## Corollary Statistical Hypothesis Testing Applied to US 50 Accident Data
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**Abstract**

This paper calculates the probability that a random accident occurring along the US 50 Tahoe East Shore Corridor between Stateline and SR28 would be caused by factors other than speed in excess of the posted limit using standard statistical hypothesis testing methodology. Our analysis is based on the same sample of traffic accident data taken between 2016 and 2020 described in the referenced paper.  We conclude that the data support an assertion that approximately 92% of accidents would result from such other factors; including wet, snow, ice and slush road conditions; impaired drivers; reckless behavior; limited viewing distance, and issues at intersections other than excessive speed.  Based on this analysis, we would assert that the vast majority of accidents that may occur along the East Shore Corridor will not be prevented by the so-called "road diet" measures proposed by the NDOT CMP study team.

**Statement of the Problem**

In order to determine the probability that a random accident would be caused by factors other than "speed in excess of the posted limit," we must formulate the problem in such a way that it can be analyzed rigorously using statistical hypothesis testing techniques and applied to the reported accident data.  This has already been done by Byren and Morrow[1] regarding the CMP assertion, and the same methodology is applied here. The accident reports, from which the accident data in Table 1 were taken[2], show two categories.  The first category, labeled "Unambiguous Speeding," includes only those reported accidents where the root cause of the accident was speed in excess of the posted limit.  The second category, labeled "Possible Speeding," also includes the unambiguous speeding accidents but adds those accidents labeled "Too Fast for Road Conditions" but where those conditions could not be correlated with " Wet, Ice, Snow, or Slush" conditions, based on the way these accidents were reported.   A third category, labeled "Other Factors," is the difference between the total number of accidents and those attributable to "Possible Speeding."  For the purpose of this analysis, we have included accidents within the total to be analyzed that occurred at intersections.

The reader is directed to the earlier paper[1] for a thorough description of the statistical hypothesis testing methodology used herein.

**Table 1.  Summary of US 50 Accident Data from SR28 to Stateline**

| US 50 Road Segment | Description of Segment | Total Accidents | Unambiguous Speeding Accidents | Posted Speed Limit | Too Fast for Road Conditions | Wet, Ice, Snow or Slush | Possible Speeding Accidents | Other Than Possible Speeding |
|---|---|---|---|---|---|---|---|---|
| Total Corridor | SR28 to Stateline | 534 | 17 |  | 127 | 101 | 33 | 501 |
| Segment 1 | SR28 to Glenbrook | 44 | 1 | 50 | 20 | 18 | 3 | 41 |
| Segment 2 | Glenbrook to Friedhoff Rd | 57 | 0 | 45 | 19 | 14 | 5 | 52 |
| Segment 3 | Cave Rock to Skyland | 92 | 4 | 45 | 28 | 27 | 5 | 87 |
| Segment 4 | Skyland to Round Hill Pines | 116 | 7 | 45 | 25 | 24 | 8 | 108 |
| Segment 5 | Round Hill Pines to Kingsbury Grade | 49 | 4 | 35-45 | 11 | 9 | 6 | 43 |
| Segment 6 | Kingsbury Grade to Stateline | 57 | 1 | 25-35 | 7 | 2 | 6 | 51 |
| Intersections (removed from Total Corridor) | Total of Intersections SR 20 to Stateline | 119 | 0 |  | 17 | 7 | 0 | 119 |

| Notes: | 1.  All traffic accident data taken from accident reports between 2016 1ne 2020. |
|---|---|
|  | 2.  Total Corridor row is the total for reported accidents across all six segments of the corridor, including accidents that occurred in intersections. |
|  | 3.  "Unambiguous Speeding" includes only those accidents where speed in excess of the posted limit is the root cause, and the road surface was reported to be dry. |
|  | 4.  "Possible Speeding" includes accidents reported as speed in excess of the posted limit PLUS accidents reported as speed too fast for road conditions MINUS those accidents where wet, ice, snow or slush was also reported. |

## Conclusion

Given a sample size of 534 accidents across the entire US 50 corridor between SR28 and Stateline, we can assert that 91.77% of these accidents are attributable to factors other than speed in excess of the posted limit with a 95% confidence level.

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## References

1.  R. Byren and S. Morrow, "Statistical Hypothesis Testing Applied to US 50 Accident Data," TESA website, 2023

2.  S. Morrow, Nevada Department of Transportation. NDOT Crash Data 2016-2020. https://ndot.maps.arcgis.com/apps/webappviewer/index.html?id=00d23dc547eb4382bef9beabe07eaefd. Accessed June, 2023.

## Author Biography

**Robert Byren:**  Mr. Byren is a retired electrical engineer with over 40 years professional experience in military lasers, laser radar, beam control, adaptive optics, thermal imaging, and optical metamaterials.  Prior to retirement, he served as Chief Technologist for Raytheon's Space and Airborne Systems business unit with responsibility for the senior technical staff, intellectual property, innovation, and university relations.  Post retirement, he lead a small consulting firm in the field of high energy laser systems.  Mr. Byren holds 43 US Patents and has

co-authored 55 books and technical papers.  He received his MSEE degree from Stanford University in 1975 and his BSEE degree from Lehigh University in 1974**.**

**Sydney Morrow:**  Sydney Morrow is a full-time resident of the East Shore. She received her Ph.D. from the University of Texas Graduate School of Biomedical Sciences in 1986. Following a long career with the Department of Veterans Affairs, she and her husband relocated to Lake Tahoe in 2015.Sydney has been actively involved with wildfire prevention and serves as the FireWise coordinator for Glenbrook.