



## Pedestrian/Bicycle Crash Analysis



Instructors: Mike Matuzak / Mike Reade

Date: 26-Mar-09

Place: Jacksonville, FL

Vehicle: 1998 Ford Crown Vic  
 VIN: 2FAFP71W6WX163589  
 OL: 17.67 Feet  
 OW: 6.50 Feet  
 WB: 9.58 Feet  
 FOH: 3.58 Feet  
 ROH: 4.50 Feet

Hood H: 33 Inches

The above data was collected from Expert AutoStats a product of 4N6XPRT Systems.

### Searle Using Angle:

$$V = \frac{\sqrt{2 \times \mu \times g \times d}}{[\cos \theta + (\mu \times \sin \theta)]}$$

### Searle Maximim:

$$V_{\max} = \sqrt{2 \times \mu \times g \times d}$$

### Searle Minimum:

$$V_{\min} = \sqrt{\frac{2 \times \mu \times g \times d}{1 + \mu^2}}$$

(The results of the above formulas (fps) are converted to MPH results.)

| Crash Data:                     | Test 1   | Test 2  | Test 3 | Test 4  | Test 5 | Test 6 |
|---------------------------------|----------|---------|--------|---------|--------|--------|
| <b>Ped Ht (in.):</b>            | 63       | 63      | 63     | 63      | 63     |        |
| <b>Ped C/M Ht (in.):</b>        | 39       | 39      | 39     | 40      | 42     |        |
| <b>Ped Slide D (ft.):</b>       | 6.8      | 58.6    | 27.1   | 30.2    | 31.5   |        |
| <b>Airborne D (ft.):</b>        | 26.2     | 58.9    | 54.1   | 38.5    | 43.5   |        |
| <b>Ped f-Value:</b>             | 0.66     | 0.66    | 0.66   | 0.66    | 0.66   |        |
| <b>Throw D (ft.):</b>           | 33       | 117.5   | 81.2   | 68.7    | 75     |        |
| <b>Takeoff (Min):</b>           | 10       | 10      | 10     | 10      | 10     |        |
| <b>Takeoff (Max.):</b>          | 20       | 20      | 20     | 20      | 20     |        |
| <b>1st Evid. (ft):</b>          | 16.0     | 22.8    | 25.0   | 0.0     | -4.1   |        |
| <hr/>                           |          |         |        |         |        |        |
| Vehicle Data:                   |          |         |        |         |        |        |
| <b>Hood Height (in.):</b>       | 33       | 33      | 33     | 33      | 33     |        |
| <b>C/M - Hood Change (in.):</b> | 6        | 6       | 6      | 7       | 9      |        |
| <b>Braking (Yes=Y/No=N):</b>    | Y-Before | Y-After | No     | Y-After | No     |        |
| <b>Skid Total (ft.):</b>        | 57       | 63.9    | 0      | 58.1    | 0      |        |
| <b>Skid Impact (ft.):</b>       | 17       | 0       | 0      | 0       | 0      |        |
| <b>Road f-Value:</b>            | 0.633    | 0.65    | N/A    | 0.673   | N/A    |        |
| <b>Vericom (Impact):</b>        | N/A      | N/A     | N/A    | 36.58   | N/A    |        |
| <b>Video (Impact):</b>          | 28.61    | 39.81   | 30.15  | 32.75   | 37.52  |        |
| <b>Radar (Start Braking):</b>   | N/A      | N/A     | N/A    | N/A     | N/A    |        |
| <b>Radar (Impact):</b>          | N/A      | 45      | 35     | N/A     | 40     |        |

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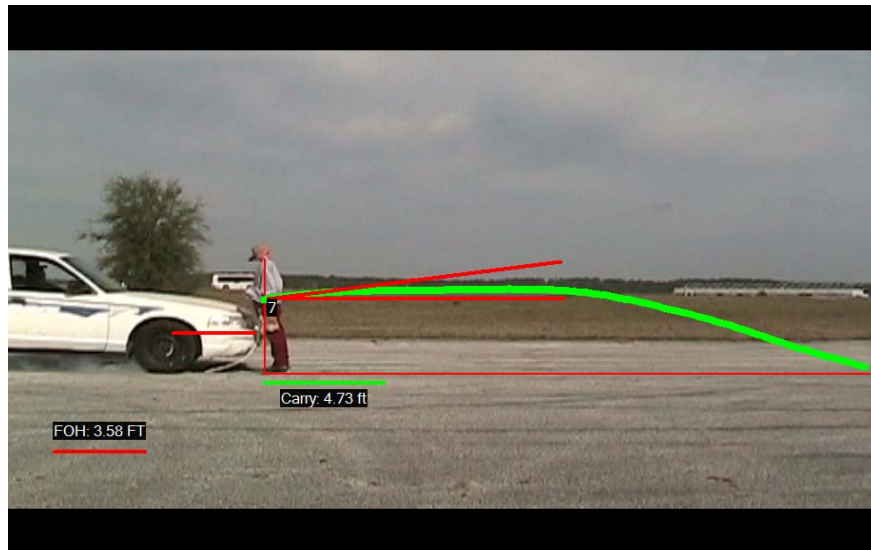


# Pedestrian/Bicycle Crash Analysis



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Test 1



## **Pedestrian Speed Analysis:**

|                             |           |
|-----------------------------|-----------|
| Searle (10 Degree) Takeoff: | 23.25 mph |
| Searle (20 Degree) Takeoff: | 21.93 mph |
| Searle Minimum Formula:     | 21.33 mph |
| Searle Maximum Formula:     | 25.56 mph |

## **Vehicle Speed Analysis:**

|                                   |           |
|-----------------------------------|-----------|
| Speed - Start of Braking (Skid):  | 32.90 mph |
| Speed - Impact (Skid):            | 27.56 mph |
| Speed - Start of Braking (Radar): | N/A mph   |
| Speed - Impact (Radar):           | N/A mph   |
| Speed - Impact (Vericom):         | N/A mph   |
| Speed - Impact (Video):           | 28.61 mph |

## **Other Calculations:**

|                                   |            |
|-----------------------------------|------------|
| Speed (With Adjusted Data):       | 22.05 mph  |
| Throw Minus Carry Distance(ft):   | 28.27 feet |
| Location of First Evidence (ft.): | 16.0 feet  |
| % of Speed Attained (Ped):        | 77%        |
| Difference (C/M vs. Hood H (in.): | 6 inches   |
| Takeoff From Video (Degrees):     | 7 Degrees  |
| Carry Distance (ft.):             | 4.73 feet  |

*(Percentage is determined by dividing Searle Minimum result by Speed Impact Skid)*

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Test 2



### **Pedestrian Speed Analysis:**

|                             |           |
|-----------------------------|-----------|
| Searle (10 Degree) Takeoff: | 43.87 mph |
| Searle (20 Degree) Takeoff: | 41.39 mph |
| Searle Minimum Formula:     | 40.26 mph |
| Searle Maximum Formula:     | 48.23 mph |

### **Vehicle Speed Analysis:**

|                                   |           |
|-----------------------------------|-----------|
| Speed - Start of Braking (Skid):  | 35.30 mph |
| Speed - Impact (Skid):            | N/A mph   |
| Speed - Start of Braking (Radar): | N/A mph   |
| Speed - Impact (Driver):          | 45.00 mph |
| Speed - Impact (Vericom):         | N/A mph   |
| Speed - Impact (Video):           | 39.81 mph |

### **Other Calculations:**

|                                   |             |
|-----------------------------------|-------------|
| Speed (With Adjusted Data):       | 44.74 mph   |
| Throw Minus Carry Distance(ft):   | 107.89 feet |
| Location of First Evidence (ft.): | 22.8 feet   |
| % of Speed Attained (Ped):        | 89%         |
| Difference (C/M vs. Hood H (in.): | 6 inches    |
| Takeoff From Video (Degrees):     | 3 Degrees   |
| Carry Distance (ft.):             | 9.61 feet   |

*(Percentage is determined by dividing Searle Minimum result by Speed Impact Driver)*

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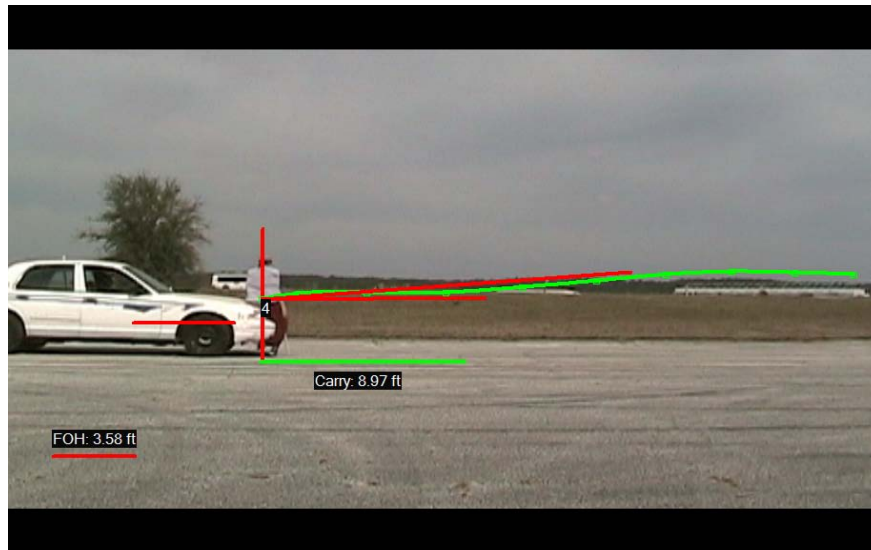


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Test 3



### **Pedestrian Speed Analysis:**

|                             |           |
|-----------------------------|-----------|
| Searle (10 Degree) Takeoff: | 36.47 mph |
| Searle (20 Degree) Takeoff: | 34.41 mph |
| Searle Minimum Formula:     | 33.47 mph |
| Searle Maximum Formula:     | 40.10 mph |

### **Vehicle Speed Analysis:**

|                                   |           |
|-----------------------------------|-----------|
| Speed - Start of Braking (Skid):  | N/A mph   |
| Speed - Impact (Skid):            | N/A mph   |
| Speed - Start of Braking (Radar): | N/A mph   |
| Speed - Impact (Driver):          | 35.00 mph |
| Speed - Impact (Vericom):         | N/A mph   |
| Speed - Impact (Video):           | 30.15 mph |

### **Other Calculations:**

|                                   |            |
|-----------------------------------|------------|
| Speed (With Adjusted Data):       | 36.24 mph  |
| Throw Minus Carry Distance(ft):   | 72.23 feet |
| Location of First Evidence (ft.): | 25.0 feet  |
| % of Speed Attained (Ped):        | 96%        |
| Difference (C/M vs. Hood H (in.): | 6 inches   |
| Takeoff From Video (Degrees):     | 4 Degrees  |
| Carry Distance (ft.):             | 8.97 feet  |

*(Percentage is determined by dividing Searle Minimum result by Speed Impact Driver)*

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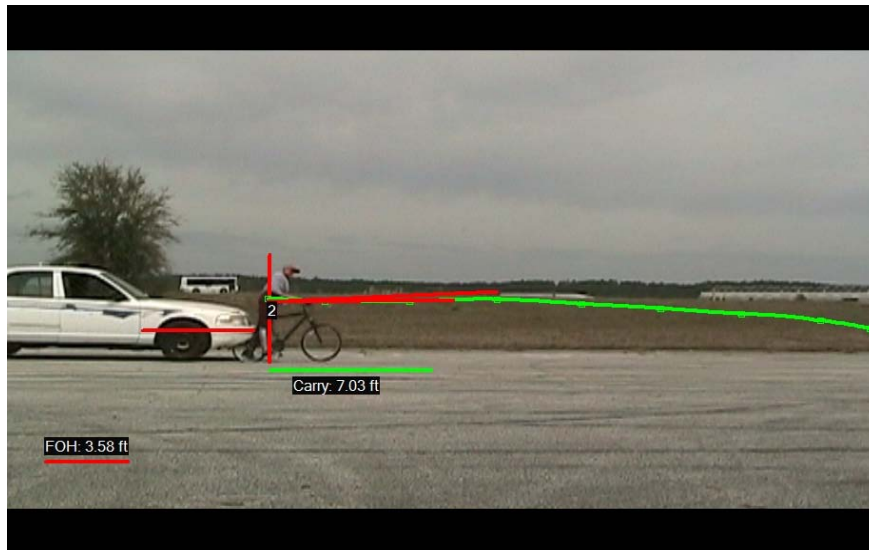


## Pedestrian/Bicycle Crash Analysis



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Test 4



### **Pedestrian Speed Analysis:**

|                             |           |
|-----------------------------|-----------|
| Searle (10 Degree) Takeoff: | 33.55 mph |
| Searle (20 Degree) Takeoff: | 31.65 mph |
| Searle Minimum Formula:     | 30.78 mph |
| Searle Maximum Formula:     | 36.88 mph |

### **Vehicle Speed Analysis:**

|                                   |           |
|-----------------------------------|-----------|
| Speed - Start of Braking (Skid):  | 34.25 mph |
| Speed - Impact (Skid):            | N/A mph   |
| Speed - Start of Braking (Radar): | N/A mph   |
| Speed - Impact (Radar):           | N/A mph   |
| Speed - Impact (Vericom):         | 36.58 mph |
| Speed - Impact (Video):           | 32.75 mph |

### **Other Calculations:**

|                                   |            |
|-----------------------------------|------------|
| Speed (With Adjusted Data):       | 34.18 mph  |
| Throw Minus Carry Distance(ft):   | 61.67 feet |
| Location of First Evidence (ft.): | 0.0 feet   |
| % of Speed Attained (Ped):        | 84%        |
| Difference (C/M vs. Hood H (in.): | 7 inches   |
| Takeoff From Video (Degrees):     | 2 Degrees  |
| Carry Distance (ft.):             | 7.03 feet  |

*(Percentage is determined by dividing Searle Minimum result by Speed Impact Vericom)*

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## Pedestrian/Bicycle Crash Analysis



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Test 5



### **Pedestrian Speed Analysis:**

|                             |           |
|-----------------------------|-----------|
| Searle (10 Degree) Takeoff: | 35.05 mph |
| Searle (20 Degree) Takeoff: | 33.07 mph |
| Searle Minimum Formula:     | 32.16 mph |
| Searle Maximum Formula:     | 38.54 mph |

### **Vehicle Speed Analysis:**

|                                   |           |
|-----------------------------------|-----------|
| Speed - Start of Braking (Skid):  | N/A mph   |
| Speed - Impact (Skid):            | N/A mph   |
| Speed - Start of Braking (Radar): | N/A mph   |
| Speed - Impact (Driver):          | 40.00 mph |
| Speed - Impact (Vericom):         | N/A mph   |
| Speed - Impact (Video):           | 37.52 mph |

### **Other Calculations:**

|                                   |            |
|-----------------------------------|------------|
| Speed (With Adjusted Data):       | 35.20 mph  |
| Throw Minus Carry Distance(ft):   | 65.43 feet |
| Location of First Evidence (ft.): | -4.1 feet  |
| % of Speed Attained (Ped):        | 80%        |
| Difference (C/M vs. Hood H (in.): | 9 inches   |
| Takeoff From Video (Degrees):     | 2 Degrees  |
| Carry Distance (ft.):             | 9.57 feet  |

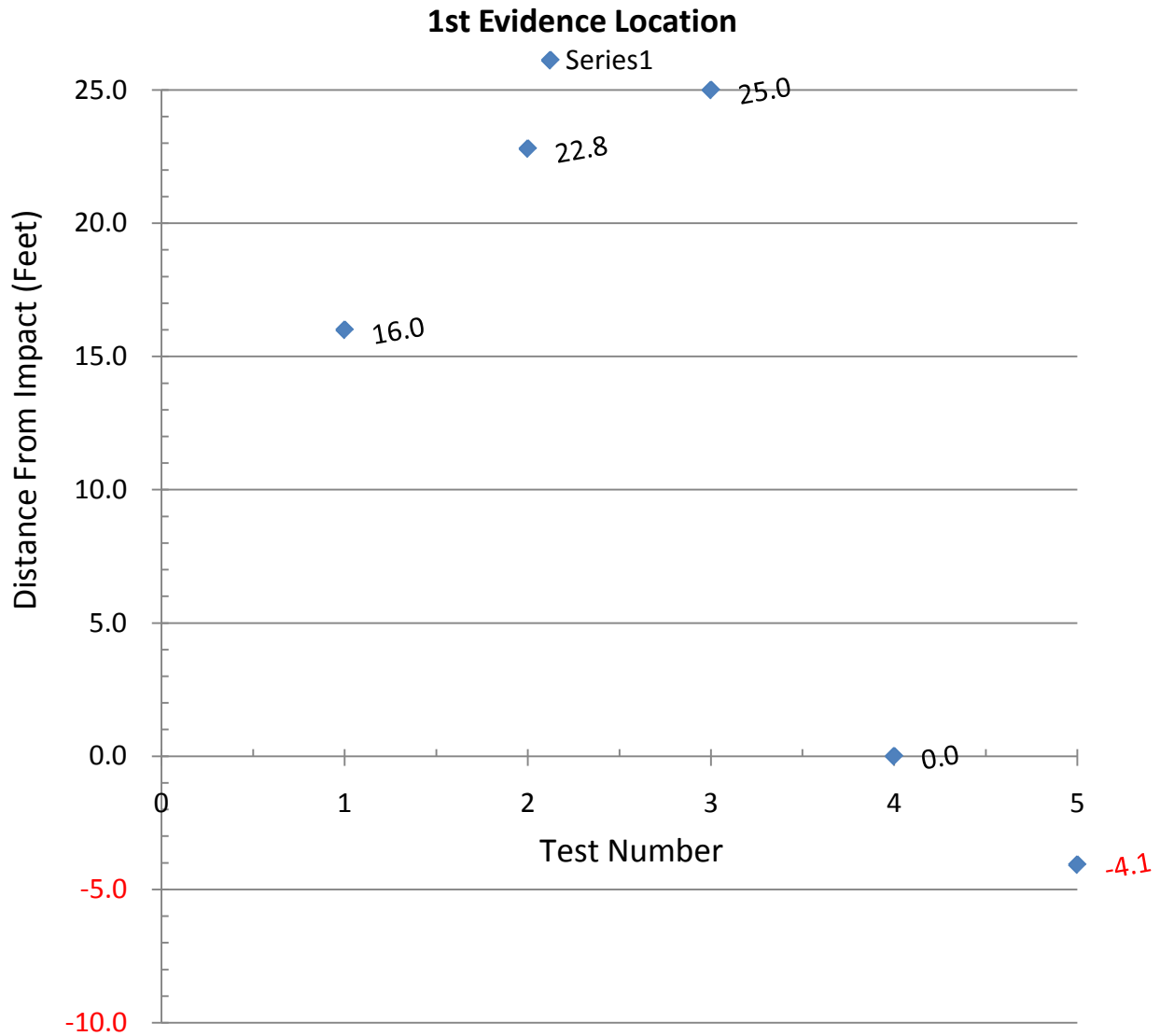
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The above graph represents the location of the "1st" Evidence after impact. The longitudinal distance was measured from the impact location either forward or backward. In cases where the 1st Evidence lands before impact, the value is shown as a "RED" negative number.

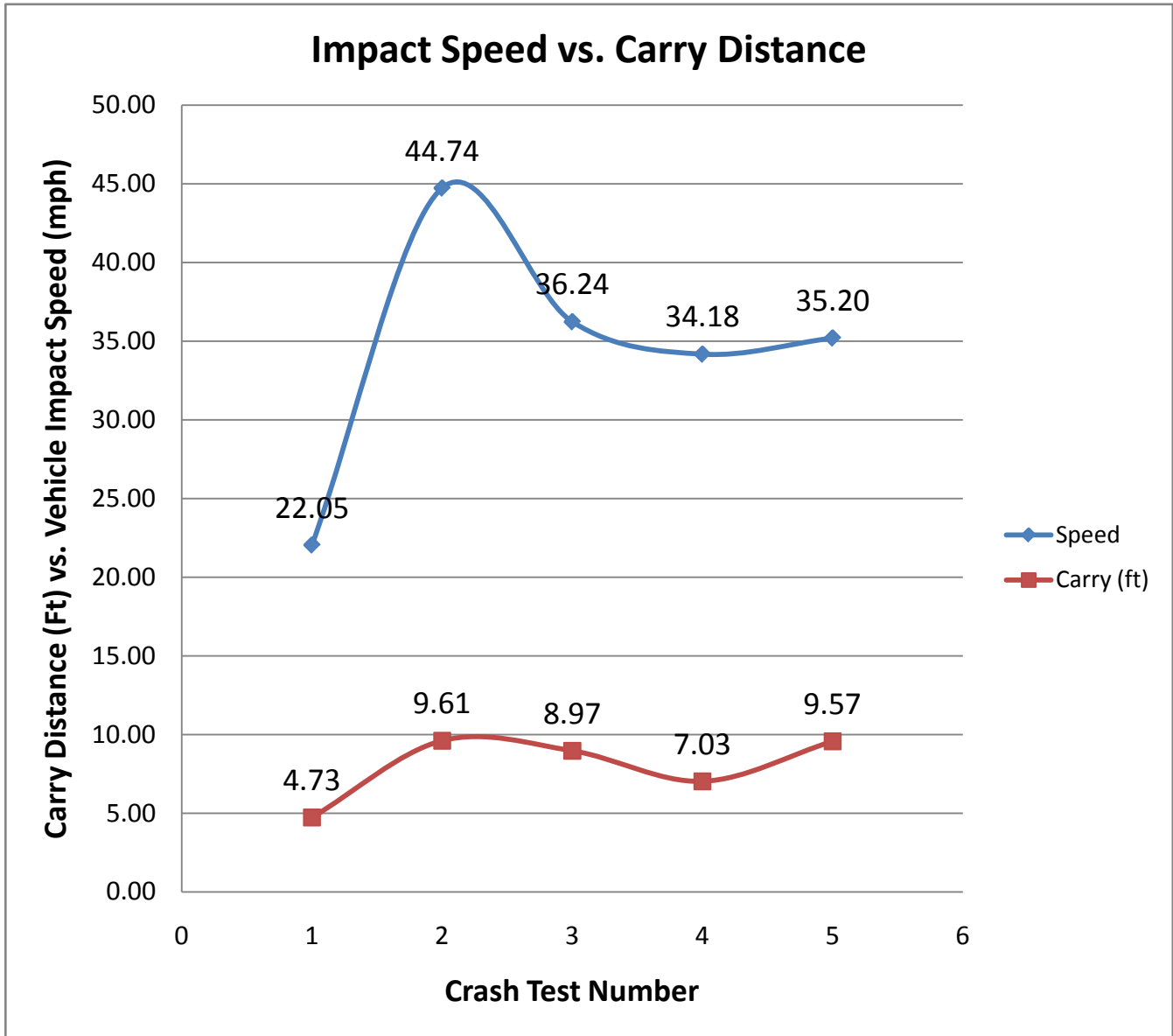
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| Data    | Speed | Carry (ft) |
|---------|-------|------------|
| Test 1: | 22.05 | 4.73       |
| Test 2: | 44.74 | 9.61       |
| Test 3: | 36.24 | 8.97       |
| Test 4: | 34.18 | 7.03       |
| Test 5: | 35.20 | 9.57       |

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