**PROBLEM STATEMENT**

- Cyclists complained about ride quality of newly applied chip seals
- Need to identify ways of measuring ride quality for cyclists

**METHODOLOGY**

- Cyclist perception: ride quality survey on cyclists
- Direction measurement: bicycle vibration measured by accelerometer
- Physical characterization: surface macrotexture measured by profiler
- Check correlation of the three alternatives
- Focus of this paper: the bicycle vibration

**BICYCLE VIBRATION MEASUREMENT**

- **Instrumentation**
  - Bicycle instrumented with accelerometers (solid red circles) at three typical mounting locations and a GPS unit on the handle bar (blue circle).

**Data Processing**

- Average Deviation from gravity
- Weighted average using travel distance as weight
- Normalization to regular speed of 16 miles per hour

**RESULTS AND DISCUSSIONS**

- Measurement variability and effect of accelerometer mounting position on bicycle vibration.
  (Note: CS = chip seal, EB = eastbound, WB = westbound, HMA = hot-mix asphalt)

- Bicycle vibration was measured and used to evaluate pavement ride quality for cyclists
- Bicycle frame material, rider weight, accelerometer mounting position and tire pressure can all affect the measured value so need to be carefully controlled and accounted for
- Bicycle vibration has strong correlation with both macrotexture and perceived bicycle ride quality
- A threshold value for bicycle vibration exists that separates acceptable and not acceptable ride quality
- Bicycle vibration measurement is a viable quick and cheap way for evaluating ride quality for cyclist

**SUMMARY AND CONCLUSIONS**

- Bicycle vibration was measured and used to evaluate pavement ride quality for cyclists
- Bicycle frame material, rider weight, accelerometer mounting position and tire pressure can all affect the measured value so need to be carefully controlled and accounted for
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