Motorcycle Data Collection in Montana

A Brief Summary
In January 2007 the FHWA issued a memorandum outlining the requirements for motorcycle data collection.

Why the Need?
- Motorcycles in Montana are now registered permanently. The number of registrations were used to compile our motorcycle data. But when compared with fatalities in Montana the data gave a near 100% death rate for motorcycle owners. This was a serious fallout of inaccurate data.

- Accurate motorcycle data was a needed to generate accurate motorcycle factors.

The Kick Off
- Designs and testing strategies were begun with an initial focus on portable, temporary solutions.
Motorcycle Data Collection
MDT’s Criteria for Implementation

- Collect motorcycles with the same accuracy as other vehicle classes.
- Use existing data collection equipment.
- Use a single implementation
  (One site collects FWHA types 1-13—no motorcycle-only sites)
- Accurately count motorcycles riding side-by-side in a lane (legal in Montana).
ATR Class Sites consist of two loops and one Piezo sensor per lane. Class sites can collect class, length, and speed.

Loops, in most cases, will miss motorcycles so in this case an error is generated.
Motorcycle Grouping Patterns in Montana
Motorcycle Data Collection Option One:

Solutions for portable operations were implemented in 2007 and 2008 with mixed results:

- While the accuracy was acceptable,
  - Setup was very time consuming
  - At times difficult to keep intact on the roadway.
  - Portable operations were abandoned prior to 2009.
Heavy Modifications to the Blocker had to be implemented.
- Tubing glued in place
- Strapping glued to the bottom
- Retainer straps that where nailed to the pavement
- Highway traffic broke the blockers

Ver. 2.0 Design Change
- Used Stainless Steel Tubing inserted into the hose tube
- Clamped in place
- Easier deployment
- Less “in Traffic” time
- Highway traffic damaged the tubing
How the Motorcycle Vehicle Class Works

- Each Direction of travel is divided into two “Virtual” lanes or “Channels,” effectively “two lanes” per one actually lane of traffic.
- Motorcycle A traveling in shoulder wheel path, “virtual lane,” will cross and compress the hoses that extend only halfway into the lane and be counted while being “blocked” from being counted by the second set of hoses.
- Motorcycle B traveling in the centerline wheel path, “virtual lane,” will compress the longer hoses and be counted.
- ALL motorcycle data from both virtual lanes are compiled to create the traffic count for the entire lane of travel.
Setting Out Traffic Hoses for a Motorcycle Class Count
Motorcycle Data Collection Second Option: Cameras

- Miovision optical data collection was implemented in 2008:
  - Accuracy for motorcycles in daylight (or well-lit streets at night) is 90%+/- using proprietary software to extract traffic data from digital video.
  - Nighttime collection is inaccurate in low light conditions.
  - Used only in urban areas where there is light.
  - Miovision processing is relatively expensive.
Temporary installations provided “Proof of Concept “

On to a permanent configuration

Criteria for Implementation

- Collect motorcycles with the same accuracy as all other vehicle classes
- Use existing data collection equipment.
- Use a single implementation, i.e. (One site collects FWHA types 1-13—no motorcycle-only sites)
- Accurately count motorcycles riding side-by-side in a single lane (legal in Montana).
Permanent Site Counter Modified for 4 Virtual lanes (8 sensor input)
Motorcycle Classification
Typical Permanent Layout for Rural ATR

- ATR Cabinet
- Existing ATR Unit Modified To Accept 8 Piezo Inputs.
- Piezos Staggered to Provide Cable Path to Cabinet
- 6 foot piezo, typically an MSI Class 1 BL
- Buried Conduit
- Travel lanes are divided into 2 “virtual” lanes or channels. Motorcycle totals for a given direction of travel are the combined for the 2 “virtual” lanes.
- All other classification data for a given direction of travel is taken from the shoulder line “virtual” lane
- 3’ spacing Interspersed on virtual lanes
- 6’ Axle Sensor, 2 per Virtual Lane
- Pull Box
Motorcycle Capable Site
Pros Of This Design:

- Tested and verified accuracy is 97% for motorcycle detection. Montana currently operates 18 motorcycle capable sites, all of which are checked for accuracy 4 times per year (once per quarter).
  - Note: All of Montana’s ATR and WIM sites (100+) are checked for accuracy once per quarter.
- Two channels per lane gives accurate detection of motorcycles riding side by side in the lane. Montana state law allows this practice on all roadways.
- No loops. Eliminates the fickle properties of using loops to detect motorcycles.
- Configuration allows collection of all FHWA classes—not just motorcycles.
- 6 ft. sensor spacing/9 ft. array spacing allows possible placement of array between transverse cracks in roadway, dependent on transverse crack spacing.
- Can be installed in roads with ruts due to the flexible nature of the BL sensor.
- 9 ft. array size minimizes errors due to motorcycles (or any vehicle) passing or changing travel paths while passing over the array.
Cons Of This Design:

• This design cannot be used in areas where traffic does not flow freely.

• This design cannot be used in areas where traffic regularly tailgates closer than 40 feet apart.

• Multiple cuts in the road in close proximity of each other can cause issues of pavement deterioration if the pavement is of poor quality.

• Sensor cuts of depths 1.25 to 1.5 inches can lead to cracking in thin pavements. Minimum pavement thickness of 3 inches is necessary to minimize these effects.

• All epoxy in travel lanes (and shoulders if possible) must be ground or sanded flat with the contours of the road in order to minimize epoxy damage due to traffic.
## 2016 A-63 Monthly Motorcycle Totals

<table>
<thead>
<tr>
<th>Month</th>
<th>Total Motorcycles</th>
<th>Total All Class</th>
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<tbody>
<tr>
<td>Jan</td>
<td>127</td>
<td>24,416</td>
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<tr>
<td>Feb</td>
<td>235</td>
<td>25,063</td>
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<tr>
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<td>188</td>
<td>31,891</td>
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<tr>
<td>Apr</td>
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<td>Jul</td>
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<td>55,821</td>
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<tr>
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<td>Nov</td>
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<td>Dec</td>
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<tr>
<td>Totals</td>
<td>9635</td>
<td>463,795</td>
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</tbody>
</table>
Montana currently has 18 permanent motorcycle sites.

Use only existing equipment (slightly modified)

Class data from types 1 through 13 are collected from each site.

Data is used to determine much more accurate factors for motorcycles in Montana.

Currently used ONLY on two lane, rural roads

Plans for Interstate use are awaiting updates in equipment.
Montana’s Traffic Data Collection and Analysis Section

Supervisor:  Ms. Becky Duke
bduke@mt.gov
406-444-6122

Presenters:  Mr. John Adams
jadams@mt.gov
406-444-5585

Mr. Tedd Little
tlittle@mt.gov
406-444-9417

Website:  http://www.mdt.mt.gov/publications/dastats/traffic.shtml

MDT’s white paper on motorcycle data collection is available through Steven Jessburger.