



November 29, 2016

Mr. Dane W. Heig
X Games
4326 10th Avenue South
Minneapolis, MN 55407

Subject: Summary Report of Harley Davidson Flat Track Racing - Noise Evaluation
Near the Mall of America, Bloomington, Minnesota

Dear Mr. Heig:

It is our understanding that X Games is planning a motorcycle racing event near the Mall of America in Bloomington, Minnesota on July 12th and 13th, 2017. The City of Bloomington has requested a "noise study that depicts where the L10 65 dBA noise contour would be located relative the event area." This letter is our summary of the noise evaluation based on the course layout that you provided.

The L10 level is a statistical measure of noise in an outdoor environment. The City of Bloomington noise code defines the L10 as the "noise level, expressed in dBA, which is exceeded 10% of the time for a one-hour survey." Since we expect a race to last for more than 6 minutes per hour, and the motorcycles will be the loudest sources in the area, the noise we calculate from a race, based on the assumptions given below, will be the L10 level that the City has requested.

The following schedule is based on a similar X Games race held in Austin, Texas in June 2016:

- Wed., July 12 (practice day – no spectators): 4:30pm – 8:00pm
- Thu., July 13 (competition day): 8:00pm – 10:00pm

You have explained in our email correspondence that the Harley Davidson Flat Track Racing features customized motorcycles reaching speeds of 140 mph on an oval dirt track. Further, the finals for the race will be the loudest event and will consist of 14 bikes racing simultaneously. We have been told that each motorcycle can generate a maximum noise (sound pressure level) of 105 dBA measured at 10 ft from the motorcycle.

In our evaluation of the L10 noise contour, we made the following assumptions:

- 1) each motorcycle operates at 105 dBA for the entire duration of the race
- 2) the 14 motorcycles are distributed around the course in 3 groups of 6, 4, and 4
- 3) each race duration is more than six minutes per hour and therefore the L10 is the noise of race only
- 4) noise reductions caused by buildings and terrain can be ignored (barrier effects)

- 5) noise reductions from environmental effects of air absorption, temperature gradients, wind, ground absorption and trees can be ignored (excess attenuation)
- 6) the ambient noise of traffic, aircraft, LRT trains and other sources are not included and the results are race noise only

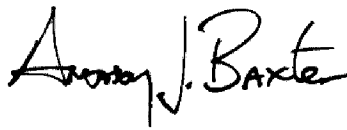
The event noise was calculated at distances away from the course using the single value overall noise level of 105 dBA at 10 ft from a motorcycle. Since the motorcycles will not operate at maximum noise levels for the full race event, the results of our analysis will be worst case. A square area of 7,500 ft by 7,500 ft was used in the computations with coordinate points at 15 foot intervals. This size was sufficiently large to include the 65 dBA contour and the interval spacing fine enough to provide good resolution.

The noise of each motorcycle group was increased according to the group size using logarithmic addition. For example, a group six motorcycles increase the noise to 113 dBA at 10 ft away. The noise of the three groups was logarithmically summed at all coordinate points away from the course.

The plot is attached shows the noise contours from the race overlaid onto an aerial photo of the area. As shown in the plot, an L10 65 dBA would be reached at 3,575 feet away from the center of the three groups of motorcycles. The distance does not change significantly if the motorcycles are grouped differently or are located at different locations on the track. These results are considered worst case.

Please do not hesitate to contact me if you have any questions or need more information.

Sincerely,

A handwritten signature in black ink that reads "Anthony J. Baxter". The signature is fluid and cursive, with the first name "Anthony" and last name "Baxter" clearly legible.

Anthony J. Baxter, P.E.

Principal
ESI Engineering Inc.

Attachment

Noise Contour Plot – X Games Motorcycle Racing

