

## Preliminary Analysis of Big Cottonwood Canyon Environmental Study

### BCC Bus Hub Stats

Garage capacity: 1,750 stalls

UDOT average: 2 people/vehicle

Hub average capacity: 3,500 people

Bus capacity: 75 people standing and sitting

Canyon length: 15 miles

Transit time: 40 minutes

Bus frequency: Initially 10-15 minute intervals -- projecting 5-7 minute intervals by 2050

First bus: 6:00 AM

Resort lifts open: 9:00 AM

Bus Frequency	Buses / Hour	Passengers/hour 75/bus	Hours to Load 3,500 Passengers	1 <sup>st</sup> Bus 6:00 AM -- Last Passenger on Last Bus
<b>5 minutes</b>	<b>12</b>	<b>900</b>	<b>3.8</b>	<b>10:00 AM</b>
<b>7 minutes</b>	<b>9</b>	<b>675</b>	<b>5.2</b>	<b>11:00 AM</b>
<b>10 minutes</b>	<b>6</b>	<b>450</b>	<b>7.8</b>	<b>2:00 PM</b>
<b>15 minutes</b>	<b>4</b>	<b>300</b>	<b>11.7</b>	<b>6:00 PM</b>

### Worst Case Scenario -- 15-minute intervals

The chart speaks for itself. No matter how many skiers enter the hub on any given day with buses running at 15-minute intervals only 300 riders can be evacuated every hour.

If the hub fills to capacity, either rapidly in the morning or slowly over the course of the day, and the buses are running consistently 15 minutes apart, it will take about 12 hours to evacuate all 3,500 people. If the buses start running at 6:00 AM, the last person will be boarding the bus at 6:00 PM.

### Best Case Scenario -- 5-minute intervals

Of the available options, the 5-minute interval between buses is obviously the best. As long as everything runs smoothly, 3,500 people could all be bused out in about 4 hours.

# Preliminary Analysis of Big Cottonwood Canyon Environmental Study

## "Best Case" Caveat

The "best case" scenario is just describing a situation where the entire system is working perfectly. If the average number of persons per vehicle increases, or every bus is not filled to capacity, or there is an undue delay in timing between the buses, then all of the travel time numbers will increase, possibly significantly.

If the buses start running at 6:00 AM and the resort lifts open at 9:00 AM, and it's a 40 minute ride up the canyon, it seems unlikely that all of the early buses will be filled to capacity. This early morning start to the bus schedule may work well for resort employees -- but any regular skiers that get on the first bus, will have a 2 hour 20 minute wait at the resort before the lifts open.

The most likely scenario is that most skiers will enter the hub a bit later in the morning, inevitably leading to queuing problems.

## Queuing Problems

Just like the LCC Gondola situation, any system that has demand spikes and a technical bottleneck will inevitably have queuing issues. Skiers tend to want to be on the slopes in the same time frames every day, thus causing demand spikes -- and with up to 3,500 people in a single hub with a fixed and limited transit schedule, queuing is inevitable.

## AM Queuing

Every skier that is looking for a full day of skiing wants to be on an early lift. Since the resort lifts open at 9:00 AM and a ride up the canyon is about 40 minutes long, one might think that boarding a hub bus around 8:20 would be ideal -- but unfortunately everyone is thinking the same thing.

The buses start running at 6:00. If you enter the hub around 8:20 (or in fact anytime of the day except for the earliest hours) there could be 200 or 2,000 people in line ahead of you. In the "best case" scenario, the buses will be 5 minutes apart and each bus will carry 75 people.

If there are only 200 people ahead of you when you enter the hub, you can get on the 3<sup>rd</sup> bus in line in about 15 minutes. ( $200/75=2.7$  (3<sup>rd</sup> bus) x 5 min = 15 minutes)

If there are 2,000 people ahead of you, you will need to wait about 2 hours for the 27<sup>th</sup> bus. ( $2,000/75=27$  bus x 5 min = 2.2 hours)

Timing is everything, and queuing times are unpredictable

## PM Queuing

At the end of any given ski day up to 3,500 people could be trapped at the top of the canyon with the buses as there only means of escape. If most of the people want to leave at about 3:00, and the buses are running smoothly at 5-minute intervals, everyone can be evacuated in about 4 hours with the last bus arriving back at the hub at about 7:40.

## **Preliminary Analysis of Big Cottonwood Canyon Environmental Study**

Any alteration from this particular schedule will cause potentially significant increases in transit times.

During the 4-hour evacuation window everyone will be jockeying to get a good position in the queue. Winter sunset in BCC is about 5:00. On any given day, most people will be riding down the canyon in the cold winter darkness. Queuing is unpredictable, and timing is everything.

### **Possible Staging Areas**

An earlier UDOT document envisioned "5,000-7,000 square foot enclosed waiting areas" at both Brighton and Solitude. Since these areas are equivalent to the size of 1 - 1 ½ basketball courts, it seems like UDOT has anticipated that there will definitely be long waiting lines and queuing issues. I don't know yet whether these staging areas are still included in UDOT's final proposal.

### **Preliminary Analysis**

This is just a preliminary analysis. Corrections and adjustments will be made as needed..

James McGauley  
mcgaule26@gmail.com  
801-580-70711