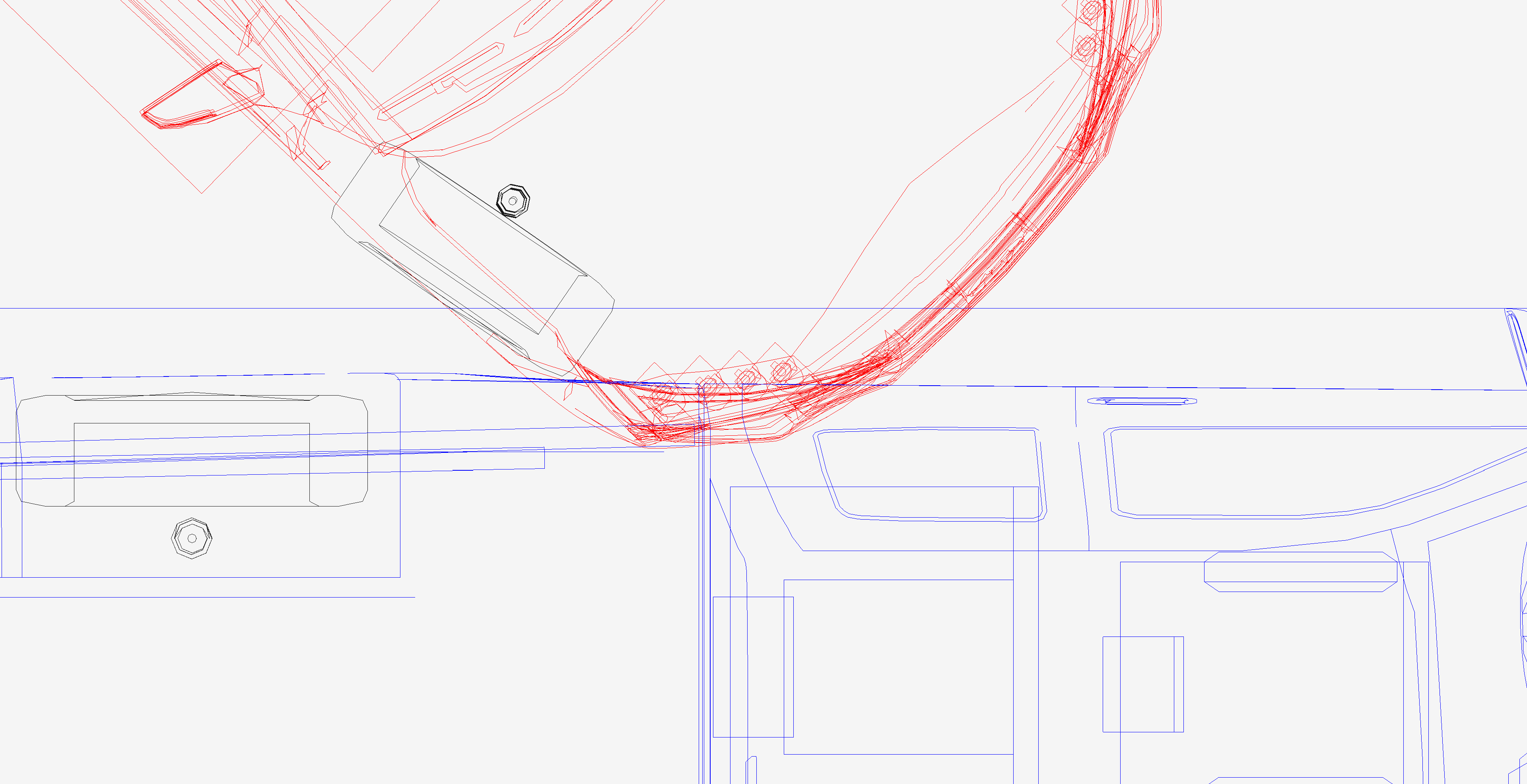
Mr. Suber estimated his speed between 25-30 mph and there are no statements from Mr. Rine regarding his speed although the police report estimated both vehicle speeds as 30 mph at impact. Deformation to the Chevrolet appears to be approximately 1-2 inches while the photos and damage estimate to the Hyundai indicate 4+ inches of deformation. A widely used crash simulation program[[1]](#footnote-1) is capable of modeling deformation and depth of penetration or maximum engagement during a collision. By overlapping the damage between scale models of the Hyundai and the Chevrolet as observed in the photos, I can model the subject crash to determine a closing speed estimate, which will in turn, estimate an approximate speed change or delta V imparted to the Chevrolet in the crash by using a momentum, energy and restitution (MER) analysis, and then matching these results to the physical and other evidence.

An impact speed of 25 mph by both vehicles would have resulted in a delta V in the Chevrolet of approximately 5.5 mph, with a peak vehicle acceleration for the impact of approximately 4.0 g. Deformation (overlap or depth of penetration) between the Hyundai and the Chevrolet is shown below and is fairly consistent with what is observed in the photos. Delta V to the Hyundai is approximately 8.4 mph which is consistent with an airbag non-deployment.



**Simulated 25 mph depth of penetration (overlap or maximum engagement) fairly consistent with photos and damage estimates. Chevrolet is the vehicle on the bottom in blue.**

Mr. Suber’s body, because of rotational acceleration, would have experienced a delta V of 6.2 mph with a peak acceleration of 4.2 g.

The Hyundai likely had to travel around 57 feet to the area of impact. If the Hyundai was stopped, as Mr. Rine has claimed, then it would have needed to accelerate at almost 12 fps2 which is very high (rapid acceleration is considered 10 fps2). An internet search[[2]](#footnote-2) indicates a new Hyundai Elantra accelerates 0-60 mph in 9.0 seconds which is an average of just under 10 fps2. Cars generally accelerate at a higher rate during the first couple of seconds so it is possible the Hyundai would have stopped but Mr. Rine would have probably needed to “floor” the accelerator to reach the impact speed of 25 mph. Any higher impact speed (such as 30 mph as opined by Dr. Potma and Mr. Bradshaw) then it is likely Mr. Rine did not stop before entering SW 2nd Ave.

Dr. Potma relied on a reconstruction by Jeff Bradshaw. Mr. Bradshaw came to his conclusion using a crush analysis but none of his work was provided. Both Mr. Bradshaw and Dr. Potma incorrectly identify the collision as a sideswipe. Sideswipes are defined as “a collision of two vehicles in which the sides of both vehicles sustain minimal engagements”[[3]](#footnote-3) and are typically impacts of less than 15 degrees relative to each vehicle and where surfaces do not necessarily reach a common velocity during the engagement[[4]](#footnote-4) and no significant transfer of energy is completed. Damage to the Hyundai indicates the impact Principal Direction of Force (PDOF) is around 45 degrees and there is significant energy transfer. There is evidence of sustained contact, that is also indicated in the simulation, but this does not indicate a sideswipe as Mr. Bradshaw has opined. It does not appear that Dr. Potma considered rotational forces in her analysis.

1. Virtual Crash 5, vCrash America Inc. [↑](#footnote-ref-1)
2. https://www.motortrend.com/reviews/2017-hyundai-elantra-first-test-review/ [↑](#footnote-ref-2)
3. SAE 89-0634, “The Vocabulary of Accident Reconstruction”, Sens, Guenther, et.al., 1989 [↑](#footnote-ref-3)
4. SAE 99-0094, “Practical Analysis Technique for Quantifying Sideswipe Collisions”, Toor, et al., 1999 [↑](#footnote-ref-4)