

**Coaster/Site Selection:****Basic Facts:**

- Manufacturer: Bolliger & Mabillard
- Type: Floorless
- Major Elements: 175 feet tall, 720° Helix, Bat Wing, Norwegian Loop, Corkscrew

**Previous Research:**

I really liked rides that featured banked drops that transitioned into inversions, especially for corkscrews. The banking and turning of the drop flows very well to the turning of the inversion. Additionally, I liked rides that utilized the terrain of the park to make the ride more interesting or exciting. Unfortunately, Kentucky Kingdom seems pretty flat with very few trees so I am not sure how well I will be able to use the terrain in the design of my ride. The last feature that I liked in the coasters I watched was when rides featured unusual inversions. The same old loops and corkscrews get boring after a while, so rides that have less common inversions are more interesting to me.

I didn't like rides that were one-dimensional. Some rides only focused on one element and the entire ride was basically the same thing over and over again. Also, I didn't like rides that were very linear. These rides had very few turns or transitions into the different elements and the straight sections dividing the elements got very boring very quickly. Lastly, I didn't like when rides had brakes immediately following a fast, intense part of the ride. Typically these brakes hurt because they decelerate you too quickly, and the sudden decrease in velocity is a big letdown after having just been through a really exciting portion.

**Site:**

The coaster will be placed where Chang used to be. This area is along the bottom of the green region, in between T2 and the go karts. I chose this location because it has proven to be a good location for coasters in the past, as demonstrated by the success of Chang. Additionally,

with T2 being right next to it, thrill seekers are already drawn to this region of the park, which will give the ride more visibility. The station for the ride will be located where the green pavilion is now, about half way in between the go karts and T2. A path will be constructed that leads to the station. This path will pass directly underneath the bat wing, giving people an up close view of the ride as they are walking toward it and generating more excitement for the ride.

### Visual Representation:



### Statistics, Calculations, and Estimations:

Height: 175 ft

Drop: 165 ft

Max Positive G-force: 3.5

Max Negative G-force: -1

Max Lateral G-force: 0

Number of Trains: 3

Size of Trains: 4 person across, 8 rows (32 people per train)

Speed at the Bottom of First Drop:

- $v_f = \sqrt{v^2 + 2 * 9.8 * h}$
- $v = 4.5 \text{ m/s}$
- $h = 165 \text{ ft}$ 
  - $\text{feet} = 3.28 * \text{meters}$
  - $h = \frac{165}{3.28} = 50.292 \text{ meters}$
- $v_f = \sqrt{4.5^2 + 2 * 9.8 * 50.292}$
- $v_f = \sqrt{20.25 + 985.7232}$
- $v_f = \sqrt{1005.9732}$
- $v_f = 31.717 \text{ m/s}$
- $\frac{m}{s} = \text{mph} * 0.4472$
- $31.717 = \text{mph} * 0.4472$
- $v_f = 70.92 \text{ mph}$

Radius at bottom of first hill:

- $v = 70.92 \text{ mph} = 31.717 \text{ m/s}$
- Desired G-force = 3
- $g * 9.8 = \frac{v^2}{r}$

- $(3 - 1) * 9.8 = \frac{31.717^2}{r}$
- $19.6 = \frac{1005.97}{r}$
- $r = \frac{1005.97}{19.6} = 51.32 \text{ m} = 168.35 \text{ ft}$

Radius and banking of the helix:

- Desired lateral G-force = 0
- Desired positive G-force = 3.5
- Velocity = 60 mph = 26.83 m/s
- Radius:
  - $g * 9.8 = \frac{v^2}{r}$
  - $3.5 * 9.8 = \frac{26.83^2}{r}$
  - $34.3 = \frac{719.85}{r}$
  - $r = \frac{719.85}{34.3} = 20.98 \text{ m} = 68.83 \text{ ft}$
- Banking:
  - $b = \tan^{-1} \frac{l}{p}$
  - $b = \tan^{-1} \frac{3.5}{1} = 74.05^\circ$

**Capacity:**

I estimate the duration of this ride will be around 150 seconds. This is shorter than other B&M floorless coasters (which have durations of around 180 seconds) because this ride uses a cable lift hill instead of a chain lift, making the lift hill go much faster and thus decreasing the

total duration. Also, the ride is not as long as some other B&M floorless coasters so the duration will be less.

- $\text{riders per hour} = \frac{3600}{\text{duration in seconds}} * \text{riders per train} * \text{number of trains}$
- $\text{riders per hour} = \frac{3600}{150} * 32 * 3$
- $\text{riders per hour} = 2304$

This estimation is off because it assumes that the trains are completely full and that all trains are running at all times and that the duration is exactly the same every single time the ride runs.

#### **Cost:**

Based on the cost of previous B&M Floorless Coasters, such as Bizarro at Six Flags Great Adventure (\$15 million), Hydra the Revenge at Dorney Park (\$13 million), Medusa at Six Flags Discovery Kingdom (\$15 million) and Griffon at Busch Gardens Williamsburgh (\$15.6 million), I estimate it will cost around \$15 million to make. This number is right around the average for a B&M Floorless Coaster.

#### **Length of the ride:**

I estimate this ride will be around 3,500 feet long. This estimation is based on the lengths of other B&M floorless coasters. They range from around 3,100 feet (Griffon and Hydra) to almost 4,000 feet (Medusa and Bizarro). I think this ride will be somewhere in the middle because, while it is taller than most other B&M floorless coasters, it does not have as many twists and turns as most others do.