COGGS) to facilitate cross-country biking access through the SMRA and ensure the cross-country bikers respect the operating requirements of the downhill bike park.



Campground

- Renovate the existing support buildings.
- Determine whether or not additional campsites can be added to the existing campground with a nominal increase in the operating footprint.
- Consider whether yurts or other more permanent tent structures could be incorporated into the offering at the campground.
- Evaluate the financial feasibility of a stand-alone RV park in the overflow parking area and determine the level and type of facilities that will be required to support a successful operation. Assess whether this will be a marketable product that will attract clientele that will be compatible with other users of the recreation area.

Grand Avenue Base

- Increase parking supply for anticipated increased demand due to the new Nordic Center and year round function as a trailhead. Parking at Grand Avenue will also assist in parking for the lower Spirit water access along the St. Louis River.
- Over time, adjust the opening hours and offerings at the Grand Avenue Chalet to meet the needs of Nordic skiers and other trail users.
- Provide an accessible path from the bus stops at Grand Avenue and Warwick up to the parking lot level to make the area more transit friendly.
- Build a free outdoor playground suitable for year round use to encourage tourists and local families to spend more time at the Grand Avenue base; this will benefit the Riverside Café and Grill.
- Use snow from lot clearing to create a small snow hill for free snow play.
- Consider hosting events such as weekly farmers' or artisans' markets, outdoor movie nights or concerts as a way of creating a better connection with locals and tourists.
- With the addition of the proposed lower Spirit water access to the St. Louis River, the Grand Avenue base could become an attractive venue for a summer day camp targeted at local and regional families, as well as tourists staying in the campground or nearby hotels.
- Any consideration of accommodation development on the SMRA property at Grand Avenue should consider provisions for underground parking and the possibility that all units remain available for nightly rentals for tourists.



Regional Trail Connectivity and Trailhead

Trail systems at Spirit Mountain provide free or low-cost recreational opportunities for residents and visitors. They also offer users access to areas for enjoyment of the scenery and appreciation of the environmental features of the landscape. The City has recently completed a Trail Master Plan for Western Duluth which identifies how Spirit Mountain will integrate with regional trails including the Superior Hiking Trail, Cross City Trail, the Duluth Traverse, the Munger Trail and the Western Waterfront Trail. The Grand Avenue base provides a convenient trailhead with parking, washrooms and food and beverage facilities and easy access to all of these trail systems. Figures 2a and 2b illustrate how these trails have been planned to pass through the Spirit Mountain Recreation Area in the winter and summer seasons, as well as showing the new trails proposed within the SMRA.

All Weather Loop is a hard surface multi-use trail that will provide a loop between the top and bottom of the mountain and is meant to be an easy grade that beginner bikers and

pedestrians can use. In the winter, the south section passing through the ski terrain will be closed to avoid conflict with downhill skiers.

Cross City Trail (CCT) is a ten to twelve foot wide accessible path that will be either paved or gravel surface and will extend from the Lake Superior Zoo to the Grand Avenue base along the DWP alignment. A multi-use trail will also be extended from the Grand Avenue Chalet to connect to the Willard Munger Trail and eventually the Western Waterfront Trail.

Duluth Traverse (DT) is a cross-country mountain trail extending across the City; in the SMRA it will follow the DWP alignment from the Grand Avenue Chalet to Beck's Road.

Actions

- Provide trailhead signage at both the upper and lower base areas including large scale maps.
- Explore winter and summer programming options that take advantage of the proposed connection to the Lake Superior Zoo.



Connection to Saint Louis River

The distance from the Grand Avenue Chalet to the Saint Louis River at the proposed lower Spirit water access is approximately 600 yards with a 90 feet grade change. This is a short enough distance to assume that users of one facility might walk (6 to 8 minutes) to the other in good weather. With limited parking planned near the lower Spirit Landing water access, the parking and food and beverage facilities at the Grand Avenue base will be an asset any amenities south of Grand Avenue. Similarly, the potential Spirit Landing water access will add another attraction for visitors to Spirit Mountain in the spring, summer and fall, particularly if there are water tours or boat rentals offered. When operating, the Spirit Express II provides an efficient link between the upper and lower mountain.

Actions

- Ensure that pedestrian connections between the Grand Avenue base and the proposed lower Spirit water access consider visual connectivity between the two locations and include animation (banners, light poles, etc.).
- Provide a looped walking route between the Grand Avenue base and the river
- Provide directional signage and on-site maps

Repair, Renovate and Renew Aging Buildings

An evaluation of the condition and functionality of the existing buildings was beyond the scope of this Master Plan Update. The Main Chalet and the Maintenance facility are between 30 and 40 years old and have not been kept in good condition. Since these two facilities are essential to the successful operation of the facility, the SMRA Board and management team must develop a phased plan for repair and renewal and apply for federal and state grants to facilitate these works.

Daylodge/Main Chalet

Repairs and maintenance on the existing daylodge are overdue. The renovations proposed in the 2008 Master Plan were too substantial for the level of funding available and would have required the building to be out of service during the profitable wedding and

banquet season, so did not proceed. The building is now nine years older and repairs must be completed to preserve the structural integrity of the building.

While the ideal solution would be a replacement of the facility, realistically SMRA must address these immediate deficiencies and then develop a plan for a phased renewal of the building and identify potential sources of funding. Since the daylodge is a revenue producing asset (food and beverage, lessons, rentals, banquets, retail) and critical to the ongoing operation, there may be opportunities to finance some of these projects.

Maintenance Facility

The existing maintenance building is reported to be in poor repair and insufficient for the current size of the operation. Management has also complained that it is poorly located; the existing location was chosen when all the ski runs ended above the DWP and road access was available. With the extension of the ski terrain down to the Grand Avenue base, the maintenance facility is now cut off from road access during the ski season.

The main selection criteria for the location of a ski center's maintenance area are:

- Level area of about 0.5 acres for building, front and rear access, fuel depot, employee parking and snowmaking equipment storage in close proximity to the ski slopes.
- Road access for equipment and fuel delivery, as well as for employees driving to work.
- Over the snow access for the snow cats and snowmobiles and a short distance to the ski runs.
- Connection to electricity, water and sewer.
- Screened from public view or at least out of the way of public pedestrian and vehicle traffic.

Two potential locations for a replacement maintenance facility have been identified and are illustrated on Figure 2a. Location A is adjacent to the existing dry storage building. This area is accessible by road from the end of North 80th Avenue. There is an existing paved road to the City reservoir and a gravel road extends the rest of the way to the site, however water, sewer and snowmaking must be brought to the site. The site appears to

have sufficient surface area for the facility. The distance from the nearest ski trail is approximately 270 yards.

Location B is at the top of the mountain on the gently sloping terrain below the main parking lot P4. A tree buffer between the parking lot above and the maintenance area could be preserved, as well as between the facility and the ski trail to the south. Some grading would be required to create a level site. A winter road for vehicle access from Parking Lot P5 could be built above the existing mountain road that is used for public snowmobiling in the winter. A snow road to the Big Air ski run would be needed, as well as connections for water, sewer and electricity. The sewer connection may require a force main up to the main chalet or to the new RV Park, if constructed. The proposed All Weather Trail passes through this area so the alignment for the trail may have to be modified slightly to allow room for a new maintenance facility. Since maintenance facilities are non-revenue producing but necessary, a capital fund for a new facility will need to be established and funds allocated over time.

Potential Indoor Training Center

The SMRA management team has expressed some interest in an Indoor Training Center somewhat similar to the Woodward facilities in Pennsylvania, Copper Mountain and Boreal Mountain and other areas. These large enclosed spaces provide room for a wide range of training and recreational features including skate parks, trampolines, gymnastic floors, bmx tracks, foam pits, climbing walls, etc., that allow athletes in a variety of sports to learn and practice new skills in a safe environment. A facility such as this would tie in with SMRA's mandate for providing recreational facilities, however, an analysis of the market need and a business case should be carried out to determine if there is sufficient demand for such a facility in the Duluth area.



Facilities Deferred Maintenance Plan

As previously stated in the document existing structures at the SMRA are essential to the successful operation of the facility, and the SMRA Board and management team must develop a phased plan for repair and renovations. An evaluation and inspection of existing buildings including the Upper Chalet, Maintenance Shop and other relevant operations facilities shall be performed as part of the deferred maintenance plan. Maintenance and renovations for the buildings should be prioritized based on their immediate needs, which are those that may impact day to day operations. Funding for the renovation and repairs shall consist of budgeted maintenance and repair funds and applying for federal and state grants to facilitate these works.

The phased plan will prioritize the relevant needs over a ten-year period:

- Critical – 1-3 years
- Potentially critical – 3-5 years
- Necessary, not yet critical – 5-10 years

Forested Land Base Management and Sustainable Green Development

A considerable portion of Spirit Mountain's land base is relatively undeveloped high value forested land. This land has inherent ecological values, contains historical-cultural features, and contributes to the overall attractiveness of the facility. Sustaining these values is critical to Spirit Mountain's ongoing success. This plan anticipates preservation of

the majority of the forested land above Skyline Parkway, with the exception of limited expansion of the campground and improvements to the trail networks.

Integral to the design and implementation of this Master Plan is the concept of sustainable development. This concept is reflected in a desire to minimize the expansion of the footprint of existing development, to redevelop existing structures and use areas, implement energy efficiencies in design and operations, use of pervious parking lot surfaces, and creation of surface water runoff control structures.

Actions

- Devise a management plan for the undeveloped, forested area of the SMRA property, which will focus on maintenance and enhancement of ecological values and functions, and, protection of cultural sites and values.

Development Opportunities within the SMRA

Over the years, there has been interest in commercial accommodation development on the SMRA property, particularly at the Grand Avenue base. An on-site hotel would provide ski-in/ski-out accommodation that may serve to expand Spirit Mountain's appeal to a longer stay regional visitor. A location within the recreation area would be more attractive to summer recreation tourists than the existing hotel at the edge of the interstate. However, a detailed market assessment of the demand for on-site hotel accommodation and additional hotel rooms within western Duluth during the shoulder seasons would need to be carried out to determine if this is a realistic opportunity.

The need to retain ownership of the land by the recreation authority and impose a mandatory rental management covenant on the units will complicate the development of a condominium hotel where individual units are sold to private buyers; development of a pure hotel would be less complex. A comparative evaluation of the opportunities and constraints of the Grand Avenue location vs. the top of the mountain should be explored in more detail. A new hotel at the top of the mountain could provide an opportunity to replace the aging portion of the upper daylodge by providing skier service facilities on the lower floors. It would support the existing accommodation, be close to the larger banquet facilities, tubing and the summer adventure park and have excellent views and year round sun exposure and could tie in well with the wedding and conference business. More Villa style accommodation or "glamping" facilities may prove more attractive to the core family market. This type of accommodation would present less of a financial risk because the units can be added one or two at a time and less operating risk, as the units can easily be closed and locked up during the shoulder seasons. Figures 3a and 3b identify areas at the top and bottom of the mountain that could be considered for this type of development.

The Legislative Act establishing the SMRA outlines specific powers and duties related to the use of designated areas. The authority may lease, sell or contract for the use of the land within the area to individuals or firms for purposes designed to be compatible with recreational uses and to accomplish the purposes of the act. Any non-recreational development within the SMRA would have to be carefully vetted to ensure it is consistent with the SMRA's mandate to provide recreational facilities for local residents and tourists and that it does not create a parking deficit. New development that's supportive to the

recreational area and located outside of the LAWCON Boundary or adjacent to the site could help bolster SMRA's long term success.

Cooperate with Private Development on Adjacent Lands

Spirit Mountain supports and encourages development on private land adjacent to the mountain, especially development that provides lodging for mountain users and generally enhances the area as a desirable destination for visitors. Along Grand Avenue, Spirit Mountain encourages development that would strengthen Spirit Mountain's connections to western Duluth neighborhoods and enhance connections between the SMRA and the St. Louis River.

Actions

- The City and the SMRA Board should work with adjacent developers to ensure optimal integration of vehicle and pedestrian access, trail connectivity and recreational amenity spaces with the future plans for the SMRA.
- Review Adventure Park parking lot plan for expansion as noted on figure 2A and figure 2B.

Spirit Mountain Recreation Area Authority (SMRA)

2017 Master Plan Update

Land Use Code

Purpose.

The purpose of the SMRA Land Use Code is to implement the goals and objectives of the 2017 Master Plan Update using those authorities over the development, redevelopment, use and occupancy of the land and structures, and over the protection of the environment. SMRA enabling legislation Section 5 (e) states that the authority may construct and maintain buildings, facilities and other equipment consistent with the purposes of the legislative act. Regulation of the land within the recreation area for its prescribed use is dictated by the master plan for the development of the area. Chapter 50 of the City of Duluth Legislative Code, Unified Development Chapter (UDC), regulates the use of land within the City. Applicable Sections of the UDC for development, redevelopment, use and occupancy of the land and structures within SMRA area will be used to regulate land use.

The Spirit Mountain Recreation Area Authority enabling legislation (Laws of Minnesota, 1973, Chapter 327), Section 5 Powers and Duties:

(e) The authority may construct and maintain buildings, facilities, and other equipment consistent with the purposes of this act. Previous zoning requirements within the recreation area shall be superseded by this act and replaced by procedures outlined hereinafter. Permitted uses include all forms of recreational facilities, including buildings and equipment, and commercial and recreational enterprises designed to be compatible with the recreational use of the area and to accomplish the purposes of this act, including, but not limited to, food services, intoxicating and nonintoxicating beverage sales, various forms of lodging, and shops which complement the recreational usage of the area. The authority may lease, sell or contract for the use of the land within the area to individuals or firms for the aforesaid purposes.

Prior to the construction of any buildings or facility or any other use of the area by the authority or others, the city council, upon recommendation of the city planning commission and the city park and recreation board shall review and approve a master plan for the development of the area and any subsequent changes to said master plan. Further, prior to the construction of any buildings or facility or prior to any site preparation or removal of vegetation or initiation of any use within the area, the authority or any other person or firm shall obtain a permit from the City Council after the City Planning Commission and City Park and Recreation Board have held a public hearing and given their recommendations to the Council. The planning commission working jointly with the park and recreation board, shall adopt necessary and reasonable requirements for such review to insure that the proposed use is within the purposes of this act and shall attach appropriate conditions and safeguards to insure compliance. The construction and maintenance codes of the city of Duluth shall apply to the construction and maintenance in the area.

Applicable UDC Regulations:

Section 50-18 Overlay districts.

- 50-18.1 Natural Resources Overlay (NR-O).
- 50-18.4 Skyline Parkway Overlay (SP-O).

Section 50-24 Parking and loading.

- 50-24.2 Required parking spaces
 - Land Use Supervisor shall determine number of parking space required for non-ski related uses.
- 50-24.7-4 Parking Design Standards
 - Required Surface Treatment/Paving as determined by Land Use Supervisor
- 50-24.7.B, Parking Lot Walkways
 - As determined by Land Use Supervisor

Section 50-25 Landscaping and tree preservation

- Applies to Lower Chalet area
- 50-25.9 Tree Preservation Requirements.
 - Applicable area wide

Section 50-26 Screening, walls and fences

- 50-26.B, Exempt area wide

Section 50-27 Signs.

- Public information sign exempt
- Trail sign exempt
- Directional sign exempt
- Building directional sign exempt

Section 50-28 Stormwater drainage and erosion control.

- Applicable area wide

Section 50-29 Sustainability standards.

- As determined by Land Use Supervisor

Section 50-30 Design standards.

- As determined by Land Use Supervisor

Section 50-31 Exterior lighting.

- Ski hill lighting exempt

Section 50-33 Plats.

- Applicable area wide

Section 50-34 Maintenance and operating standards.

- Applicable area wide

Article 5: Administration & Procedures

- Applicable area wide

**SPIRIT MOUNTAIN RECREATION AREA
PRELIMINARY PARKING LOT EXHIBITS AND COST ESTIMATES
9500 Spirit Mountain Place
Duluth, MN 55812**

Prepared: July 17, 2017

Owner:

City of Duluth
411 West First Street
Duluth, MN 55802
Phone: (218) 730-5325
Email: afulton@DuluthMN.gov

Prepared by:

Northland Consulting Engineers, L.L.P.
David Bolf, P.E.
102 South 21st Avenue West, Suite 1
Phone (218) 727-5995
Email david@nce-duluth.com

Report Prepared by:

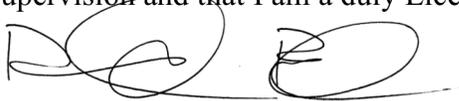


Signature

Trent Prigge, E.I.T.

Printed Name

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.



Signature

David Bolf, P.E.

Printed Name

07-17-17

Date

40926

Registration Number

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2. Area B Narrative
3. Area C Narrative
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Area C Layout and Cost Estimate
Area D Layout and Cost Estimate
Area E Layout and Cost Estimate

INTRODUCTION

Northland Consulting Engineers, LLC (NCE) was contacted by Ecosign Mountain Resort Planners to provide preliminary engineering services at the Spirit Mountain Recreation Area (SMRA). The scope of the services includes re-evaluating SMRA's master plan for transportation and parking lots throughout the recreation area. Specific areas include the drop off, main parking lot, RV park, realignment of Skyline Parkway, and expansion of the Grand Avenue chalet parking lot. Five areas have been investigated. Below is a brief narrative of the preliminary design of each area. Attached are exhibits and cost estimates for each rendition.

Parking counts shown on the exhibits are contingent upon having stanchions and ropes to properly lay out the parking area. Parking attendants will be necessary during high volume times such as holidays and weekends to achieve the maximum parking count as we have shown on the exhibits. Stanchions and ropes will need to be removed prior to snow removal to provide easier plowing. Some of the parking stalls may be needed for snow storage if the snow isn't removed from the parking areas entirely.

AREA A (RV PARK RECONSTRUCTION)

The area currently being considered for an RV park is located on the east side of Skyline Parkway. This gravel areas primary use is for bus parking during the winter. The city would like to repurpose the gravel lot into an RV park for summer camping. The new RV park will include a 40-site loop, turn around, and registration station. With the current alignment of Skyline Parkway, the turnaround and registration will be on the west side of the road while the camping loop will be on the east side. If Skyline Parkway is realigned the RV park would be entirely on the east side of the road (see Area D for Skyline Parkway realignment). The RV park would be re-graded to provide better drainage. The new surface would be a class 5 aggregate section in all areas. The cost associated with the reconstruction of the RV park is approximately \$890,000.00. This includes construction cost plus design fees. See attached engineer's estimate for a breakdown of cost.

AREA B (MAIN PARKING LOT RECONSTRUCTION)

The main parking lot is currently situated between the chalet and the gravel area being considered for an RV park. The attached exhibit provides an increase in parking stalls and a more efficient parking layout. The parking will be oriented in the same direction. The driving lanes will run north-south and have head in parking on both sides of the drive aisle. Some of the green space will be removed to increase parking. The entire parking area will be regraded to have a maximum grade of approximately 6.00% per recommendation made by Ecosign. The reconstructed parking lot would be entirely gravel. Gravel parking lots are typical of what is commonly seen at mountain resorts. Area B will also provide a dedicated bus drop-off to provide relief of the existing drop-off at the main chalet. The estimated cost associated with this area is approximately \$748,000.00 and includes construction and design fees.

AREA C (MAIN CHALET DROP OFF AND PARKING)

The main drop off area has significant issues with traffic patterns and parking accessibility. The drop off loop and the parking area by the main chalet will be reconstructed. This will require removal of the existing bituminous drives and parking area. The loop will be made wider to provide a smoother turning radius for delivery vehicles and guests. A dedicated drop off lane will provide better protection to vehicles dropping

off guests while maintaining necessary width for vehicles to bypass the drop off zone. The small parking area in the middle of the loop will be adjusted to provide 2-way traffic and have head in parking on both sides of the drive aisle. The reconstructed surface will be replaced with a new 24" bituminous pavement section. It will also require some adjustment to existing storm sewer culverts to convey water through the parking and drop off area. The estimated cost associated with area C is \$539,000.00.

AREA D (REALIGNMENT OF SKYLINE PARKWAY)

The existing Skyline Parkway is in need of repair. The section of the roadway near the gravel area being considered for an RV park is a narrow and windy road that is susceptible to significant potholing. Area D illustrates a realignment of Skyline Parkway that provides a straighter and more direct connection to the main parking area. The challenge of this area is the elevation change to the west of skyline parkway. A significant amount of rock excavation that would likely include blasting operations would be required to realign Skyline. The roadway would need to be cut into the hill approximately 15-20' to provide a desirable roadway grade. The new roadway section would be a 24' wide bituminous pavement section. As part of this area a scenic overlook would also be constructed on the west side of skyline to provide views of the St. Louis River and Duluth/Superior. The estimated cost of realigning Skyline Parkway in this area is \$1,190,000.00.

AREA E (EXPANSION OF GRAND AVENUE CHALET PARKING)

The Grand Avenue parking area is in need of expansion. Currently the Grand Avenue chalet has a paved parking lot that provides 45 parking spaces. An adjacent gravel lot provides an additional 50-60 parking spaces. Our intent is to leave both of these lots as they exist today and expand the parking lot to the east toward Grand Avenue. The expanded parking lot would be entirely gravel. SMRA has shown desire to provide a concrete accessible walk from Grand Avenue to the chalet. The parking lot expansion would raise the parking count to approximately 360 parking spaces. The estimated cost for this area is approximately \$454,000.00 and includes both construction and design fees.

CONCLUSION

Feasibility studies would need to be performed to determine how viable each of these areas is. The City of Duluth and SMRA have also expressed a desire to connect the lower mountain to the upper mountain with a public roadway. Two options exist to accomplish this, both having their own challenges. The first being a reconstruction of Knowlton Creek Boulevard. This roadway will need to be re-stabilized at areas affected by the Duluth flood of 2012. The other option is an extension of Gogebic Street. This roadway will require significant realignment to connect to Skyline parkway with grades desirable for a roadway bed. Further study of a connection between the upper mountain and lower mountain will be required. Table 1 below shows the estimated cost of each area.

Estimated Cost of Areas A-E

Area	Description	Estimated Cost
Area A	RV Park Reconstruction	\$890,000.00
Area B	Main Parking Lot Reconstruction	\$748,000.00
Area C	Main Entrance/Drop-off Reconstruction	\$539,000.00
Area D	Realignment of Skyline Parkway	\$1,190,000.00
Area E	Grand Avenue Chalet Parking Expansion	\$454,000.00



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MOUNTAIN VILLAS.

TRAIL HEAD PARKING.

OVERFLOW PARKING.

MAIN CHALET PARKING AND DROP OFF.

MAIN CHALET

MAIN PARKING LOT

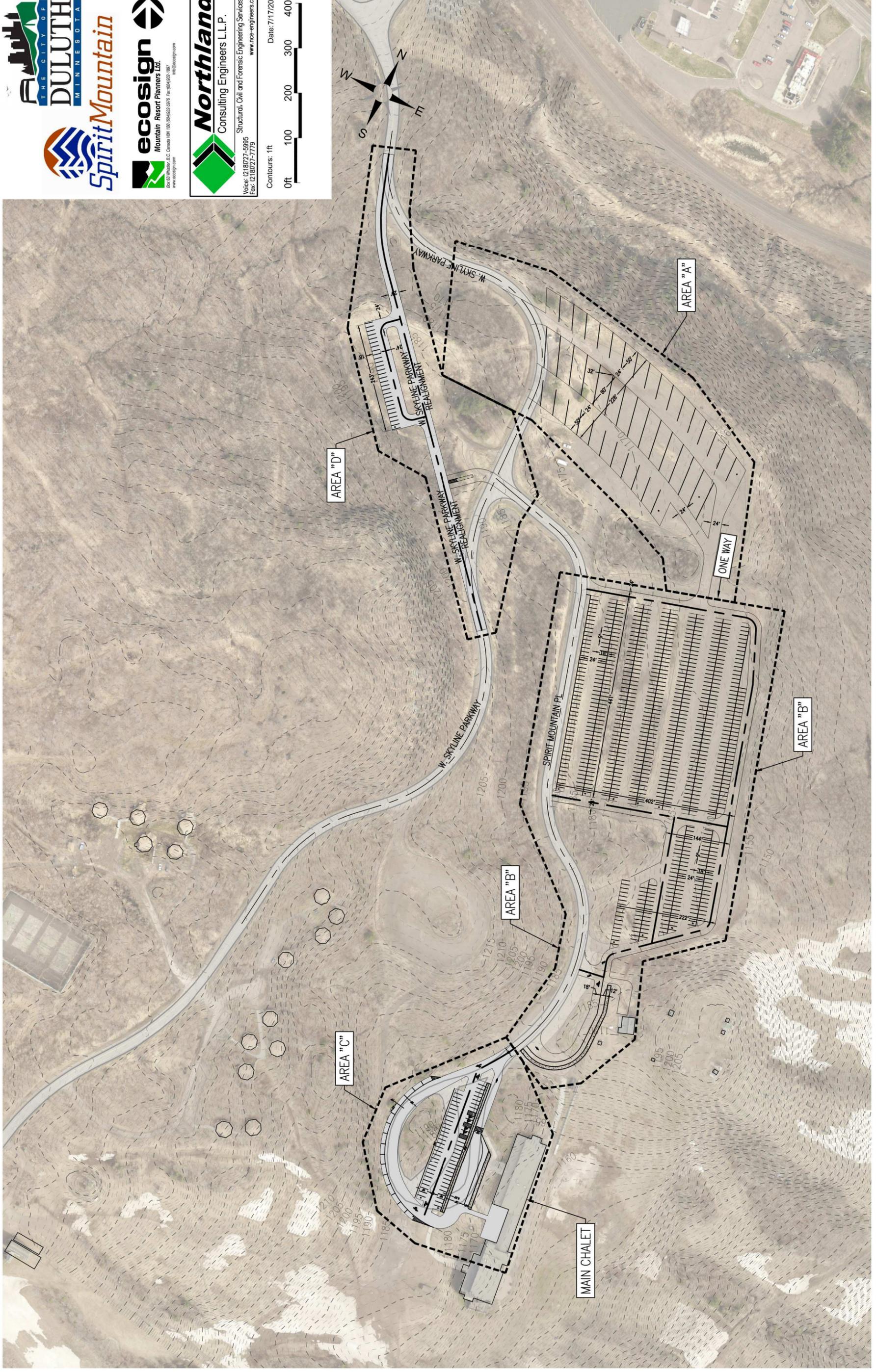
OVERFLOW PARKING.

EXISTING CONDITIONS



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Area "A" Cost Estimate

Date: 7/17/17

Spirit Mountain Parking Lot Analysis

Project No.: 17-221

Item No.	Spec. No.	Item Description	Unit of Measure	Estimated Quantities	Estimated Unit Price	Estimated Total Cost
1	2021.501	MOBILIZATION	LUMP SUM	1	\$20,000.00	\$20,000.00
2	2101.511	CLEARING AND GRUBBING	LUMP SUM	1	\$15,000.00	\$15,000.00
3	2104.509	REMOVE AND SALVAGE SIGN	EACH	14	\$25.00	\$350.00
4	2104.509	REMOVE LIGHT POLE AND BASE	EACH	6	\$500.00	\$3,000.00
5	2105.501	COMMON EXCAVATION (EV)	CU YD	16,100	\$18.00	\$289,800.00
6	2211.503	AGGREGATE BASE (CV), CLASS 5	CU YD	6,440	\$40.00	\$257,600.00
7	2503.603	HDPE PIPE SEWER	LIN FT	165	\$20.00	\$3,300.00
8	2563.601	TRAFFIC CONTROL	LUMP SUM	1	\$4,000.00	\$4,000.00
9	2573.502	SILT FENCE, TYPE HEAVY DUTY	LIN FT	1,350	\$3.00	\$4,050.00
10	2573.530	STORM DRAIN INLET PROTECTION	EACH	6	\$500.00	\$3,000.00
11	2575.555	TURF ESTABLISHMENT	LUMP SUM	1	\$15,000.00	\$15,000.00
12	2575.601	EROSION CONTROL	LUMP SUM	1	\$10,000.00	\$10,000.00
13		CONCRETE WALKS	SQ FT	2,500	\$4.00	\$10,000.00

Construction Sub-Total **\$635,100.00**

Engineering Fee (30%) **\$ 190,530.00**

Construction Contingency (5%) **\$ 31,755.00**

City Administrative Cost (5%) **\$ 31,755.00**

Total Project Cost **\$ 889,140.00**

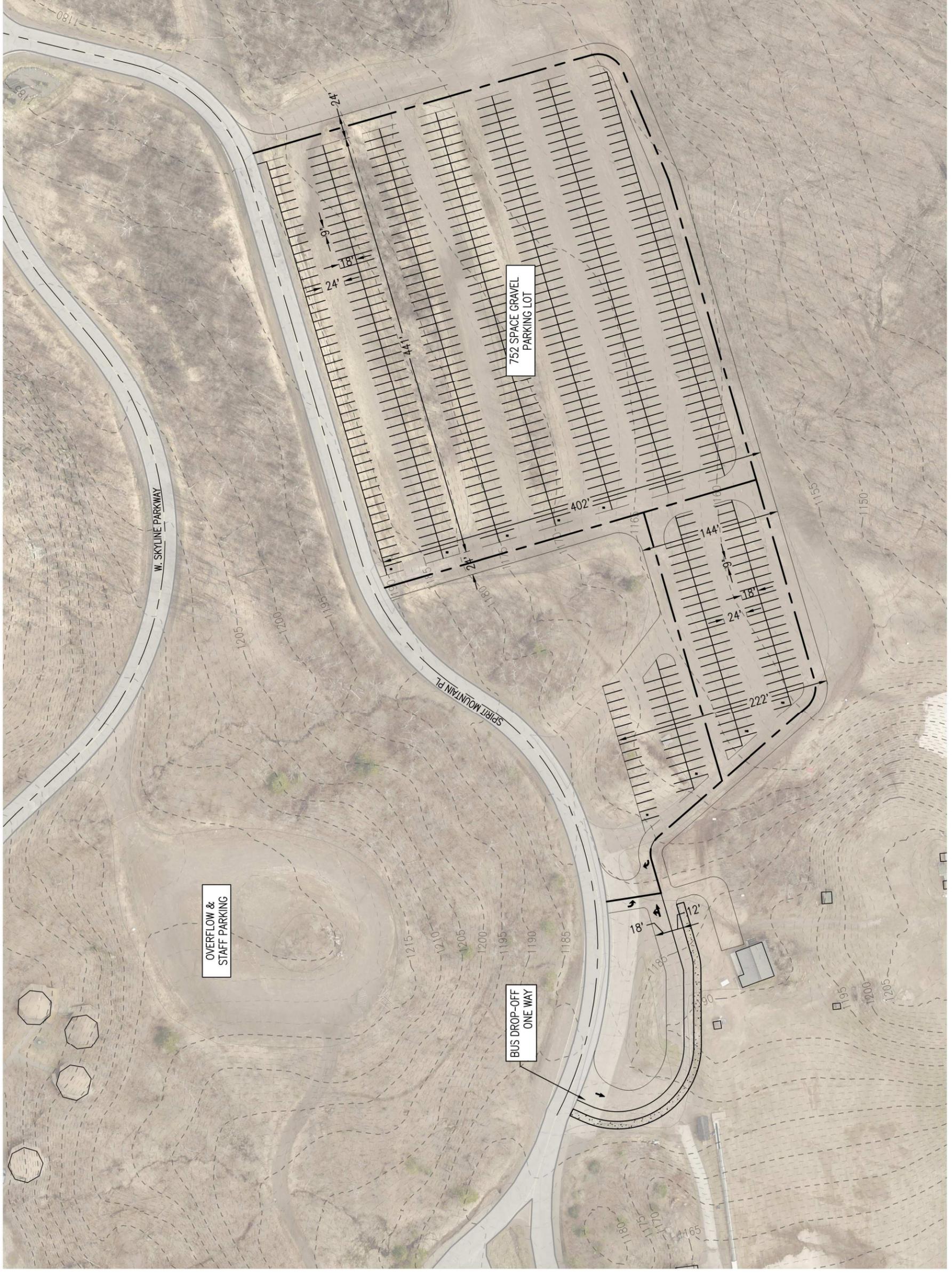
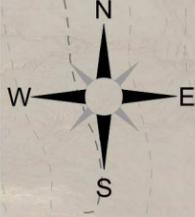
*Engineering Fee includes 10% Design Engineering, 10% Construction Engineering, 5% Geotechnical, and 5% Boundary and Topographic Survey.



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Area "B" Cost Estimate

Date: 7/17/17

Spirit Mountain Parking Lot Analysis
 Project No.: 17-221

Item No.	Spec. No.	Item Description	Unit of Measure	Estimated Quantities	Estimated Unit Price	Estimated Total Cost
1	2021.501	MOBILIZATION	LUMP SUM	1	\$20,000.00	\$20,000.00
2	2101.511	CLEARING AND GRUBBING	LUMP SUM	1	\$15,000.00	\$15,000.00
3	2104.509	REMOVE AND SALVAGE SIGN	EACH	14	\$25.00	\$350.00
4	2104.509	REMOVE LIGHT POLE AND BASE	EACH	6	\$500.00	\$3,000.00
5	2105.501	COMMON EXCAVATION (EV)	CU YD	1,265	\$18.00	\$22,770.00
6	2105.522	SELECT GRANULAR BORROW (CV)	CU YD	505	\$20.00	\$10,100.00
7	2211.503	AGGREGATE BASE (CV), CLASS 5	CU YD	9,525	\$40.00	\$381,000.00
8	2360.504	TYPE SP 12.5 WEARING COURSE MIX (2,B)	TON	345	\$95.00	\$32,775.00
9	2503.603	HDPE PIPE SEWER	LIN FT	450	\$20.00	\$9,000.00
11	2531.501	CONCRETE CURB AND GUTTER DESGIN B618	LIN FT	335	\$20.00	\$6,700.00
12	2563.601	TRAFFIC CONTROL	LUMP SUM	1	\$4,000.00	\$4,000.00
13	2573.502	SILT FENCE, TYPE HEAVY DUTY	LIN FT	1,725	\$3.00	\$5,175.00
14	2573.530	STORM DRAIN INLET PROTECTION	EACH	2	\$500.00	\$1,000.00
15	2575.555	TURF ESTABLISHMENT	LUMP SUM	1	\$5,000.00	\$5,000.00
16	2575.601	EROSION CONTROL	LUMP SUM	1	\$8,000.00	\$8,000.00
17		CONCRETE WALKS	SQ FT	2,505	\$4.00	\$10,020.00

Construction Sub-Total **\$533,890.00**

Engineering Fee (30%) **\$ 160,167.00**
Construction Contingency (5%) **\$ 26,694.50**
City Administrative Cost (5%) **\$ 26,694.50**

Total Project Cost **\$ 747,446.00**

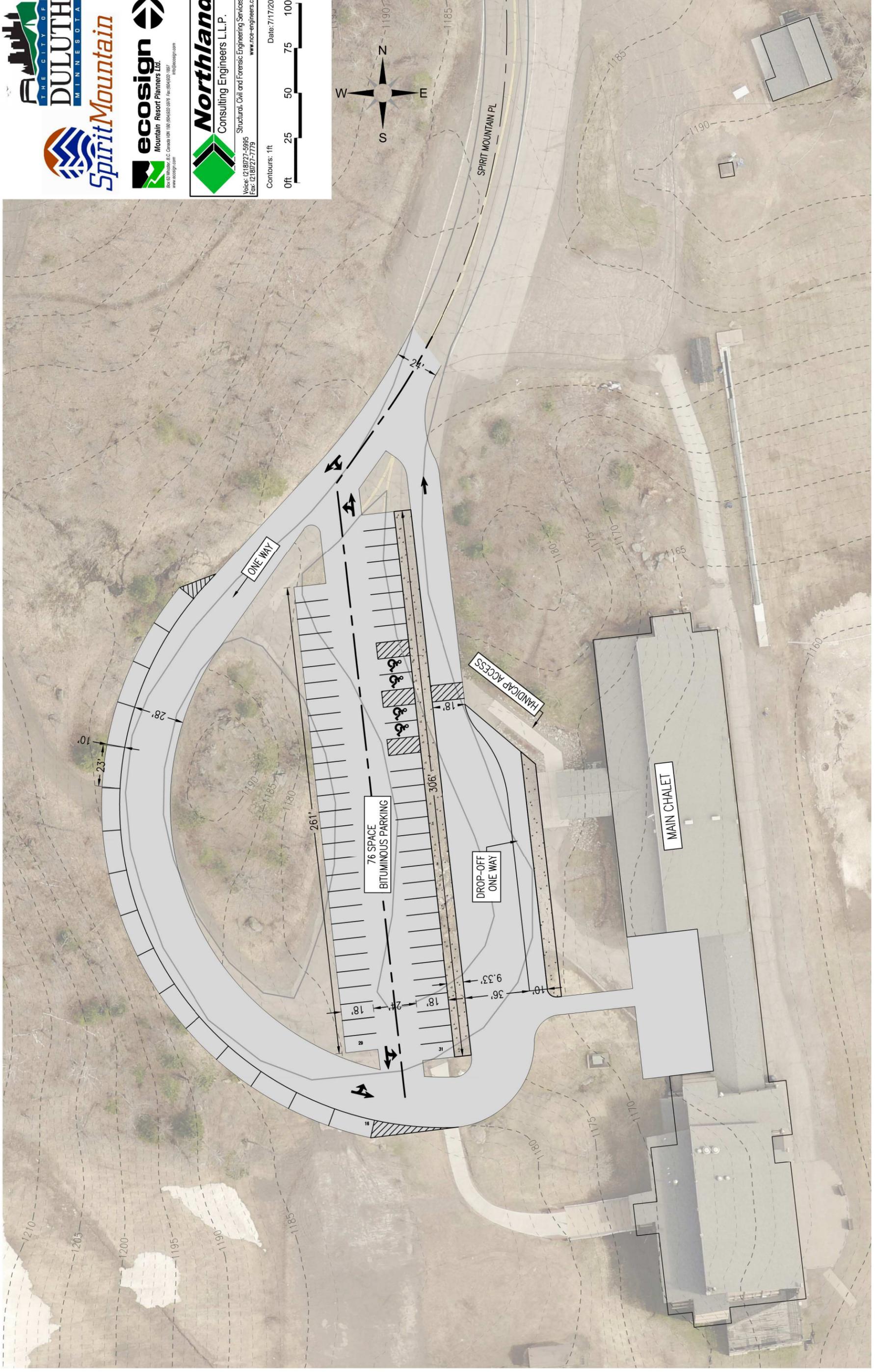
*Engineering Fee includes 10% Design Engineering, 10% Construction Engineering, 5% Geotechnical, and 5% Boundary and Topographic Survey.



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Area "C" Cost Estimate

Date: 7/17/17

Spirit Mountain Parking Lot Analysis
Project No.: 17-221

Item No.	Spec. No.	Item Description	Unit of Measure	Estimated Quantities	Estimated Unit Price	Estimated Total Cost
1	2021.501	MOBILIZATION	LUMP SUM	1	\$10,000.00	\$10,000.00
2	2101.511	CLEARING AND GRUBBING	LUMP SUM	1	\$5,000.00	\$5,000.00
3	2104.505	REMOVE BITUMINOUS PAVEMENT	SQ YD	3,420	\$6.00	\$20,520.00
4	2104.509	REMOVE AND SALVAGE SIGN	EACH	14	\$25.00	\$350.00
5	2104.509	REMOVE LIGHT POLE AND BASE	EACH	2	\$500.00	\$1,000.00
6	2104.513	REMOVE PIPE SEWER	LIN FT	120	\$5.00	\$600.00
7	2104.513	SAWING BITUMINOUS PAVEMENT	LIN FT	74	\$3.00	\$222.00
8	2105.501	COMMON EXCAVATION (EV)	CU YD	4,220	\$18.00	\$75,960.00
9	2105.522	SELECT GRANULAR BORROW (CV)	CU YD	1,985	\$20.00	\$39,700.00
10	2211.503	AGGREGATE BASE (CV), CLASS 5	CU YD	1,325	\$40.00	\$53,000.00
11	2360.504	TYPE SP 12.5 WEARING COURSE MIX (2,B)	TON	1,340	\$95.00	\$127,300.00
12	2503.603	HDPE PIPE SEWER	LIN FT	100	\$20.00	\$2,000.00
13	2506.501	DRAINAGE STRUCTURE DESIGN F	LIN FT	15	\$300.00	\$4,500.00
14	2506.501	APRON	EACH	2	\$500.00	\$1,000.00
15	2506.516	CASTING ASSEMBLY	EACH	3	\$700.00	\$2,100.00
16	2531.501	CONCRETE CURB AND GUTTER DESGIN B618	LIN FT	630	\$20.00	\$12,600.00
17	2563.601	TRAFFIC CONTROL	LUMP SUM	1	\$4,000.00	\$4,000.00
18	2573.502	SILT FENCE, TYPE HEAVY DUTY	LIN FT	525	\$3.00	\$1,575.00
19	2573.530	STORM DRAIN INLET PROTECTION	EACH	5	\$500.00	\$2,500.00
20	2575.555	TURF ESTABLISHMENT	LUMP SUM	1	\$5,000.00	\$5,000.00
21	2575.601	EROSION CONTROL	LUMP SUM	1	\$4,000.00	\$4,000.00
22		CONCRETE WALKS	SQ FT	2,860	\$4.00	\$11,440.00

Construction Sub-Total **\$384,367.00**

Engineering Fee (30%) **\$ 115,310.10**

Construction Contingency (5%) **\$ 19,218.35**

City Administrative Cost (5%) **\$ 19,218.35**

Total Project Cost **\$ 538,113.80**

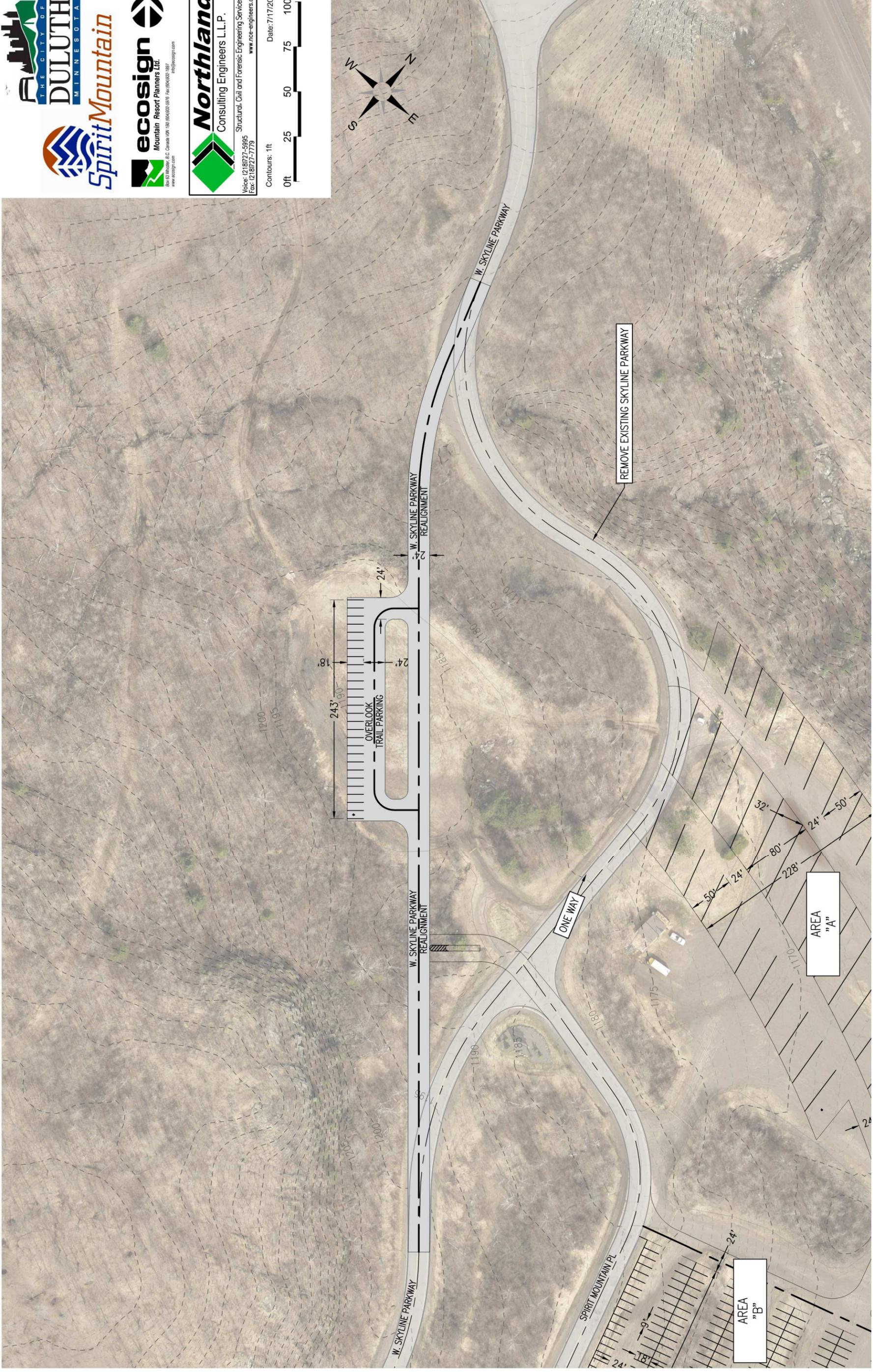
*Engineering Fee includes 10% Design Engineering, 10% Construction Engineering, 5% Geotechnical, and 5% Boundary and Topographic Survey.



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Area "D" Cost Estimate

Date: 7/17/17

Spirit Mountain Parking Lot Analysis
 Project No.: 17-221

Item No.	Spec. No.	Item Description	Unit of Measure	Estimated Quantities	Estimated Unit Price	Estimated Total Cost
1	2021.501	MOBILIZATION	LUMP SUM	1	\$40,000.00	\$40,000.00
2	2101.511	CLEARING AND GRUBBING	LUMP SUM	1	\$30,000.00	\$30,000.00
3	2104.505	REMOVE BITUMINOUS PAVEMENT	SQ YD	3,505	\$6.00	\$21,030.00
4	2105.501	COMMON EXCAVATION (EV)	CU YD	30,900	\$18.00	\$556,200.00
5	2105.522	SELECT GRANULAR BORROW (CV)	CU YD	1,355	\$20.00	\$27,100.00
6	2211.503	AGGREGATE BASE (CV), CLASS 5	CU YD	955	\$40.00	\$38,200.00
7	2360.504	TYPE SP 12.5 WEARING COURSE MIX (2,B)	TON	915	\$95.00	\$86,925.00
8	2503.603	HDPE PIPE SEWER	LIN FT	165	\$20.00	\$3,300.00
9	2563.601	TRAFFIC CONTROL	LUMP SUM	1	\$4,000.00	\$4,000.00
10	2573.502	SILT FENCE, TYPE HEAVY DUTY	LIN FT	1,350	\$3.00	\$4,050.00
11	2573.530	STORM DRAIN INLET PROTECTION	EACH	6	\$500.00	\$3,000.00
12	2575.555	TURF ESTABLISHMENT	LUMP SUM	1	\$20,000.00	\$20,000.00
13	2575.601	EROSION CONTROL	LUMP SUM	1	\$15,000.00	\$15,000.00

Construction Sub-Total **\$848,805.00**

Engineering Fee (30%) **\$ 254,641.50**
Construction Contingency (5%) **\$ 42,440.25**
City Administrative Cost (5%) **\$ 42,440.25**

Total Project Cost **\$ 1,188,327.00**

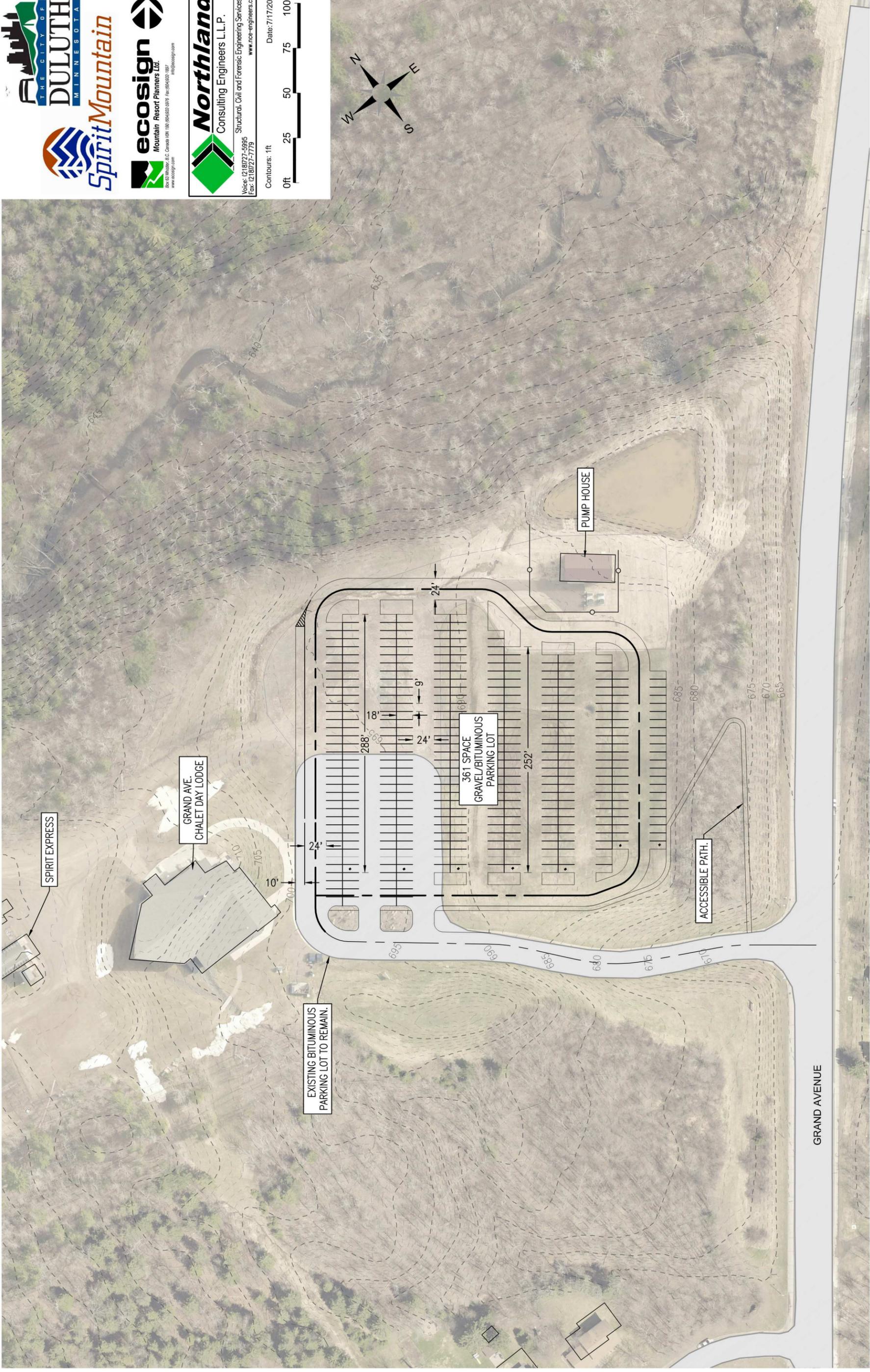
*Engineering Fee includes 10% Design Engineering, 10% Construction Engineering, 5% Geotechnical, and 5% Boundary and Topographic Survey.



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0ft 25 50 75 100





Area "E" Cost Estimate

Date: 7/17/17

Spirit Mountain Parking Lot Analysis
 Project No.: 17-221

Item No.	Spec. No.	Item Description	Unit of Measure	Estimated Quantities	Estimated Unit Price	Estimated Total Cost
1	2021.501	MOBILIZATION	LUMP SUM	1	\$15,000.00	\$15,000.00
2	2101.511	CLEARING AND GRUBBING	LUMP SUM	1	\$5,000.00	\$5,000.00
3	2105.501	COMMON EXCAVATION (EV)	CU YD	4,100	\$18.00	\$73,800.00
4	2105.522	SELECT GRANULAR BORROW (CV)	CU YD	4,100	\$20.00	\$82,000.00
5	2211.503	AGGREGATE BASE (CV), CLASS 5	CU YD	2,740	\$40.00	\$109,600.00
6	2563.601	TRAFFIC CONTROL	LUMP SUM	1	\$2,000.00	\$2,000.00
7	2573.502	SILT FENCE, TYPE HEAVY DUTY	LIN FT	950	\$3.00	\$2,850.00
8	2575.555	TURF ESTABLISHMENT	LUMP SUM	1	\$10,000.00	\$10,000.00
9	2575.601	EROSION CONTROL	LUMP SUM	1	\$8,000.00	\$8,000.00
10		CONCRETE WALKS	SQ FT	3,970	\$4.00	\$15,880.00

Construction Sub-Total \$324,130.00

Engineering Fee (30%) \$ 97,239.00
Construction Contingency (5%) \$ 16,206.50
City Administrative Cost (5%) \$ 16,206.50

Total Project Cost \$ 453,782.00

*Engineering Fee includes 10% Design Engineering, 10% Construction Engineering, 5% Geotechnical, and 5% Boundary and Topographic Survey.

SKI TRAIL ABILITY LEVEL

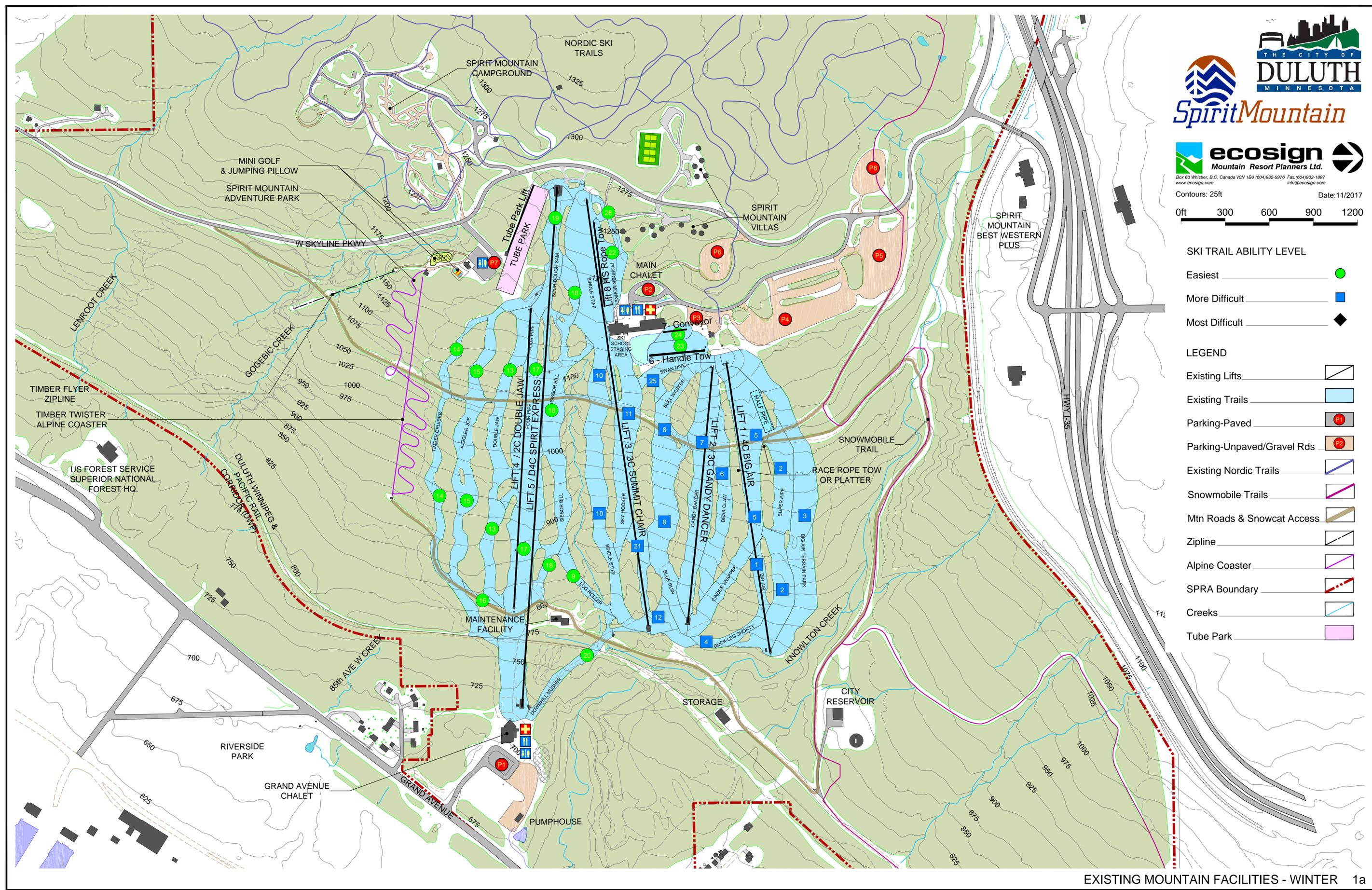
Easiest ●

More Difficult ■

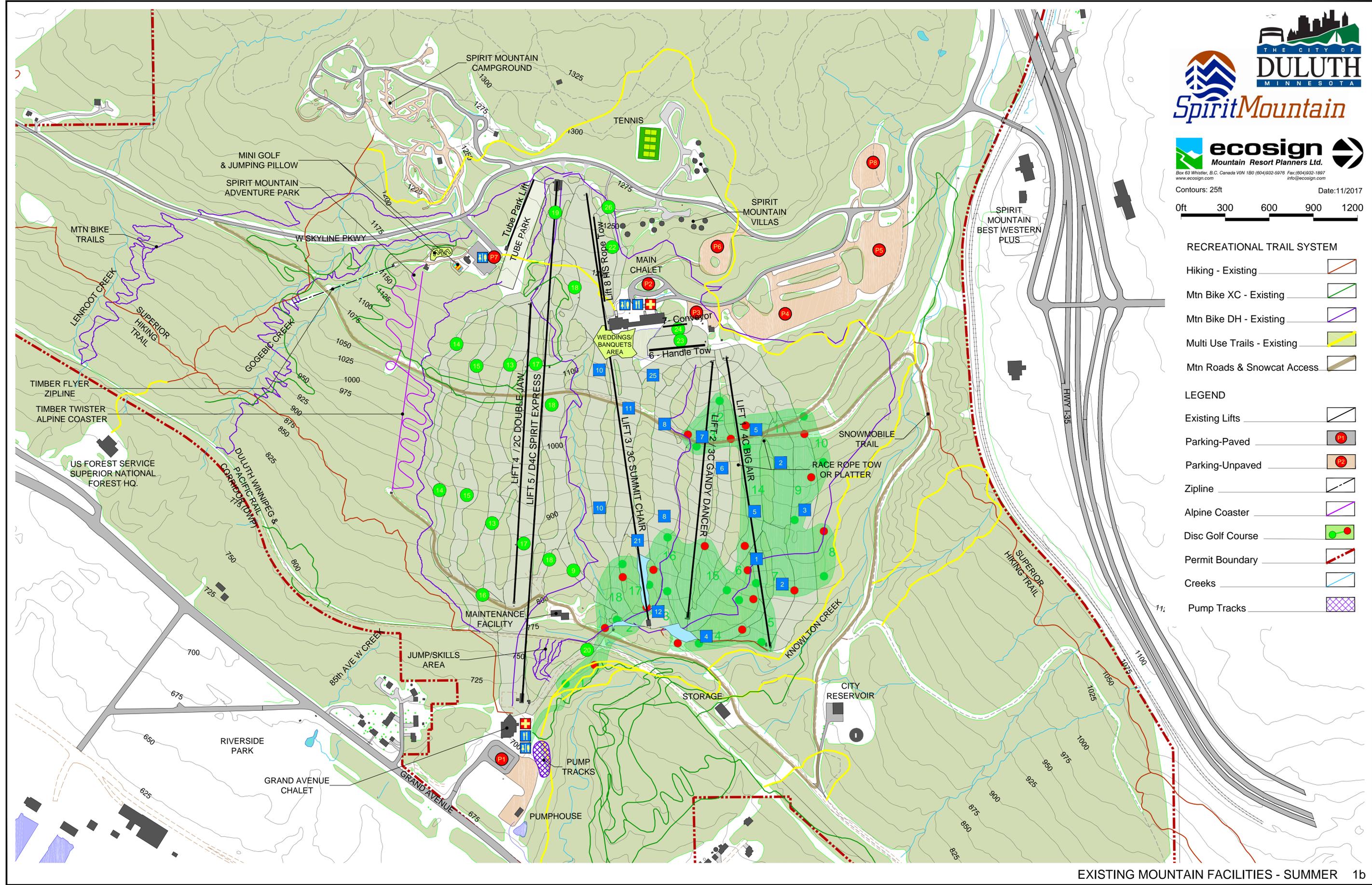
Most Difficult ◆

LEGEND

- Existing Lifts
- Existing Trails
- Parking-Paved
- Parking-Unpaved/Gravel Rds
- Existing Nordic Trails
- Snowmobile Trails
- Mtn Roads & Snowcat Access
- Zipline
- Alpine Coaster
- SPRA Boundary
- Creeks
- Tube Park



EXISTING MOUNTAIN FACILITIES - WINTER 1a



RECREATIONAL TRAIL SYSTEM

- Hiking - Existing 
- Mtn Bike XC - Existing 
- Mtn Bike DH - Existing 
- Multi Use Trails - Existing 
- Mtn Roads & Snowcat Access 

LEGEND

- Existing Lifts 
- Parking-Paved 
- Parking-Unpaved 
- Zipline 
- Alpine Coaster 
- Disc Golf Course 
- Permit Boundary 
- Creeks 
- Pump Tracks 

SKI TRAIL ABILITY LEVEL

Easiest ●

More Difficult ■

Most Difficult ◆

LEGEND

Existing Lifts

Existing Trails

Parking-Paved

Parking-Unpaved/Gravel Rds

Existing Nordic Trails

Snowmobile Trails

Mtn Roads & Snowcat Access

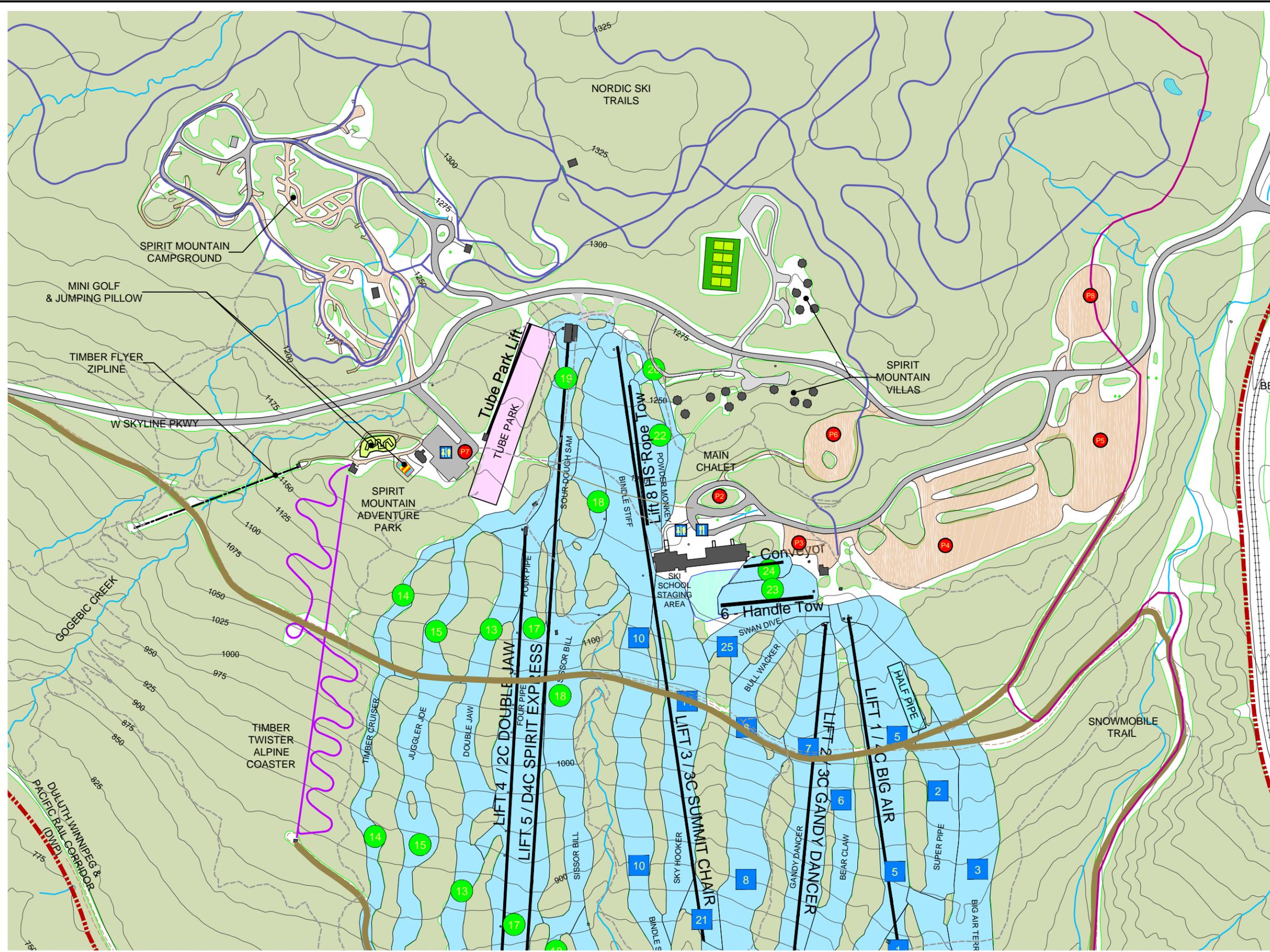
Zipline

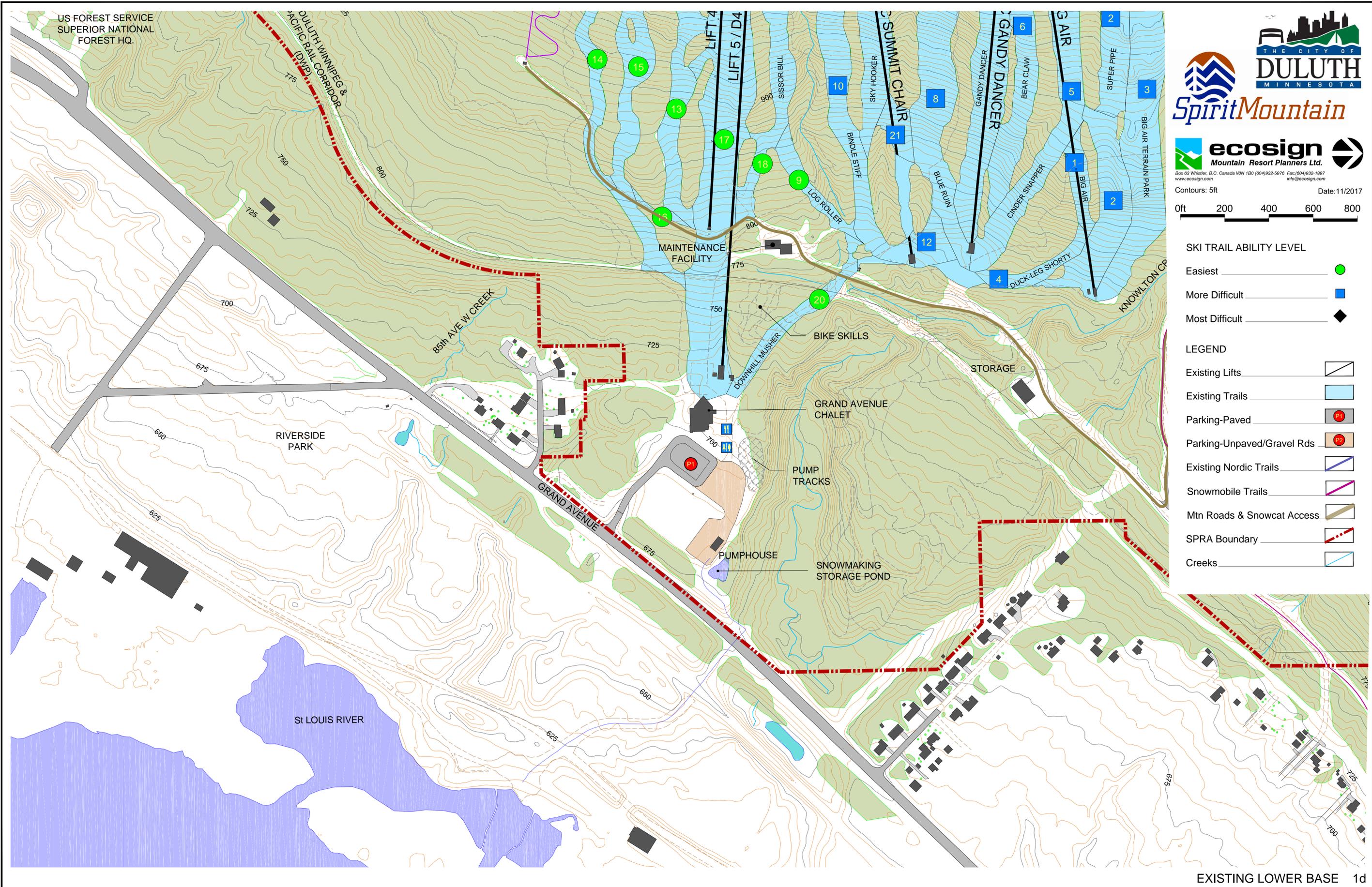
Alpine Coaster

SPRA Boundary

Creeks

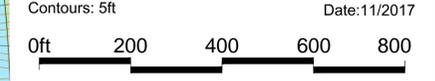
Tube Park






SpiritMountain

Box 83 Whistler, B.C. Canada V0N 1B0 (604)932-5976 Fax: (604)932-1897
 www.ecosign.com info@ecosign.com



SKI TRAIL ABILITY LEVEL

Easiest 

More Difficult 

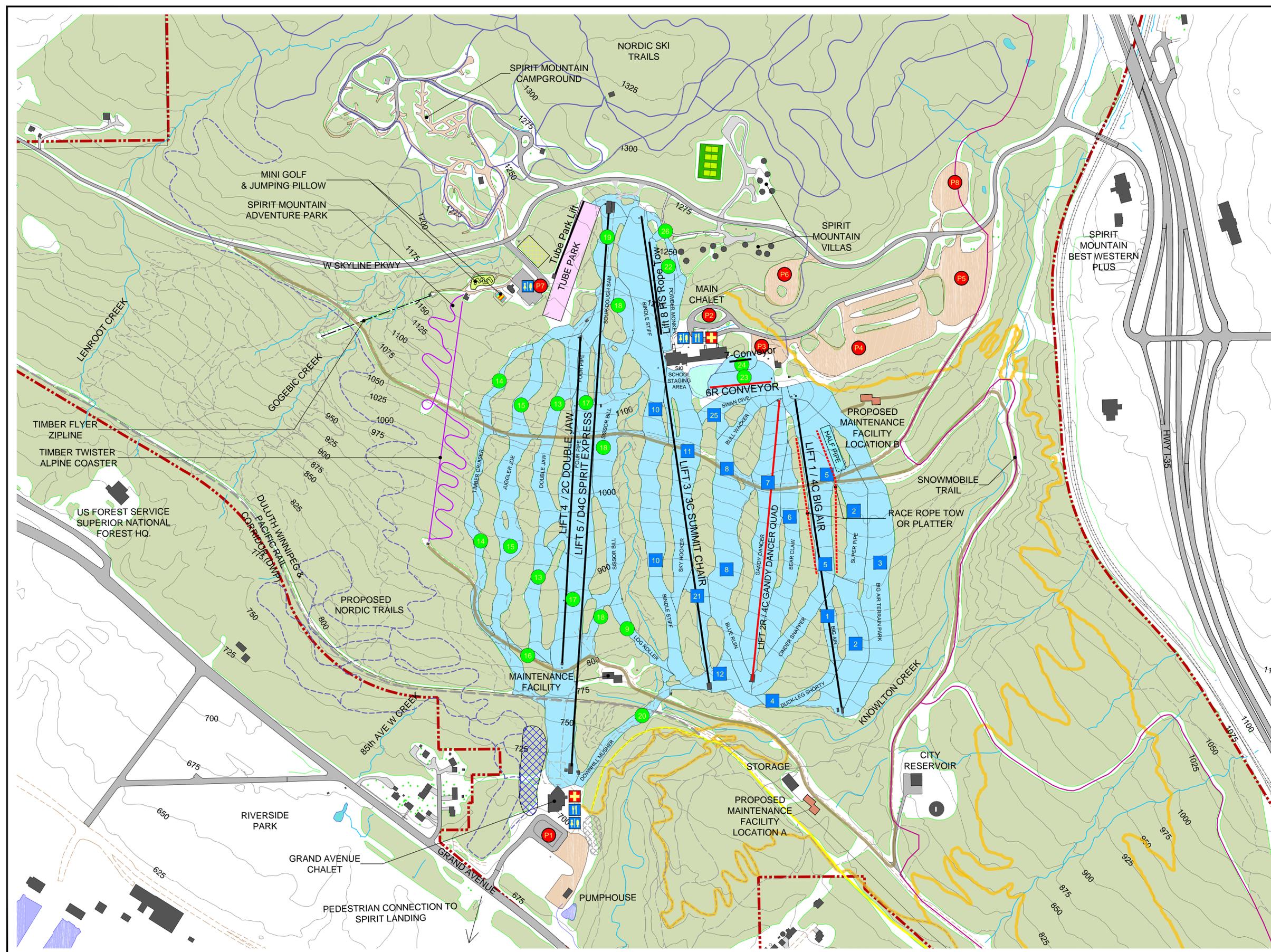
Most Difficult 

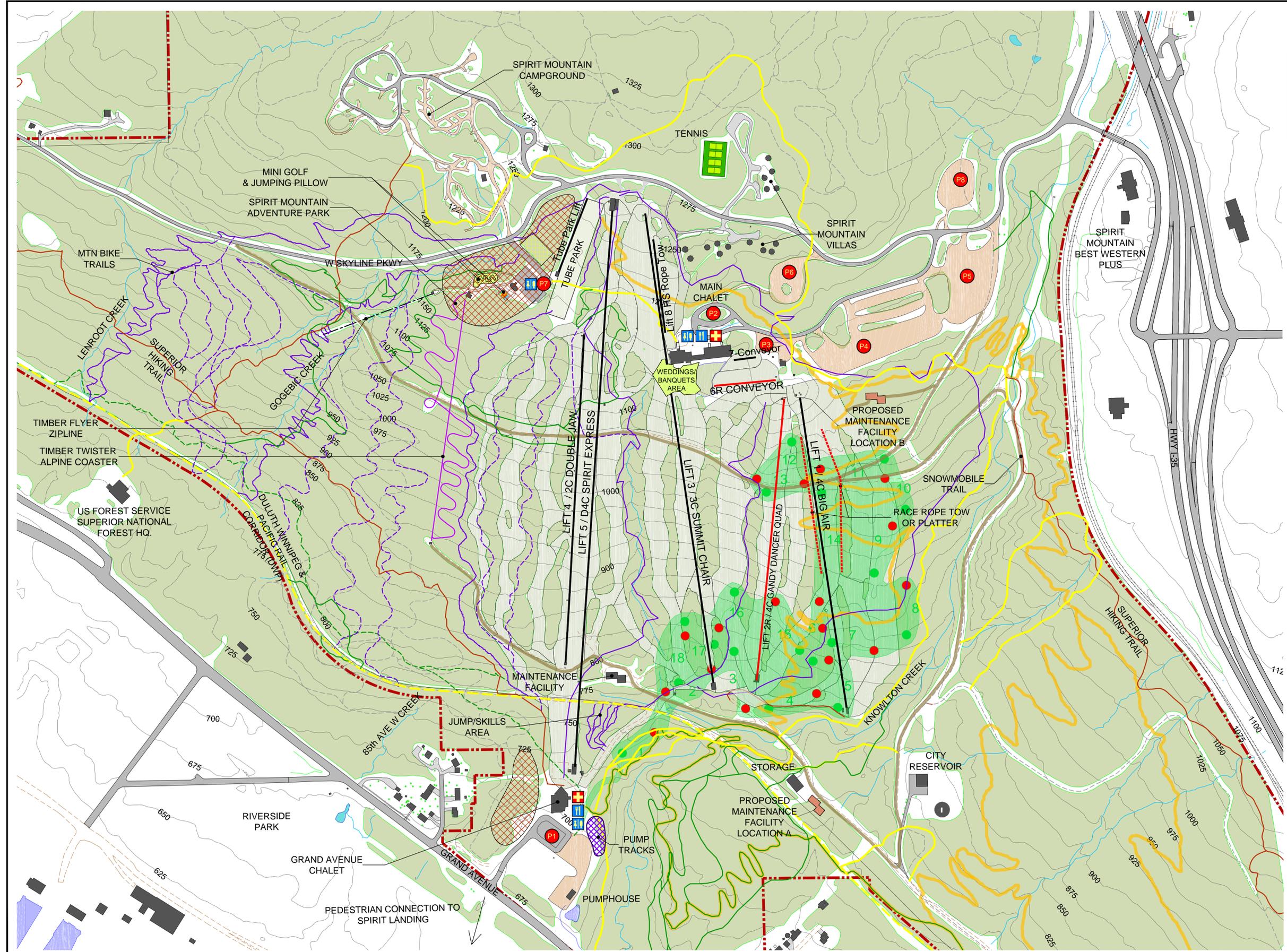
LEGEND

- Existing Lifts 
- Existing Trails 
- Parking-Paved 
- Parking-Unpaved/Gravel Rds 
- Existing Nordic Trails 
- Snowmobile Trails 
- Mtn Roads & Snowcat Access 
- SPRA Boundary 
- Creeks 

- SKI TRAIL ABILITY LEVEL**
- Easiest ●
 - More Difficult ■
 - Most Difficult ◆

- LEGEND**
- Existing Lifts
 - Proposed Chair Lifts
 - Proposed Rope/Platter Lifts
 - Existing Trails
 - Parking-Paved
 - Parking-Unpaved
 - Parking Lot Expansion
 - Existing Nordic Trails
 - Proposed Nordic Trails
 - All Weather Trail - Proposed
 - Multi Use Trail - Proposed
 - Snowmobile Trails
 - Mtn Roads & Snowcat Access
 - Zipline
 - Alpine Coaster
 - Permit Boundary
 - Creeks
 - Tube Park
 - Snowplay Area



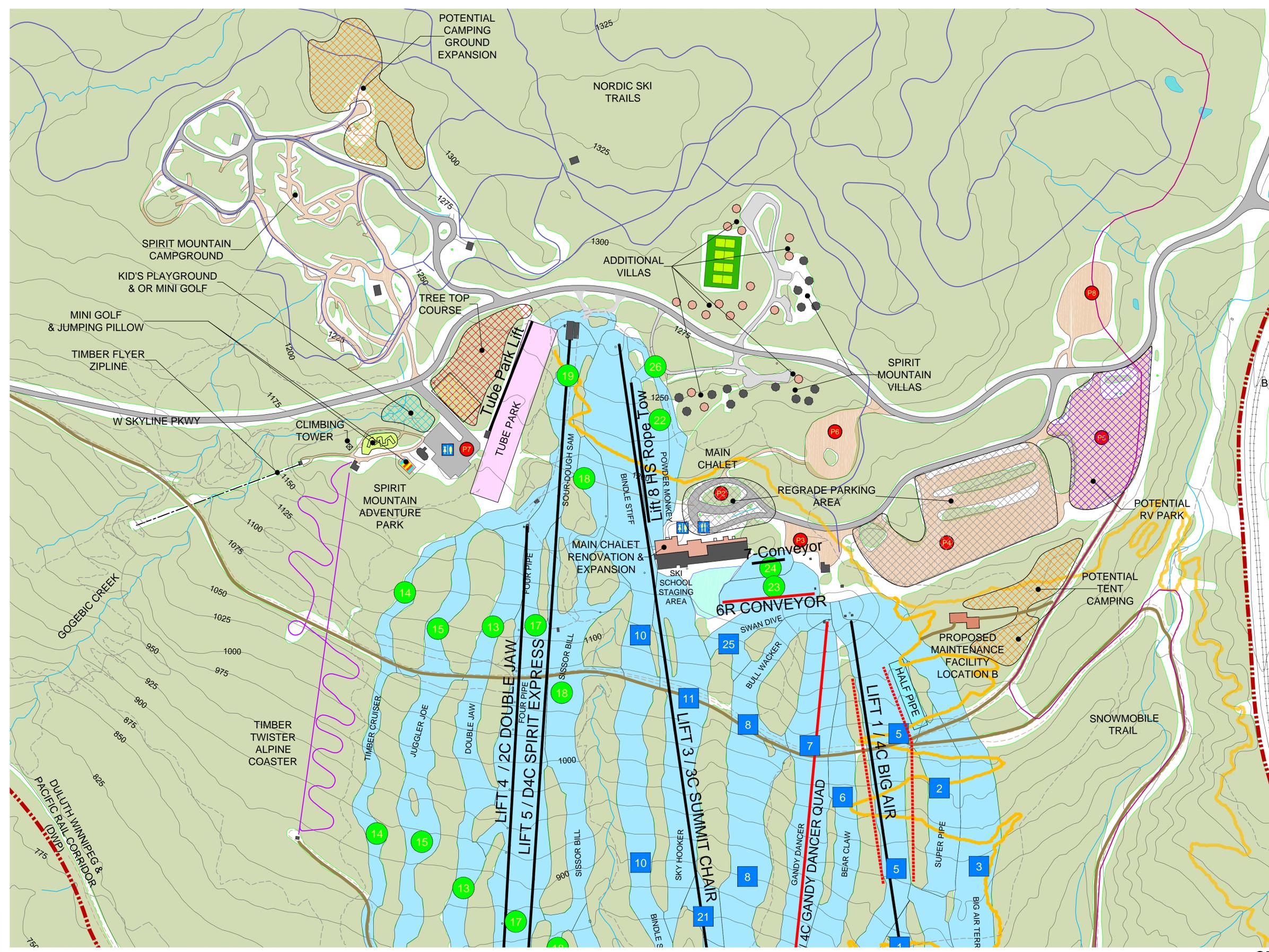


RECREATIONAL TRAIL SYSTEM

- Hiking - Existing 
- Hiking - Proposed 
- Mtn Bike XC - Existing 
- Mtn Bike XC - Proposed 
- Mtn Bike DH - Existing 
- Mtn Bike DH - Proposed 
- All Weather Trail - Proposed 
- Multi Use Trails - Existing 
- Multi Use Trails - Proposed 
- Mtn Roads & Snowcat Access 

LEGEND

- Existing Lifts 
- Proposed Lifts 
- Proposed Rope/Platter Lifts 
- Parking-Paved 
- Parking-Unpaved 
- Parking Lot Expansion 
- Zipline 
- Alpine Coaster 
- Disc Golf Course 
- Permit Boundary 
- Creeks 
- Pump Tracks 
- Upper Mtn Adventure Zone 
- Lower Mtn Summer Activity Zone 



SKI TRAIL ABILITY LEVEL

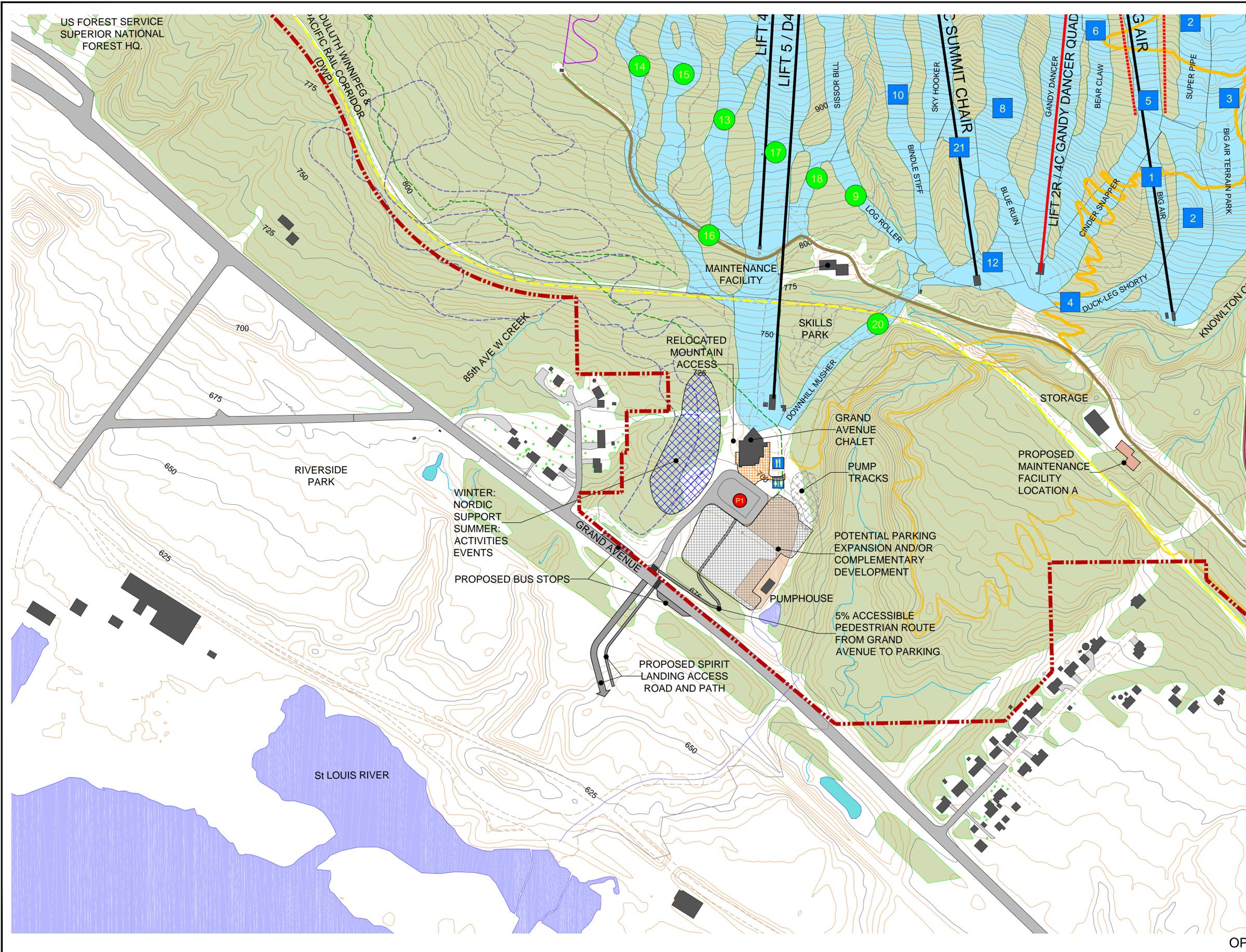
Easiest ●

More Difficult ■

Most Difficult ◆

LEGEND

- Existing Lifts
- Proposed Lifts
- Existing Trails
- Parking-Paved
- Parking-Unpaved/Gravel Rds
- Existing Nordic Trails
- Snowmobile Trails
- Mtn Roads & Snowcat Access
- All Weather Trail - Proposed
- Zipline
- Alpine Coaster
- SPRA Boundary
- Creeks
- Tube Park





SpiritMountain



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Contours: 5ft Date: 11/2017

0ft 200 400 600 800

- SKI TRAIL ABILITY LEVEL**
- Easiest ●
 - More Difficult ■
 - Most Difficult ◆
- LEGEND**
- Existing Lifts 
 - Proposed Lifts 
 - Existing Trails 
 - Parking-Paved 
 - Parking-Unpaved/Gravel Rds 
 - All Weather Trail - Proposed 
 - Winter XC- Proposed 
 - Multi-Use trail - Proposed 
 - Mtn Bike DH 
 - Mtn Bike XC - Proposed 
 - Mtn Roads & Snowcat Access 
 - SPRA Boundary 
 - Creeks 
 - Recreation Development 
 - Potential parking Development 