

Transit Gondola Feasibility Study for the Park City Municipal Corporation

May 2020

Prepared for:

Park City Municipal Corporation

Prepared by:

SE Group

Executive Summary

In 2020, the engineering and planning firm SE Group was retained by the Park City Municipal Corporation to conduct a preliminary evaluation around the concept of connecting various major destinations throughout Park City with an aerial transportation system (gondola). The impetus for such a study is the current and anticipated pressure on Park City's transportation infrastructure and system. Urban Aerial Gondola's (UAG) can provide options for transporting goods and people when roads are constrained due to geography, capacity, community goals, and a need to move a lot of people between fixed locations is desirable.

This Park City Transit Gondola Feasibility Study is guided by the following questions:

1. Does an aerial transportation system appear to be an effective transit solution for Park City?
2. Are there potential feasible alignments sufficient to accommodate the system?
3. To what extent may residents and guests use an aerial system for transportation and experience an enhancement of transportation services?
4. When considering construction, operations, maintenance and potential offsetting costs, what are the economic realities of these concepts?
5. Does an aerial transit system help achieve Park City's sustainability goals?
6. What other options are available to meet transit needs of the future?

One of the primary goals of this study was to evaluate potential gondola terminals/stations that would serve as a viable transportation option for Park City residents and visitors, while

minimizing the number of stations/turn stations (due to the added costs and travel times that additional infrastructure brings).

Three segments of a system were conceptualized and evaluated through this analysis. The segments were selected based on connecting the major commercial nodes throughout the City, and a future Park City Arts and Culture District (A&CD) coming to the SW corner of Kearns Blvd and Bonanza Dr; with an anticipated completion date in 2024. The segments include: from the future A&CD to Old Town Transportation Center area (OTTC), with options for connecting lines to Park City Mountain Base Area (PCM) and Deer Valley's Snow Park Base Area (DVSP).

From the analysis performed in this study, it is concluded that while there are significant barriers, development uncertainties, and additional infrastructure requirements, an aerial gondola system could provide a feasible transportation option between the major commercial and resort centers within Park City. The approach and details regarding the conclusions are included within this report.

Introduction

In 2020, Park City Municipal Corporation contracted with SE Group to evaluate the feasibility of an aerial transportation system in Park City. A preliminary evaluation around the concept of connecting major commercial destinations and transit nodes throughout Park City with an aerial transportation system (gondola) was completed and is described in this report. Three segments were conceptualized and evaluated through the analysis contained herein from the future A&CD, to OTTC, PCM and DVSP. The alignment details are in **Figures 1 – 4**, further referenced in each segment siting section. Files are in report folder (link to folder provided in email). A gondola for the purposes of this study is defined as a cable driven aerial connection with independent cabins that runs an average of 11mph/1,000 feet per minute.

The need for this study developed from the increasing demand on current transportation modes. Park City and its surrounding area have been experiencing substantial growth over the last decade. This has put significant pressure on the limited number of transportation corridors into and out of Park City; that is, Utah State Route-224 (SR-224) and Utah State Route-248 (SR-248). Additionally transit passengers on Park City Transit routes continue to increase year over year by an average of 11% a year for the last five years [1], and the major nodes explored represent the most popular destinations. These routes are used to access major destinations such as Old Town Park City, Lower Park Ave/Bonanza Ave, Park City Mountain Resort and Deer Valley.

Aerial Transportation in Park City

1. Does an aerial transportation system appear to be an effective transit solution for Park City?

The conceptualized Park City aerial transit system can offer guests, residents, and commuters an alternative method of reliable public transportation that will help meet the City's goals of reduced single occupancy vehicle trips, and a sustainable transportation system. Park City has identified an aerial transit system as a potential opportunity to provide an alternative transit access to PCM, A&CD, DVSP, and OTTC. Given the estimated increase in traffic and public transit use, an aerial transit option throughout Park City could help reduce traffic, alleviate pressure on the existing transit system, and offer supplemental service to provide a more energy efficient transportation alternative for users.

OPPORTUNITIES

The aerial system could be an effective transit solution as one component of an overall transportation system. If existing conditions persist, SR-224 and SR-248 are projected to reach over capacity during peak hours by 2040 [2]. In addition, parking options are projected to be more limited and in higher demand given the increased projection of daily users coming into Park City. In the future, economic incentives and transit options could motivate people arriving to Park City via Kimball Junction or Quinn's Junction to park in outlying lots (i.e., Ecker Hill Park and Ride, Richardson Flat Park and Ride and other future satellite parking developments) and take public transportation to the aerial terminal. Safe and accessible satellite parking options, served by high-frequency transit, coupled with strong in-town parking policies will allow visitors and commuters chose a viable alternative to access Park City other than driving a personal vehicle. In addition, current bus routes would need to be modified to provide access to current high density and frequently visited areas other than the four gondola terminals analyzed in this study. Essentially, the existing bus system would modify itself to become a "feeder" system for the trunk line that would be the gondola. Figure 1 shows the gondola system in proximity to current major public transit stops within Park City.

CHALLENGES

The gondola system does present some challenges as a transportation solution. As currently conceptualized, the gondola would help move people to/from the A&CD to OTTC and potentially PCM and DVSP. It could, but is not necessarily conceptualized to alleviate skier traffic during winter mornings and afternoons as the proposed alignments does not currently intercept regional travelers before they travel on SR-224 or SR-248. Other challenges concern uncertainty with future development of the A&CD, the PCM and DVSP; physical constraints of existing buildings, utilities and rights-of-ways; and parking and access to the gondola system. Collaboration with key stakeholders and property owners would be needed to overcome these challenges. These challenges are large enough that it may not be feasible for all three segments of the system to be built.

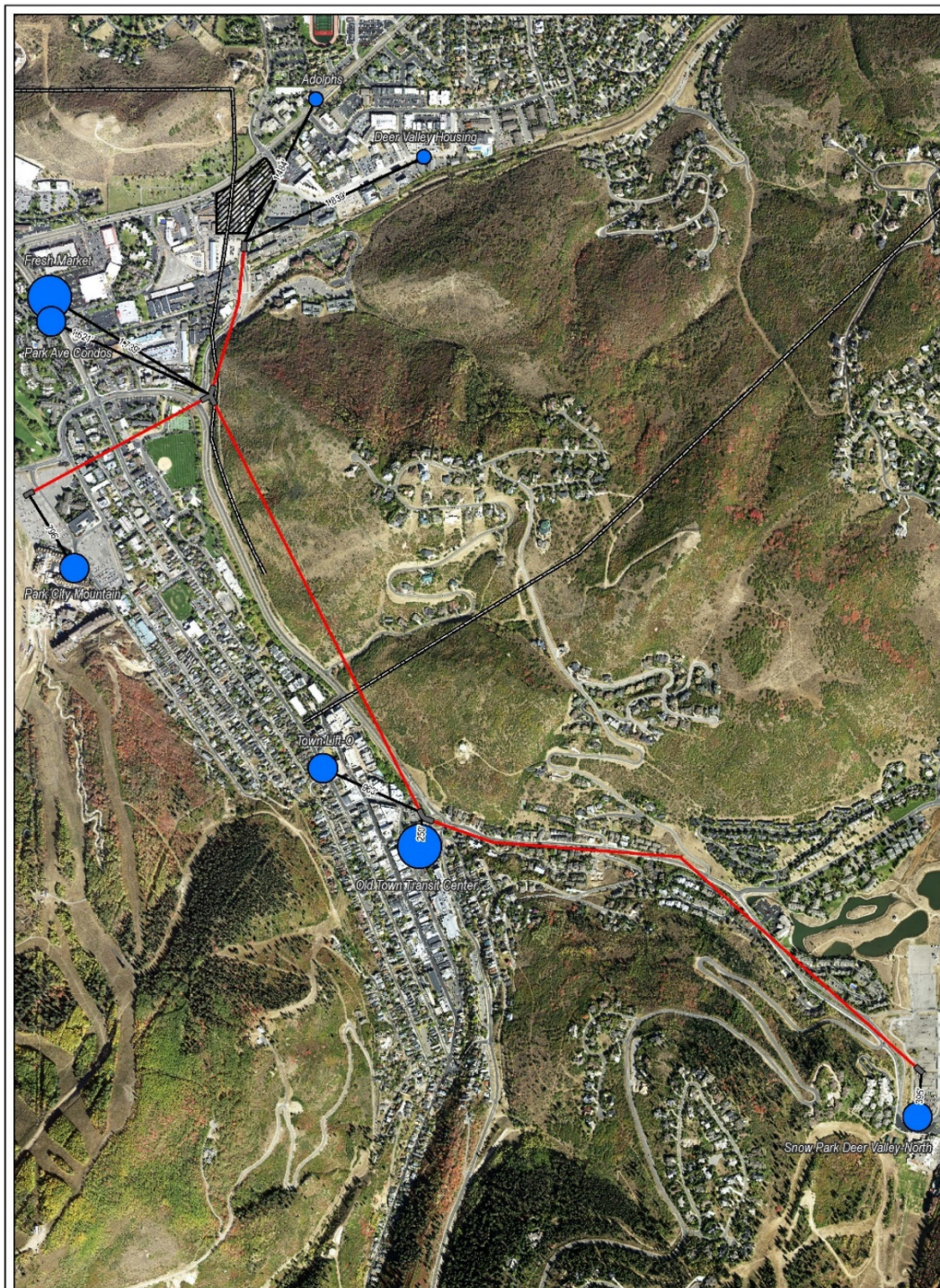
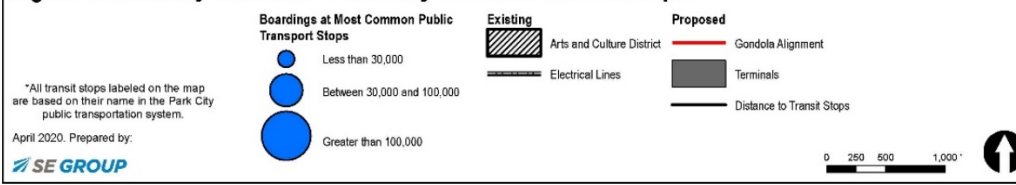


Figure 1: Park City Gondola - Proximity to Public Transit Stops



Siting of the Gondola System

2. Are there potential feasible alignments sufficient to accommodate the system?

The scope of the Park City Transit Gondola Feasibility Study was to analyze a potential aerial connection from the A&CD to OTTC with spur lines connecting PCM and DVSP. These were determined to be the primary “hubs” and “spokes” of a potential aerial transportation system due to being major destinations throughout Park City. Approximate travel times are identified in **Table 1** between major hubs. With terminals established, a siting analysis was completed that considered numerous factors of transporting riders to and from these locations. These factors assessed the viability of the alignment and included physical constraints (e.g., buildings, topography, and parking), property ownership, regulations and other assumptions about the operations of such a system. A brief description of each segment and a discussion about these factors are detailed below. The alignments should be viewed as initial concepts due to the number of uncertainties with property ownership and stakeholders. Figures 2 – 4 present the overall proposed aerial system configuration.

Table 1. Approximate Travel Times between Hubs

	A&CD	OTTC	PCM	DVSP
A&CD	--	~7 min	~4 min	~15 min
OTTC	~7 min	--	~8 min	~6 min
PCM	~4 min	~8 min	--	~15 min
DVSP	~15 min	~6 min	~15 min	--

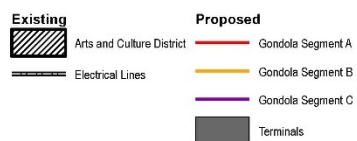
Note: The above times primarily account for aerial transportation time and a small amount of transfer time. They do not account for any lift lines or other potential delays.

As all aerial technology types were briefly evaluated it was determined that a gondola connection provides the greatest flexibility for Park City to expand segments and capacity down the road while also providing users with the most comfortable experience. A gondola for the purposes of this study is defined as a cable driven aerial connection with independent cabins that runs an average of 11mph/1,000 feet per minute.

The feasibility of a gondola system in Park City was not necessarily designed for existing conditions, but rather for potential future conditions. These future conditions include a full build-out of the A&CD, PCM, and DVSP. With the construction of these areas, the opportunity to expand transit options and work through private/public partnerships exists. Additionally, with the growing expansions, more demands will be put on the transit system, roadways and parking supply than currently exists.



Figure 2: Park City Gondola Alignment Map - Full Extent



April 2020. Prepared by:

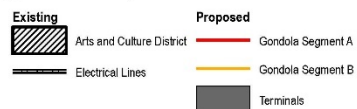


0 250 500 1,000'





Figure 3: Park City Gondola Alignment Map - Extent 1

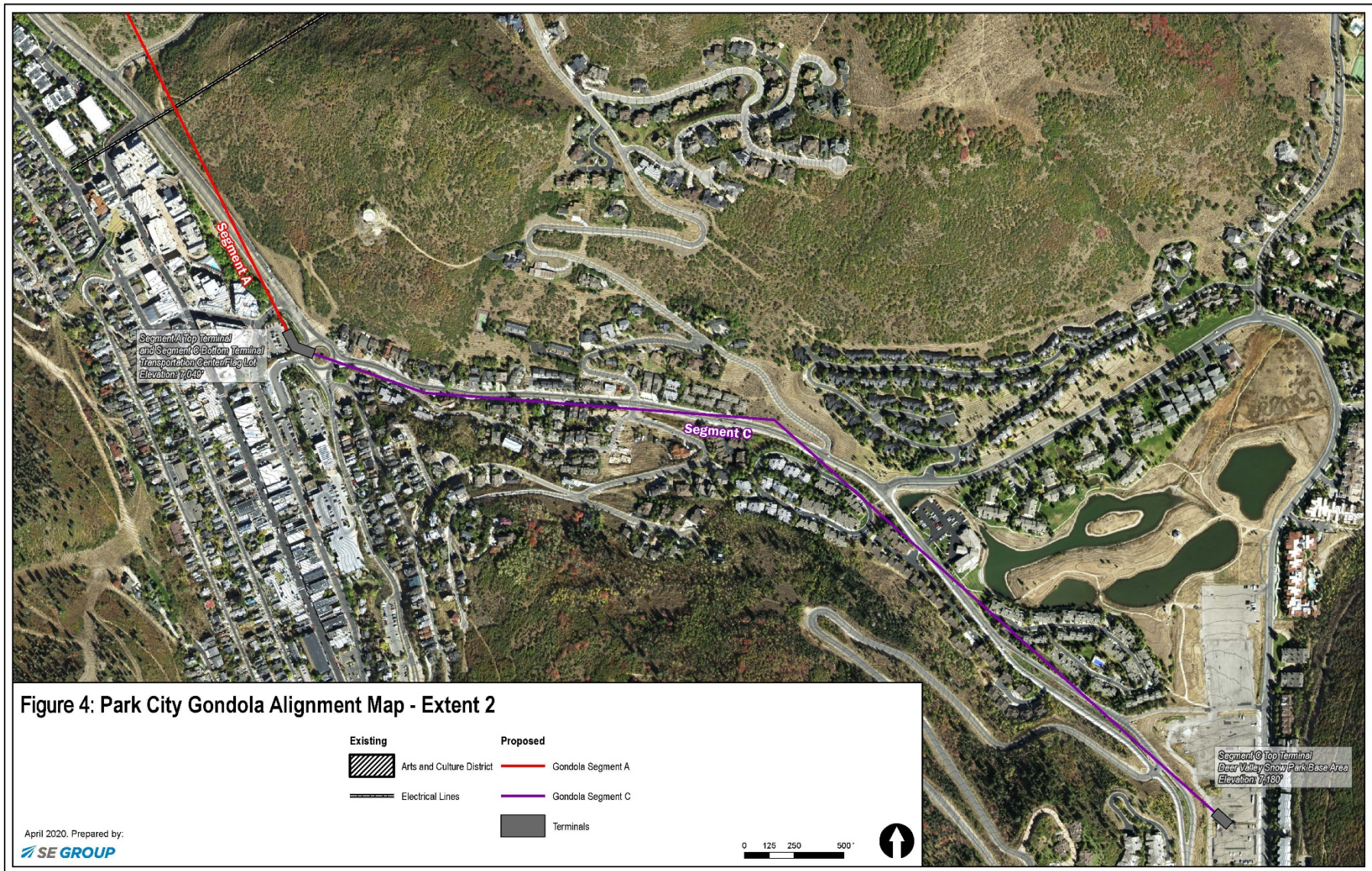


April 2020. Prepared by:



0 125 250 500'





Segment A

Segment A is the main line of the planned Park City Gondola. It would transport riders from the A&CD to OTTC with a mid-station on the east side of the intersection at Deer Valley Drive/SR224 and Bonanza Drive, then continuing up the East side of Deer Valley Dr. to the top terminal located near the OTTC. Having a mid-station in Segment A, would allow riders to transfer to Segment B and access the PCM base area (details in Segment B section).

The bottom or northernmost terminal of Segment A would be located in or next to the planned A&CD district. Depending on the exact terminal location, the alignment could span buildings or might require a small bend (less than four degrees) in the alignment to avoid crossing buildings. It is important to note that a bend greater than four degrees requires an angle station and increases the cost per line by approximately \$3 million. Additionally the segment would need to be built high enough to clear current power lines and seek an exception to current fire codes, or relocation of these power lines should be considered.

From the mid-station, the alignment would traverse Aerie Mountain hillside for a distance of approximately 3,000 feet, avoiding buildings and potential land ownership conflicts. It would cross Deer Valley Drive/SR-224 near the intersection of Heber Avenue and Deer Valley Drive before reaching the top terminal, located near the OTTC. From the top terminal, riders would be able to access Old Town, the Park City bus transit system, or transfer to Segment C to access Deer Valley Resort.

The total length of Segment A is approximately 6,000 feet and includes three stations (bottom, middle and top terminals). A total of 49 cabins would be needed for an initial capacity of 1,500 persons per hour (PPH). The ride time would be approximately 6 minutes assuming an operating speed of 1,000 feet/minute (or 11 miles/hour).

Additional considerations for Segment A gondola alignment:

- A major distribution powerline for the A&CD runs parallel with the Munchkin lot (PCM owned property) located south of the A&CD along Munchkin Road at approximately 65 feet aboveground. These lines currently are not planned to be relocated underground. They could be relocated to the southern edge of the Munchkin lot to allow for the widening of Munchkin Road and to improve the aesthetics of the A&CD however; this would not benefit the current gondola alignment. The gondola would have to cross over or under the powerline. This is not an uncommon circumstance with aerial transportation and would require meeting regulatory fire and Utah state ropeway code to ensure the safety of the gondola and the powerline.
- To avoid bending the gondola alignment more than four degrees and increasing the cost of the alignment significantly, the mid-station of Segment A was located on the eastern side of Bonanza Drive and Deer Valley Drive. To provide access to Segment A mid-station, a tunnel or improved pedestrian crossing would be recommended across Bonanza Drive. These improvements could range from \$10,000 for an improved

crosswalk across Bonanza Drive from the existing bike path to \$4 million for an underpass similar to the recently installed SR248/Kearns Boulevard tunnel.

- For Segment A to be feasible, key stakeholders and property owners would need to be involved to overcome any property rights issues; however, the majority of Segment A is aligned on public property. (See **Table 2, Figures 2 - 3** for the number of potential property owners impacted). Variance to Utah state ropeway regulations would be needed to construct and operate the gondola with buildings within the required 70-foot corridor clearance (see *Regulations* for more details).
- Actual siting and parcel location for the terminal of Segment A has not been included in this study. Supportive amenities and facilities are not included in the cost estimate.

Segment B

Segment B would be a short ride from the Segment A mid-station (on the eastside of Deer Valley Drive/SR224 and Bonanza intersection) to the PCM base area. The proposed alignment as currently conceptualized spans City Park and a privately owned three-story building across from the PCM parking lots. This alignment was chosen due to the limited number of building crossings (there is considerable density between Sullivan Road and Empire Avenue) and an approximate location within the privately owned PCM existing parking lots. The top terminal location would likely need to be modified based on these plans. Key stakeholders and private partnerships would need to be engaged to determine an ideal top terminal location within the planned redeveloped PCM base area and any potential property owner conflicts that might arise.

The total length of Segment B is approximately 2,000 feet with two stations (bottom and top terminals). A total of 19 cabins would be needed for an initial capacity of 1,500 PPH. The ride time would be approximately 3 minutes assuming an operating speed of 1,000 feet/minute (or 11 miles/hour).

Additional considerations for Segment B gondola alignment:

- There may be the potential to align the gondola along 15th Street and avoid spanning taller buildings. The 15th Street alignment would require spanning some one-story buildings. Skiers and riders would likely use the First Time Lift. This could result in some circulation issues with a larger number of skiers and riders starting their day from this area. Additional attention would need to be given to the pedestrian circulation from the terminal of the gondola connecting users to the resort base area.
- For Segment B to be feasible, key stakeholders and property owners would need to be involved to develop partnerships to overcome any property rights issues. (See **Table 2, Figures 2 - 4** for the number of potential property owners impacted). Additionally Park City would need to seek variance to the State regulations to construct and operate the gondola between and above buildings within the required 70-foot corridor clearance (see *Regulations* for more details).

Segment C

Segment C would extend from the Segment A top terminal at the OTTC area to the DVSP base area. The alignment would include two angle stations and generally follow the Deer Valley Drive road alignment. The first angle station would be located near the junction of Deer Valley Drive and Deer Valley Loop. The second angle station would be located near the junction of Deer Valley Drive and Mellow Mountain Road.

The top terminal location was chosen assuming the Silver Lake Express Lift would eventually extend down into existing parking lots. The DVSP parking lots are planned to be developed; and this is a partnership opportunity to advance transit for the City to explore. The top terminal location would likely need to be modified based on future development plans. Key stakeholders would need to be engaged to determine an ideal top terminal location within the planned development of the DVSP base area and any potential property owner conflicts that might arise.

The total length of Segment C is approximately 5,000 feet with four stations (bottom and top terminals and two angle stations). A total of 38 cabins would be needed for an initial capacity of 1,500 PPH. The ride time would be approximately 6 minutes assuming an operating speed of 1,000 feet/minute (or 11 miles/hour).

Additional considerations for Segment C gondola alignment:

- This segment lacks a direct alignment to DVSP base area from the OTTC area. The proposed alignment was chosen to maximize the existing roadway right-of-way and avoid multiple property line intersections, avoid as many structures as possible and to provide the most direct route possible. Even with these considerations, a number of private structures along Deer Valley Drive would be impacted. Other alignments were considered over Rossi Hill to Snow Park base area but were eliminated from consideration due to the number of property lines the alignment would intersect. This would be a significant challenge to overcome. This study only explored connections to DVSP base area, therefore additional alignments to the Silver Lake base area were not considered within the scope of this project.
- For Segment C to be feasible, key stakeholders, resorts and property owners would need to be involved to overcome any property rights and siting issues. (See **Table 2, Figures 2 and 4** for the number of potential property owners impacted). Variance to State ropeway regulations would be needed to construct and operate the gondola with buildings within the required 70-foot corridor clearance (see *Regulations* for more details).

Other Factors

PHYSICAL CONSTRAINTS

A gondola system at this scale and capacity requires a horizontal clearance corridor width of approximately 40 feet to accommodate towers, rope, cabins and requisite clearance distances to ensure safe operation. Utah Ropeway regulation requires a 70-foot corridor. Park City will have to seek variances for each proposed segment. (see *Regulations* for more details). Though tower footprints are relatively small (approximately 30 square feet) once installed, the required corridor width applies at the ground level should tree clearing be necessary. Per state Ropeway code, tree branches are not allowed within 6 feet of the cable, gondola cabins or towers. The gondola alignments presented here pass *between* existing structures to the greatest extent possible and attempt to avoid crossing *above* buildings. As mentioned above, Segments A, B and C as shown requires passage *over* buildings (see **Table 2** for number of buildings within a 70-foot gondola alignment corridor). These could be minimized once initial conversations with key stakeholders are held and ideal terminal locations are established. Topography was also considered in siting stations, with a preference for flat areas and minimization of grade changes between towers and stations. **Figures 2 – 4** presents the alignments on aerial imagery of Park City to provide context for how the alignments fit within the context of existing buildings, vegetation and in relation to the planned A&CD, PCM, Old Town and Deer Valley.

PROPERTY OWNERSHIP

An assessment of property ownership was conducted through the acquisition of detailed parcel data. A Geographic Information Systems (GIS) database was developed to allow site planning and property ownership to be considered and evaluated. The assessed alignments occupy Park City-owned property to the greatest extent possible to reduce the costs and impacts to private landowners. **Table 2** displays ownership of all parcels intersected for each gondola alignment segment within a 100-foot corridor and buildings within a 70-foot corridor.

Table 2. Property Ownership Along Gondola Alignment

Property Owners within 100-Foot Gondola Alignment Corridor	Segment A	Segment B	Segment C
Park City Municipal Corporation	X	X	X
UDOT	X	X	X
Deer Valley Resort Company			X
Vail Resorts	X	X	
Other Private Property Parcels	24	131	183
« Buildings within the 70-foot Gondola Alignment Corridor (per State Tram Board regulations)	2	5	18

UTAH STATE REGULATIONS

It was assumed the gondola system would be built to comply with all applicable standards and codes. In Utah, gondola systems are governed by the Utah Passenger Ropeway Safety Committee and Utah Administrative Code Rule R920-50 Ropeway Operation Safety [3]. This is a subset of Utah Department of Transportation (UDOT). Air space requirements note no structure (temporary or permanent) shall be permitted to encroach into the air space (i.e., 35 feet space on either side of or under the ropeway). The Ropeway Safety Committee can grant variances can to the requirement, but typically require mitigation for any safety impacts to the gondola. Due to the urban setting, variances along certain sections of the gondola would be required and were assumed to be granted for the purposes of this study.

As planned, the gondola system could also require variances to the fire code for two reasons: the alignment would travel over buildings and terminals would likely be embedded into larger developments. The system was designed to avoid as many building crossings as possible, as well as determine a linear alignment to avoid expensive turn stations. In addition, a gondola terminal could be constructed on the second story of buildings to maximize developable space, create a seamless user experience and reduce the distance needed for gondolas to reach the required elevation. The building's fire alarm system and lift operations would likely need to be linked to receive a variance from fire code. It was assumed variances to the fire code would be granted.

Utilities

The alignment of Segment A and Segment B includes crossing of electrical distribution lines owned by Pacific Corporation (Rocky Mountain Power). These power lines are 60-65 feet tall. The study recommends further discussion with Pacific Corporation on the options available to Park City for: 1) relocating the lines; 2) running the gondola to go over or under the power lines and the required clearance. The estimated power requirements for each gondola segment are:

Segment A 500HP 540kVA, 480V, 3 Phase required power

Segment B 400HP 450kVA, 480V, 3 Phase required power

Segment C 400HP 450kVA, 480V, 3 Phase required power

For return and mid-stations, 80kVA of 480VAC (Per lift at station) are required.

Additional study and discussion with Rocky Mountain Power is recommended to determine exact power infrastructure and energy demands.

ASSUMPTIONS

The conceptualized gondola system required a number of assumptions to be made. These include impacts from future developments within Park City, coordination with key stakeholders and integration into the public transportation system.

Three major future developments within Park City include the A&CD, PCM base area and DVSP base area. Due to the uncertainty with these three properties (e.g., not yet constructed), terminal locations were generally placed within the boundaries of the given properties; however, additional siting and discussion with key stakeholders will be necessary and potential alignment modifications made based on these discussions. Additionally, the assumptions made to determine gondola terminal locations are also true for gondola alignments. If terminal locations were to change due to additional information about property development, alignments would also have to be modified. The terminal locations and alignments were chosen based on the best available information at the time of this report.

The analysis also considered the gondola system within the context of a greater regional transportation system. It was assumed the gondola system would not eliminate all bus routes in Park City but compliment them. It was also assumed a portion of vehicles would park in outlying lots (i.e., Ecker Hill and Richardson Flats park-and-ride lots or future park-and-ride lots), take a bus to the A&CD gondola hub to access OTTC, PCM or DVSP. Potential modifications or reductions to bus service (and associated cost savings) were not explored as part of this phase of feasibility. It can be assumed that the high capacity of the gondola system could supplement or replace most existing transit service that serves similar areas and many transit routes could turn into “gondola feeder” lines that drop off at various gondola stations. However, additional study and evaluation is recommended in order to determine the impacts and potential alterations needed to the transportation system to enhance the overall user experience and effectively incorporate an aerial system. Additionally, a gondola connections to/from Quinn’s Junction and Kimball Junction were considered, but not studied in detail for this analysis due to the initial identified scope of the project. Refer to *Comparable Options* section for a more detailed discussion on these connections.

Capacity

3. To what extent may residents and guests use the system and experience an enhancement of services?

One of the primary goals of this study is to site gondola stations that would serve as a viable transportation option for Park City residents and visitors, while minimizing the number of terminals/turn stations (due to cost, maintenance and travel time impacts). Stations were located and spaced to serve the primary destinations within Park City by providing ready connections between the A&CD, PCM, Old Town and DVSP base area. The gondola system aims to reduce traffic congestion, improve connectivity across Park City and enhance both transit service and the experience of using transit. To that end, the existing transit system was analyzed at a very high level as well as existing vehicular traffic numbers to get a sense of what the initial and future demand on the gondola system might be as presented in this study. Future evaluation and study of these issues is recommended.

Gondola ridership has the potential to be very supported by users in Park City due to the mountain town culture, existing traffic volumes and bus ridership. However, a variety of barriers exists to ensure the system is successful and can adequately capture riders (shifting existing trips off of private vehicles and buses). A primary barrier to potential gondola ridership is the availability and location of parking to service the gondola. Ideally, cars would park at the periphery of the gondola system and use it to access all of the commercial areas. Currently, the base areas for DV and PCM have free parking, creating no incentive for vehicles to not drive directly to these base areas. It is unclear how much parking is planned as part of the A&CD, PCM and DVSP developments. While parking in Old Town is a scarce resource, the location of the proposed OTTC gondola terminal is walking distance to China Bridge - a five story ~600 vehicle capacity parking garage. Utilizing park and rides farther away from Park City along SR 224 and SR 248 (Ecker Hill, Quinn's Junction and Richardson Flat) are options, but would necessitate multiple transit trips to access the gondola system and require transfers. Until a broader parking strategy is included into the transportation system, it is unreasonable to estimate the ridership on the gondola system based off of existing vehicle traffic. We can only reasonably estimate gondola ridership as a replacement/supplement to current transit options.

The proposed gondola system would have a capacity of 1,000 to 3,000 PPH. Although existing transit demand is currently at about 450 PPH during peak times, that number is expected to increase each year. Therefore, an initial capacity of 1,000 to 1,200 for the gondola system seems to be a good target. If bus routes are reconfigured to "feed" the gondola segments and additional parking is built near any of the gondola stations, the gondola would likely have even higher utilization.

The existing bus network in Park City is robust. With twelve (12) bus lines and a Main Street Trolley (as well as some additional services during the Sundance Film Festival) the bus system recorded 2.8 million rides during 2019. Of those rides, 1.7 million of them occurred during the winter months of December through March. Transit ridership has increased on average by 11% per year for the last five years [4].

The routes that most closely follow the gondola system alignment are the 1, 2, 3, 4, 5, 10 and the Main Street Trolley. These are also known as the Red, Green, Blue, Orange, Yellow and parts of the Kimball Junction/Main Street Express Route. Ridership for these routes was estimated at 30,189 trips for the winter months of 2019 [5]. When service hours for these routes are taken into account, the ridership is 239 PPH across all service hours. If a peak hour is estimated to have triple the ridership of a non-peak hour, a peak hour could have approximately 450 PPH using transit. If a 10% growth per year projection is applied, the demand could be nearly 800 PPH in 2025 and over 1,200 PPH by 2030.

Vehicular traffic on the two main routes into Park City (SR 224 and SR 248) are also growing each year. The current AADT (Average Annual Daily Traffic) for SR 224 is 16,500 cars per day with numbers between 18,000 and 20,000 cars per day during the peak months. The segment of SR 248 between the intersections at SR 224 and Bonanza Drive saw an AADT in 2016 of 25,000 vehicles per day [6]. Vehicle traffic is projected to increase on both of these corridors by an estimated 3-5% per year between now and 2040 [7]. Park City has been working with the

Utah Department of Transportation on corridor plans and intersection improvements to manage traffic flow on these roads. Both are projected to have a LOS (Level of Service) of D or F in the near future. A level of LOS D through F describes a road segment that is at or is close to capacity and failure (frequent stoppages and delays in movement).

Financial Evaluation

4. When considering construction, operations, maintenance and potential offsetting costs, what are the economic realities of these concepts?

Using the information gathered, SE Group consulted lift equipment manufacturers (as well as our own internal data) to establish preliminary parameters for the cost, installation, operation and maintenance (short and long term) of the three gondola segments. The financial evaluation has been separated out by segment.

Capital Cost of Equipment and Infrastructure

Based on the identified system configurations and capacities, preliminary anticipated total capital project costs were developed by SE Group in conjunction with Leitner-Poma engineers. The anticipated capital costs include all lift equipment, site works, buildings, design, engineering, permitting and an applicable project contingency (10% of total). The values calculated are preliminary, based on project details known to-date and error on the conservative side where assumptions are required. While the equipment costs are thought to be reasonably accurate, the estimated costs for site works, construction, and buildings have been generalized at approximately 50 percent of the equipment costs (based on discussions with Leitner-Poma). Site works and buildings were considered to include grip maintenance building, standalone terminals, electricity to terminals, grading/paving for pedestrian and vehicle access and other required site work. If undertaken, more detailed site planning and analysis is recommended and may reveal these costs to be somewhat overstated.

Table 3. Capital Expense Detail

Segment	Equipment Cost	Site Works and Buildings	Design and Permitting (5%)	Contingency (10%)	Total Project Cost
Segment A	\$14,100,000	\$7,050,000	\$1,057,500	\$2,115,000	\$24,322,500
Segment B	\$7,700,000	\$3,850,000	\$577,500	\$1,155,000	\$13,282,500
Segment C	\$15,400,000	\$7,700,000	\$1,155,000	\$2,310,000	\$26,565,000
Total	\$37,200,000	\$18,600,000	\$2,790,000	\$5,580,000	\$64,170,000

Operations, Operating Cost and Maintenance

The analysis evaluated anticipated operating and maintenance costs inclusive of labor (operators, supervisors and maintenance personnel), daily/annual maintenance requirements/supplies, power, insurance, licensing and inspection. Operating costs were aggregated as a total cost per operating hour and were calculated to be \$310/hour for Segment A, \$190/hour for Segment B and \$230/hour for Segment C. If all segments were operating, total operating cost would be \$730/hour.

Season, days and hours of operation were developed using the following parameters (modeling the operations as a transit service):

- Winter operations would run from November 1 to April 30, 7:00 a.m. to 10:00 p.m.
- Summer operations would run from May 7 to October 24, 9:00 a.m. to 10:00 p.m.
- Total annual operating hours under these parameters is 4,925 hours.

Long-term maintenance costs for equipment replacement/refurbishment were calculated based on 20 years of cumulative operating hours and include stations refurbishment, haul rope replacement, motor and gearbox overhauls and gondola cabin restoration. These long-term maintenance requirements are apportioned over a 20-year operating period and included as an annual operating expense. To account for potential future inflation and cost increases, all operating and maintenance costs are inflated by 3 percent per year within the model. Maintenance was assumed to occur at the Segment A mid-station because it is a central location within the gondola system and easily accessed from major roads. The building would include storage and space to complete gondola and cabin maintenance. The building would be approximately 2,000 square feet.

Table 3. Annual Operations and Maintenance Cost

Segment	Cost per Hour	Operating Hours	Operating Cost
Segment A	\$310	4,925	\$1,526,750
Segment B	\$190	4,925	\$935,750
Segment C	\$230	4,925	\$1,132,750
Total	\$730		\$3,595,250

Capital Origination and Debt Service

Per discussions with the PCMC, capital necessary to implement the project would likely be secured by municipal bonds. Terms included in the financial analysis are 100 percent bonding, 4 percent annual interest with a 15-year amortization. Annual expenses to service (retire) this debt have been allocated within the model by operating year. Capital could come from grants or other funding sources through private/public partnership.

Summary of Financial Evaluation and Operating Costs

As described above, three segments were evaluated in detail. The following tables present a summary of the operating expenses, maintenance costs, debt service requirements and Net Operating Cost by year for the first ten years of operation for each system configuration evaluated.

Table 5. Financial Evaluation Summary

Park City Gondola Feasibility Study 2020										
Anticipated Financial Performance - Financial Performance										
Operating Expenses estimated to increase 3.0% per year										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Operating Expenses										
Segment A	\$1,526,750	\$1,572,553	\$1,619,729	\$1,668,321	\$1,718,371	\$1,769,922	\$1,823,019	\$1,877,710	\$1,934,041	\$1,992,062
Segment B	\$935,750	\$963,823	\$992,737	\$1,022,519	\$1,053,195	\$1,084,791	\$1,117,334	\$1,150,854	\$1,185,380	\$1,220,942
Segment C	\$1,132,750	\$1,166,733	\$1,201,734	\$1,237,787	\$1,274,920	\$1,313,168	\$1,352,563	\$1,393,140	\$1,434,934	\$1,477,982
Total Operating Expenses	\$3,595,250	\$3,703,108	\$3,814,201	\$3,928,627	\$4,046,486	\$4,167,880	\$4,292,917	\$4,421,704	\$4,554,355	\$4,782,073
Net Operating Expenses	\$3,595,250	\$3,703,108	\$3,814,201	\$3,928,627	\$4,046,486	\$4,167,880	\$4,292,917	\$4,421,704	\$4,554,355	\$4,782,073
Capital Maintenance Reserve (3% of Operating Exp.)	\$107,858	\$111,093	\$114,426	\$117,859	\$121,395	\$125,036	\$128,787	\$132,651	\$136,631	\$140,730
Annual Facility Cost before Debt Service	\$3,703,108	\$3,814,201	\$3,928,627	\$4,046,486	\$4,167,880	\$4,292,917	\$4,421,704	\$4,554,355	\$4,690,986	\$4,922,802
Debt Service - Segment A		\$5,771,520	\$5,771,520	\$5,771,520	\$5,771,520	\$5,771,520	\$5,771,520	\$5,771,520	\$5,771,520	\$5,771,520
Debt Service - Segment B		\$1,194,643	\$1,194,643	\$1,194,643	\$1,194,643	\$1,194,643	\$1,194,643	\$1,194,643	\$1,194,643	\$1,194,643
Debt Service - Segment C		\$2,389,285	\$2,389,285	\$2,389,285	\$2,389,285	\$2,389,285	\$2,389,285	\$2,389,285	\$2,389,285	\$2,389,285
Total Debt Service	\$0	\$9,355,448	\$9,355,448	\$9,355,448	\$9,355,448	\$9,355,448	\$9,355,448	\$9,355,448	\$9,355,448	\$9,355,448
Net Operating Cost after Debt Svc.	\$3,703,108	\$13,169,649	\$13,284,075	\$13,401,934	\$13,523,329	\$13,648,365	\$13,777,152	\$13,909,804	\$14,046,434	\$14,278,251

Other Considerations

5. Does an aerial transit system help achieve Park City's sustainability goals?

SUSTAINABILITY GOALS

Park City has some of the most ambitious sustainability goals in North America: to be carbon neutral and run on 100% renewable electricity for city operations by 2022 and for the whole community by 2030 [8]. The city intends to achieve these goals by focusing on high-level strategies including energy efficiency, electrification, renewable energy and regeneration. Transportation plays an important role in achieving Park City's sustainability goals and efforts have already been made to reduce carbon emissions associated with travel. For example, since 2016, Park City has embarked on conversion of its bus transit system from diesel-powered buses to electric buses and has set up the beginnings of charging infrastructure for personal electric vehicles. Implementation of a gondola system is consistent with Park City's sustainability goals, as a gondola would provide a convenient and energy efficient option for local transportation, potentially reducing the use of personal motorized vehicles, especially for short, local trips. Gondolas are estimated to use approximate 0.1 kWh of power to carry one passenger over 1 km [9]. This makes gondolas more favorable than cars and buses, but less efficient than trains or light rails at moving people on a per person basis. Numerous studies have documented the energy consumption for these transportation modes.

Gondola systems may function as energy efficient transportation alternatives when compared to motorized vehicles. Lift conveyor systems benefit from operational efficiencies given the use of stationary motors which are optimized to meet the demands of the system. Meanwhile, automobiles consume energy transporting machinery in addition to passengers. An automobile's energy consumption may also vary based on the driver, road conditions, etc.

Furthermore, gondola systems may be plugged into the energy grid and powered or offset by renewable energy sources such as solar and wind. As Park City moves towards 100% renewable energy for city operations and the whole community, it is anticipated that the gondola system could also be powered by renewable energy sources. Renewable energy powered gondola systems currently exist in mountain towns such as Telluride and Aspen, which are powered by wind and solar energy [10].

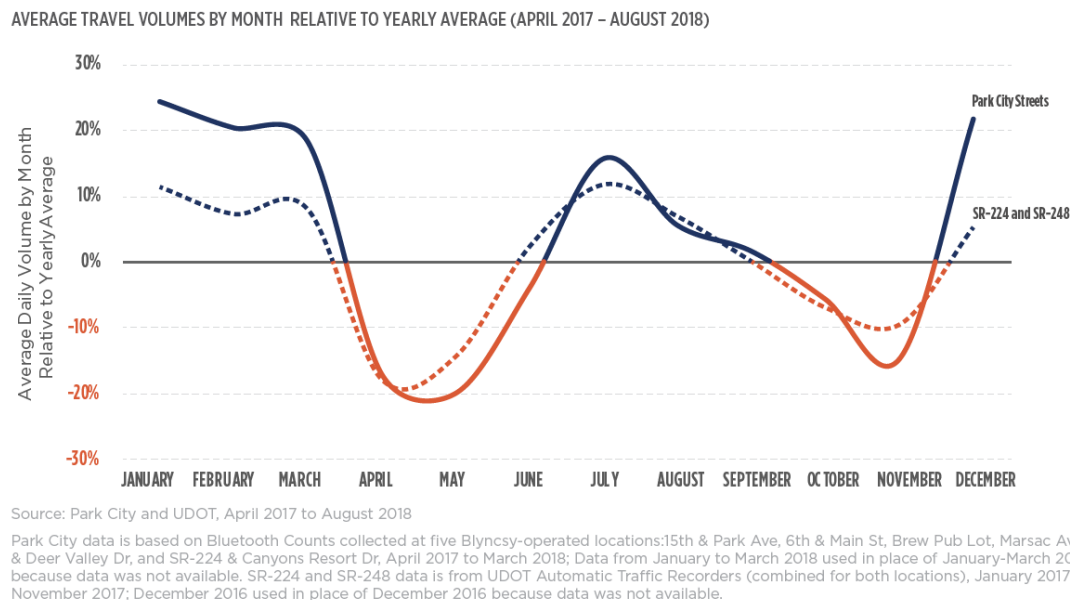
TRANSPORTATION GOALS

Based on Park City's aggressive transit and transportation goals, a gondola system can fit well with identified gaps and service needs. The feasibility for a gondola system has been evaluated within the context of the existing (and projected) transportation network in Park City. The concept proposed within this study is to operate the gondola system with similar hours to that of transit routes. For the gondola to replace single occupancy vehicle use or existing bus lines, it

would need to operate in a manner that encourages its use: similar to transit; year round operation; access to desired locations, to mention a few requirements for successful implementation.

SR-224 is a north-south route owned by Utah Department of Transportation (UDOT) which connects Park City to Kimball Junction and Salt Lake City via Interstate-80. SR-248 is a state east-west route which connects Park City to Quinn's Junction and other outlying communities via U.S.-40. SR-224 has an express route between Kimball Junction and Park City which is the single busiest route for Park City Transit; however, both routes experience significant usage and traffic throughout the year [11]. Together, these two routes provide access to and from Park City for tourists, full-time residents, second-home owners and more.

However, both of these routes—and Park City in general—currently experience higher traffic volumes during both the summer and winter. Below is a figure showing the average traffic volumes from April 2017-August 2018.



There are strong influences to traffic in Park City from special events to winter and summer visitation that drive large fluctuations in volumes and travel behavior.

Park City currently offers a variety of free public transit routes options to support multi modal transportation options for residents, visitors and commuters. Park City Transit operates twelve (12) bus routes and one (1) trolley within and beyond the Park City municipal boundary. The existing public transit system currently connects riders to Main Street, PCM, Deer Valley, Thayne's Canyon, Prospector Square, Quinn's Junction, Kamas, Silver Lake, Empire Pass, Canyons Village, Kimball Junction, Pine Brook and Summit Park. Utah Transit Authority and Park City Transit offer a route between SLC and Park City. The public transit system ridership has varied since implementation but existing ridership is approaching three (3) million one-way passenger trips per year [12]. Seven of the top ten most boarded bus stops are within the Park

City municipal boundary, meaning a significant number of riders use the transit system within Park City municipal boundaries, as well as use it to commute from Kimball Junction, Canyons, and Ecker Hill park and ride [13].

CHALLENGES

While the traffic volumes moving people into, around and through Park City are significant during peak times, the answer of how users will access the gondola segments from within Park City, as well as outlying areas was not part of this study. It is recommended that additional study be undertaken to further understand travel behaviors from a City as well as regional context, and how those may be shaped to both access and benefit from an aerial gondola.

Comparable Options

6. What other options are available to meet transit needs of the future?

This study analyzed the potential gondola connection from the A&CD to OTTC with spur lines connecting PCM and DVSP base areas and did not take a comprehensive look at other terminal locations throughout Park City, per the scope of the project. Other gondola terminals initially discussed but eliminated from the scope were connections to/from Quinn's Junction and Kimball Junction.

A gondola from Quinn's Junction could be feasible and could help address peak day capacity issues on SR-248. An alignment would be approximately 3 miles and could tie into the conceptualized gondola system analyzed in this report. Similar challenges, such as property rights and parking at terminus, would likely need to be overcome. Additional analysis of a gondola system from Quinn's Junction should be considered for a future study.

A gondola connection from Kimball Junction into Park City would be approximately 6 miles. Typically, a gondola is not an effective transportation option over 3 miles. At those distances, transportation modes such as light rail or other mass transportation options are typically more effective.

Alternative transportation options that could meet Park City's future transit needs include light rail, expanded transportation corridors, expanded bus services, congestion pricing and increased parking rates. Some of these alternative transportation options would be prohibitively expensive due to the cost and potential right-of-way acquisition that would be required (i.e., light rail at a cost of over a \$100 million per mile [14]). Most likely a combination of transportation options will be needed to reduce traffic and congestion in Park City in the future and a gondola could be one piece of that overall transportation solution.

Figures

- Figure 1. Park City Gondola Alignment and Major Transportation Nodes
- Figure 2. Park City Gondola Alignment Figure – Full Extent
- Figure 3. Park City Gondola Alignment Figure – Extent 1
- Figure 4. Park City Gondola Alignment Figure – Extent 2

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